T2 Off Lease Environmental Management Plan

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T2.1 Introduction

T2.1.1 Outline

Hancock Galilee Pty Ltd has assessed the potential impacts on land use, soil and ecology aspects of the off lease infrastructure proposed to be developed for the Kevin's Corner Project (the Project). The findings of this assessment are detailed in the report: *Kevin's Corner Project Off Lease Assessment*, URS 2012.

The assessment report detailed the results of a desktop review of current literature and available studies to describe the existing environmental values relevant to land use, ecology and soils-related aspects and potential impacts that may occur as a result of the development of the refined Project off lease infrastructure. Where impacts were identified, appropriate mitigation measures were identified to prevent or minimise impacts.

This Environmental Management Plan (EMP) describes the actions that will be implemented during the construction and operation of the off lease infrastructure that will support the development of the mining lease. The EMP comprises the following components for performance criteria and implementation strategies:

- the commitments to acceptable levels of environmental performance, including environmental objectives, performance standards and associated measurable indicators, performance monitoring and reporting
- impact prevention or mitigation actions to implement the commitments
- corrective actions to rectify any deviation from performance standards
- an action program to ensure the environmental protection commitments are achieved and implemented. This will include strategies in relation to:
  - continuous improvement
  - environmental auditing
  - monitoring
  - reporting
  - staff training
  - a rehabilitation program for land proposed to be disturbed under each relevant aspect of the proposal.

T2.2 Off Lease Infrastructure

The *Kevin's Corner Project Off Lease Assessment* (URS 2012) has identified and assessed potential impacts on land use, soils and ecology of the off lease road realignment and the off lease rail spur alignment. This Off Lease EMP identifies control measures that are specific to the construction and operation of the proposed off lease infrastructure. In addition, further discussion of air quality, noise and vibration impacts and mitigation strategies specific to the proposed off lease developments are presented in the Supplementary EIS (SEIS).

T2.2.1 Off Lease Rail

Processed coal will be transported from the Kevin's Corner mine site along the proposed Alpha to Abbot Point Rail Line to the Port of Abbot Point. The Kevin's Corner rail spur, which connects the Kevin's Corner mine site to the proposed Alpha to Abbot Point Rail Line, is approximately 17.8 kilometres (km) in length (including both on lease and off lease components).

The proposed off lease rail spur (outside of MLA 70425) consists of both north and south rail sections of approximately 2 km in length. The off lease rail spur is to be sited on rural lands to the east of MLA 70425 and is depicted on **Figure 2-1**.

The proposed rail spur alignment is located to align with the Alpha to Abbot Point Rail line while avoiding excessive cuts and/or filled embankments and to minimise the impact on surrounding land forms, environmental values and land holder interests. The alignment also considered the placement of other Project infrastructure, drainage and access to local properties. The rail infrastructure is considered to be a permanent structure for the life of the Project.

For the purposes of defining an area of potential impact, the corridor for locating the proposed off lease rail infrastructure is assumed to be a total width of 60 metres (m).

