AngloGold Ashanti Australia

Independence Group NL

Tropicana Gold Project

Public Environmental Review

September 2009

EPA Assessment No: 1745 EPBC No: 2008/4270

360 environmental

TROPICANA GOLD PROJECT

PUBLIC ENVIRONMENTAL REVIEW

September 2009

Tropicana Joint Venture

EPA Assessment No: 1745

EPBC No: 2008/4270

Date	Revision	Description of Revision	Originator	Review	Project Approval
17/2/2009	A	Issued draft for AGAA Review	MR,BL, HN	BB	DG
26/2/2009	B	Issued draft for Joint Venture Review	MR,BL, HN	DG, BB, CB, OA	DG
13/3/2009	C	Issued draft for Joint Venture Review	MR, BL, HN	BB, DG, TK, CB	DG
20/3/2009	D	Issued for EPASU Format Review	MR, BL, HN	EPASU	DG
4/04/2009	E	Issued for DMA Review	BL, FD	DMA	DG
24/07/09	F	Issued draft for AGAA Review	FD, BL	TJV	BB
31/07/09	G	Issued for EPASU Review	FD, BL, BB	EPASU	BB
14/09/09	H	Issued for EPASU Review	FD, BL, BB	EPASU	BB
16/09/09	I				Approved for release by EPASU

INVITATION TO MAKE A SUBMISSION

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal. Both electronic and hard copy submissions are most welcome.

The Tropicana Joint Venture (the Joint Venture) proposes to develop the Tropicana Gold Project (the Project), a gold mine located approximately 330 km northeast of Kalgoorlie and 200 km east of Laverton. In accordance with the *Environmental Protection Act 1986* (EP Act) and the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act; via the Bilateral Agreement between the Federal Government and State), a Public Environmental Review (PER) has been prepared which describes this proposal and its likely effects on the environment. The PER is available for a public review period of eight weeks from 28 September 2009 closing on 24 November 2009.

Comments from government agencies, non-government organisations and the public will help the EPA and to prepare an assessment report in which it will make recommendations to government.

WHERE TO GET COPIES OF THIS DOCUMENT

A CD-ROM version of the PER will be provided by the Joint Venture on request. An electronic copy of the PER and appendices are available from the website: http://www.tropicanajv.com.au/irm/content/projects_goldvpublicenviron.html.

WHY WRITE A SUBMISSION?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents unless provided and received in confidence subject to the requirements of the *Freedom of Information Act 1982*, and may be quoted in full or in part in the EPA's report.

WHY NOT JOIN A GROUP?

If you prefer not to write your own comments, it may be worthwhile joining with a group interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

DEVELOPING A SUBMISSION

You may agree or disagree with, or comment on, the general issues discussed in the PER or the specific proposal. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal more environmentally acceptable.

When making comments on specific elements of the PER:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable; and,
- suggest recommendations, safeguards or alternatives.

POINTS TO KEEP IN MIND

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- refer each point to the appropriate section, chapter or recommendation in the PER;
- if you discuss different sections of the PER, keep them distinct and separate, so there is no confusion as to which section you are considering; and,
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name;
- address;
- date; and,
- whether you want your submission to be confidential and the reason why you want your submission to be confidential.

Information in submissions will be deemed public information unless a request for confidentiality of the submission is made in writing and accepted by the EPA. As a result, a copy of each submission will be provided to the proponent but the identity of private individuals will remain confidential to the EPA.

The closing date for submissions is: [24 November 2009]

The EPA prefers submissions to be made electronically using one of the following:

- the submission form on the EPA's website: www.epa.wa.gov.au/submissions.asp;
- by email to submissions.eia@dec.wa.gov.au;
- by email to the officer kaylene.carter@dec.wa.gov.au. or

Alternatively, submissions can be:

- posted to: Chairman, Environmental Protection Authority, Locked Bag 33, CLOISTERS SQUARE WA 6850, Attention: (Kaylene Carter); or
- delivered to the Environmental Protection Authority, Level 4, The Atrium, 168 St Georges Terrace, Perth, Attention: (Kaylene Carter); or
- faxed to (08) 6467 5562.

If you have any questions on how to make a submission, please ring the EPA assessment officer, Kaylene Carter (08) 64675413.

Table of Contents

List of Tables

List of Figures

List of Plates

LIST OF ATTACHMENTS AND APPENDICES

EXECUTIVE SUMMARY

This document and supporting appendices comprise the Public Environmental Review documentation for the proposed Tropicana Gold Project (the Project), located approximately 330 km east northeast of Kalgoorlie and 200 km east of Laverton, on the western edge of the Great Victoria Desert in Western Australia (Figure ES1). The Project is subject to the State environmental impact assessment process legislated under the *Environmental Protection Act 1986* (EP Act) and a Federal assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Federal assessment is being carried out via the Bilateral Agreement between the State and Federal Governments.

The proponent for the Project is the Tropicana Joint Venture (the Joint Venture) which commenced in 2002. The Joint Venture is a partnership between AngloGold Ashanti Australia Ltd (AngloGold; 70 % stakeholder and manager) and Independence Group NL (30 % stakeholder). The Joint Venture aims to develop the Tropicana and Havana gold deposits and adjacent satellite deposit which will form the basis of the Project.

The Tropicana Gold Project

The Project is a proposed open-cut gold mine focused on the Tropicana and Havana deposits, with supporting infrastructure. At its maximum expected potential, the Project would operate for approximately 15 years to extract the potential resource resulting in clearing of up to 3,440 ha of vegetation. Key characteristics of the Project are shown in Table ES1.

Despite the relative proximity to the mining hub of Kalgoorlie, the region surrounding the proposed Project is characterised by a lack of infrastructure. This Public Environmental Review (PER) is for gold mining, processing activities and associated infrastructure for the proposed Project (Figure ES1; refer Map Attachment 1) including the:

- Operational Area – a proposed gold mine including the pit(s), waste landforms, stockpiles, tailings storage facility, processing plant, water storage dams, power station, internal roads, administration block(s), village, aerodrome and other supporting infrastructure (Figure ES2);
- Infrastructure Corridor(s) – an access road and communications corridor to link the Operational Area to existing communications and road networks at Kalgoorlie. Two options have been considered - the Pinjin Option is the confirmed route for the mine access road and the Tropicana-Transline option is the preferred route for the fibre optic communications corridor; and,
- Water Supply Area – two options have been considered, the Minigwal Trough and the Officer Basin Water Supply Areas. The Minigwal Trough has been confirmed as a suitable source of water for the Project.

