Ecologically Sustainable Development Report

for

Black Hill

Prepared for

Coal & Allied Industries Limited

EnSight
Integrated Energy Services Corporation Pty Ltd
ABN 56 106 199 991
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TABLE OF CONTENTS

PART 1 - ESD REPORT

PART 2 - ENERGY SAVINGS ACTION PLAN

PART 3 - WATER SAVINGS ACTION PLAN

PART 4 - VEHICLE MANAGEMENT PLAN

1. EXECUTIVE SUMMARY

This report demonstrates that Coal & Allied Industries Limited (Coal & Allied) the current owner of the proposed Black Hill Employment Lands project and its existing sustainable development policies are aligned to the successful implementation of ESD design, construction and operation principles of a sustainable employment land development.

Coal & Allied is proposing to develop 183 hectares for Employment Lands at Black Hill into 22 super-lots. This report addresses and demonstrates to the Director General's Environmental Assessment Requirements (DGEAR) related to the proponent's commitment to sustainability and ESD principles in the design, construction and operation phases of the project and the project's capability in achieving the requirements.

Parts 2, 3 and 4 of this report also demonstrate that the project satisfies the principles of ESD and compliance with the intention of water reuse, waste minimisation, minimisation of energy use and a Vehicle Management Plan (VMP). The report further demonstrates how the proposed development can reduce greenhouse gas emissions (GHG) and water use to best practice levels meeting the NSW government's best practice requirements.

The DGEAR specifically requests that the developer responds to the following:

> ***Sustainability*** *- The EA should outline commitments to sustainability including water reuse, waste minimisation, the minimisation of energy use and car dependency etc.*
>
> ***Ecological Sustainable Development*** *- The EA should demonstrate that all aspects of the concept plan satisfy principles of ESD principles including compliance with NSW DEUS Energy and Water Savings Action Framework.*

This report demonstrates how the ESD design for the proposed Black Hill employment lands project has addressed the sustainable development principles of the project owner. The report also demonstrates that the proposed mechanism to achieve ESD outcomes for the project is for the construction and operation of the Black Hill employment land development to comply with an Environmental Management System (EMS).

Coal & Allied is committed to the implementation of ESD design principles in the proposed Black Hill employment lands project. This is demonstrated by the enclosed project ESD strategy with indicators and targets. The developer has also appointed a specialist ESD consultant to oversee the integration of sustainability into the project. All consultants in the design team have participated in individual briefings with the ESD consultant and as a group participated in a daylong project sustainable development workshop. All consultants are reporting to the project ESD strategy as part of their contractual obligations.

The ESD approach adopted for the project is set out in Part 1 of this report and follows industry and nationally accepted ESD development processes. The DGEAR requests the EA to demonstrate the sustainability of water reuse, waste minimisation, the minimisation of energy use and car dependency. The Coal and Allied Limited's commitment is demonstrated by the Energy and Water Savings Action Plan and a Vehicle Management Plan (VMP) set out in this report. These plans are presented in Parts 2, 3 and 4 of this report respectively. These parts of the report demonstrate how the project will comply with the NSW DEUS Energy and Water Savings Action Plan framework and also provides a strategy to reduce car dependency for the proposed development. The proponent is also committing that all future industrial development at this site will meet best practice sustainable design in accordance with the current legislation and rating tools at the time of a development application.

The Energy and Water Savings Action Plans (SAP) prepared for the Black Hill site address both energy and water savings from an building occupier perspective, not from a developer's perspective. Undertaking the cost-effectiveness analysis from a building occupier perspective ensures all viable energy and water saving measures are identified and included in the SAP. The analysis has not been undertaken from a developer perspective as this would result in all proposed energy and water saving measures been excluded, on the basis that they are not cost-effective. The SAP decision rule requires all cost effective energy and water saving measures to be included, and to exclude energy and water saving measures that are not cost-effective. This approach is called best practice financially viable. This results in the developer fulfilling the role of a sustainability facilitator, through the provision of

design guidelines. Refer to part 1 of this report for a description of how the design guidelines will be implemented.

This report provides two viable energy and water saving approaches. These approaches align with Coal & Allied sustainability goals; statutory compliance, and Best Practice providing compliance with DGEAR sustainability requirements. Energy use at the Industrial development will be lower than business as usual by 40% and water use by 30%. Achieving these target results in each of the 22 super-lot purchasers complying with the intent of the NSW DEUS Energy and Water Savings Action Plan framework.

A beyond best practice energy and water SAP approach demonstrates how greenhouse gas emissions and potable water use is reduced by 53% and 67% respectively. The quantifiable outcomes of both approaches are set out below.

DEUS Energy Savings Action Plan framework – Best Practice

The Energy Savings Action Plan approach achieves annual greenhouse gas emission (GHG) and energy use savings of an estimated 40% per annum. The total GHG saving over the site is estimated at 37,667 tonnes per annum. Sustainable energy reduction measures include:

1. Extensive use of sky lighting with lighting controls for daylight harvesting,
2. High performance fluorescent lighting incorporating energy saving controls and design; This includes occupancy, timer, and daylight controls and zoning for lighting circuits,
3. Motors with variable speed drives for all motor applications; this includes pumping, compressed air and other motor drive systems,
4. 3-phase motors where feasible,
5. Use of efficient heat exchangers and heat pump systems for process heat applications,
6. Computer control, variable frequency drives and efficient compressors for large refrigeration applications,
7. Heat pump packaged systems for low sensible load spaces,
8. Variable speed supply fans and inverter compressors for air conditioning systems,

9. Well zoned air HVAC design,
10. Gas boosted solar water heaters where hot water is required,
11. Passive solar building design,
12. Energy star rated office appliances
13. Any cooking facilities to use gas appliances

DEUS Water Savings Action Plan framework – Best Practice

The Compliance approach to water use reduction achieves an estimated annual water savings of 5,404 kilolitres per lot per day. The total water savings over the estate is estimated at 118,910 kilolitres per annum. Water saving measures include; water efficient taps and fittings and water efficient landscaping. Incorporating these measures is predicted to reduce water use by 30%. Sustainable water reduction measures include:

1. Water efficient shower roses, minimum 3 star WELS rating
2. Water efficient taps, minimum 6 star WELS rating
3. Water efficient toilets, minimum 4 star WELS rating
4. Water efficient landscaping, designed for the Black Hill climate

DEUS Energy Savings Action Plan framework - Beyond Best Practice

This approach to energy use reduction also achieves a total annual greenhouse gas emission (GHG) saving of an estimated 2,305 tonnes per super lot. The total GHG saving over the estate is estimated at 50,718 tonnes per annum. The proposed energy saving measure is photovoltaic grid interactive arrays to cover 10% of all roof spaces equating to 80,000m2 of array area producing 11.7GWh of electricity per annum. Incorporating this measure, it is predicted to reduce greenhouse gas emissions by more than 50%.

DEUS Water Savings Action Plan framework - Beyond Best Practice

This approach to rainwater reuse with 1,000 kilolitres of storage per super-lot results in a reduction of potable water use per super lot of by 20%. The Beyond Financially Viable daily potable water demand is estimated at 544.6 kilolitres. This system was modelled with the consultant's water modelling software, comparable

to the DEUS Water Savings Action Plan Framework established for buildings. The model shows a total reduction in potable water use of 50%.

Vehicle Management Plan – Best Practice

A Vehicle Management Plan (VMP) to achieve best practice has been set out for the Black Hill Employment Lands development in order to minimise private vehicle usage. The proponent of the Black Hill Employment Lands development will minimise car dependency with the following measures;

1. Provide accessible pedestrian ways to connect to public domains
2. Provide accessible convenience shopping, cafes and other support facilities within the overall development area to reduce vehicle-kilometres (vkms) from necessary supplies.
3. Provide an integrated bikeway network to existing regional public infrastructure.
4. Support the use of an electric or hybrid community bus to link to existing regional public infrastructure.
5. Provide each building with access to a high-speed internet thereby reducing the need for professionals living in the area to travel to Newcastle and Sydney.

This plan should be incorporated into the developer's project and operational plans to ensure effective implementation and monitoring. A review of this project should be conducted in line with the developer's EMS requirements as set out in the ESD section of this report. The VMP aims to reduce greenhouse gas emissions and the use of motor vehicles in the Black Hill Employment Lands development. A direct environmental indicator of greenhouse transport is the estimated vehicle kilometres of businesses operating in the development. The VMP includes initiatives for Black Hill that could reduce total vehicle trips in the region.

2. PROJECT & PLANNING CONTEXT

It is proposed that the entire Coal & Allied owned Black Hill and Tank Paddock sites be rezoned / listed as a 'State Significant Site' (SSS) in Schedule 3 of State Environmental Planning Policy (Major Development). A draft Schedule 3 listing will be prepared with the Concept Plan Application.

The Concept Plan will apply to the entire 183ha Black Hill and the 147ha Tank Paddock sites. The key parameters for the proposed development of the sites are as follows:

- Dedication of 147ha of conservation land to the New South Wales Government (NSWG) that is identified in the Lower Hunter Regional Strategy and Lower Hunter Regional Conservation Plan, comprising 100% of the Tank Paddock site.
- Use of the 183ha Black Hill site as 'employment lands' for a range of employment generating activities.
- Indicative development staging. The number of lots and extent of staging for release areas will be largely dictated by the service infrastructure requirements as well as responding to market forces.
- The provision of associated infrastructure.

Approval will not be sought under the Concept Plan for a specific lot or road layout. An indicative super- lot layout will be prepared, which will indicate how subdivision could be achieved that will enable a range of industrial and ancillary activities to be undertaken.

An existing mining consent under the Black Hill site will defer development on the site until post June 2013. Accordingly, a detailed built form layout has not been prepared at this stage. Approval is not sought under the Concept Plan for subdivision or for individual buildings on the site. Urban Design Guidelines will be prepared to inform the Concept Plan in respect of urban form, built form, open space and landscape, access and movement and visual impact for the site.

It is proposed to dedicate land for conservation purposes as part of the Major Project Application via a Voluntary Planning Agreement (VPA) between Coal & Allied and the NSWG in accordance with s.93F of the Environmental Planning & Assessment Act, 1979 (EP&A Act).

The proposed Concept Plan and a Plan showing the proposed development areas and conservation areas is included in the Environmental Assessment (EA) prepared by Urbis.

The requirement for Sustainability and ESD are as detailed below:

> ***Sustainability*** *- The EA should outline commitments to sustainability including water reuse, waste minimisation, the minimisation of energy use and car dependency etc.*
> ***Ecological Sustainable Development*** *- The EA should demonstrate that all aspects of the concept plan satisfy principles of ESD principles including compliance with NSW DEUS Energy and Water Savings Action Plan Framework.*

About the consultants

EnSight is an Australian award winning sustainable design consultancy, completing award winning projects in environmentally sensitive, remote and island communities. These include Bingara Gorge land development by Bovis Lend Lease, Kelvin Grove Urban Village, Couran Cove Island Resort, to name a few. Established since 1996 and working on leading sustainable projects such as Australia's first 4.5 star ABGR building, the William Buck Building, Australia's first 5 star ABGR building, William McCormack Place, Orion Town Centre and Kelvin Grove Urban Village.

EnSight brings to the Black Hill project a range of innovative and practical sustainable energy, water and development experience.

In addition EnSight has worked with the Queensland EPA Sustainable Industries Division to review policy initiatives and evaluation of programs. "IES (EnSight) have been used as advisors by the EPA's Sustainable Industries Divisions because they bring the complete suite of competencies from a strong understanding of public policy and process to energy engineering and financial packaging." Dr John Cole, Executive Director Queensland Environmental Protection Agency.