T2.2.2 Off Lease Road

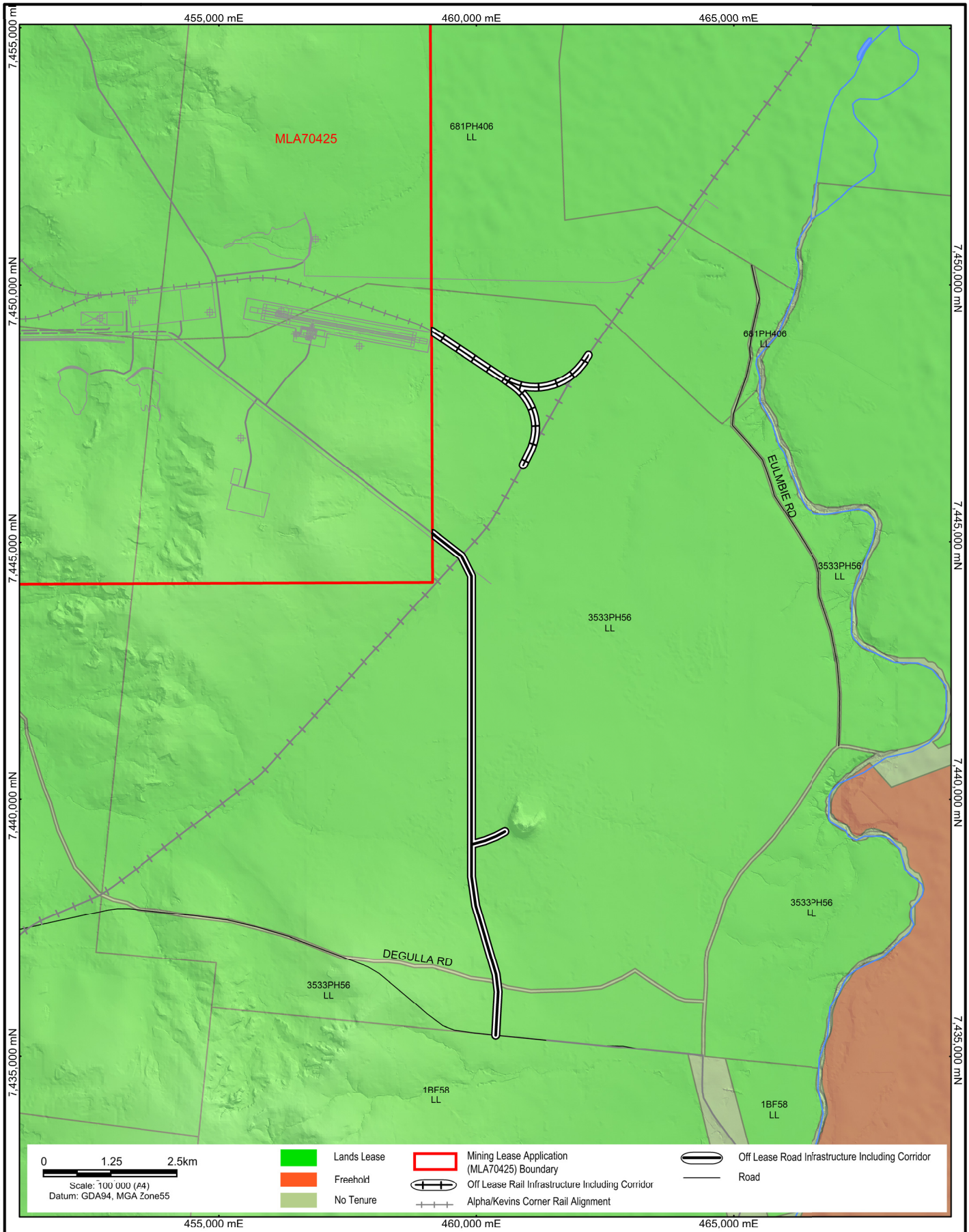
The proposed realignment of Jericho-Degulla Road shown on Figure 2-1 involves a diversion of approximately 8 km of the unsealed Jericho-Degulla-Road. The proposed road will allow access to the Kevin's Corner Coal Mine.

For the purposes of defining an area of potential impact the corridor for locating the proposed off lease road infrastructure is assumed to be a corridor of 30 m either side of the road centre line.

T2.2.3 Relevant Legislation

It is anticipated that a subset of the following regulatory provisions will apply to the construction and operation of the off-lease road and rail infrastructure. In addition to the control measures detailed in this Off-lease EMP, activities will be further regulated by the legislative requirements of the following acts, policies and regulations.