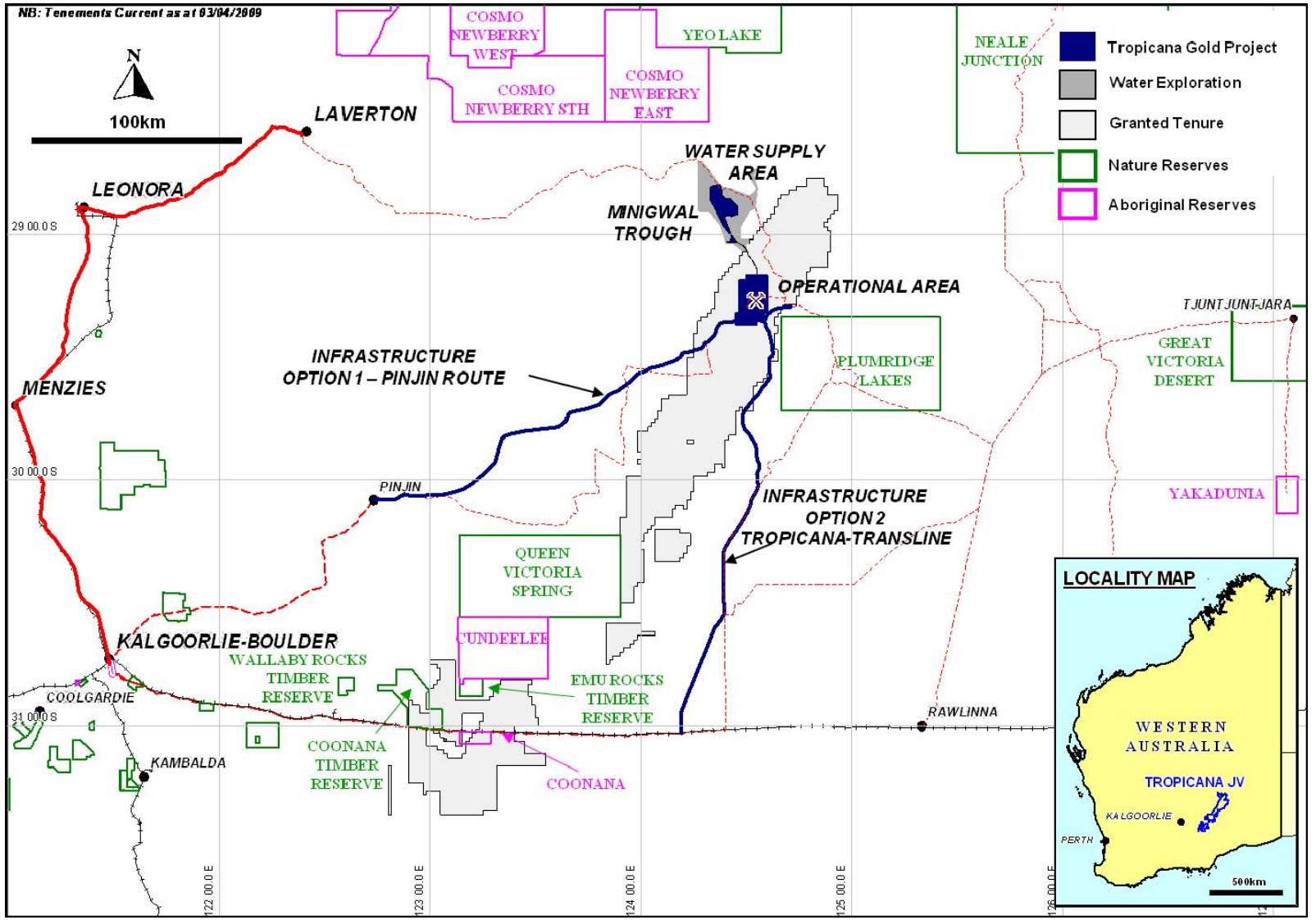
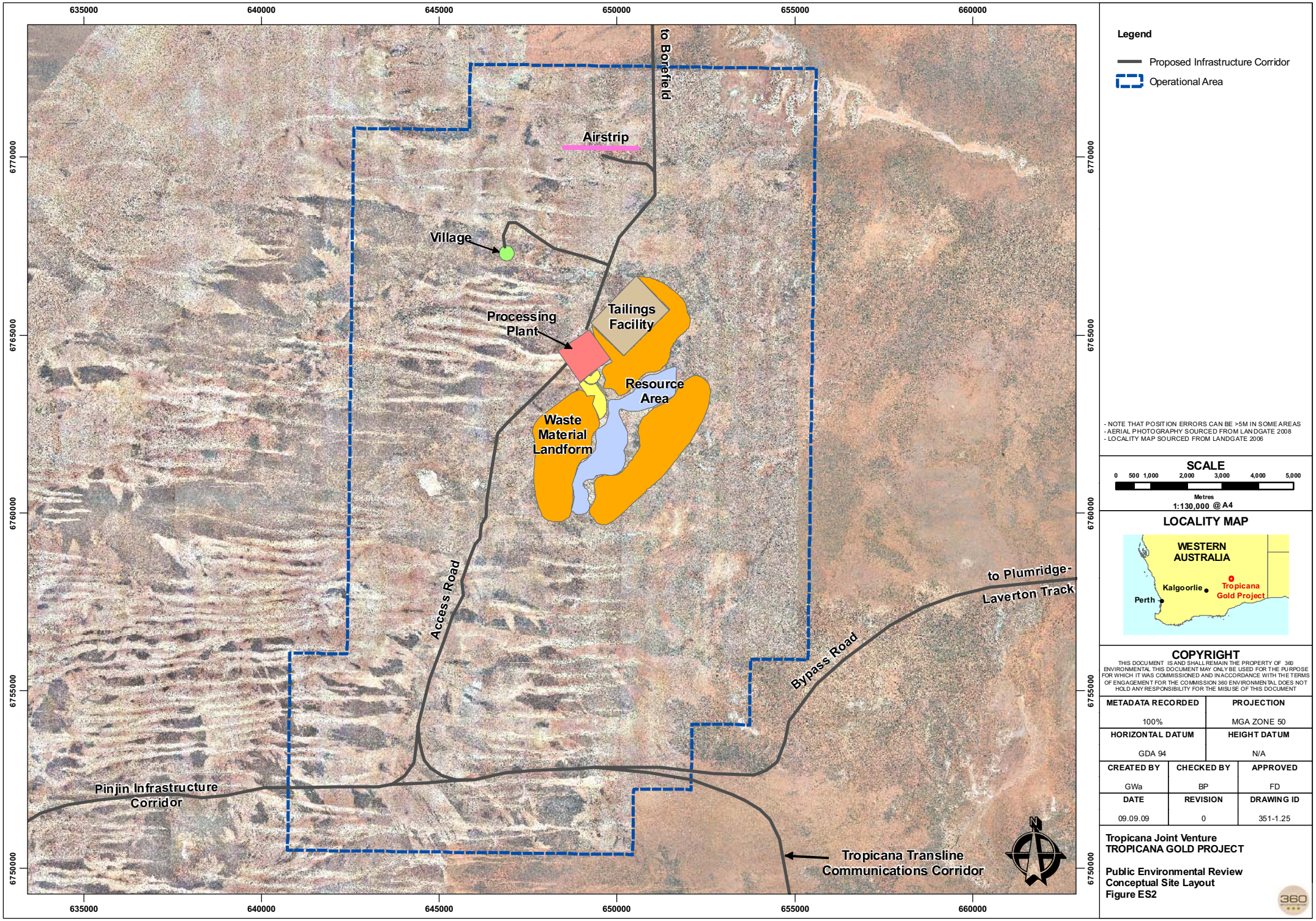


Figure ES1: Location of the Proposed Tropicana Gold Project

Table ES1: Project Characteristics

Element	Description
Current Resource:	
Resource Tonnes	75.3 Mt
Resource Grade	2.07 g/t
Estimated Gold Resource	5.01 Moz
Proposed Utilisation of Resource:	
Construction Period	Approximately 30 months, commencing 2010
Mining Rate (ore and waste)	Up to 75 Mtpa
Stripping Ratio	Up to 8:1
Number of Pits	Up to 4
Open Pit Void(s)	Up to 400 ha
Maximum length of pit	6 km
Maximum width of pit	1.5 km
Pit Depth	Up to 400 m
Overburden Volume	Up to 800 Mt
Waste Landform	Up to 1,200 ha; some in-pit dumping being considered. Maximum height of 375 mRL Slope with a maximum angle of 15˚
Processing Plant and Rate	Carbon In Leach plant with processing rate of up to 7 Mtpa
Water Supply	Up to 7 Mm^3 /annum Borefield located 50 km NNW of Operational Area Pipeline length of 50 km
Dewatering Rate	1,000 – 5, 000 kL/ day
Major Components:	
Mine Access Road	Pinjin Option – 370 km (~ 210 km of road construction)
Communications	Fibre Optic or Microwave via either Pinjin or Tropicana-Transline Corridor
Aerodrome	All weather strip 2.4 km long
Power Supply	Onsite power station with an installed capacity of up to 40 MW during the operational phase. Temporary generators will be used during construction, with a maximum capacity of 2 MW
Tailings Storage Facility	Up to 7 Mtpa; two-cell Paddock tailings storage facility with possible in-pit deposition Maximum height of 372 mRL Approximately 1330 m wide by 1850 m
Village	Construction phase – up to 700 rooms Operational phase – up to 450 rooms
Workforce	Construction – up to 700 Operational – up to 400
Life of Mine:	
Project Life	Approximately 15 years of mining; total project duration up to 25 years (including post closure monitoring)
Approximate maximum area of disturbance	3,440 ha
Estimated CO_2 Emissions	Up to 330 kt $CO_{2\text{-}e}$/ year during operations and 4,500 kt $CO_{2\text{-}e}$ over the life of the Project



Legend

- Proposed Infrastructure Corridor
- Operational Area

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- AERIAL PHOTOGRAPHY SOURCED FROM LANDGATE 2008
- LOCALITY MAP SOURCED FROM LANDGATE 2006

SCALE

0 500 1,000 2,000 3,000 4,000 5,000

Metres

1:130,000 @ A4

LOCALITY MAP

METADATA RECORDED	PROJECTION
100%	MGA ZONE 50
HORIZONTAL DATUM	**HEIGHT DATUM**
GDA 94	N/A

CREATED BY	CHECKED BY	APPROVED
GWa	BP	FD
DATE	**REVISION**	**DRAWING ID**
09.09.09	0	351-1.25

Tropicana Joint Venture
TROPICANA GOLD PROJECT

Public Environmental Review
Conceptual Site Layout
Figure ES2

Environmental Assessments

A referral document was prepared in accordance with Section 38 of the EP Act and submitted to Western Australia's Environmental Protection Authority (EPA) on 30 May 2008. The EPA determined that a formal environmental impact assessment should be carried out via a PER level of assessment with an eight week public comment period. No appeals were received on the level of assessment. An Environmental Scoping Document (ESD) was prepared according to Section 6.1 of the EPA's Environmental Assessment (Part IV Division 1) Administrative Procedures 2002 and was approved by the EPA on 18 March 2009 (Appendix 4).