PART 1

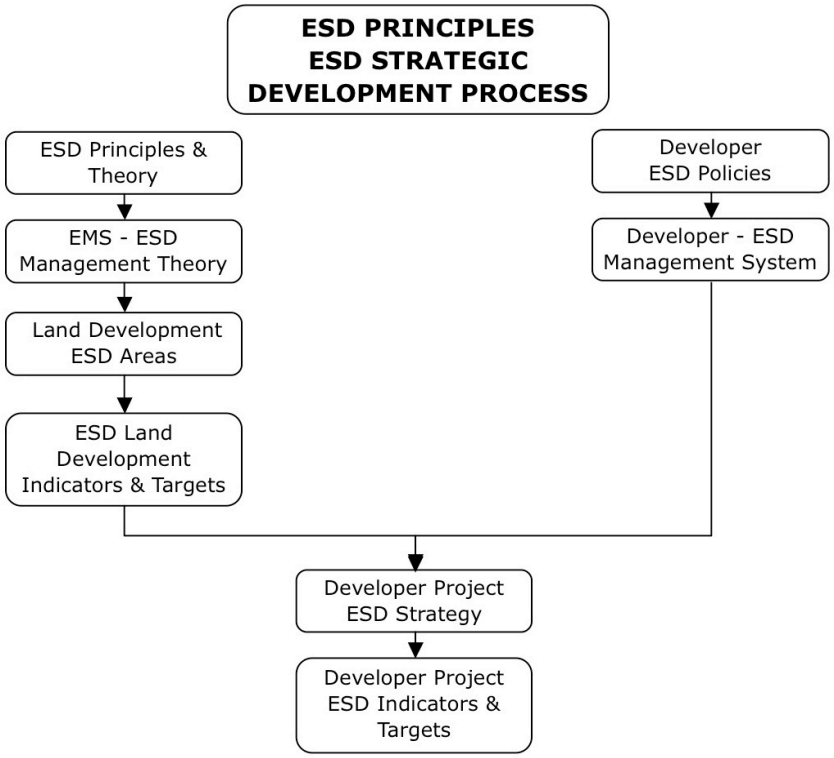
ESD REPORT

1. ESD PRINCIPLES

1.1 INTRODUCTION

ESD principles are based on sustainability theories that have been developed over the many years since the publication of “The Limits to Growth” (Meadows et al) in 1972. Edwards, in ‘the Sustainability Revolution’ (2005) suggests that sustainability seeks a context in which legitimate interests can be satisfied: environmental, economic and social. This premise suggests that an ESD focused company will embed ESD principles into their corporate strategies. This section of the report aims to overview foundational ESD theory and summarise the ESD principles and how these principles are implemented. Then it is outlined how ESD principles apply to land development and are qualified through relevant indicators and targets. This will be followed by a summary of the ESD policies and practices to be implemented for the proposed land development.

The process in which ESD principles, translated into an ESD strategy, are overlayed by corporate policies and developed into an integrated and congruent ESD Project Strategy, is shown in the table below.



1.2 ESD PRINCIPLES AND THEORY

Australia's national strategy for Ecologically Sustainable Development (ESD), endorsed by all Australian jurisdictions in 1992, defines the goal of 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."* (Brundtland, 1992)

It includes three key objectives:

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

What are ESD principles? Principles are defined as "a fundamental, primary, or general law or truth from which others are derived"[i]. Thus ESD principles are those principles that are fundamental to the achievement of ESD outcomes. To achieve ESD outcomes consistent with the objectives stated above requires the integration of short and long-term economic, social and environmental effects in all decision-making. Thus, to be consistent with ESD principles, "resources not only need to be used sustainably, but how they are used, who benefits and when, along with the impacts of their use, all need to be evaluated" (Fletcher, 2002).

The National Strategy for Ecologically Sustainable Development (1992) adopted widely accepted principles underpinning the consideration of economic, social and environmental effects are:

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

b) Inter-generational equity - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

c) Conservation of biological diversity and ecological integrity – namely, that a full and diverse range of plant and animal species should be maintained.

d) Improved valuation, pricing and incentive mechanisms – these mechanisms would enable environmental factors to be included in the valuation of assets and services

The four principles are interrelated. For instance, inter-generational equity can only be achieved in instances where biodiversity is conserved for the use and enrichment of future generations. The linkage of the four principles means that they must be considered both individually and collectively when assessing whether a proposed project would contribute to ESD in Australia. Sustainability now has a broader meaning with a strong focus on the integration of environmental, social and economic goals through societal and economic development activity. This has been expressed in Australian legislation as;

"Decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations."

Government and corporate decision-making processes promote adopting ESD principles by considering the effects of;

a) economic,

b) environmental,

c) social and equitable impacts.

These three areas of considerations underpin the ESD decision-making framework used for this project. The system to be established to monitor, manage and report on the implementation of measures to achieve ESD outcomes will be discussed in the next section.

1.3 EMS - ESD IMPLEMENTATION

Successful implementation of ESD principles, which aims to minimise the project's impact and maximise the benefits of the social, economic and environmental

resources, requires accurate reporting and monitoring of relevant indicators to determine the projects' intended and actual progress.

One internationally accepted management system for reporting of a business' environmental performance is the Environmental Management System (EMS) Standard ISO14001. It is widely recognised as an effective framework for the monitoring and reporting of environmental management. Whilst many organizations are aligning their environmental management systems with ISO14001, not all seek to have their systems certified due to its rigorous nature. Certification does provide external stakeholders with a high level of assurance that an organization's EMS is robust, verifiable and functional.

The core of an EMS is the development of indicators that assist an organization in providing information on how it manages any environmental impacts on its operations, products and services. These EMS indicators demonstrate the organization's capacity to monitor and control material environmental risks, and to capitalise on market opportunities arising through effective environmental management. It is proposed in this project, and accepted internationally (Global Reporting Initiative www.globalreporting.org), that an EMS can also report on social and economic impacts. It is proposed that this project will use the EMS to report on the project's compliance to the ESD strategy, indicators and targets.

Furthermore, the EMS indicators provide information on how an organization can identify and assess initiatives and opportunities it has to enhance its environmental performance and demonstrate its commitment to continual improvement. An organization's willingness to report progress in relation to objectives and targets illustrates an ongoing commitment to such continual improvement. It also demonstrates accountability for environmental performance and a commitment to managing environmental risks and meeting legal and other obligations.

EMS indicators are particularly valuable as they are forward-looking or 'lead' indicators that can provide a basis for future performance forecasts. For example, an organization that sets environmental objectives and targets is likely to show improvement in relation to environmental performance indicators (e.g. energy, water, waste), as the management process is evidence of planning and resource allocation.

EMS indicators presented below, as they specifically relate to land development, broadly correspond to the report recommendations outlined in the 'Governance Structure and Management Systems', part C, section 3 of the Global Reporting Initiative's (GRI) 2002 Sustainability Reporting Guidelines. The environmental aspects of land development activities are considered at two levels, namely:

- Design related aspects, such as master planning, urban and architectural design, landscaping design and engineering design.
- Construction and operation related aspects, such as civil works and building construction.

A suitable approach to report on ESD project outcomes is to select a small number of relevant indicators and demonstrate performance improvements. Reporting against a large number of indicators does not necessarily enhance or improve overall EMS performance (GRI 2007).

1.4 ESD DESIGN

ESD design is an umbrella term to describe a set of strategies, components and technologies that lower environmental, economic and social impact (Mclennan, 2004). Design related ESD issues are addressed through project-specific ESD design criteria that are based on accepted ESD indicators and targets. There are many ESD design principles applied to the built form, of which some will and some will not apply to land development. Accepted ESD design principles (Green Star, Office) include:-

1. Management
2. Indoor environmental quality
3. Energy
4. Water
5. Transport
6. Ecology & Land use
7. Materials
8. Emissions

This framework ignores economic and social impacts; principally it is an environmental management tool. The GRI provides social and economic performance indicators, which are reported below. The relevant social

performance indicators within this (GRI) guide address the following key social issues:

1. Community
2. Public policy
3. Compliance

The general and relevant economic performance indicators within the GRI guide address the following key economic issues:

1. Economic performance
2. Market presence
3. Indirect economic impact

1.5 ESD LAND DEVELOPMENT

This section of the report will adapt and consolidate the general environmental indicators from the built form and relevant and general GRI social and economic indicators to specifically address land development. Urban planning and development can have long-term environmental, economic and social impacts. The priority is to ensure sustainability is incorporated, as early as possible, in the design stage so that the opportunities for sustainable development are not limited or lost in subsequent delivery stages.

The environmental performance indicators for land development that are consistent with the accepted built form tools are:

1. Energy
2. Water
3. Materials, Waste – solid and hazardous
4. Emissions and discharges to air, land and water
5. Biodiversity
6. Compliance

The social performance indicators for land development and that are consistent with the GRI guide include:

1. Social and community infrastructure
2. Education access and diversity
3. Retail access and diversity

4. Health Services provision and access
5. Employment opportunities and income levels
6. Cultural identity protection

The economic performance indicators that address land development and that are consistent with the GRI guide include:

1. Economic improvements to the region
2. Affordability, adaptability and staging
3. Profitability of the development

1.6 ESD LAND DEVELOPMENT, INDICATORS AND TARGETS

A number of ESD indicators and areas of consideration flow from the application of ESD principles when applied to a land development. These areas take into account the specific nature of land development and achieving a triple bottom line outcome for the developer. The key indicators of sustainability; economics, social and environment, are subdivided further for reporting and goal setting purposes. The indicators presented below broadly correspond to the report content recommendations outlined in the 'Governance Structure and Management Systems' part C, section 3 of the GRI's Sustainability Reporting Guidelines ('02). The twelve ESD areas of consideration and indicators are listed below:-

BLACK HILL ESD INDICATORS BY ESD AREA	
ESD Areas	**ESD Indicators**
1. Social & Community	Community consultation Community facilities Creating community Community education for sustainable living
2. Economics	Regional economic impact Local economic impact
3. Employment	Local employment - construction Local employment – operation
4. Transport	Local transport Regional transport
5. Water Cycle Management	Water use – building/infrastructure Water supply availability Alternative water supplies Pollution control

BLACK HILL ESD INDICATORS BY ESD AREA	
ESD Areas	**ESD Indicators**
	Flow management
6. Energy	Carbon neutral – construction Energy supply – electricity/gas/renewable Energy use – building/infrastructure Energy efficiency - built form/ urban form
7. Ecosystem management	Native vegetation Landscape design
8. Riparian corridor management	Riparian length Environmental corridors Terrestrial and aquatic habitat Bed and bank stability & water quality
9. Conservation of indigenous heritage (including Items, values, and places of cultural significance)	Conserve indigenous heritage Consultation with indigenous peoples Conservation management plans
10. Conservation of European heritage	Conserve significant heritage items and places Conservation management plans.
11. Indoor environmental quality, waste and sustainable materials	IEQ Waste – construction Waste – organic Sustainable materials
12. Number and nature of compliance	Protection of Environment Operation (POEO) Act – Developer POEO Act – contractors Other environment, OH&S and planning legislation – Developer Other environment, OH&S and planning legislation – contractor Environmental audits/ scores

1.7 DEVELOPER ESD PRINCIPLES

As identified in the ESD Strategic Development Process diagram in section 3.1 there are four tiers in which ESD is integrated into the commitments for this project: developer ESD policies, developer ESD management system, developer ESD strategy and developer project ESD indicators and targets. These four tiers flow from a hierarchy of sustainability policies and principles from the developer to the project. The developer's sustainability philosophy is as follows;

> *Sustainable development is about balancing economic, social and environmental priorities.*

A developer needs to explore the opportunity to incorporate sustainable design initiatives into its development projects that are consistent with its sustainability policy. Typical development sustainability policy features six key areas. The six key areas of sustainability policy are listed below:

1. Product Stewardship
2. Asset Use and Resource Efficiency
3. Culture
4. Economic Viability
5. Community Relationships
6. Environmental Stewardship

Coal & Allied is committed to delivering sustainable development outcomes from their business operations. There is a total alignment between the developer's sustainable development aspirations and the theory and implementation of ESD in general and specifically in land development.

1.8 ESD STRATEGY DEVELOPMENT

Coal & Allied has a sustainable development strategy for the Black Hill estate that should, when combined with ESD principles, guide its overall decision-making. The strategy establishes the overall project outcomes sought by Coal & Allied.

BLACK HILL ESD STRATEGY

Develop the Black Hill Employment Lands estate to create a social, economic and environmental legacy for the people of the Lower Hunter region as set out in the ESD strategy.