- *Aboriginal Cultural Heritage Act 2003*
- *Aboriginal Land Act 1991*
- *Building Act 1975*
- *Electrical Safety Act 2002*
- *Environmental Protection Act 1994 (and Environmental Protection Regulation 2008)*
- *Fisheries Act 1994*
- *Forestry Act 1959*
- *Integrated Planning Act 1997*
- *Land Act 1994*
- *Native Title (Queensland) Act 1993*
- *Nature Conservation Act 1992,*
- *Nature Conservation (Wildlife) Regulation 2006*
- *Soil Conservation Act 1986*
- *Sustainable Planning Act 2009*
- *Transport Infrastructure Act 1994*
- *Transport Operations (TransLink Transit Authority) Act 2008*
- *Transport Planning and Coordination Act 1994*
- *Vegetation Management Act 1999*
- *Workplace Health and Safety Act 1995*
- *Environmental Protection (Noise) Policy 2008*
- *Sustainable Planning Regulation 2009*
- *South East Queensland Regional Plan 2009–2031*
- *Transport Infrastructure (Dangerous Goods by Rail) Regulation 2008*
- *Water Act 2000*



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HANCOCK GALILEE PTY LTD

Kevin's Corner Project
Supplementary Environmental Impact Statement

LAND USE CONTEXT

URS

OFF LEASE ASSESSMENT REPORT

Figure: 2-1

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T2.3 Environmental Management

T2.3.1 Air Quality

Air Quality		
Resource	**Potential Impact**	**Control Strategies**
1. AIR QUALITY - Construction	Potential dust emission sources associated with the construction of off lease infrastructure include: (a) Clearing of vegetation; (b) Infrastructure construction (processing area, haul roads etc.); (c) Topsoil disturbance and removal; (d) Vehicle movements; and (e) Transport of materials to site.	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) All plant and equipment will be kept in good working order to ensure compliance with adopted air quality criteria; (ii) Dust generating activities will be conducted in such a manner that complies with the applicable air quality criteria at receptor locations outside of the mining lease boundary; (iii) Off lease infrastructure will be considered in the Air Quality monitoring program developed for the site; (iv) In the event of any exceedance of the established air quality criteria, originating from off lease infrastructure the Proponent will take immediate action to investigate and remedy the situation; (v) Construction haul roads will be watered for dust suppression as necessary; (vi) Speed limits on haul roads will be limited to a level that minimises dust generation; (vii) Well defined haul roads will be established; (viii) Exposed areas/active areas will be watered to suppress dust generation as necessary;

Air Quality		
Resource	**Potential Impact**	**Control Strategies**
		(ix) Areas of disturbance will be minimised; (x) Meteorological monitoring will be undertaken and considered when scheduling dust generating activities; and (xi) Dust generating activities will be ceased or modifed on dry windy days considering monitoring information.
2. AIR QUALITY - Operations	Potential dust emission sources associated with the operation of off lease infrastructure include: (a) Coal dust from trains; (b) Emissions from idling trains; and (c) Vehicle movements on the off-lease road.	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) Recommendations outlined in the QR Network 2010, Coal Dust Management Plan (CDMP), will be incorporated into the CDMP for the Kevin's Corner Projects; (ii) Coal surface veneering or partial enclosure of coal trains; (iii) Significant coal spillage the rail loop corridor will be cleaned up on as required basis; (iv) Continue to seek improved coal loading techniques to reduce over-filling (and subsequent coal spillage onto the rail corridor); (v) Improve the profile of the coal load to reduce surface erosion during transport; and (vi) Avoid allowing trains to idle near sensitive receptors.

T2.3.2 Noise

NOISE		
Resource	**Potential Impact**	**Control Strategy**
1. NOISE -	Potential sources of noise and vibration associated with the construction of off lease	In addition to all practicable control measures described in the Kevin's

NOISE		
Resource	**Potential Impact**	**Control Strategy**
Construction	infrastructure include: (a) Blasting; (b) Operation of machinery; (c) Infrastructure construction (processing area, haul roads etc.); and (d) Transport of materials to site.	Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) All plant and equipment in good working order to ensure compliance with the noise criteria; (ii) Noise generating equipment will comply with the applicable noise criteria at receptor locations outside of the mining lease boundary; (iii) Off lease infrastructure will be included in the noise, vibration and overpressure monitoring program developed for the site; (iv) In the event of any exceedance of the established noise, vibration or overpressure criteria, originating from off lease infrastructure the Proponent will take immediate action to investigate and remedy the situation; and (v) Develop a complaints handling protocol to respond to any complaints in relation to noise, vibration or overpressure and investigate these, where necessary.
2. NOISE - Operations	Potential sources of noise and vibration associated with the construction of off lease infrastructure include (a) Train movements outside the mining lease would have potential for noise impact at noise sensitive receptors.	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) Avoid allowing trains to idle near sensitive receptors; (ii) Apply effective track and track/wheel engineering techniques to reduce noise i.e. vibration isolated track sections; continuously welded rail wherever feasible; track friction reduction devices (rubber or electronic grease dispensers); (iii) Use barriers in some sections of the alignment where sensitive receptors are in proximity; and (iv) Treat sensitive receptors' dwellings to reduce external noise intrusion.