The Joint Venture referred the Project to the Federal Department of the Environment, Water, Heritage and the Arts (DEWHA) as a potential 'controlled action' under the EPBC Act on 9 June 2008. DEWHA confirmed that the Project does constitute a 'controlled action' and that Federal assessment of the Project could occur via the Bilateral Agreement. The Proposal was considered to be a 'controlled action', requiring assessment, due to the following controlling provisions:

- listed threatened species and communities (sections 18 and 18A); and,
- listed migratory species (sections 20 and 20A).

The ESD prepared for the EPA serves as the Terms of Reference for the Federal assessment.

This PER document and supporting appendices has been prepared in accordance with Version 5 of the EPA's Guidelines for Preparing a Public Environmental Review. It also meets the requirements of the EPBC Act.

The purpose of this document is to:

- provide a detailed description of the Project;
- describe activities undertaken by the Joint Venture to engage and consult with stakeholders;
- provide a detailed description of the environment in and around the proposed project;
- describe the results of the Project-specific environmental risk assessment process;
- describe potential environmental impacts of the Project;
- explain the environmental management framework for the Project;
- present the results of environmental studies that have been completed for this environmental impact assessment; and,
- present management strategies for incorporation into the Project's Integrated Management System.

Environmental Approach

The Joint Venture's environmental objective for the Project was to establish a mine for the future that meets the environmental and social expectations of current and future stakeholders by preventing or limiting impacts on the environmental values of the local area. Recognising the absence of broad scale environmental studies in the Great Victoria Desert, the Joint Venture commissioned extensive surveys to put regional context around the data being collected on the areas proposed for impact. This work has resulted in a significant increase in the knowledge of the biology and geology of the area. The Joint Venture also commissioned an extensive and comprehensive program of archaeological and ethnographic baseline surveys. Ethnographic surveys commenced in 2002 with the grant of the first exploration lease. The baseline heritage surveys for the Project commenced in 2006. Over the 2006 to 2008 period the Joint Venture has commissioned the mapping of vegetation covering

230,000 ha, of which 131,000 ha has been mapped over the Operational Area alone. The Project footprint by comparison equates to 3,440 ha. This has resulted in a significant increase in scientific knowledge for the region.

The Joint Venture has demonstrated a precautionary approach to the management of environmental risk throughout the Project development (including the exploration phase) in the following ways:

- by referring its exploration program to the DEWHA for potential impacts on native species of 'national environmental significance' (EPBC Act);
- undertaking botanical and zoological surveys over a broader area than that proposed for impact, to set an appropriate biological context for the PER impact assessment;
- avoidance of critical habitat during exploration and in the design of the Project;
- deferring potentially high risk activities until adequate data is available to confidently determine the risk level; and,
- in the event that available data did not enable the Joint Venture to be satisfied that the potential risk of their activities was insignificant or manageable, the Joint Venture representatives have engaged with the relevant decision making authorities for advice (e.g. Department of Environment and Conservation [DEC], DEWHA).

This approach will continue into the construction, commissioning, operational, decommissioning and closure phases.

Proposal Description and Justification

The Joint Venture has identified a series of design criteria for the Project that have included (additional criteria are discussed in the body of the document):

- avoid all identified Indigenous heritage sites;
- avoid direct impacts to Declared Rare Flora;
- minimise impacts on ecological communities of conservation interest;
- minimise impacts to fauna protected under the State *Wildlife Conservation Act 1950* (WC Act) and EPBC Act;
- minimise impacts to Threatened and Priority Flora and Fauna;
- minimise impacts on Priority Ecological Communities;
- design an energy and water efficient mine and processing plant;
- listen to, and incorporate, stakeholder feedback for the Project;
- consider closure requirements during all design stages;
- design the waste landform (a series of interconnected waste dumps) to blend into the natural environment;
- design the infrastructure to cope with a 1:100 yr 72 hr rainfall event; and,
- ensure compliance with industry codes and recognised standards such as the International Cyanide Management Code, Australian Standards, Environmental Management Standards (ISO14001) and Safety Management Standards (OHSAS18001).

The primary resource to be extracted and utilised by the Project is gold-bearing ore. The Tropicana and Havana deposits are hosted in gneissic metamorphic rocks; mineralisation has been tested to a typical vertical depth of 300 - 400 m.

The mining method selected for use at the Project is open pit mining with conventional drill and blast techniques and a typical mining fleet (e.g. diesel fuelled trucks and excavators). Ore extraction will occur from open pits. Excavated ore will be hauled to the run of mine pad before processing to extract gold. Marginal material will be stockpiled separately so that it is accessible for processing should economic conditions allow gold recovery.

In the process of extracting the ore, vegetation and overburden/ waste material will be removed and stockpiled as appropriate. For example waste material will be placed in the waste landform, and other resources, including sandalwood and retrievable rehabilitation materials, will be recovered and stored. Planning for the progressive expansion of the waste landform over the life of the Project has considered a range of variables, including:

- locations of the pit ramp exit points from the starter and main pits;
- schedule for the generation of waste material; and,
- engineering constraints (e.g. zone of instability).

The processing facility will consists of the following major process steps:

- primary and secondary crushing;
- grinding via high pressure grinding rolls;
- ball milling;
- thickening, followed by leaching and carbon adsorption;
- carbon elution, carbon regeneration and electrowinning;
- thickening and tailings disposal; and,
- tailings water recovery.

The tailings storage facility planned for the Project has been designed around the following requirements:

- permanent and secure containment of all solid waste materials;
- removal and reuse of free water;
- minimisation of seepage;
- excess storage capacity to retain a 1 in 100 year 72 hour event; and,
- timely and effective rehabilitation.

Water is required for numerous uses in the mine, processing facilities, administration areas and village. Discovery of a suitable and sustainable water supply was one of the critical items for the Project. Water exploration identified a source of suitable quality and quantity in the Minigwal Trough. Water will be pumped via a pipeline from the Minigwal Trough borefield, approximately 50 km from the processing plant. Significant effort has been made to maximise water-use efficiency in all aspects of the Project and thereby minimise abstraction and pumping requirements along the pipeline.

Another critical item for the Project is the selection and construction of a Mine Access Road that is appropriate for the volume and type of road traffic required to support an operating gold mine. Existing tracks to the area were considered inappropriate due to their route through Nature Reserves or through more biologically sensitive areas

(e.g. located near known Declared Rare Flora populations or across Priority Ecological Communities). Two routes were considered by the Joint Venture and the Pinjin Infrastructure Corridor has been confirmed as the preferred route for the Mine Access Road. The Pinjin option was preferred over the Tropicana-Transline (TT) Corridor because it is shorter. It has less light vehicle use currently and will have the lowest greenhouse footprint (a 380 km one way trip to Kalgoorlie over a 480 km one way trip). The road will be a private road, with tenure granted under the *Mining Act 1978* as a Miscellaneous Licence. Management of traffic along road will require ongoing consultation and cooperation between the Joint Venture, adjacent landholders, local councils and other State regulators.

A communications link to existing national infrastructure (for external communication) will be required for the Project. Several options have been considered including fibre optic, microwave and satellite all of which have different environmental and operational advantages. At the present time, fibre optic technology is the preferred option as it provides greater bandwidth and management options, and provides the most reliable connection. A fibre optic cable aligned along the TT is the preferred option. A final decision will be made by the Joint Venture prior to construction. Should an opportunity arrive to install the fibre optic cable along the side of the proposed Mine Access Road this option would be preferred but is currently not viable due to infrastructure limitations in the Pinjin area.

A power station of up to 40 MW total installed capacity is required to service the Project. The average continuous electrical load for the Project is estimated at 27 MW. Several options have been considered by the Joint Venture including:

- traditional diesel or gas fuelled generator;
- generator fuelled with waste oil;
- solar thermal generation with fossil fuel back up power (hybrid system); and,
- grid power from Kalgoorlie.

The power supply selected for the Project will need to take into consideration the technical, economic and environmental risks associated with each option. The Joint Venture recognises the potential advantages in reducing greenhouse emissions through the selection of the solar thermal option, with a diesel fired power plant as a back-up. However, the Joint Venture also recognises that this option would result in the largest clearing impact, was found not to be commercially viable in the current fiscal regime and is untested in a remote resources project therefore presenting a significant technical risk. As a result of the Joint Venture evaluations it has been determined that the site will have an onsite fossil fuel powered power station. The power station will be designed to be fueled by diesel, waste oil or gas. At the current time gas is supply constrained in the WA market. Should a gas supply become available either during construction or operational phases of the Project a gas pipeline could be installed once all relevant approvals are obtained via a separate process to this PER.