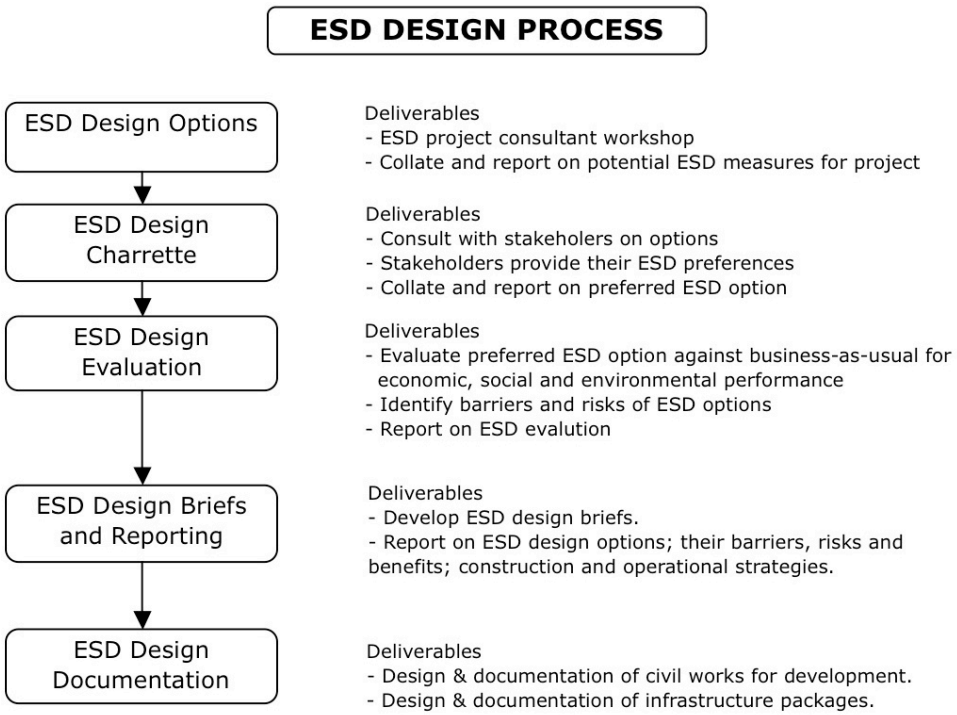
To achieve the proposed Black Hill ESD Strategy, twelve ESD areas have been identified along with an associated ESD goal, set out in the table below.

BLACK HILL ESD GOALS BY ESD AREA	
ESD AREAS	**ESD GOALS**
1. Social & Community	Contribute towards the sustainable social and community growth of the Lower Hunter consistent with the Lower Hunter Regional Strategy (LHRS).
2. Economics	Contribute towards the sustainable economic growth of the Lower Hunter consistent with the LHRS
3. Employment	Increase and enhance employment opportunities in the Lower Hunter consistent with the aspiration of the LHRS.
4. Transport	Increase and enhance public transport and efficient transport options to improve mobility and build

	community consistent with the aspiration of the LHRS.
5. Water Cycle Management	Incorporate and demonstrate best practice whole-of-project water cycle management consistent with the LHRS.
6. Energy	Create a carbon friendly estate with greenhouse gas emission reductions of 50% compared to a standard development reduction of 40%.
7. Ecosystem Management	Identify and conserve significant ecosystems to promote conservation, interpretation and community engagement.
8. Riparian Corridor Management	Identify, conserve and/or create riparian corridors.
9. Conservation of Indigenous Heritage	Identify and conserve indigenous heritage to promote conservation, interpretation and community engagement.
10. Conservation of European Heritage	Identify and conserve European heritage to promote interpretation, tourism, employment and community engagement.
11. Indoor Environmental Quality, Waste and Sustainable Material	Identify and promote the use of low Volatile Organic Compounds (VOC) and reuse of materials in the buildings and estate infrastructure.
12. Estate Development Compliance	Develop the Employment Lands with 100% compliance to government and Coal & Allied environmental policies.

2. ESD DESIGN

The ESD design process followed for the Black Hill project is set out below. This process aims to deliver on the sustainable development principles of Coal & Allied.



2.1 ESD GOAL, INDICATORS & TARGETS

ESD indicators and targets have been developed to allow the measurement of ESD outcomes for the operational phase of the project, inform design and construction methods. The targets for each ESD indicator are shown in the table below.

> ***Develop the Black Hill Employment Lands to create a social, economic and environmental legacy for the people of the Lower Hunter region as out in the ESD strategy.***

For each of the 12 ESD areas an ESD goal has been developed that sets the direction for the ESD indicators and targets that follow. The indicators and targets have been developed to allow the measurement of ESD outcomes for the operational phase of the project, inform design and construction methods. The targets for each ESD indicator are shown in the table below.

BLACK HILL ESD PROJECT GOALS & TARGETS	
ESD AREA	**ESD GOAL**
1. Social & Community	**Contribute towards the sustainable social and community growth of the Lower Hunter consistent with the Lower Hunter Regional Strategy.**
ESD INDICATORS	ESD TARGETS
Community Consultation	(a) A community Consultation plan is developed and implemented in accordance with the developer's community policy.
	(b) 100% of identified stakeholder groups being engaged through consultation and participation.
Community Facilities	(c) Targets are to be determined on each project based on the community demography and needs.
Creating a Business Community	(d) All Employment Lands will have a Creating a Business Community program.
	(e) Where there are Creating Community programs, initial contact to be made within 14 days of completion of each building.
Community Education for Sustainable Business	(f) Develop educational program and materials for the project.
	(g) 80% reduction in carbon emissions through education and promotion to the community via an intranet of energy use and renewable energy targets and actual estate performance.
	(h) 95% reduction in potable water use through education and promotion to the community via an intranet of water use targets and actual Employment Lands performance.
	(i) 100% of the Employment Lands has marketing material that includes business education on sustainable businesses.
2. Economics	**Contribute towards the sustainable economic growth of the Lower Hunter consistent with the Lower Hunter Regional Strategy.**
Regional Economic Impact	(a) Improved property values, neutral travel costs, regional employment and neutral wage differentials.
Local Economic Impact	(b) Improved property values, neutral travel costs, regional employment and neutral wage differentials.
	(b) Promote the increase in disposable income from reduced expenditure on energy and water from Employment Lands promoting integrated energy and water solutions.
3. Employment	**Increase and enhance employment opportunities in the Lower Hunter consistent with the aspiration of the Lower Hunter Regional Strategy.**
Local Employment - Construction	(a) Provide community employment opportunities during project construction by promoting local contractors.
Local Employment – Operation	(b) Provide community employment opportunities with operation of the development through joint ventures with regional training authorities and small business development agencies.
4. Transport	**Increase and enhance public transport and efficient transport options to improve mobility and build community, consistent with the aspiration of the Lower Hunter Regional Strategy.**
Local Transport	(a) Provide accessible pedestrian ways to connect to public domains.
	(b) Provide, through joint development, estate accessible convenience shopping and cafes to reduce vehicle-kilometres (vkms) from necessary supplies.
Regional Transport	(c) Provide an integrated bikeway network to existing regional public infrastructure.
	(d) Provide each building with high-speed internet access to encourage professionals businesses to reduce the need for travel.

BLACK HILL ESD PROJECT GOALS & TARGETS	
ESD AREA	**ESD GOAL**
5. Water Cycle Management	**Incorporate and demonstrate best practice whole-of-project water cycle management consistent with the Lower Hunter Regional Strategy.**
Water Sensitive Urban Design (WSUD)	(a) 100% of the super lots to have project-specific WSUD strategies.
Water use –	(b) Combination of water efficiency and reuse options – achieve 60% score for water index.
Water Use – Infrastructure	(c) Public domain irrigation shall be from non-potable sources and incorporate water efficient landscaping.
Water supply availability	(d) Eliminate or minimise the need for public water infrastructure upgrades through innovative design.
Alternative water supplies	(e) Provide third pipe solutions to all Employment Lands to minimise use of potable water if proven to be financially viable and meet commercial and regulatory requirements.
	(f) Maximise the reuse of water by using water that is fit-for-purpose.
Pollution control	(g) Provide sewer treatment and third pipe access to Black Hill to reduce riparian and water table pollution risk if proven to be financially viable and meet commercial and regulatory requirements.
	(h) 45% reduction in the mean annual load of total nitrogen (TN) based on EPA best practice guidelines.
	(i) 45% reduction in the mean annual load of total Phosphorus (TP) based on EPA best practice guidelines.
	(j) 80% reduction in the mean annual load of total suspended solids (TSS).
	() 90% reduction in nitrogen and phosphates in the Class A+ reuse water, through community education of environmentally friendly cleaning products and detergents.
Flow management	(k) Post-development storm discharges; pre-development storm discharges for 1.5 year ARI event, to minimise the impact of frequent events on the natural waterways and to minimise bed and bank erosion.
6. Energy	**Reduce greenhouse gas emissions by 50% compared to a standard development.**
Carbon Neutral – Construction	(a) The developer will participate in an approved Greenhouse offset scheme for construction activities.
Energy Supply – Electricity	(b) Provide an electricity system sufficient to meet maximum power demand and lowest life cycle cost. Investigate the use of co-generation and grid support solutions with Energy Australia for each estate.
Energy Supply – Gas	(c) All industrial and commercial buildings will have access to natural gas to ensure greenhouse friendly energy solutions are adopted. Refer to Energy Savings Action Plan for details.
Energy Supply – Renewable Energy	(d) All industrial and commercial buildings are to be fitted with solar water heaters sufficient to meet 90% of annual hot water requirements. Refer to Energy Savings Action Plan for details.
	(e) All industrial and commercial buildings are to be fitted with photovoltaic solar panels to achieve a greenhouse neutral balance. Refer to Energy Management Plan for details.
Energy Use – Building	(f) All industrial and commercial buildings shall achieve a minimum of 50% implementation of initiatives presented in section 2 of this report. Refer to Energy Savings Action Plan for details.
Energy Use – Infrastructure	(g) All infrastructures shall incorporate energy efficiency principles to reduce energy by 50% over standard practice.
Energy Efficiency - Built Form	(h) 100% of industrial and commercial buildings to have design guidelines to support thermal performance and efficient transport access.
Energy Efficiency - Urban Form	(i) All design guidelines produced for the estate shall include minimum solar access zones in accordance with SEDA's Solar Access for Lots Guidelines for Employment Lands

BLACK HILL ESD PROJECT GOALS & TARGETS	
ESD AREA	**ESD GOAL**
	subdivision in NSW.
7. Ecosystem management	**Identify and conserve significant ecosystems to promote conservation, interpretation and community engagement.**
Native vegetation	(a) Preservation of 80% of the developer's Lower Hunter lands to ensure no net loss for high conservation value vegetation.
Landscape design	(b) Landscape design to integrate into urban form to create community and promote energy efficiency.
8. Riparian corridor management	**Identify and conserve riparian corridors in each of the proposed developed Employment Lands.**
Riparian length	(a) No loss of length in Category 3 and 2 streams.
Environmental corridors	(b) Category 3 – Environmental Corridors – greater than 40M riparian corridor on either side (from top of bank).
Terrestrial and Aquatic Habitat	(c) Category 2 – Terrestrial and Aquatic Habitat – 20M riparian corridor + 10M buffer (from top of bank).
Bed and Bank Stability & Water Quality	(d) Category 1 – Bed and Bank Stability & Water Quality – 5M-10M riparian corridors (from top of bank).
9. Conservation of indigenous heritage (including items, values, and places of cultural significance)	**Identify and conserve indigenous heritage to promote conservation, interpretation and community engagement.**
Conserve indigenous heritage	(a) 100% of significant items and places to be conserved (unless there is, safety or contamination/mining issues).
Consultation with indigenous peoples	(b) Consultation occurs for 100% of estate's indigenous heritage issues.
Conservation Management Plans	(c) 100% of estate's indigenous heritage issues have Conservation Management Plans.
10. Conservation of European heritage	**Identify and conserve European heritage to promote interpretation, tourism, employment and community engagement.**
Conserve significant heritage items and places	(a) 100% of significant European heritage items and places conserved (unless there is, safety or contamination/mining issues).
Conservation Management Plans.	(b) 100% of Employment Lands including European heritage have Conservation Management Plans.
11. Indoor Environmental Quality (IEQ), Waste and Sustainable Material	**Identify and promote the use of low Volatile Organic Compounds (VOC) and reuse of materials in the building and estate infrastructure.**
IEQ	(a) Promote the use of low VOC paint, adhesives and floor coverings to improve the health outcomes for residents of the Employment Lands.
Waste – Construction	(b) Achieve 85% recycling of building waste during construction and reduce waste to landfill by 50%.
Waste – Organic	(b) Achieve 95% recycling and reuse of organic waste during the operation of the Employment Lands through the implementation of an integrated organic reuse strategy.
Sustainable Materials	(c) Achieve the use of 100% recycled materials in all public domain infrastructures.
12. Number and nature of compliance	**Develop the Employment Lands with 100% compliance to government and the developer's workplace and environmental policies.**
Protection of Environment Operation (POEO) Act – The Developer	(a) Achieve full compliance with the Protection of Environment Operation (POEO) Act – The developer's actions (ie. penalties issued in the developer's name)
Protection of Environment Operation	(b) Achieve full compliance with Protection of Environment Operation (POEO) Act –

BLACK HILL ESD PROJECT GOALS & TARGETS	
ESD AREA	**ESD GOAL**
(POEO) Act – Contractors	contractors' actions.
Other environment, OH&S and planning legislation – The Developer	(c) Achieve full compliance with other environment, OH&S and planning legislation – developer's actions
Other environment, OH&S and planning legislation – Contractor	(d) Achieve full compliance with other environment, OH&S and planning legislation – contractors' actions.
Environmental audits	(e) 100% of the developer's contracts have environmental audits procedures
Environmental audits scores	(f) 100% of environmental audit scores are greater than 75%. (i.e. every audit score, not the average of all audit scores).