T2.3.3 Land Use

LAND USE		
Resource	**Potential Impact**	**Control Strategy**
3. TENURE & TENEMENT CHARACTERISTICS	(a) Approximately 232 ha will be excluded from within Surbiton South property holding by reconfiguring into new allotments separate from the existing land tenure. (b) MLA 70425 covers the Project mine site, which extends over Exploration Permit Coal (EPC) 1210 and Mineral Development Licence (MDL) 333. The proposed rail and road alignment overlies EPC 1263 and will not impact any other type of mining or petroleum tenement.	(i) If applicable, HGPL will liaise with the landholder to determine adequate compensation for loss of land area.
4. PROTECTED AREAS	(a) The proposed rail and road alignment is to be located on unimproved and improved grazing pasture and areas comprising "Of Concern Sub-Dominant and Dominant Remnant Ecosystem". (b) In addition, the proposed road alignment intersects a portion of Endangered Regional Ecosystem (Category B protected area) at the southern-most point of the alignment. (c) Category A protected areas will not be impacted by development of either the off lease rail or road.	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) To maintain the integrity of vegetated land that is not cleared for development of the road or rail corridor, appropriate erosion and sediment controls will be developed to prevent sediment deposition in remaining habitat; (ii) Recreated landforms will be contoured to resemble original regional topography where possible; (iii) A number of pest and weed Management strategies will be developed by HGPL in order to minimise the potential of future weed infestations; (iv) Monitoring for weeds of management concern will be undertaken, via annual observations by site personnel; (v) A Pest and Weed Management Plan (SEIS Appendix T4.02) will be developed to limit the spread of these species on and surrounding the road and rail corridor; (vi) If weeds of management concern are identified, they will be eradicated from the site in accordance with local best management practice from

LAND USE		
Resource	**Potential Impact**	**Control Strategy**
		the Barcaldine Regional Council (formerly Jericho Shire) Pest Management Plan (Maunsell, 2008) and / or the DEEDI Pest Fact sheets (DEEDI 2007); and (vii) Awareness of weed management issues will be promoted by inclusion of weed management processes and systems in to new Personnel Induction Programmes.
5. NATIVE TITLE	(a) The proposed development of the off lease road and rail will result in loss of lands with cultural value to traditional owners. (b) The proposed alignment of the off lease rail and road infrastructure lies wholly within the boundaries of the Wangan & Jagalingou Native Title claim (QC04/5, QUD85/04), as shown in Figure 6-8 of the Kevin's Corner EIS (HGPL 2011), with the exception of the southern-most section of the road.	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) An Indigenous Land Use Agreement (ILUA) has been approved for the Wangan & Jagalingou Alpha Coal Railway ILUA Area and is currently in place for the proposed land use activities; and (ii) A Cultural Heritage Management Plan (CHMP) has been agreed between the Proponent and the Wangan & Jagalingou. The terms of this CHMP will cover the off lease developments.
6. EXISTING TRANSPORT INFRASTRUCTURE	(a) The area of the proposed off lease infrastructure development is predominantly low intensity grazing with few services, therefore the development of the proposed infrastructure is not likely to detrimentally impact existing services or utilities. The access road may intersect private electricity lines servicing surrounding homesteads and existing on farm infrastructure, access tracks and fences. (b) The construction of the rail spur and access road will impact the existing transport infrastructure networks as per the impact assessment undertaken within Section 6.5 and Section 17 of the Kevin's Corner EIS (HGPL 2011).	(i) To ameliorate any potential impacts to the landholder, the Proponent will reinstate any damage to on-farm infrastructure and utilise the mitigation measures proposed in Section 6.5 of the Kevin's Corner EIS (HGPL 2011).
7. LAND USES & FACILITIES	(a) The nearest sensitive receivers to the rail spur alignment are Eulimbie Homestead and Surbiton Homestead.	(i) Potential impacts on surrounding land uses will be adequately mitigated through the proposed mitigation measures contained within Section 6.5 of