Supporting infrastructure including an accommodation village and upgraded aerodrome will also be required to support the Project.

Stakeholder Engagement and Consultation

The Joint Venture defines a stakeholder as an individual, group or government body that can potentially influence, or are potentially influenced by, the Project. With the commencement of exploration activities within the region in 2002, the Joint Venture established communication channels with a wide range of interested parties which included the local Indigenous community, government departments and the local councils. The Joint Venture recognises the importance of an open and transparent approach to stakeholder consultation. Formal consultation has occurred between the Joint Venture and various Indigenous and environmental interest groups, local government agencies and State and Federal regulatory bodies and the general public.

Key messages the Joint Venture have continued to communicate and demonstrate are:

- the Joint Venture is and will comply with environmental regulations with regard to approvals, construction and operation of the Project. The Joint Venture partners have an excellent track record of environmental performance and the Project will be implemented in such a way that impacts are avoided, minimised, mitigated or are offset, as a last resort only;
- the Joint Venture will aim to contribute positively to environmental management in the region as a result of the Project;
- the Joint Venture is on target to have the Project under construction in 2010. Project updates are available to key stakeholders if and as required;
- the Joint Venture will work with local communities to seek mutually beneficial outcomes; and,
- the Joint Venture is pro-actively managing greenhouse gas emissions.

Environmental Protection and Management

The Joint Venture is committed to managing its activities in an environmentally and socially responsible manner. Environmental Management of the Project will be influenced by the International Council of Mining and Metal's Sustainable Development Principles, the Mineral Council of Australia's Enduring Values of Sustainable Development and the core Environmental Protection Authority principles:

- the precautionary principle;
- the principle of intergenerational equity;
- the principle of the conservation of biological diversity and ecological integrity;
- principles relating to improved valuation, pricing and incentive mechanisms; and,
- principles of waste minimisation.

Along with State and Federal legislation, these national and international principles and values drive the environmental protection framework of the Project's Integrated Management System (IMS), as it relates to environmental and social issues. The framework for management of the Project will be closely modeled on AngloGold's successful business and management structure. The IMS for the Project will incorporate environmental, community, safety and health, operational and legal compliance requirements. Key elements of the IMS will include:

- commitment and policy;
- planning;
- implementation and operation;
- inspecting and corrective action; and,
- management review.

Central to the Project IMS are:

- Tropicana Gold Project Integrated Management System Manual;
- Construction Environmental Management Strategy;
- Operational Environmental Management Strategy; and,
- Conceptual Closure and Rehabilitation Strategy.

These documents are included in the Appendix Series 3 of this document. Specific management strategies for threatened species and communities, heritage and tailings management are also included. They describe the performance indicators, targets and management actions required to achieve the Joint Venture's objectives.

Existing Environment

The Project is located predominately within the Great Victoria Desert (GVD) Interim Biogeographic Region of Australia (IBRA), the start of the Pinjin Infrastructure Corridor is located in the Murchison IBRA region and the southern proportion of the Tropicana-Transline (TT) Corridor is located in a transition zone between the Coolgardie and Nullarbor IBRA regions. The majority of the GVD is vacant crown land with some conservation reserves and Indigenous lands. Pastoral development in the bioregion is confined to a few peripheral areas in the south and east where water and feed are available in some years, depending largely on climatic conditions.

The GVD is dominated by longitudinal sand dunes with a predominant east-west orientation and ring dunes separated by interdune corridors (or swales) and sand plains. The majority of the Operational Area lies in a broad valley between an extensive yellow/ orange sand dunefield and a local high point. The drainage catchments upstream of the Project Operational Area and Infrastructure Corridors are generally characterised by low relief, poorly defined drainage lines and areas with strongly linear sand dunes and internal drainage. The region's climate is hot and persistently dry, with evaporation greatly exceeding average rainfall.

Groundwater within the Operational Area occurs mainly in fractures and joints in the deeper basement rock, with most porosity and permeability occurring in the lower saprolite and the underlying sap-rock. Groundwater recharge rates over the Albany-Fraser Range are very low, estimated at less than 0.5 % of annual rainfall. Consequently, groundwater salinities are high, ranging from 10,000 to 40,000 mg/L TDS within the Operational Area. Groundwater levels fluctuate between 20 and 30 m below ground.

Prior to the commissioning of baseline surveys for the Project, there was limited baseline environmental knowledge for the proposed impact zones of the Project. The Joint Venture commissioned extensive environmental surveys on a large scale to allow context to be put around the data being collected on the areas proposed for the Project. Biological surveys for the purpose of impact assessment commenced in August 2006 to describe the existing environment. In addition, the Joint Venture has (and continues to) participate in regional studies in conjunction with the DEC and local interest groups to assist in reducing the knowledge gap in the region.

The Joint Venture has:

- developed detailed vegetation maps for approximately 230,000 ha of native vegetation;
- undertaken baseline surveys for terrestrial and subterranean fauna;
- engaged threatened fauna specialists to conduct specific threatened fauna surveys;
- conducted or assisted with threatened flora and/ or fauna assessments in the Queen Victoria Spring, Plumridge Lakes and Neale Junction Nature Reserves; and,
- assisted with a Feral Camel Density Survey over the southern part of the Great Victoria Desert.

ecologia Environment (*ecologia*), Mattiske Consulting and Botanica Consulting were commissioned to undertake botanical surveys of the proposed disturbance areas of the Project. Eleven major vegetation communities were identified by *ecologia* within the 131,000 ha survey area around the Operational Area. Six major plant communities were identified along the Pinjin Infrastructure Corridor (20,000 ha). Nine major plant communities were identified along the Tropicana-Transline Corridor (TT Corridor) (43,000 ha). Five major vegetation communities were described in the Water Supply Area survey area (44,000 ha). None of the vegetation communities identified across the Operational Area, Pinjin Infrastructure Corridor, TT Corridor or Water Supply Area are listed as Threatened Ecological Communities under either State or Federal legislation. However,

communities within or adjacent to the survey areas around the Operational Area and both Infrastructure Corridors show possible similarities with the 'Yellow sandplain communities of the Great Victoria Desert' which has recently been listed as a Priority Ecological Community (PEC). At present, detailed descriptions and regional mapping for this PEC are not available which does impede a thorough analysis of impacts. The Joint Venture has adopted a precautionary approach in the absence of detailed information, and has aimed to minimise its impacts on the PEC.

The only one formally protected, threatened flora species located during the surveys was *Conospermum toddii* (Victoria Desert Smokebush), which is listed as Endangered under the EPBC Act and Schedule 1 under the WC Act. All known locations of *C. toddii* are located outside of the proposed impact areas of the Project. Twenty Priority species were recorded across the combined survey areas; most are located outside of the disturbance areas. The following three species will have greater than 5% of the known populations (including regional data) removed by the Project:

- *Acacia eremophila* numerous-nerved variant;
- *Acacia eremophila* var. *variabilis*; and,
- *Eucalyptus pimpiniana*.

ecologia, Ninox Wildlife Consulting, Jeff Turpin (Waru Pty Ltd), URS Australia, Joe Benshemesh, Martin Schultz, Glen Gaikhorst and Cathy Lambert were commissioned to undertake various vertebrate fauna surveys over the Operational Area, Infrastructure Corridors and Water Supply Area. No mammalian species of conservation interest were captured during the surveys. The surveys did however identify signs of the Marsupial Mole ('mole holes', inferred to be made by the Southern Marsupial Mole, [*Notoryctes typhlops*]) and habitat apparently suitable for the Sandhill Dunnart (*Sminthopsis psammophila*) and Mulgara (*Dasycercus blythi*). Localised impacts are expected for the Marsupial Mole, evidence of which has been recorded within the Resource Area. However, the Joint Venture has demonstrated the wide occurrence of the species in the surrounding area and wider region. It is considered unlikely that development of the Project will result in a negative alteration to the conservation status of the Sandhill Dunnart or Mulgara as impacts to potential habitat are being minimised or avoided.