2.2 ESD DESIGN OPTIONS

To achieve the desired ESD outcomes the consultant team has been tasked with the challenge of delivering ESD based design, construction and operation outcomes for the Black Hill project. ESD design is achieved through the application of design principles based on the following guidelines:

- Whole systems "thinking" to capture synergies and opportunities;
- Interconnectedness between supply and demand to capture cost savings;
- Service-based approach to broaden the choices and options;
- Comprehensive economic analysis that enables whole-of-life comparisons;
- End-use efficiency to secure upstream supply benefits;
- Bio-mimicry to reduce waste and match solutions to the local resources;
- Environmental footprint impact to maintain ecosystems and mitigate future costs;
- Innovation orientation to minimise risks and increase flexibility and adaptability

2.3 ESD DESIGN CONSULTATION

Comprehensive stakeholder consultation was undertaken during the preliminary design process of the project. Consultation was conducted with local community groups, local councils, representatives of traditional owners, design consultants and emergency, health and law enforcement agencies. A high level commitment to ESD design principles was demonstrated by those consulted.

2.4 ESD DESIGN EVALUATION

The ESD design options and suggestions that arose from the ESD design consultation were evaluated for their economic, environmental and social impacts.

The ESD consultant prepared an ESD design report addressing energy and water issues (refer to Part 2 & 3 of this report). Other design team consultants will report on other ESD related design issues prior to project approval.

2.5 ESD DESIGN BRIEFS & REPORTING

The ESD consultant prepared ESD design briefs for each of the infrastructure services consultants to ensure that ESD targets and indicators were included in the ESD design documents and ESD reporting requirements were clearly articulated for use in tender and specifications. The ESD design briefs are input documents for the design consultants. They set out the matters to be considered and addressed by their specifications, in design, construction and operation phases of the project.

2.6 ESD DESIGN DOCUMENTATION

All design documentation endeavour to address the goals of the ESD strategy. The design consultant team will develop tender documents that reflect the requirements of the ESD strategy, briefs and EMS reporting. The implementation of an EMS will be a key factor in the success of achieving ESD outcomes during the construction and operational phases.

2.7 ESD DESIGN GUIDELINES

The implementation of the ESD outcomes in the industrial buildings to be constructed on the land will be via project specific design guidelines. The design guidelines include minimum solar access zones (generally indicates where private open space should be located) in accordance with SEDA's Solar Access for Lots Guidelines for Employment Lands subdivision in NSW. Buildings, infrastructure and the environment are inextricably linked. Energy, materials, water and land are all consumed in the construction and operation of buildings and infrastructure. These built structures in turn become part of our living environment, affecting our living conditions, social wellbeing and health. It is therefore important to explore environmentally and economically sound design and development techniques in order to design buildings and infrastructure that are sustainable, healthy and affordable, and encourage innovation in buildings and infrastructure systems and designs.

ESD construction is a way for the building industry to move towards achieving sustainable development, taking into account environmental, socio-economic and cultural issues. Specifically, it involves issues such as design and management of buildings, materials and building performance, energy and resource consumption - within the larger orbit of urban development and management.

The key here is to look at appropriate ESD rating tools and concepts for the design and assessment of the sustainability impacts of materials, components and technologies used in buildings and their construction. There is a need to develop a better understanding of the appropriateness of technologies that is used in buildings and for construction, including indigenous materials and technologies that are currently being used.

3. ESD CONSTRUCTION

3.1. INTRODUCTION

ESD construction will be achieved from the implementation of a project specific Environmental Management System (EMS). A Construction Management Plan (CMP) (construction and operation) should be prepared and implemented that complies with the requirements of the developer's EMS. The developer should review the plan before the commencement of construction, and regularly during operation. The EMS framework is designed to assist individuals and organisations manage the way they conduct their operations, generally to reduce their impact on the environment.

An EMS involves the proposed development of a plan that includes the issues covered, the targets set, and details of the management actions that will be taken to achieve the targets, along with how performance will be monitored and evaluated.

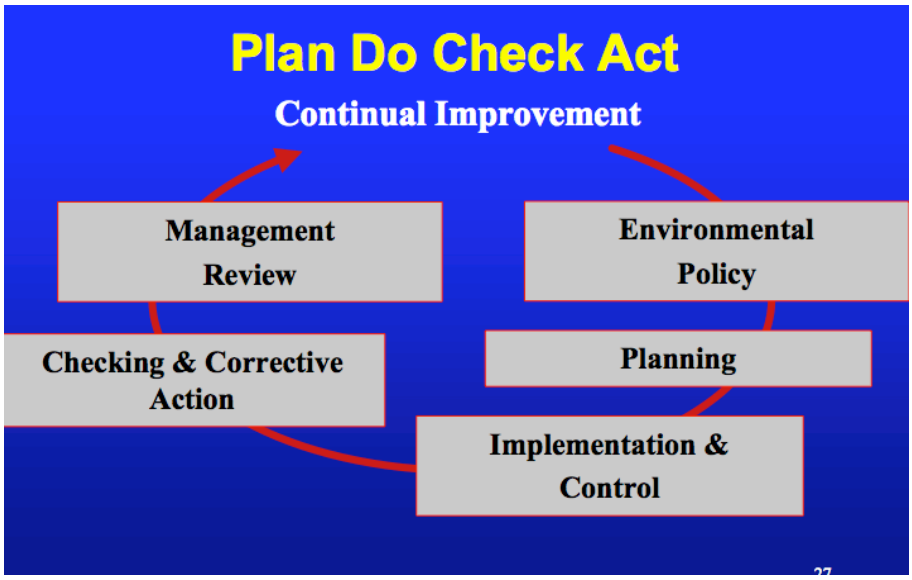
The developer's EMS should be developed and preferably accredited to meet the requirements of ISO 14001 standard. The integration between an EMS/CMP and ESD is that the ESD framework is designed to encompass all aspects and issues of the management of activities that may affect natural resources.

Therefore, having an EMS is an important mechanism in achieving the implementation of ESD principles. However, an EMS is only one possible method for achieving ESD principles. Prior to commencement of construction, a Construction Management Plan (CMP) will be issued. It includes:

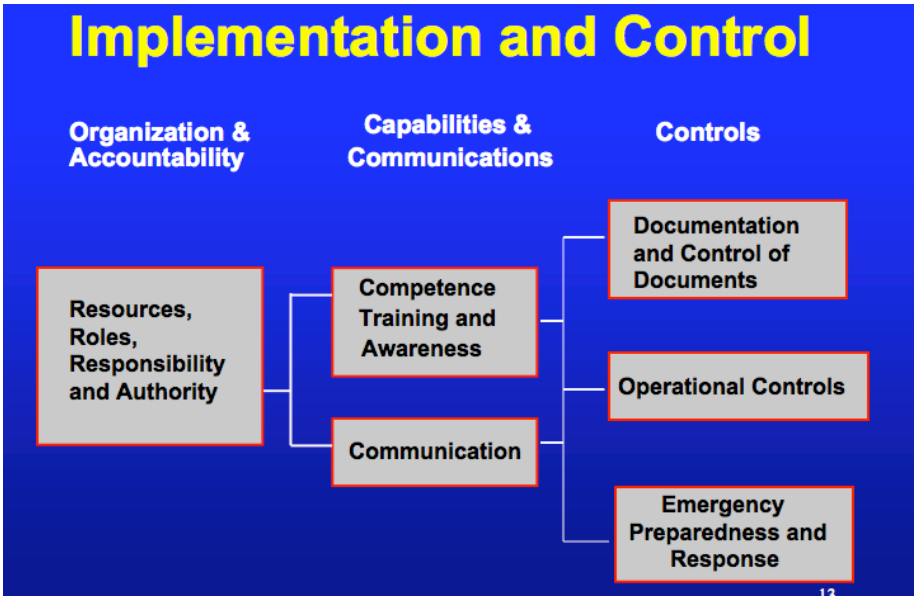
1. Development of a site-specific soil erosion and sediment control plan.
2. Confirmation of construction hours in accordance with the conditions of consent.
3. Air quality/dust control procedures.
4. Noise management procedures.
5. Waste management plan.

6. Community safety plan.
7. Arrangements for temporary pedestrian and vehicular access.
8. Storage and handling of materials procedures.
9. Environmental training and awareness.
10. Contact and complaints handling procedures.
11. Emergency preparedness and response.

CMP is based on a process of continual improvement cycles as shown below. This ensures that the CMP remains relevant and achieves its desired outcomes. See table below:



The process of implementation and control is shown in the diagram below. This process shows how the developer, as the responsible organisation, remains in control of the CMP at the Black Hill project.



3.2 ESD CONSTRUCTION - REPORTING REQUIREMENTS

ESD reports should be prepared and submitted by the Principal Contractor to the developer at each stage of the project. The reporting requirements for each stage of the development are shown in the following sections.

Tender Stage

The Principal Contractor should submit with the tender documentation an ESD report, which outlines how the ESD performance requirements will be achieved. The report shall include the following areas as a minimum and will be evaluated to assess both the confidence of the submitted design and the construction/operation contractor to achieve the ESD performance and essential requirements:

- Transport impact minimisation
- Social sustainability
- Innovation
- Management (design, construction and operation)
- Lot layout and footprint
- Building design guidelines, including
    1. Passive design features
    2. Indoor environment quality optimisation
    3. Energy use minimisation
    4. Water use reduction
- Waste minimisation
- Emission reduction
- Land use and ecology
- Choice of materials

Design & Construction Stage

The Principal Contractor should submit ESD reports in progress reviews of design and construction to outline how the ESD performance requirements will, or have been achieved. Design reports

shall follow the developer's "ESD section of Design report template" which should be contained in the EMS.

For 'Management', The Principal Contractor should submit;

- monthly reports during construction on the implementation of the construction management plan and sub-plans
- reports on commissioning in progress reviews.

For 'Waste', The Principal Contractor should submit monthly reports during construction;

- on the implementation of the waste management sub-plan;
- confirming weight or volume of wastes by waste streams, leaving site and the percentage of waste reused / recycled; and
- on hazardous wastes.

Provide ESD update at Project Control Group (PCG) meetings.

Provide reports on facility management reviews throughout the contract period.

To be consistent with the monitoring protocols of the developer's EMS reporting framework, The Principal Contractor should submit a quarterly ESD Report (for the duration of the defects liability period) which states:

- Energy consumption for construction, including monthly breakdown and annual summary, including gas, fuel and electricity use, including HVAC.
- Greenhouse gas emissions; monthly breakdown and annual summary.
- Water consumption; total and for sub-metered uses; monthly breakdown and annual summary, including potable and recycled water use, and
- Waste; total percentage to landfill and total recycled by waste streams.

Report Submission

During the design and construction stages, the Principal Contractor should submit reports as required under the project specification. ..