LAND USE		
Resource	**Potential Impact**	**Control Strategy**
(including sensitive receptors)	(b) The proposed off lease road realignment is located 500 m to west of Surbiton South Homestead and will include a connection from the realigned road to the property. This can also be utilised for access to the Surbiton South Quarry should it receive planning approval and become operational. (c) Potential impacts on surrounding land uses may include reduced amenity as a result of: i. Increased vehicular traffic and associated impacts on amenity (refer to EIS Volume 1, Section 17); ii. Dust and other windblown particulate contaminants (refer to EIS Volume 1, Section 13); iii. Noise and acoustic intrusion (refer to EIS Volume 1, Section 15 and further discussion in SEIS); iv. Reductions in visual amenity (refer to EIS Volume 1, Section 7); and v. Light spillage from rail movements (refer to EIS Volume 1, Section 7).	the EIS (HGPL 2011). (ii) Operational techniques contained within the EMP (refer to EIS Volume 2, Appendix W) will be included in an Environmental Management Plan (EMP) for off lease infrastructure to mitigate potential amenity impacts at sensitive receptors in the vicinity of the off lease road and rail spur.
8. AGRICULTURAL VALUES	(a) Potential reduction in the agricultural values of the land underlying and adjoining the off lease infrastructure may result by way of: i. Landscape fragmentation and segregation; ii. Impediments to existing on farm operations; and iii. Preclusion of the existing use/and future uses (cattle grazing). (b) There is potential for the proposed rail infrastructure to fragment the existing farm land and result in areas of the Surbiton South property being segregated from regular farm operations. This is likely to occur for the parcel of land created between the rail spurs and Alpha to Abbot Point Rail line alignment and may also happen, to a lesser extent, for the	(i) The potential for fragmentation and segregation will require one or more stock crossings to allow for the movement of stock in and out of each of these created land parcels. To ensure the proposed infrastructure does not detrimentally impact Surbiton South farm operations, consultation between the land holder and rail manager will be required to allow for stock movement across the rail infrastructure. In addition: a. Land use management techniques within the EMP will sufficiently ameliorate impacts to agricultural values of the subject lands; b. Stock crossings over/under proposed infrastructure to

LAND USE		
Resource	**Potential Impact**	**Control Strategy**
	parcels of land created between: i. The property boundary with Surbiton, the perimeter of MLA 70425 and the northern rail spur alignment; and ii. The Alpha to Abbot Point Rail line, southern rail spur alignment, proposed realignment of Jericho-Degulla Road and the perimeter of MLA 70425.	facilitate stock movement; and c. Ongoing land holder consultation to discuss farm management techniques before, during and after construction of the infrastructure and for during operation of the proposed infrastructure.
9. PESTS & WEEDS	(a) The construction and operation of linear infrastructure corridors has the potential to act as a conduit for the spread of pest and weed infestations.	(i) A Pest & Weed Management Plan (SEIS Appendix T4.02) applicable to off-lease linear infrastructure will be developed prior to construction; (ii) During construction and operation of linear infrastructure recommendations described in the QLD Government publication *Queensland Weed Spread Prevention Strategy* (DPIF 2008) will be implemented wherever feasible.
10. VISUAL IMPACTS	(a) The construction of the road and rail spur may have an impact on the visual amenity of the area. (b) The visual assessment for Kevin's Corner mine concluded that there was a general lack of major view points, outlooks or significant features within the vicinity of the Project, or the presence of any key focal points and landmarks that contribute to the visual quality of the surrounding area. Therefore the potential for visual amenity impacts from the off-lease linear infrastructure is considered to be low.	(i) Visual amenity impacts of the proposed off-lease liner infrastructure should be considered during the detailed design phase. (ii) Artificial lighting of linear infrastructure will be confined to areas of operations, with measures adopted to prevent light pollution of adjacent areas of sensitive wildlife habitat.