During the surveys, evidence of several bird species of conservation interest (or potential habitat) was recorded in the impact areas. These were the Malleefowl (*Leipoa ocellata*), Peregrine Falcon (*Falco peregrinus*), Australian Bustard (*Ardeotis australis*), Rainbow Bee-eater (*Merops ornatus*) Fork-tailed Swift (*Apus pacificus*), Wood Sandpiper (*Tringa glareola*), Common Greenshank (*Tringa nebularia*) and Crested Bellbird (*Oreoica gutturalis*). The avoidance of potentially suitable Malleefowl habitat will reduce risks of impact to this species, it is therefore considered unlikely that development of the Project will result in a negative alteration to the conservation status of the Malleefowl. Due to the extent of suitable habitat outside the study area for the Australian Bustard, its wide distribution and nomadic nature, the impact of the Project is likely to be negligible and it is considered highly unlikely that development of the Project will result in any negative alteration to the conservation status if the Australian Bustard. The Rainbow Bee-eater is widely distributed in Australia; no significant impacts to this species are expected. Peregrine Falcons are also widely distributed and not anticipated to be significantly impacted. No significant impacts are expected for the other bird species.

One reptilian species, the Woma Python (*Aspidites ramsayi*) (DEC Priority 1) was recorded in the Operational Area.

Areas of high value vertebrate fauna habitat were identified and mapped within the survey areas e.g. sand dunes for Marsupial Moles, areas of mature spinifex for Sandhill Dunnarts and dense Mulga for Malleefowl. Impacts to these habitats are being avoided where possible, and minimised were avoidance is not possible.

ecologia was commissioned to undertake an assessment of the potential occurrence of Short Range Endemic invertebrates within the Operational Area. Several species that are new to science were identified or are

otherwise of conservation interest. All but one species has been located outside of the impact footprint. One putative short range endemic species *Kwonkan* sp. 2 has not been located outside of the footprint and will be fully impacted by the Project, based on its current known range (only a specimen has been sampled). The preferred habitat of the Kwonkan is predicted to extend beyond the impact footprint. None of the sampled invertebrates are listed as protected species and their conservation significance results from the fact that all are new to science, or belong to genera composed predominantly of Short Range Endemic species.

ecologia and Subterranean Ecology were commissioned to undertake desktop assessments and surveys for Stygofauna in the Operational Area and Water Supply Area, respectively. Desktop assessments for both areas suggested that the likelihood of the Joint Venture encountering Stygofauna were low, primarily due to the physical characteristics of the target aquifers being unsuitable for habitation. Follow-up sampling programs were commissioned to test the conclusions of the desktop assessments. Field sampling confirmed that both areas had highly saline groundwater and were otherwise physico-chemically dissimilar to known Stygofauna habitats in Western Australia. No Stygofauna were located in either the Operational Area or the Water Supply Area.

ecologia also undertook sampling for Troglofauna in the Operational Area. Troglobytic species belonging to the following three families were recorded:

- Isopoda (slater);
- Diplura (dipluran); and,
- Chilopoda (centipede).

Currently, the dipluran and centipede have only been located inside the disturbance footprint. The slater has been located both within and outside of the footprint. Work on habitat distribution for troglofauna has demonstrated that the most likely habitat (based on regolith profile and geological structure) is wide spread in the region and although the dipluran and centipede have not been located outside of the footprint in sampling to date, they are likely to be present in the wider area.

Environmental Impact Assessment

The key Environmental Factors for the Project are summarised in Table ES2. Where possible, the layout of the Project has been designed to avoid or minimise environmental impacts (e.g. minimise impact to the yellow/orange dunefield on the western side of the Operational Area which contain preferred habitat for many listed flora species and the Marsupial Mole).

The Joint Venture will obtain and maintain ISO14001 accreditation (or equivalent) over the life of the Project. Documented management strategies have been drafted and will be finalised, maintained and incorporated into the Project's Integrated Management System for environmental aspects that require documented controls to ensure that desired environmental outcomes are achieved. The following key management strategies have been identified and are provided as part of the PER documentation:

- Threatened Species and Communities Management Strategy;
- Heritage Management Strategy;
- Tailings Environmental Management Strategy;
- Construction Environmental Management Strategy;
- Operational Environmental Management Strategy; and,
- Conceptual Closure and Rehabilitation Management Strategy.

The Joint Venture will ensure its management strategies are adapted as new information becomes available and will develop additional management strategies as required.

A research program will support the rehabilitation work and is aimed to understand the restoration requirements for the local area, the ecophysiology of framework species such as spinifex, mulga (*Acacia aneura*) and marble gum (*Eucalyptus gongylocarpa*), seed bank handling, seed catchment understanding, broadcasting, germination and propagation.

Fauna Protected Under the *Environment Protection and Biodiversity Conservation Act 1999*

Matters of potential 'national environmental significance' under the EPBC Act include:

- Marsupial Mole (both the southern and northern forms are listed as Endangered; *Notoryctes typhlops* and *Notoryctes caurinus* respectively)

  Any development of the Project on or in close proximity to dune systems could potentially impact the Marsupial Mole. Targeted surveys for the Marsupial Mole have demonstrated that the species is likely to occur in most of the dune systems in the area. This species may undergo a localised impact due to loss of habitat (e.g. in the area of the pit/ s). However, due to the large areas of sand dunes located in the region, direct impacts from the Project to regional populations of Marsupial Mole are expected to be insignificant.

- Sandhill Dunnart [*Sminthopsis psammophila*] (listed as Endangered)

  Although this species is known to occur in the region, it was not recorded in the surveys. Areas of suitable habitat for the Sandhill Dunnart were recognised in the Operational Area and both infrastructure corridors. Disturbance of dune systems, particularly areas consisting of large spinifex clumps may reduce the area of suitable habitat available to the highly restricted Sandhill Dunnart.

- Malleefowl [*Leipoa ocellata*] (listed as Vulnerable)

  The majority of suitable habitat for Malleefowl in the Operational Area has been burnt within the last 10 years, thus reducing its current suitability as habitat. In addition, all mounds recorded in the Operational Area have been classified as inactive or historical. This suggests that the habitat is not high quality at the present time. However, as the habitat recovers from fire impacts over the next decade and becomes potentially suitable, the likelihood of Malleefowl occurring in the Operational Area may increase accordingly. Signs of Malleefowl (sightings, nest mounds and tracks) were identified in both Infrastructure Corridors and the Water Supply Area. Due to the low level of impact in these areas (e.g. relatively small areas of clearing) the construction of the infrastructure corridor/ s, borefield and pipeline will not significantly impact Malleefowl habitat.

- Crest-tailed Mulgara [*Dasycercus cristicauda*] (listed as Vulnerable)

  A possible inactive burrow of *Dasycercus sp*. was observed on the Operational Area and along the Pinjin Infrastructure Corridor. Recently the Mulgara genus (*Dasycercus*) has undergone taxonomic review and it was found that what has been known as the single species Mulgara (*Dasycercus cristicauda*) is now two distinct species. The distribution of the Brush-tailed Mulgara (*Dasycercus blythi*) lies within the Project area, the inactive burrow is most likely to belong to *D. blythi*. This species is not listed under the EPBC Act. At the time of the survey, the Crest-tailed Mulgara (*Dasycercus cristicauda*) was considered extinct in Western Australia. *D. blythi* is mainly known from sandy dunes or sand plain country with a cover of spinifex, therefore impacts on individuals may occur during the construction of the Infrastructure Corridor in likely habitats.

- Rainbow Bee-eater [*Merops ornatus*] (listed as Migratory)

  This species is a common bird in WA and was observed on many occasions during surveys for the Project. Due to its ability to travel large distances and its diverse habitat preferences, this species is unlikely to be significantly impacted by the Project.

- Night Parrot [*Pezoporus occidentalis*] (listed as Endangered).

  The lack of confirmed sightings of the Night Parrot through most of its former distribution indicates that it is unlikely to occur in the Project footprint; however suitable habitat is present along the Pinjin Infrastructure Corridor. The clearing of suitable habitat, dense low vegetation including spinifex and/ or chenopod shrublands, especially close to water, may potentially impact the ground dwelling parrot.

- Wood Sandpiper [*Tringa glareola*] (listed as Migratory)

  This species was sighted at small lake north of Lake Rebecca. The Wood Sandpiper is typical of well-watered regions, particularly coastal plains and plains about lower courses of larger rivers. Wood Sandpipers are not thought to be impacted by the Project.

- Common Greenshank [*Tringa nebularia*] (listed as Migratory)

  The Common Greenshank was observed at small lake between the Pinjin Station and Lake Rebecca. The species is typical of well-watered regions; casual or vagrant on west-coast islands and in the arid east. The Common Greenshank is not thought to be impacted by the Project.

Heritage Management and Protection

In broad terms, the Operational Area spans lands that may have been used by the Wongatha and Spinifex peoples. Prior to the Tropicana Gold Project, only a very limited number of formal studies had ever been undertaken within the region, as a result there being very limited documented knowledge of Indigenous occupation in the Project area. This general absence of recorded archaeological and ethnographic sites surrounding the Project, is almost certainly a reflection of the lack of surveys prior to the Joint Venture's activities in the area.