4. ESD OPERATION

An operational Environmental Management Plan should be prepared prior to the opening of the development. Consideration should be given to the engagement of the community in the continual monitoring and maintenance of the ESD initiatives incorporated into the project. This could include reporting, monitoring and corrective action of the ESD indicators and targets. Where appropriate the reporting should be consistent with the monitoring protocols of the developer's EMS reporting framework. Possible ESD indicators that should be reported include:-

- Energy consumption for construction, including monthly breakdown and annual summary, including gas, fuel and electricity use.
- Greenhouse gas emissions; monthly breakdown and annual summary.
- Water consumption; total and for sub-metered uses; monthly breakdown and annual summary, including potable and recycled water use.
- Waste; total percentage to landfill and total recycled by waste streams.

5. CONCLUSION

The proposed 22 super lot Employment Lands development at Black Hill can deliver the environmental, economic and social outcomes that are consistent with the industry best practice ESD benchmark and principles.

The ESD Design outcome is to develop the proposed Black Hill Employment Lands estate, creating a social, economic and environmental legacy for the people of the Lower Hunter region as outlined in the ESD strategy.

The ESD Construction outcomes could be achieved through the development and implementation of a Construction Management Plan (CMP) that is consistent with the developer's EMS. The CMP will address the following:

1. Development of a site-specific soil erosion and sediment control plan.
2. Confirmation of construction hours in accordance with the conditions of consent.
3. Air quality/dust control procedures.
4. Noise management procedures.
5. Waste Management Plan.
6. Community Safety Plan.
7. Arrangements for temporary pedestrian and vehicular access.
8. Storage and handling of materials procedures.
9. Environmental training and awareness.
10. Contact and complaints handling procedures.
11. Emergency preparedness and response

ESD Operation is achieved through a comprehensive reporting and monitoring process that will also be addressed in the CMP.

PART 2

ENERGY SAVINGS ACTION PLAN

1. ENERGY SAVINGS ACTION FRAMEWORK

This Energy Savings Action Plan has been prepared for the proposed Black Hill development in response to the Director General's Requirements under Section 75F of the Environmental Planning and Assessment Act 1979 issued as part of the assessment requirements for this development. Black Hill estate is a 183 ha Employment Lands will be assessed under the NSW DEUS Energy Savings Action Plan framework, which is the applicable framework for large energy users.

Whilst this is not strictly the case with a freehold lot Employment Lands subdivision, it is the most suitable framework. The proponent is also committing that all future industrial development at this site will meet or exceed best practice sustainable design in accordance with the current legislation and rating tools at the time of a development application.

The super lot developer and the subsequent building owners and occupiers will be the direct beneficiary of an investment in energy saving measures. If this report was written from the developer's perspective no measure would be cost-effective and therefore no energy or water saving measures would be implemented.

Therefore this report evaluates the cost effectiveness of energy saving measures from the land purchaser's perspective. This Energy Savings Action Plan has been prepared based on a framework set out in the DEUS Guidelines for Energy Savings Action Plans published in October 2005. The guidelines provide the following framework for a preparation of a plan:

1. Overview and introduction to the business
2. Identification of baseline energy use
3. Identification of the efficiency opportunities
4. Energy management actions
5. Energy saving measures

2. ENERGY SAVINGS ACTION PLAN

This Energy Savings Action Plan created for the proposed Black Hill land subdivision has been prepared to address the following topics:

1. Overview and introduction to the business
2. Identification of baseline energy and water use
3. Identification of the efficiency opportunities
4. Energy & Water management actions
5. Energy and Water saving measures
6. Implementation and Review

2.1 OVERVIEW

It is proposed to develop a 22-super lot Employment Lands subdivision at Black Hill. The infrastructure consultant Cardno has reviewed existing electricity, natural gas, water and sewerage treatment infrastructure in their report "*Lower Hunter Land Development, Concept Plan Infrastructure Report Black Hill*". Energy Australia has indicated that the high voltage supply to Black Hill may be upgraded and that natural gas will be available.

2.2 IDENTIFICATION OF BASELINE ENERGY USE

The baseline energy use for the proposed 22 super lot Employment Lands is derived from energy end-use data for commercial and light industrial infrastructure for the USA and corrected for the Newcastle climate. Calculations are based on the total development area minus roads and infrastructure and assuming a 50% building coverage results in an estimated GFA of 800,000m^2.

The average electrical and gas energy use key performance indicators (KPI's) taking into account different light industrial building types as reported in the CEC Report on US commercial/industrial energy end use (CEC Report ID#: CEC-400-2006-005) are 135 kWh/m^2.annum for electricity and 45 MJ/m^2.annum for gas. The breakdown to 'end use' energy service is based on data published in the same report.

BASELINE ENERGY BREAKDOWN BLACK HILL	
Service	**Energy Use (kWh/annum)**
Lighting	23,454,635
Refrigeration	19,590,388
Motors	14,943,114
HVAC	12,968,386
Process Heat	6,703,833
Misc.	4,708,363
Office Equipment	1,657,936
Compressed Air	1,523,515
Water Heating	1,392,971
Pumping	1,078,564
Processes	667,789
Cooking	175,310
TOTAL	**88,864,803**

The total baseline energy use is estimated at 89GWh per annum, which equates to 95,085 tonnes of greenhouse gases using the standard NSW grid multiplier of 1.07 kilograms/kWh. The average energy use baseline for the 22-super lots is estimated to be 4.04GWh.

BASELINE ENERGY CONSUMPTION PER ANNUM - BLACK HILL		
Number of Super Lots	**Average Electricity Use per Super Lot kWh p.a.**	**Total Electricity Consumption kWh p.a.**
22	4.04 GWh	88.9 GWh

Energy Balance Baseline

The greenhouse gas emission baseline estimate for the entire development is shown in the table below.

BASELINE GREENHOUSE GAS EMISSIONS PER ANNUM BLACK HILL	
Total Electricity Consumption kWh p.a.	**Total Estimated GHG Emissions Tonnes p.a.**
88.9 GWh	95,123

The energy activity indicators for a Employment Lands are five fold; total energy consumed for the project, total greenhouse gas emissions generated for the

project, energy consumed per super lot, peak building electrical demand (summer & winter). These are reported for the proposed Black Hill development in the table below.

BASELINE ENERGY ACTIVITY INDICATORS BLACK HILL	
INDICATORS	**MEASURE**
A= baseline Energy use per annum (GWh)	88.9
Greenhouse Emissions (T)	95,123
Is baseline representative of normal Energy use? YES / NO	Yes
B= Impact of variation on energy use (i.e. variation from normal) per annum (kWh)	0
C= A – B baseline energy use corrected for variation (GWh)	88.9
Business Activity Indicators	Super Lot
D= Quantity of Site Business Activity Indicator	22
E= C / D baseline energy use Key Performance Indicator (KPI)	4.04
Baseline summer peak Electrical use (kVa)	1,350
Baseline winter peak Electrical use (kVa)	1,050

2.3 IDENTIFICATION OF THE EFFICIENCY OPPORTUNITIES

2.3.1 MANAGEMENT REVIEW

A management review was conducted of the key areas of Coal & Allied's performance in sustainable energy management. These included the following:

- Senior management commitment to, and involvement in energy management
- Understanding of energy savings potential at operations and maintenance levels, and within new capital works
- Management of energy targets and key performance indicators
- Energy metering and monitoring
- Energy management reporting
- Energy supply management and alternative energy supply options
- Incorporation of energy management into operating and maintenance procedures
- Accountabilities for energy management
- Training and awareness procedures
- Compliance with legal or other requirements.

The response and scoring of management to the above questions is shown in the table below.

Area	Review Area	Rating				
		Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
A	Senior management commitment					
B	Understanding of energy savings potential					
C	Energy targets and key performance indicators					
D	Energy metering and monitoring					
E	Energy management reporting					
F	Energy supply management					
G	Operating and maintenance procedures					
H	Accountabilities for energy management					
I	Training and awareness procedures					
J	Compliance with legal and / or regulatory requirements					

The management review indicates that Coal & Allied has adequate systems in place to manage the implementation of the Energy Savings Action Plan. The three management areas to be addressed for this project are listed in the next table.

Project No	Energy Management Action	Responsibility	Planned Completion Date	Actual Completion Date
BH-1	Confirm energy targets for Black Hill. **Step 1.** Review and amend project brief and tender documents to incorporate energy targets for project. **Step 2.** Obtain PCG approval and have noted in Environmental Actions. **Step 3.** Communicate to staff and consultant team.	Project Director/General Manager	Three months Part 3A approval	
BH-2	Increase project team awareness of energy saving opportunities. **Step 1.** Consult with Newcastle Climate Action coalition and visit leading project sites. **Step 2.** Obtain PCG approval for awareness training plan. **Step 3.** Senior staff and development consultants attend site visits and workshops.	Project Director/General Manager	Three months Part 3A approval	
BH-3	Establish strategy for metering for the project, including feedback to building occupier for energy saving opportunities. **Step 1.** Consult with Energy Australia on remote metering and business feedback options and obtain costings. **Step 2.** Obtain PCG approval for budget to investigate options. **Step 3.** Communicate results to PCG to determine if implementation is viable.	Project Director/General Manager	Three months Part 3A approval	

2.3.2 TECHNICAL REVIEW

Name of the Assessor

Francis Barram, EnSight, Unit 1/37 Cordelia Street, South Brisbane, Queensland, 4101.

Description of the site and methodology used

Black Hill is located northwest of Newcastle. 22 super lots of employment lands will be made available from the proposed land development at Black Hill. The methodology adopted for this project compares the energy and greenhouse savings based on each super lot, meeting the intent of the framework set out in the NSW DEUS Energy Savings Action Plan. The measures aim also to meet the local Council DCP requirements for energy efficiency. A second scenario of implementing beyond best practice involves installing solar power systems, also based on the DEUS Energy Savings Action Plan Framework.

Metering, historical usage

There are no metering records as the project is at the approval stage.

Comments on Targets

There are two targets for the project. The first one is a Compliance target, which is to achieve a best practice reduction in greenhouse gas emissions usage. The second target is a beyond best practice target; to reduce greenhouse gas emissions by what is considered not cost effective. The first target can be achieved by following the recommended plan in the ESD Report element of this report. The second target will require substantial engagement and financial commitment from the super lot purchasers in order to be realized.

2.3.3 ENERGY - – BEST PRACTICE

The best practice energy reduction target for the Black Hill Employment Lands development is based on the necessary measures to achieve a sustainable energy design within the DEUS Energy Savings Action Plan Framework. The efficiency initiatives needed to achieve this reduction are listed in the table below. The energy use is based on the application of the DEUS Energy Savings Action Plan Framework, with each Super-lot estimated to demand 2,440 MWh per annum. The

table below shows the breakdown in annual energy demand by end use service and the energy reduction initiatives for the entire development having been implemented.

Service	Energy Use (kWh/annum)	Best Practice Energy Use (kWh/annum)	Energy Saved (percent)
Lighting	23,454,635	9,381,854	60%
Refrigeration	19,590,388	9,795,194	50%
Motors	14,943,114	11,207,335	25%
HVAC	12,968,386	9,077,870	30%
Process Heat	6,703,833	5,698,258	15%
Misc.	4,708,363	4,237,527	10%
Office Equipment	1,657,936	1,326,349	20%
Compressed Air	1,523,515	1,142,636	25%
Water Heating	1,392,971	278,594	80%
Pumping	1,078,564	808,923	25%
Processes	667,789	567,621	15%
Cooking	175,310	175,310	0%
TOTAL	**88,864,803**	**53,697,471**	**40%**

The total energy use on a super lot is estimated at 2,440,794 kWh per annum which equates to 2,611,650 kilograms of greenhouse gases using the standard NSW grid multiplier of 1.07 kilograms/kWh. The total energy based on the DEUS Energy Savings Action Plan Framework for the 22 lots is shown in the right hand column of the table below.

NSW DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK – BEST PRACTICE ENERGY CONSUMPTION PER ANNUM-BLACK HILL		
Number of Lots	**Average Energy Use kWh p.a.**	**Total Energy Consumption kWh p.a.**
22	2,440,794	53,697,471

The estimated greenhouse gas emissions for the entire employment lands development is shown in the table below.

DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK – BEST PRACTICE GREENHOUSE GAS EMISSIONS PER ANNUM - BLACK HILL	
Total Energy Consumption kWh p.a.	**Total Estimated GHG Emissions Tonnes p.a.**
53,697,471	57,456

DEUS Energy Savings Action Plan Framework Best Practice

The Energy Balance for the DEUS Energy Savings Action Plan Framework Best Practice approach is shown in the table above, categorised into services and fuel source on a per super-lot basis. Best Practice are energy efficiency initiatives that are cost effective to implement, achieving a payback on their investment in under six (6) years. The energy activity indicators for an Employment Lands super-lot are fivefold; (1) total energy consumed for the project, (2) total greenhouse gas emissions generated for the project, (3) energy consumed per building, (4 & 5) peak building electrical demand winter and summer. These are reported in the table below for the proposed Black Hill development.

DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK – BEST PRACTICE ENERGY ACTIVITY INDICATORS - BLACK HILL	
INDICATORS	**MEASURE**
A= baseline energy use per annum (kWh)	53,697,471
Greenhouse Emissions (T)	57,456
Is baseline representative of normal Energy use? YES / NO	Yes
B= Impact of variation on energy use (i.e. variation from normal) kWh per annum	0
C= A – B baseline energy use corrected for variation (kWh)	53,697,471
Business Activity Indicators	Employment Lands
D= Quantity of Site Business Activity Indicator	22
E= C / D baseline Energy use Key Performance Indicator (KPI) (kWh)	2,440,794
Baseline summer peak Electrical use (kVa)	1,250
Baseline winter peak Electrical use (kVa)	1,050

The DEUS Energy Savings Action Plan Framework Best Practice energy strategy could incorporate the following initiatives.

1. Extensive use of sky lighting with lighting controls for daylight harvesting,
2. High performance fluorescent lighting incorporating energy saving

controls and design; This includes occupancy, timer, and daylight controls and zoning for lighting circuits,

3. Motors with variable speed drives for all motor applications; this includes pumping, compressed air and other motor drive systems,
4. 3-phase motors where feasible,
5. Use of efficient heat exchangers and heat pump systems for process heat applications,
6. computer control, variable frequency drives and efficient compressors for large refrigeration applications,
7. Heat pump packaged systems for low sensible load spaces,
8. Variable speed supply fans and inverter compressors for air conditioning systems,
9. Well zoned air HVAC design,
10. Gas boosted solar water heaters where hot water is required,
11. Passive solar building design,
12. Energy star rated office appliances
13. Any cooking facilities to use gas appliances

2.3.4 ENERGY - DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK BEYOND BEST PRACTICE

The DEUS Energy Savings Action Plan Framework beyond best practice energy reduction target for the Black Hill Employment Lands development is achieved by implementing all measures in the best practice approach as well as suggesting the implementation of solar photovoltaic arrays on 10% of the 800,000m^2 building roof area. The annual grid supplied electrical and gas supplied energy use of a beyond financially viable super lot is 1.91GWh, 1.89GWh of electricity and 0.02GWh of Natural Gas. The table below shows the breakdown in annual energy demand by end use service based on the beyond financially viable.

DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK BEYOND BEST PRACTICE ENERGY CONSUMPTION BREAKDOWN PER ANNUM - BLACK HILL	
Service	**DEUS Energy Savings Action Plan Framework Beyond Financially Viable Energy Use (kWh/annum)**
Lighting	9,381,854
Refrigeration	9,795,194
Motors	11,207,335
HVAC	9,077,870
Process Heat	5,698,258
Misc.	4,237,527
Office Equipment	1,326,349
Compressed Air	1,142,636
Water Heating	278,594 (gas)
Pumping	808,923
Processes	567,621
Cooking	175,310 (gas)
Solar PV	***(11,700,000)***
TOTAL	**41,997,471**

The total Beyond Financially Viable energy use on a per super lot basis is 1.91GWh per annum which equates to 2,043 tons of greenhouse gases using the standard NSW grid multiplier of 1.07 kilograms/kWh for electricity and 0.2 kilograms/kWh_t for natural gas.

The total energy for Beyond Financially Viable for the 22 super lots is shown in the right hand column of the table below.

DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK BEYOND BEST PRACTICE GRID AND GAS SUPPLY ENERGY CONSUMPTION PER ANNUM-BLACK HILL		
Number of Super Lots	**Average Energy Use GWh p.a.**	**Total Energy Consumption GWh p.a.**
22	1.89 (ELEC) 0.02 (NG)	41.5 (ELEC) 0.45 (NG)

The greenhouse gas emissions from the adoption of the Beyond Financially Viable approach for the entire development is shown in the table below.

DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK BEYOND BEST PRACTICE GREENHOUSE GAS EMISSIONS PER ANNUM - BLACK HILL	
Total Energy Consumption GWh p.a.	**Total Estimated GHG Emissions Tonnes p.a.**
41.5 (ELEC) 0.45 (NG)	44,405

The energy activity indicators for a Super-Lot are fivefold; total energy consumed for the project, total greenhouse gas emissions generated for the project, energy consumed per Super-Lot, peak building electrical demand winter and summer. These are reported for the proposed Black Hill development in the table below.

DEUS ENERGY SAVINGS ACTION PLAN FRAMEWORK BEYOND BEST PRACTICE GRID AND GAS SUPPLY ENERGY ACTIVITY INDICATORS - BLACK HILL	
INDICATORS	**MEASURE**
A= baseline energy use per annum (GWh)	41.5 (ELEC) 0.45 (NG)
Greenhouse Emissions (T)	44,405
Is baseline representative of normal Energy use? YES / NO	Yes
B= Impact of variation on energy use (i.e. variation from normal) GWh per annum	0
C= A – B baseline energy use corrected for variation (GWh)	41.5 (ELEC) 0.45 (NG)
Business Activity Indicators	Super Lot
D= Quantity of Site Business Activity Indicator	22
E= C / D baseline Energy use Key Performance Indicator (KPI) GWh per building	1.89 (ELEC) 0.02 (NG)
Baseline summer peak Electrical use (kVa)	1000
Baseline winter peak Electrical use (kVa)	1050

2.3.5 Description of Measures

DEUS Energy Savings Action Plan Framework Beyond Best Practice is achieved with the same measures as required to achieve Best Practice for the project, which included the following measures;

1. Extensive use of sky lighting with lighting controls for daylight harvesting,
2. High performance fluorescent lighting incorporating energy saving controls and design; This includes occupancy, timer, and daylight controls and zoning for lighting circuits,
3. Motors with variable speed drives for all motor applications; this includes pumping, compressed air and other motor drive systems,

4. 3-phase motors where feasible,
5. Use of efficient heat exchangers and heat pump systems for process heat applications,
6. computer control, variable frequency drives and efficient compressors for large refrigeration applications,
7. Heat pump packaged systems for low sensible load spaces,
8. Variable speed supply fans and inverter compressors for air conditioning systems,
9. Well zoned air HVAC design,
10. Gas boosted solar water heaters where hot water is required,
11. Passive solar building design,
12. Energy star rated office appliances

In addition to the initiatives listed in DEUS Energy Savings Action Plan Framework Best Practice the following measure is included;

- 80,000m^2 of solar photovoltaic power installed

Detailed information on DEUS Energy Savings Action Plan Framework Beyond Best Practice Measures

Solar Photovoltaic Power

Solar photovoltaic systems will be installed with solar array to cover 10% of all roof spaces. It is proposed that polycrystalline, monocystalline silicon or thin film solar panels be used for each solar array roof area is not limited and best value for money be procured. The output of the solar array will connect to the Energy Australia grid via grid-interactive inverter systems. Special precautions will be used at each building switchboard to ensure the electrical safety, both locally and for the electrical network. The total energy production from the solar for the site is estimated at 11.7GWh per annum equating to 0.53GWh per super lot. This output will account for approximately 25% of each super lots electricity demand.

Current NSW Solar Bonus scheme does not apply to a customer whose electricity use is less than 160MWh per annum. Customers in the of the employment lands

are likely to be using more than 160MWh which means that investment in solar is not financially viable.

Current Renewable Energy Credits (RECs) apply to solar photovoltaic systems that are installed on industrial sites. However, even after taking into of the applicable RECs the return on investment from reduced electricity purchases still does not provide solar a financially viable investment.

3. IMPLEMENTATION & REVIEW

The purpose of this report is to demonstrate that the purchaser of the super-lots in the Black Hill Employment Lands can meet the intention of the NSW DEUS Energy and Water Savings Action Plan framework requirements to achieve best practice in greenhouse gas emission reduction, at the time of making a building approval application. The second purpose of the report is to demonstrate that the super-lot purchasers of the proposed Employment Lands can also achieve a beyond best practice reduction in greenhouse gas emissions.

The implementation of the Energy Savings Action Plan should commence at the Design Development phase of the project. This plan should be incorporated into the developer's corporate and annual plans to ensure its implementation is monitored. A review of this project should be conducted in line with the developer's EMS requirements.

4. CONCLUSION

The proposed 22 super-lot Employment Lands development at Black Hill can achieve the intent of the DGEAR which is compliance with a DEUS Energy Savings Action Plan Framework best practice energy approach and reduce greenhouse gas emissions significantly.

A DEUS Energy Savings Action Plan Framework Beyond Best Practice" strategy has also been developed to achieve a further reduction in greenhouse gas emissions for each super-lot. Whilst the developer is not undertaking these strategies they should be promoted to each lot purchaser. The quantifiable outcomes of both approaches are set out below.

Energy Savings Action Plan Framework Best Practice

The Compliance approach to energy use reduction achieves an annual greenhouse gas emission (GHG) saving of an estimated 1,712 tonnes per super lot. The total GHG saving over the site is estimated at 37,667 tonnes per annum. Energy saving measures include:

1. Extensive use of sky lighting with lighting controls for daylight harvesting,
2. High performance fluorescent lighting incorporating energy saving controls and design; This includes occupancy, timer, and daylight controls and zoning for lighting circuits,
3. Motors with variable speed drives for all motor applications; this includes pumping, compressed air and other motor drive systems,
4. 3-phase motors where feasible,
5. Use of efficient heat exchangers and heat pump systems for process heat applications,
6. computer control, variable frequency drives and efficient compressors for large refrigeration applications,
7. Heat pump packaged systems for low sensible load spaces,

8. Variable speed supply fans and inverter compressors for air conditioning systems,
9. Well zoned air HVAC design,
10. Gas boosted solar water heaters where hot water is required,
11. Passive solar building design,
12. Energy star rated office appliances

Incorporating these measures are predicted to reduce energy use by 40%.

DEUS Energy Savings Action Plan Frameworks Beyond Best Practice

The approach to energy use reduction achieves a total annual greenhouse gas emission (GHG) saving of an estimated 2,305 tonnes per super lot. The total GHG saving over the estate is estimated at 50,718 tonnes per annum. The proposed energy saving measure is photovoltaic grid interactive arrays to cover 10% of all roof spaces equating to 80,000m2 of array area producing 11.7GWh of electricity per annum.

The table below shows the energy Baseline compared with Best Practice and Beyond Best Practice approaches.

ENERGY SAVING PREDICTIONS			
INDICATORS	**BASELINE**	**BEST PRACTICE**	**BEYOND BEST PRACTICE**
A= baseline energy use per annum (GWh)	88.9	53.2 (ELEC) 0.45 (NG)	41.5 (ELEC) 0.45 (NG)
Greenhouse Emissions (T)	95,123	57,456	44,405
Compliance Assessment Reduction Score		40%	53%
Is baseline representative of normal Energy use? YES / NO	Yes	Yes	Yes
B= Impact of variation on energy use (i.e. variation from normal) kWh p.a.	0	0	0
C= A – B baseline energy use corrected for variation (GWh)	88.9	53.7 (ELEC) 0.45 (NG)	41.5 (ELEC) 0.45 (NG)
Business Activity Indicators	Super Lot	Super Lot	Super Lot
D= Quantity of Site Business Activity Indicator	22	22	22
E= C / D baseline energy use Key Performance Indicator (KPI) per h'hold (GWh)	4.04	2.44	1.89 (ELEC) 0.02 (NG)
Baseline summer peak Electrical use (kVa)	1,450	1,150	1,000
Baseline winter peak Electrical use (kVa)	1,150	1,050	1,050

PART 3

WATER SAVINGS ACTION PLAN

1. ACTION PLAN FRAMEWORK

This Water Savings Action Plan has been prepared for the Black Hill Employment Lands development in response to the Director General's Requirements under Section 75F of the Environmental Planning and Assessment Act 1979 issued as part of the assessment requirements for this development. The Black Hill estate is a 22-super lot Employment Lands development.