T2.3.4 Soils

SOILS		
Resource	**Potential Impact**	**Control Strategy**

11. LAND SUITABILITY	Potential impacts on land suitability include: (a) Loss of Agricultural Land Class (ALC) A, B, C1 and C2 through the establishment of proposed infrastructure; i. The proposed rail spurs will impact areas of Class C1 GQAL, and ii. The proposed road will impact areas of Class A, B and C1 GQAL. (b) Fragmentation to existing agricultural landscape (c) Both the rail and the road are considered permanent infrastructure which will preclude any other land use from occurring where they are located; (d) Strategic Cropping Land is not present in the study area.	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure, the following control measures will also be implemented: (i) An Erosion & Sediment Control Management Plan will be developed for all areas disturbed due to the construction of off-lease infrastructure; (ii) As soon as practicable, after completion of construction activities, the construction area will be progressively rehabilitated to match the surrounding landform; (iii) Stockpiled topsoil will be distributed across the rehabilitated area and, in consultation with the landholder, any cleared vegetation placed across it to assist in soil retention and provision of feed stock for cattle (where appropriate); (iv) Revegetation will use appropriate species for the subject site (i.e. crops/pasture or Indigenous native species); and (v) All linear infrastructure will be designed to ensure that it does not interfere with the natural flow of surface waters resulting in ponding or flooding. (vi) Water sensitive urban design principles (including MUSIC modelling and the design of surface water treatment trains if required) will be incorporated in to the design of all linear infrastructure.

T2.3.5 Ecology

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
1. WILDLIFE	a) Land clearing and construction activities relating to the development of the off	In addition to all practicable control measures described in the Kevin's Corner Environmental Management Plan that are relevant to off-lease infrastructure,

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
HABITAT	lease road and rail infrastructure may result in: i. Loss of vegetation communities listed as having a high biodiversity value; a. 76 ha of remnant vegetation, including approximately 60 ha Of Concern RE11.8.11 (SEIS Appendix Q); b. Native grasslands (RE11.8.11) within the study area that provide suitable habitat for King blue-grass (*Dichanthium queenslandicum*). b) Loss of available habitat for native species on the site, including: i. Species listed in Table 7.2 of the Off Lease Rail and Road Survey Report (SEIS Appendix Q, Attachment 3); ii. Loss of habitat connectivity across the corridor areas; and iii. Weed invasion.	the following control measures will also be implemented: (i) Vegetation communities listed as Endangered at either the commonwealth or state level will be avoided where suitable alternatives exist; (ii) Impacts on state-listed Of Concern vegetation will be avoided wherever possible; (iii) Fragmentation of remnants of vegetation/habitat will be avoided wherever possible; (iv) Disturbance will be located at the edge of existing remnant vegetation where possible; (v) Where possible, access tracks and other infrastructure will be located in areas that have already been disturbed; (vi) Further targeted survey for King blue-grass (*Dichanthium queenslandicum*) be undertaken during the optimal sampling period (i.e. between March and May) to determine its presence/absence; (vii) Species-specific management plans for the conservation of threatened fauna species will be prepared (prior to construction), should these species be found (refer Off Lease Rail and Road Survey Report in SEIS Appendix Q, Attachment 3); (viii) Undertake a detailed geotechnical investigation prior to construction of the rail loop; (ix) Develop an earthworks schedule that: a. achieves a cut/fill balance; b. minimises changes to topography, particularly where this results in changes to drainage patterns; and c. minimises construction footprint wherever possible; (x) Identify areas where problem soils (highly dispersive, saline,