The nearest Indigenous communities are located at:

- Laverton and at Cosmo Newberry, both approximately 220 km to the west-northwest;
- Coonana, approximately 225 km to the southwest; and,
- Tjuntjuntjarra, approximately 250 km to the east.

Consultations regarding Indigenous heritage have been an ongoing process that commenced with the first exploration licence applications in 2002. Waru Consulting was commissioned to undertake surveys for archaeological sites across the Operational Area, Infrastructure Corridors, Water Supply Area and water pipeline corridor. A total of 11 sites were discovered and recorded within the Operational Area, with an additional 12 sites discovered during surveys of the supporting infrastructure. Only one site has been found within the 60 km^2 of the Resource Area with the remaining 10 sites located within an estimated 230 km^2 of the remainder of the Operational Area. No sites were found in the Water Supply Area or along the pipeline corridor. The most common archaeological sites were artefact scatters and quarries, with a small number of rockshelter sites.

Management of archaeological heritage involves, in the first instance, avoiding any impact to these sites. The current Project layout and infrastructure planning has taken into account the location of the archaeological sites and been modified as required to achieve site avoidance. No known archaeological sites will be disturbed by the Project.

The initial ethnographic survey which included the Operational Area was conducted with representatives of the Wongatha claimant group in 2002 when the Wongatha Native Title Claim was registered at the National Native Title Tribunal. Since 2002, additional surveys have been undertaken to cover both Infrastructure Corridors, the Water Supply Area and water pipeline corridor. No sites of ethnographic significance have been identified. Consultations are ongoing with a view to engaging with the more remote communities, with support to implement this is coming from Central Desert Native Title Services and members of the current Wongatha community. The dispersed nature of the more remote communities, cultural observances and logistics have acted against broadening the heritage consultations to date.

A draft Heritage Management Strategy has been prepared in conjunction with the Department of Indigenous Affairs, Central Desert Native Title Services, the North East Independent Body and other members of the Indigenous community. Broad consultation has been undertaken to ensure the strategy meets community expectations and is in compliance with respective State and Federal legislation established for the protection of heritage, including the *Aboriginal Heritage Act 1972* and the *Heritage of Western Australia Act 1990*. The principal objective of the Heritage Management Strategy is to prescribe the management practices that will be used by all employees and contractors working within the Project area to ensure the protection and management of all known and any newly discovered Indigenous Sites and other Heritage Sites.

The Joint Venture is committed to working cooperatively with local Indigenous communities, to build relationships to explore opportunities related to the Project's development that will result in enduring beneficial community outcomes. The Joint Venture will build on existing relationships with communities in the Goldfields region and continue to broaden those consultations and engagement with communities and groups with interests in the Great Victoria Desert Region; which will include working with agencies such as the Central Desert Native Title Service (CDNTS) and others. As part of a long term commitment to the local Indigenous community the Joint Venture is in the early phases of developing an Indigenous Community Partnership, the purpose of which will be to facilitate the creation and implementation of community development initiatives.

Hocking Planning and Architecture was commissioned to complete a desktop assessment of potential European heritage sites in the Pinjin area which is the most likely disturbance area to have significance for European heritage. The former settlement of Pinjin is an area historically associated with the mining and the pastoral industries. Since European settlement of the Shire of Menzies region in the 1890s, the Shire has been characterised by the rapid settlement and abandonment of small mining settlements. The pastoral industry has had a more permanent association with the region although the difficult conditions have seen many landholders. The former town of Pinjin and the adjacent pastoral lease and homestead are typical examples of the pattern of settlement and abandonment seen in this region. There is now little physical evidence of the town's former existence and the Old Pinjin homestead is in ruins. No known site of significance will be impacted by the Project.

Risk Based Approach to Impact Assessment

The Joint Venture has held exploration leases in the area around the Tropicana and Havana deposits since 2002. Since that time, exploration activities have increased in breadth (extending exploration activities into new areas) and intensity. For example, exploration activities began with surface sampling around the area now known as the Tropicana deposit and progressed to resource definition drilling around the Tropicana and Havana deposits. As the intensity of exploration has increased, so has the risk of damage to the environment. As the risk of damage to the environment has increased, the Joint Venture and its' environmental consultants have consulted with key stakeholders (e.g. DEC and DEWHA) and various experts (e.g. Museum of Western Australia, Dr Joe Benshemesh) for advice and to identify potential risks and impacts. The Joint Venture has also increased its environmental survey effort to identify and describe the environmental values across the disturbance area to better enable it to avoid and minimise its impacts on those values.

A formalised and detailed risk assessment process for the proposed Project was initiated as the Joint Venture progressed from exploration into pre-feasibility analysis. The risk assessment was used as the basis for the formal

environmental assessment process of which this PER documentation forms a part. The risk assessment process has been based on principles and methodology outlined in HB 203:2006 – Environmental Risk Management – Principles and Processes and AS/NZS 4360:2004 – Risk Management. The primary aim has been to identify potential environmental consequences to all activities and to assign an appropriate management response to reduce environmental risk. As risk assessment is not a one-off process, the Joint Venture will regularly re-assess environmental risks and mitigation strategies throughout the life of the Project as part of the project's IMS.

The risk assessment process for the Project began in January 2008 with a series of risk identification workshops attended by the Joint Venture and 360 Environmental staff involved in the exploration phase, design, environmental impact assessment and/ or environmental management of the Joint Venture's activities. Workshops were held on the following topics:

- processing, crushing and tailings management;
- mining and waste rock management;
- supporting infrastructure (e.g. Mine Access Road, power supply and aerodrome); and,
- project-wide activities (e.g. hydrocarbon management, waste, and internal roads).

Once the specific activities and events were identified, a qualitative risk analysis ensued. This initial assessment progressed under the assumption that environmental management controls failed or were non-existent. Therefore, the calculated risk is the inherent environmental risk of the activity or event. Controls were then assigned to each activity/ event and the residual environmental risk was calculated (i.e. the risk of the activity/ event assuming that the controls were successful). Control options, in order of priority, included:

- avoidance/ elimination: e.g. re-siting the tailings storage facility to avoid the preferred habitat of the Marsupial Mole;
- substitution: e.g. replacing a more hazardous substance with a less hazardous substance capable of filling the same role;
- engineering: e.g. automatic cut-off valve to prevent over-filling of a storage dam or pond;
- administrative: e.g. establishing and communicating written procedures; and,
- separation: e.g. bunding or secondary containment on a chemical storage tank.

Activities and events with a residual risk rating of High or Extreme require careful consideration for this environmental impact assessment.

The major risks to the Project can be summarised under the following themes (see Table ES2 for further details):

- improved access to the region;
- air emissions, particularly greenhouse gases;
- potential discharges from waste material and tailings;
- effectiveness of constructed landforms;
- disturbance to flora and fauna, particularly listed species;
- fire;
- spills and leaks;
- impacts on groundwater and hydrology; and,
- disturbance to Indigenous heritage.

Table ES2: Tropicana Gold Project - Summary of Environmental Factors

Environmental Factor	EPA Objective	Existing Environment	Potential Impact
Physical			
Soil Quality and Landform	To maintain the integrity, ecological functions and environmental values of the soil and landform.	The main Project footprint will be located in a broad low valley of sand plain with two intersecting longitudinal dunes. The sand plain soils and vegetation are a typical central Australian land type. Project is described as being in the Southern Great Victoria Zone of the Sandy Desert Region (Tille 2006). Aeolian sands and colluvium overlie a variably incised lateritic profile. The aeolian sands that form the basis for soils and regolith at the site form large areas of flat featureless plains and longitudinal dunes.	Clearing of up to 3,440 hectares. The majority of the planned disturbance will be associated with the mining operation located within the Operational Area and will entail major, but localised, impacts on both soil and landforms.
Surface Water	To maintain the quality of water so that existing and potential environmental values, including ecosystem maintenance, are protected	Annual rainfall is estimated to be between 115 mm and 300 mm and surface drainage is a very minor feature in the majority of the Great Victoria Desert where a large proportion of the Project's infrastructure will be located (Australian Natural Resources Atlas 2008a).	Potential surface water impacts identified are, clearing and disturbance increasing erosion risk, increased stormwater generation and modification to flow paths, modification of the existing drainage valley that runs through the site and diversion of stormwater flows from upslope around the west of the mine site.
Groundwater	Maintain the quality of water so that existing and potential environmental values, including ecosystem maintenance, are protected.	The Minigwal Trough is suitable for water supply for the Project, which is a sedimentary trough abutting the western margin of the Archean basement on the Fraser Range.	Water will be extracted from the Minigwal Trough for the purposes of mine water supply. Potential impacts include clearing, seepage from the tailings storage facility, generation of waste water and impacts to groundwater dependent ecosystems due to excessive water abstraction. Dewatering will form part of the open cut mine operation.
Biophysical			
Vegetation and Flora	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	The Project spans the Helms, Austin and Eucla Botanical Districts of the Eremaean Botanical Province. None of the observed vegetation units represent Threatened Ecological Communities. One Declared Rare Flora, *Conospermum toddii* was recorded in the Project area. 20 Priority Flora were recorded in the Project broader survey area which covered 230,000 ha. 13 Priority Flora were recorded in the Project footprint which covered 3,440 ha. 2 additional Priority species occur in close proximity to the Project footprint but will be avoided.	Up to 3,440 ha of native vegetation will be cleared. Vegetation clearing will directly disturb vegetation units and Priority flora species. Poorly managed development could change the conservation status of identified Priority Flora.