This report will evaluate the water saving measures from the super-lot purchaser's perspective. The financial analysis is based on an evaluation of the cost effectiveness from the owner's perspective.

This Water Savings Action Plan has been prepared based on the framework set out in the DEUS Guidelines for Energy Savings Action Plans (applied to water sustainability on this project). The principle purpose of the Action Plan is to demonstrate that the proposed Black Hill development can achieve compliance with the DGEAR requirements. The guidelines provide the following framework for a preparation of a plan:

- Overview and introduction to the business
- Identification of baseline water use
- Identification of the efficiency opportunities
- Water management actions
- Water saving measures

2. WATER SAVINGS ACTION PLAN

This Water Savings Action Plan created for the proposed Black Hill land subdivision has been prepared to address the following topics:

- Overview
- Identification of baseline water use
- Identification of the efficiency opportunities
- Water management actions
- Water saving measures
- Implementation and Review

2.1 OVERVIEW

It is proposed to develop a 22 super-lot employment lands development at Black Hill. The infrastructure consultant, Cardno has reviewed existing water and sewerage treatment infrastructure in their report "*Lower Hunter Land Development, Concept Plan Infrastructure Report Black Hill*". Hunter Water has indicated that the water supply to Black Hill may be upgraded and that sewerage will be pumped to the Beresfield SPS or treated on site with an appropriately licenced treatment facility.

2.2 IDENTIFICATION OF BASELINE WATER USE

The published data on employment iands water consumption is taken from Metcalf and Eddy Inc. 1991, Wastewater Engineering 3rd Edition. This data is conservative and ensures that a prudent approach has been taken towards the water supply design solution. Design and wastewater flows are $12m^3$ per hectare per day of total water flow.

STANDARD WATER USE Employment Lands Water Demand By Water Quality		
Description	**Percent usage by service total**	**kilolitres per day**
Non-Sanitary Use	46.6	507.6
Sanitary Waste Use	53.4	582.4
Total	**100**	**1,090.0**

The water activity indicators for Employment Lands are twofold; total sanitary water consumed for the project and total non-sanitary water consumed per super-lot. These indicators are reported for the proposed Black Hill development in the table below.

BASELINE WATER ACTIVITY INDICATORS BLACK HILL	
INDICATORS	**MEASURE**
A= baseline water use per annum (kilolitres)	185,260 Sanitary 212,579 Non Sanitary
Is baseline representative of normal Water use? YES / NO	Yes
B= Impact of variation on water use (i.e. variation from normal) kilolitres per annum	0
C= A – B baseline water use corrected for variation (kilolitres)	185,260 Sanitary 212,579 Non Sanitary
Business Activity Indicators	Super-lot
D= Quantity of Site Business Activity Indicator	22
E= C / D baseline Water use Key Performance Indicator (KPI) (kilolitres)	8,421 Sanitary 9,663 Non Sanitary

2.3 IDENTIFICATION OF THE EFFICIENCY OPPORTUNITIES

2.3.1 MANAGEMENT REVIEW

A management review was conducted of the key areas of Coal & Allied Industry's performance in sustainable water management. These included the following:

- Senior management commitment to, and involvement in water management
- Understanding of water savings potential at operations and maintenance levels, and within new capital works
- Management of water targets and key performance indicators
- Water metering and monitoring
- Water management reporting
- Water supply management and alternative water supply options
- Incorporation of water management into operating and maintenance procedures
- Accountabilities for water management
- Training and awareness procedures
- Compliance with legal or other requirements.

The response and scoring of management to the above questions is shown in the table below.

Area	Review Area	Rating				
		Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
A	Senior management commitment					
B	Understanding of water savings potential					
C	Water targets and key performance indicators					
D	Water metering and monitoring					
E	Water management reporting					
F	Water supply management					
G	Operating and maintenance procedures					
H	Accountabilities for water management					
I	Training and awareness procedures					
J	Compliance with legal and / or regulatory requirements					

The management review indicates that Coal & Allied has adequate systems in place to manage the implementation of this Water Savings Action Plan. The three management areas to be addressed for this project are listed in the next table.

Project No	Energy Management Action	Responsibility	Planned Completion Date	Actual Completion Date
BH-1	Confirm energy targets for Black Hill. **Step 1.** Review and amend project brief and tender documents to incorporate water targets for the project. **Step 2.** Obtain PCG approval and have noted in Environmental Actions. **Step 3.** Communicate to staff and consultant team.	Project Director/General Manager	Three months Part 3A approval	
BH-2	Increase project team awareness of energy saving opportunities. **Step 1.** Consult with Hunter Water and visit leading project sites. **Step 2.** Obtain PCG approval for the awareness training plan. **Step 3.** Senior staff and development consultants attend site visits and workshops.	Project Director/General Manager	Three months Part 3A approval	
BH-3	Establish strategy for metering for the project, including feedback to building occupier for water saving opportunities. **Step 1.** Consult with Hunter Water on remote metering and building occupier feedback options and obtain costings. **Step 2.** Obtain PCG approval for the budget to investigate options. **Step 3.** Communicate results to PCG to determine if implementation is viable.	Project Director/General Manager	Three months Part 3A approval	

2.3.2 TECHNICAL REVIEW

Name of the Assessor

Francis Barram, EnSight, Unit 1/37 Cordelia Street, South Brisbane, Queensland, 4101.

Description of the site and methodology used

Black Hill is located northwest of Newcastle. 22 super-lots of employment lands will be made available from the proposed land development at Black HIll. The methodology adopted for this project compares the water use savings based on each super-lot, meeting the intent of Compliance, which is achieving best practice and local Council DCP requirements for water use. A second scenario is created based on the Beyond Compliance approach, which includes additional water reuse measures to achieve a total 50% water use reduction.

Metering, historical usage

There are no metering records as the project is at the approval stage.

Comments on Targets

There are two targets for the project. The first one is a Best Practice target, which is to achieve best practice in each use of water at the property. The second one is a Beyond Best Practice target; to reduce potable water use through the implementation of water reuse strategies**.**

2.3.3 WATER BEST PRACTICE

The Water Compliance approach relates to a water use minimisation strategy, which is described below.

Minimising Water Use

Best Practice water use will be achieved through the implementation of best practice water efficient technology and equipment. Through the application of highly water efficient fixtures, fittings and appliances the average Employment Lands water demand is now estimated to be 763 kilolitres per day. This is a 30% reduction compared to standard water use. The design guidelines will specify the use of best practice water efficient use technology and will include the following:

- Water efficient shower roses, minimum 3 star WELS rating
- Water efficient taps, minimum 6 star WELS rating
- Water efficient toilets, minimum 4 star WELS rating
- Water efficient landscaping, designed for the Black Hill climate
- Water efficient non sanitary fixtures and fittings.

Each of the above water efficiency measures will be implemented in each super-lot development via the design guidelines.

The water balance for the Best Practice approach is shown in the table below, categorised into services and water source on a per super-lot basis. The table also shows daily water demand divided into non-sanitary and sanitary uses for a super-lot with a best practice water use system.

WATER USE BEST PRACTICE Employment Lands Water Demand By Water Quality		
Description	**Percent usage by service total**	**kilolitres per day**
Non-Sanitary Use	46.6	355.3
Sanitary Waste Use	53.4	407.7
Total	**100**	**763.0**

The water activity indicators for Employment Lands are twofold; total sanitary water consumed for the project and total non-sanitary water consumed per super-lot. These indicators are reported for the proposed Black Hill development in the table below.

WATER ACTIVITY INDICATORS BEST PRACTICE BLACK HILL	
INDICATORS	**MEASURE**
A= baseline water use per annum (kilolitres)	129,682 Sanitary 148,805 Non Sanitary
Is baseline representative of normal Water use? YES / NO	Yes
B= Impact of variation on water use (i.e. variation from normal) kilolitres per annum	0
C= A – B baseline water use corrected for variation (kilolitres)	129,682 Sanitary 148,805 Non Sanitary
Business Activity Indicators	Super-lot
D= Quantity of Site Business Activity Indicator	22
E= C / D baseline Water use Key Performance Indicator (KPI) (kilolitres)	5,895 Sanitary 6,784 Non Sanitary

2.3.4 WATER - BEYOND BEST PRACTICE

For the Beyond Best Practice approach each super-lot will include the consideration of installation of large rainwater tanks. The total storage capacity of rainwater tanks per super-lot will total 1,000 kilolitre. Rainwater will be used to supply non-sanitary uses of water in each super-lot. In this approach the rainwater tank will be plumbed to the amenities, wash down facilities, cleaning, laundry facilities, cooling towers and the like. The stormwater tank could also be plumbed to the external taps for wash down. These initiatives are predicted to reduce potable water use by 20%. The Beyond Best Practice daily potable water demand is estimated at 544.6 kilolitres. This system was modelled with the consultant's water modelling software, comparable to the DEUS Water Savings Action Plan Framework established for buildings. The model showed a reduction in potable water use of 50%. The table below shows daily water demand for potable water, rainwater use and flow to sewer for a building with a Beyond Best Practice water system.

The water balance for the Beyond Best Practice approach is shown in the table below, categorised into services and water source on a per building basis. The table below shows daily water demand for non-sanitary and sanitary uses for a super-lot with a compliant water system.

WATER USE BEYOND BEST PRACTICE Employment Lands Water Demand By Water Quality		
Description	**Percent usage by service total**	**kilolitres per day**
Sanitary Waste Use	46.6	355.3
Non-Sanitary Waste Use	24.8	189.3
Rainwater Reuse for Non Sanitary Use	28.6	218.4
Total	**100**	**763.0**

The water activity indicators for the Employment Lands are twofold; total sanitary water consumed for the project and total non-sanitary water consumed per super-

lot. These indicators are reported for the proposed Black Hill development in the table below.

WATER ACTIVITY INDICATORS BEYOND BEST PRACTICE BLACK HILL	
INDICATORS	**MEASURE**
A= baseline water use per annum (kilolitres)	129,682 Sanitary 69,088 Non Sanitary 79,717 Rainwater
Is baseline representative of normal Water use? YES / NO	Yes
B= Impact of variation on water use (i.e. variation from normal) kilolitres per annum	0
C= A – B baseline water use corrected for variation (kilolitres)	129,682 Sanitary 69,088 Non Sanitary 79,717 Rainwater
Business Activity Indicators	Super-lot
D= Quantity of Site Business Activity Indicator	22
E= C / D baseline Water use Key Performance Indicator (KPI) (kilolitres)	5,895 Sanitary 3,140 Non Sanitary 3,623 Rainwater

Maintaining Rainwater Quality. To ensure the highest water quality is reused, the project design guidelines will include a specification for rainwater quality and rainwater pre-treatment measures that are required to be installed at each super-lot, so to ensure that the water entering the tank is clean. These include;

- First flush diverters
- Inlet screening for mosquitoes
- Leaf guards

For all water supplied to the buildings on the super-lot, a standard treatment system and filter package will be required to be installed. The package could include a backwash sand filter and a UV filter.

Summary of Measures

BEST PRACTICE is achieved with the following measures:-

1. Water efficient shower roses, minimum 3 star WELS rating
2. Water efficient taps, minimum 6 star WELS rating
3. Water efficient toilets, minimum 4 star WELS rating
4. Water efficient landscaping, designed for the Black Hill climate

Beyond Best Practice, in addition to the initiatives listed in best practice the following measures are included:-

1. 1,000 kilolitre rainwater tanks with connection amenities wash down facilities, cleaning, laundry facilities, cooling towers and the like for each super-lot.

3. IMPLEMENTATION & REVIEW

The purpose of this report demonstrates that the Black Hill super-lot developers can meet the DEUS Water Savings Action Plan Framework best practice water use, at the time of making a building approval application. The second purpose of the report is to demonstrate that super-lot developers of can also achieve a 50% reduction in water use, in a beyond best practice strategy. The implementation of the Water Savings Action Plan will commence at the Design Development phase of the project and operate in each phase of the project construction. This plan will be incorporated into the developer's corporate and annual plans to ensure its implementation is monitored. A review of this project should be conducted in line with the developer's EMS requirements.

4. CONCLUSION

The proposed 22 super-lot Employment Lands development at Black Hill can achieve best practice with the intention of the NSW Water assessment. A strategy "Beyond Best Practice " has been developed to achieve a 50% reduction in water use for each super-lot. Whilst the developer is not undertaking these strategies they should be promoted to each super-lot purchaser. The quantifiable outcomes of both approaches are set out below.

The table below shows the water Baseline compared with best practice and Beyond Best Practice approaches.

WATER SAVING PREDICTIONS			
INDICATORS	**BASELINE**	**BEST PRACTICE**	**BEYOND BEST PRACTICE**
A= baseline water use p.a. (kilolitres)	185,260 Sanitary 212,579 Non Sanitary	129,682 Sanitary 148,805 Non Sanitary	129,682 Sanitary 69,088 Non Sanitary (79,717 Rainwater)
Equivalent Assessment Reduction Score		30%	67%
Is baseline representative of normal water use? YES / NO	Yes	Yes	Yes
B= Impact of variation on water use (i.e. variation from normal) p.a. (kilolitres)	0	0	0
C= A – B baseline water use corrected for variation (kilolitres)	185,260 Sanitary 212,579 Non Sanitary	129,682 Sanitary 148,805 Non Sanitary	129,682 Sanitary 69,088 Non Sanitary (79,717 Rainwater)
Business Activity Indicators	Employment Lands Super-lot	Employment Lands Super-lot	Employment Lands Super-lot
D= Quantity of Site Business Activity Indicator	22	22	22
E= C / D baseline Water use Key Performance Indicator (KPI) p.a. (kilolitres)	8,421 Sanitary 9,663 Non Sanitary	5,895 Sanitary 6,784 Non Sanitary	5,895 Sanitary 3,140 Non Sanitary 3,623 Rainwater

Water Best Practice

The Water Best Practice approach to water use reduction achieves an estimated annual water savings of 5,404 kilolitres per lot per day. The total water savings over the estate is estimated at 118,910 kilolitres per annum. Water saving measures include water efficient taps and fittings, collecting stormwater at each lot to supply toilet flushing and landscape watering. Incorporating these measures are predicted, according to the assessment tool, to reduce water use by 30%

Beyond Best Practice

The Beyond Best Practice approach to water use reduction achieves an estimated annual water savings of 9,049 kilolitres per lot per day. The total water savings over the estate is estimated at 199,078 kilolitres per annum. Water saving

measures include collecting rainwater at each super-lot to supply toilet flushing and other non sanitary water uses. Incorporating these measures are predicted, according to the water assessment tool, to reduce water use by 67%.

PART 4

VEHICLE MANAGEMENT PLAN

1. MANAGEMENT PLAN FRAMEWORK

This Vehicle Management Plan (VMP) has been prepared for the Black Hill Employment Lands development in response to the Director General's Requirements under Section 75F of the Environmental Planning and Assessment Act 1979 issued as part of the assessment requirements for this development. The proposed Black Hill estate is a 22-super-lot subdivision

This report identifies the opportunities and strategies for increasing public transport usage and pedestrian and bicycle accessibility and thus to minimise vehicle dependency. The land developer does not benefit directly from the savings made by any investment in minimising car dependency. The lot owner is the direct beneficiary of such an investment. If this report was written from the developer's perspective no measure would be cost-effective and therefore no minimisation of car dependency measures would be implemented.

2. VEHICLE MANAGEMENT PLAN

This Vehicle Management Plan created for the proposed Black Hill land subdivision has been prepared to address the following topics:

1. Overview and introduction to the business
2. Identification of baseline Transport usage
3. Identification of the efficiency opportunities
4. Car dependency minimisation management actions
5. Car dependency minimisation measures
6. Implementation and Review

2.1 OVERVIEW

It is proposed to develop a 22-super-lot Employment Lands subdivision in the Black Hill area. The project's transport consultant has reviewed transport infrastructure in its report "Lower Hunter Land Development, Northern Estate Black Hill Traffic and Transport". The Roads and Traffic Authority has been consulted in order to identify essential linkages to existing transport infrastructure.

The Vehicle Management Plan aims to reduce greenhouse gas emissions and the use of motor vehicles in Black Hill. A direct environmental indicator of greenhouse transport is the estimated vehicle kilometres of residents living in the development. The Vehicle Management Plan includes initiatives for Black Hill that could reduce the number of Employment Lands vehicle trips. The average Australian resident undertakes 10 trips per day to attend to work, entertainment, shopping and other activities. The Black Hill Vehicle Management Plan seeks to tackle the key reasons for vehicle travel; being trips to work, entertainment, shopping and schooling.

2.2 IDENTIFICATION OF BASELINE CAR USE

The baseline car dependency for the proposed 22 super-lot Employment Lands subdivision is based on the traffic consultants assessment included in the Hyder EA report. Traffic generation rate for the Black Hill site is proposed to be 0.58 (AM Peak) and 0.70 (PM peak) trips per 100 square metres GLFA respectively.. The result shows that the Black Hill site could generate between 4,600 and 5,600 peak hour trips when the site is fully developed.

2.3 IDENTIFICATION OF THE EFFICIENCY OPPORTUNITIES

2.3.1 MANAGEMENT REVIEW

A management review was conducted of the key areas of Coal & Allied's performance in car dependency minimisation. These included the following:

- Senior management commitment to, and involvement in car management
- Understanding of VKMs savings potential at operations and maintenance levels, and within new capital works
- Management of energy targets and key performance indicators
- VKM monitoring
- VKM management reporting
- Transport supply management and alternative energy supply options
- Incorporation of car management into operating and maintenance procedures
- Accountabilities for car management
- Training and awareness procedures
- Best Practice with legal or other requirements.

The response and scoring of management to the above questions is shown in the table below.

Area	Review Area	Rating				
		Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice
A	Senior management commitment					
B	Understanding of VKM savings potential					
C	VKM targets and key performance indicators					
D	VKM monitoring					
E	VKM management reporting					
F	Transport supply management					
G	Operating and maintenance procedures					
H	Accountabilities for car management					
I	Training and awareness procedures					
J	BEST PRACTICE with legal and / or regulatory requirements					

The management review indicates that Coal & Allied Industries has adequate systems in place to manage the implementation of the VMP. The three management areas to be addressed for this project are listed in the next table.

Project No	Car Management Action	Responsibility	Planned Completion Date	Actual Completion Date
BH-1	Confirm energy targets for Black Hill. **Step 1.** Review and amend project brief and tender documents to incorporate VKM targets for project. **Step 2.** Obtain PCG approval and have noted in Environmental Actions. **Step 3.** Communicate to staff and consultant team.	Project Director/General Manager	Three months Part 3A approval	
BH-2	Increase project team awareness of energy saving opportunities. **Step 1.** Consult with Newcastle Climate Action coalition and visit leading project sites. **Step 2.** Obtain PCG approval for awareness training plan. **Step 3.** Senior staff and development consultants attend site visits and workshops.	Project Director/General Manager	Three months Part 3A approval	
BH-3	Establish strategy for metering for the project, including feedback to building occupier for VKM saving opportunities. **Step 1.** Consult with DoT on remote metering and building occupier feedback options and obtain costings. **Step 2.** Obtain PCG approval for budget to investigate options. **Step 3.** Communicate results to PCG to determine if implementation is viable.	Project Director/General Manager	Three months Part 3A approval	

2.3.2 TECHNICAL REVIEW

Name of the Assessor

Francis Barram, EnSight, Unit 1/37 Cordelia Street, South Brisbane, Queensland, 4101.

Description of the site and methodology used

Black Hill is located on the northwest of Newcastle. 22-super-lot Employment Lands will be made available from the proposed land development at Black Hill. The methodology adopted for this project identifies opportunities to reduce car dependency whilst maintaining mobility and access to key destinations.

Comments on Targets

There are two targets for reducing local and regional car usage. These are:

1) Reduce car dependency through providing and promoting Public transport and pedestrian and cyclist access, integrating key destination points and;

2) Ensure the development is well linked with existing transport Infrastructure

2.3.5 MINIMISATION OF CAR DEPENDANCY

A reduction in the usage of personal vehicles results in lower vehicle emissions, energy consumptions and increased cost effectiveness. The provision of alternative transport methods and increased accessibility to key destination points can minimise car usage. Several opportunities to reduce car dependency of lot owners have been identified:

Local Transport

a. Providing Pedestrian Access
b. Providing convenient access to key destination points (offices, retail, recreation and employment)

Regional Transport

a. Providing Bicycle Access
b. Providing Public Transport
c. Provision of direct access to the Freeway

Other things to think about include- transit corridors, planning for future upgrades/bypasses. Ensure roads are suitable for buses, proximity to employment nodes and are they aligned with other developments and future proposed developments.

2.4 DESCRIPTION OF MEASURES

Minimisation of car dependency could be achieved with the following measures;

1. Provide accessible pedestrian ways to connect to public domains
2. Provide, estate accessible convenience shopping cafes, and support facilities to reduce vehicle-kilometres (vkms) from necessary supplies.
3. Provide an integrated bikeway network to existing regional public infrastructure.
4. Support the use of an electric or hybrid community bus to link to existing regional public infrastructure.

Additional information for minimising car dependency

Provide accessible pedestrian ways to connect to public domains. Pedestrian ways that interconnect and provide employees with easy walking access. The diverse facilities and mix of employment opportunities in the Employment Lands will create a safe, convenient and attractive development.

Provide estate accessible convenience shopping, cafes, and other support facilities to reduce vehicle-kilometres (vkms) from necessary supplies. The Black Hill development will include diverse facilities and mix of businesses, cafes, retail and offices in a single precinct which could create a safe, convenient and attractive development. This strategic inclusion of mixed development will reduce out-of-development travel requirements typical of standard Employment Lands.

Provide an integrated bikeway network to existing regional public infrastructure. Bikeways will interconnect and provide employees with easy cycling access around the development. The diverse facilities and mix of light industrial, cafes, offices and retail could create a safe, convenient and attractive business complex that reduces the need for car trips for employees.

Support the use of a hybrid electric vehicle (HEV) as the community bus to link to existing regional public infrastructure. (HEV) could be used at Black Hill and connect the community to Newcastle and the broader public transport system. It is proposed that the proponent consider the use of HEV for the local buses. HEV buses could provide the regular services around Black Hill, improving mobility, reducing traffic movements and improving air quality. The public transport system for Black Hill residents could be planned to reduce vehicle trips and to facilitate residents in being less dependent on cars.

HEV buses combine a conventional propulsion system with an on-board rechargeable energy storage system to achieve better fuel economy than a conventional vehicle, without being hampered by range. HEV busses are considered environmentally sound and economically viable. They are efficient and have reduced greenhouse gas emissions, with up to 45 percent better fuel economy than diesel buses and 100 percent improvement compared to natural gas on an energy-equivalent basis.

3. IMPLEMENTATION & REVIEW

The purpose of this report is to demonstrate that the super-lot purchasers of the proposed Black Hill Employment Lands can meet environmental planning and ESD design guideline requirements at the time of making a building approval application. These guidelines are followed in order to minimise private vehicle usage. The implementation of this Vehicle Management Plan should commence at the Design Development phase of the project. This plan should be incorporated into the developer's corporate and annual plans to ensure its implementation is monitored. A review of this project should be conducted in line with the developer's EMS requirements as set out in the ESD section of this report.

4. CONCLUSION

The proposed 22 super-lot Employment Lands at Black Hill will utilise ESD design principles to reduce the usage of personal vehicles through increasing alternative transport options and improve mobility. A strategy to minimise car dependency has been developed to reduce vehicle emissions and energy consumption, ultimately increasing cost effectiveness for the lot owner. Coal & Allied is proposing to undertake the development of a integrated pedestrian and bicycle way and the inclusion of support facilities including convenience retail facilities to reduce car dependency.

The proponent of the Black Hill Employment Lands development will minimise car dependency with the following measures;

1. Provide accessible pedestrian ways to connect to public domains
2. Provide, estate accessible support offices, retail, convenience shopping, cafes and other services to reduce vehicle-kilometres (vkms) from necessary suppliers.
3. Provide an integrated bikeway network.
4. Support the use of an electric or hybrid community bus to link to existing regional public infrastructure.

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[i] principles. (n.d.). Dictionary.com Unabridged (v 1.1). Retrieved October 14, 2007, from Dictionary.com website: http://dictionary.reference.com/browse/principles