Environmental Factor	EPA Objective	Existing Environment	Potential Impact
Terrestrial Fauna	To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	The habitats within the Project support a range of fauna species, including several that are endemic to the region and/ or listed for protection under State and Federal conservation legislation. Listed bird species observed in the survey area include the Australian Bustard (DEC Priority 4), Rainbow Bee-eater (EPBC Act - Migratory), Peregrine Falcon (WC Act – Schedule 1) and the Malleefowl (WC Act – Schedule 1, EPBC Act - Vulnerable). Marsupial Moles (WC Act – Schedule 1), EPBC Act - Vulnerable) holes were recorded in all areas of proposed infrastructure of the Project. Potentially suitable habitat for the Sandhill Dunnart (WC Act – Schedule 1, EPBC Act – Endangered) and Mulgara (DEC Priority species) One species of putative Short Range Endemics invertebrates have, to date; only been found in the impact area of the Project.	Vegetation clearing will directly disturb terrestrial fauna habitat and may result in the loss of individual terrestrial fauna. Activities associated with the Project such as increased movement of personnel and machinery use may result in changed fire regimes which pose a threat to species of conservation significance. Such impacts include immediate deaths of conservation interest fauna individuals and populations, loss of critical habitat loss of breeding habitat and habitat fragmentation. The Project may potentially increase the incidence of invasive fauna in the area resulting in competition, predation and/ or habitat degradation.
Subterranean Fauna	To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	No Stygofauna species have been recorded. A single Troglobitic Dipluran was located within the Operational Area and is currently restricted to the area. A single Troglobitic centipede was located within the Operational Area (Resource Area) and is currently restricted to the area. The third species; Isopod; has been collected from five sites, four of which were inside the Operational Area and one was outside.	Changes to surface hydrology particularly in regards to sealing of recharge areas may impact troglofauna habitat. Activities associated with mining have the potential to directly and indirectly impact of Troglofauna habitat and potentially cause the loss of some individual subterranean fauna.
Emissions Management			
Air Quality – dust	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting Statutory requirements and acceptable standards.	Due to the remote and vegetated nature of the site, dust levels are essentially natural background levels. Windblown dust can be an existing source of dust in the dry arid environment.	The generation of dust from construction, earthworks, and traffic movements, can influence the air quality, resulting in adverse impacts on human health, surrounding vegetation, fauna and ambient air quality.
Air Quality – gaseous emissions	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting Statutory requirements and acceptable standards.	Due to the remote nature of the site, air quality measures can be expected to be at natural background levels. Hazardous gaseous emissions are not expected to be present in the air.	The Joint Venture anticipates no significant increase in gaseous emissions (excluding greenhouse gases) resulting from the processing pathway selected for the Project

Environmental Factor	EPA Objective	Existing Environment	Potential Impact
Noise and Vibration	To minimise impacts from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards.	Noise and vibration levels are essentially natural background levels due to the remoteness of the location.	Noise and vibration have the potential to disrupt the fauna behaviour.
Greenhouse Gases	To minimise emissions to levels as low as practicable on an ongoing basis and consider offsets to further reduce cumulative emissions. Ensure that emissions do not adversely affect environment values (health, welfare and amenity of people and land uses).	AngloGold Ashanti joined the Australian Government's Greenhouse Challenge Plus program in 2006. The National Government's Carbon Pollution Reduction Scheme/ Emissions Trading (CPRS), once introduced it is likely that legislation will be passed to limit the emission of greenhouse gases in Australia, which will see Corporations paying for the right to emit. Currently, the Government is proposing a long term target of reducing emissions to 40% of year 2000 emissions by 2050, and a medium term target of 5-15% reductions (depending on the level of international cooperation) by 2020.	40 MW of generating capacity is required. Actual operational emissions, based on a worst case scenario, in a typical maximum-capacity operating year, will not exceed 330,000 tonnes $CO_{2\text{-}e}$. The main sources, accounting for more than 90% of the Project greenhouse gas emissions, will be: • Combustion of diesel fuel for the mining vehicles; and, • Combustion of fossil fuel to meet the project's power requirements.
Social Surroundings			
Indigenous Heritage	To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation i.e. the *Aboriginal Heritage Act 1972* and *Native Title Act 1993*.	No ethnographic sites have been reported. A total of ten archaeological sites were discovered and recorded within the Operational Area. One site has been found within the 60 km^2 of the central mining area, with another ten sites in the estimated 230 km^2 of the remainder of the Operational Area. In addition, twelve sites were found within the two infrastructure corridors. No sites were found in the Water Supply Area or in the water pipeline corridor. The most common archaeological sites are artefact scatters and quarries, with a small number of rockshelter sites.	Unidentified heritage site (s) is/ are discovered or damaged as part of the works.
Non-Indigenous Heritage	Ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation.	No known site of significance will be impacted by the Project.	Unidentified heritage site (s) is/ are discovered or damaged as part of the works.

Environmental Factor	EPA Objective	Existing Environment	Potential Impact
Visual Amenity and Landscape	To ensure that aesthetic values are considered and measures are adopted to reduce visual impacts on the landscape as low as reasonably practicable. To maintain the integrity, ecological functions and environmental values of landscapes and landforms.	The GVD is dominated by longitudinal sand dunes with a predominant east-west orientation and ring dunes separated by interdune corridors (or swales) and sand plains. The landforms in the area surrounding the Project vary in height from 2 – 40 m.	The Project creates a visual impact, whereby the waste landforms and/ or mining infrastructure do not blend in with the existing infrastructure.
Recreation and Tourism	Ensure that existing and planned recreational uses in the area are not enhanced (to increase access) or compromised.	Tourism is well-established in the Goldfields region and is expanding. The remoteness of the Project means that tourism opportunities are for serious campers and 4 wheel drivers. Recreational opportunities are centred around a wilderness experience and therefore tourism infrastructure opportunities are minimal.	Improved access to the region may have a negative impact on adjacent nature reserves, by improved access. Improved road access may add regional benefit to the local tourism industry and create opportunities to Indigenous enterprise and employment and provide better access for other mineral explorers in the region.
Public Safety	Ensure, as far as practicable, that the construction, operation and closure phases of the project do not compromise public safety.	The remoteness of the area reduces the risk that the works pose a risk to public safety.	Infrastructure provision or improvements particularly road, telecommunications and power. The remoteness of the area, and the long travelling distance pose a health and safety risk that will be required to be managed.
Socio-economic aspects	To ensure that the social and economic value of the region is not adversely impacted. Provide positive benefits for the region where practicable. To ensure the community are informed about the project and are empowered and involved through all project phases.	The Joint Venture stakeholder engagement strategy will provide opportunities for the local community and special interest groups to play an active part in designing the project that will continue through the life of the project.	Infrastructure provision or improvements particularly road, telecommunications and power. Local businesses are not supported as part of the Project.

Environmental Factor	EPA Objective	Existing Environment	Potential Impact
Other			
Rehabilitation	Ensure that rehabilitation achieves an acceptable standard compatible with the intended land use, and consistent with appropriate criteria.	Following disturbance for mining and support infrastructure rehabilitation will be required for approximately 3,040 ha including constructed landforms that cover approximately 1,200 ha.	Poorly planned and implemented rehabilitation can result in poor vegetation establishment and the need to rework rehabilitated areas. Rehabilitation research and progressive rehabilitation provides a cost effective rehabilitation method that improve the likelihood of rehabilitation success.
Decommissioning and Closure	To ensure, as far as practicable, that rehabilitation achieves a stable and functioning landform which is consistent with the surrounding landscape and other environmental values.	At Closure some areas will already be under rehabilitation. Decommissioning (demolition, salvage, preparation for rehabilitation). Rehabilitation of all outstanding areas. A new phase of negotiation with Stakeholders towards relinquishment.	Failure to achieve agreed Completion Criteria.
Matters of National Environmental Significance (EPBC Act)	Note: in the absence of specific EPA or DEWHA objectives, the Project's objective is to avoid and/ or mitigate significant impacts to matters of National Environmental Significance (EPBC Act).	Evidence of several species protected under the EPBC Act were recorded during the baseline surveys, these were: • Marsupial Mole (*Notoryctes typhlops* or *Notoryctes caurinus*; both listed as Endangered under the EPBC Act); • Malleefowl (*Leipoa ocellata*; Vulnerable under the EPBC Act); • *Conospermum toddii* (Endangered); • Rainbow Bee-eater (*Merops ornatus*); and, • Wood Sandpiper and Common Greenshank were observed during the Pinjin fauna surveys. • Potential habitat of the Sandhill Dunnart and Mulgara were also observed during the surveys.	Loss of Rare/ Protected Flora and Fauna or loss of threatened or migratory species.

Mine Closure

The current proposal for the Project will see the project operate for approximately 15 years resulting in the disturbance and eventual rehabilitation of potentially 3,040 ha (excluding the mine void). Successful closure of the Project will occur by adhering to the following precepts:

- enshrining a whole of mine life approach to closure;
- adequately provisioning for closure;
- allocating responsibilities across the operation and through time; and,
- developing an understanding of the local environment and by establishing new rehabilitation standards by embarking on a program of research and development that aims to fill in current gaps in rehabilitation knowledge.

The Project's current post-operational aim (subject to ongoing stakeholder consultation throughout the life of the Project) is:

> *To establish a sustainable native ecosystem that is as similar to the pre-existing ecosystem as can be achieved within the limits of recognised good practice rehabilitation methods and the post-mining environment.*

The following objectives also apply:

- Closure planning and implementation - To ensure that the process of closure can occur in an orderly, cost-effective and timely manner with clear accountabilities defined;
- Risk appreciation – To identify and manage risks to closure according to their likelihood and consequence;
- Financial provision – To adequately represent and plan for the cost of closure in company accounts so that the community is not left with a liability;
- Stakeholder involvement – To consider stakeholder interests during the mine closure process;
- Completion criteria – To establish a set of indicators and criteria that will demonstrate successful completion of the closure process;
- Waste materials management – To minimise waste generation over the mine life and to ensure that remaining waste cannot adversely affect the surrounding environment;
- Decommissioning – To ensure that the Decommissioning process can occur in an orderly, cost-effective and timely manner with clear accountabilities defined;
- Rehabilitation planning and implementation - To ensure that the Rehabilitation process can occur in an orderly, cost-effective and timely manner with clear accountabilities defined; and,
- Relinquishment – To arrive at a point where Project has met, or is confidently tracking towards, agreed completion criteria to the satisfaction of the Western Australian Government.

Life of mine closure planning is a process that necessarily begins conceptually. The strategy acquires greater and greater resolution as decisions and facts surrounding closure accumulate. The intended progression of closure and rehabilitation planning for the Project will be:

- Conceptual Mine Closure and Rehabilitation Strategy – Submitted as part of the PER documentation. This documents the concepts behind the closure and rehabilitation outcomes and principles that will be incorporated into the closure and rehabilitation strategies;

- Proposed Mine Closure and Rehabilitation Strategy – The proposed strategy will be prepared within five years of the Project commencing. The strategy will be reviewed every 2-3 years;
- Approved Mine Closure and Rehabilitation Plan – The document will be submitted to the relevant stakeholders for approval 3-5 years prior to the closure of the project; and,
- Closure and Rehabilitation Research and Design Strategy - The strategy combines existing broad-scale rehabilitation knowledge with a research program tailored to improve the understanding of the rehabilitation requirements for the Project. This strategy will be a live document that will be modified to meet the requirement of the Project Closure and Rehabilitation object.

Environmental and Social Management Commitments

In developing the Project, the Joint Venture aims to deliver an environmentally responsible project in line with leading practices, management and technologies. The Joint Venture will take into consideration current and future community needs, legislation and guidance from relevant stakeholders including the EPA, DEWHA and others.

Harnessing proactive mechanisms to ensure the Project reduces its ecological footprint were the cornerstones of the preliminary design process. This was driven not only by environmental considerations but by the need to commit to a leading edge design, one that the Joint Venture could be proud of. What followed were not only efficiencies in the technology but also in project delivery. Impact avoidance and the development of a future-proof design have been primary considerations as demonstrated by Table ES3.

Table ES3: Examples of Best Practice Environmental Management Incorporated into the Preliminary Design

Design Change	Benefit
Tailings storage facility location	• Protection of species of conservation interest • Reduce visual impact • Reduce clearing footprint • Improved rehabilitation outcomes
Waste landforms	• Avoid Short Range Endemic Species
Infrastructure corridor design and location	• Protection of species of conservation interest and heritage values • Reduce greenhouse footprint
Multi-purpose access route for the water supply pipeline, airstrip/village access	• Reduced clearing
Incorporation of high pressure grinding rolls into crushing circuit	• Reduce energy consumption • Reduced greenhouse emission • Reduce transportation of material to site
Two stage thickening and processing water recycling	• Reduced water consumption • Reduced energy consumption for pumping • Reduced greenhouse emission • Reduced consumption of reagents
Village relocated	• Location selected to reduce noise and dust impact, to avoid heritage sites and conservation interest species • Water and energy conservation measures incorporated

The Project has committed to minimising its greenhouse footprint and to operating both a water and energy efficient site. A proactive approach has been adopted to reducing or offsetting greenhouse emissions. Greenhouse Gas abatement options have considered the implementation of the CPRS. To offset the emissions of

the Project the Joint Venture is committed to funding a research and development program for greenhouse offsets whereby the Joint Venture will invest $1.00/tonne/annum of $CO_{2\text{-}e}$ produced in the preceding year following the first full year of gold production. This program will focus on low carbon energy, energy efficiency programs and alternative options.

In line with State and Federal guidance documents, environmental offsets are only being considered to mitigate impacts for which best practice management options are insufficient. Proposed biodiversity offsets for the Project are a combination of:

- direct offsets, restoration and rehabilitation; and,
- contributing offsets, the establishment of an environmental trust.

Stakeholder consultation has been extensive to date and will continue throughout the life of the project. Given the Joint Venture partner's proven track record and demonstrated commitment to excellent environmental outcomes it is anticipated that the impacts associated with the Project can be managed at a level that has positive outcomes for both the environment and the State.

.

Glossary of Terms and Abbreviations

4WD	Four-wheel drive
AngloGold	AngloGold Ashanti Australia
ARI	Average Recurrence Interval
CIL	Carbon in Leach
CDNTS	Central Desert Native Title Services
CPRS	Carbon Pollution Reduction Scheme
DEC	Department of the Environment and Conservation (Western Australia)
DEWHA	Department of Environment, Water, Heritage and the Arts (Federal)
DIA	Department of Indigenous Affairs (Western Australia)
DMP	Department of Mines and Petroleum (Western Australia)
DoIR	Department of Industry and Resources (Western Australia, changed to DMP)
DRF	Declared Rare Flora
Eco SSLs	Ecotoxicity Ecological Soil Screening Levels
EHS	Environment, health and safety
EIA	Environmental Impact Assessment
EPA	Environment Protection Authority (Western Australia)
EP Act	*Environmental Protection Act 1986* (Western Australia)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Federal)
ESD	Environmental Scoping Document
FESA	Fire and Emergency Service Association
GVD	Great Victoria Desert
HDPE	High Density Polyethylene
HPGR	High Pressure Grinding Rolls
IBRA	Interim Biogeographic Regionalisation for Australia
IG	Independence Group NL
IMS	Integrated Management System
Infrastructure Corridors	Two routes are currently under consideration to provide an access road and communications corridor to the Operational Area (Tropicana-Transline and Pinjin)
LNG	Liquified Natural Gas
MCA	Minerals Council of Australia
MCC	Motor Control Centre
Operational Area	Consists of the proposed open pits, ore/ gold processing infrastructure, aerodrome, village and other buildings necessary for the functioning of the Project
PEC	Priority Ecological Community
PER	Public Environmental Review
Resource Area	the physical surface directly above the identified mineralisation at the Tropicana and Havana deposits
SIA	Social Impact Assessment
TEC	Threatened Ecological Community
TT Corridor	Tropicana-Transline Corridor
WAD Cyanide	Weak Acid Dissociable Cyanide
WC Act	*Wildlife Conservation Act 1950* (Western Australia)