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
		cracking clays, potential acid sulfate soils) may impact on construction; (xi) Ensure the design and construction of the rail loop line takes into account issues arising from cracking clays and highly dispersive soils as relevant, including: a. allow for expansion joints; b. encapsulating soils by placing and compacting swelling clays within embankment cores to minimize exposure to drying/wetting; c. incorporating moisture control barriers with foundation swelling clays to control lateral seasonal migration of moisture; d. applying lime stabilisation to reduce plasticity and shrinkage potential; e. where the shrink/swell ratio is unacceptable, identifying appropriate disposal locations for these soils; and f. avoiding disturbance of highly dispersive soils where possible; (xii) Include drainage requirements in design such that concentration of flow does not occur and erosion is avoided; (xiii) Implement an erosion and sediment control plan during construction, and until post-construction rehabilitation has been completed, with a particular emphasis on controlling drainage across dispersive soils; (xiv) Encapsulate, seal or cap dispersive soils so that the soils are not exposed to running water; (xv) Rehabilitate after construction, including replacement of topsoil and

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
		re-vegetation to minimise exposure of dispersive soils to erosive forces; (xvi) Develop and implement a rail loop specific Decommissioning and Rehabilitation Plan; (xvii) Use only low residual pesticides such as glyphosates, that are listed on the PUBCRIS database of the approved active constituents and agricultural and veterinary chemicals which are registered for sale and use in Australia; (xviii) Use licenced operators for pesticide application; (xix) Clean up coal spillage adjacent to the track promptly; (xx) Ensure access roads to the rail corridor are free of dust and mud as far as reasonably practicable; (xxi) Transport dangerous goods and potential contaminants in accordance with Australian Code for Transport of Dangerous Goods by Road and Rails (ADG) Code.
2. PROTECTED AREAS	a) The proposed rail and road alignment is to be located on unimproved and improved grazing pasture and areas comprising "Of Concern Sub-Dominant and Dominant Remnant Ecosystem". b) In addition, the proposed road alignment intersects a portion of Endangered Regional Ecosystem (Category B protected area) at the southern-most point of the alignment. c) Category A protected areas will not be impacted by development of either the off-lease rail or road.	(i) To maintain the integrity of vegetated land that is not cleared for development of the road or rail corridor, appropriate erosion and sediment controls will be developed to prevent sediment deposition in remaining habitat; (ii) Recreated landforms will be contoured to resemble original regional topography where possible; (iii) A number of pest and weed Management strategies will be developed by HGPL in order to minimise the potential of future weed infestations; (iv) Monitoring for weeds of management concern will be undertaken, via annual observations by site personnel; (v) A Weed and Pest Management Plan will be developed to limit the

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
		spread of these species on and surrounding the road and rail corridor; (vi) If weeds of management concern are identified, they will be eradicated from the site in accordance with local best management practice from the Barcaldine Regional Council (formerly Jericho Shire) Pest Management Plan (Maunsell, 2008) and / or the DEEDI Pest Fact sheets (DEEDI 2007); and (vii) Awareness of weed management issues will be promoted by inclusion of weed management processes and systems in to new Personnel Induction Programmes.
3. HABITAT CONNECTIVITY	a) There is potential for linear infrastructure (i.e. rail and road) to fragment large tracts of wildlife habitat disrupting wildlife corridors.	(i) The design of the road and rail spur should avoid fragmentation of sensitive habitat and protected areas wherever possible; and (ii) Where the road or rail spur does cross sensitive habitat, known wildlife corridors or protected areas, the feasibility of the incorporation of a dedicated fauna crossing in to the design should be considered with reference to the publication *Fauna Sensitive Road Design* (TMR, 2002).
4. AQUATIC HABITAT - water crossings	a) Interruption of fish passage. b) Sedimentation of aquatic habitats. c) Loss or riparian and instream habitat.	The impacts of off lease infrastructure on water crossings will be mininised by consideration of the following issues during the design and construction phase of the infrastructure: (i) Consider the full width of the riparian corridor and its functions in the design and construction of any water crossings. Where possible, the design should accommodate fully structured native vegetation; (ii) Minimise the design and construction footprint and extent of proposed disturbances within the watercourse and riparian corridor; (iii) Maintain existing or natural hydraulic, hydrologic, geomorphic and

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
		ecological functions of the watercourse; (iv) Demonstrate that where a raised structure or increase in the height of the bed is proposed there will be no detrimental impacts on the natural hydraulic, hydrologic, geomorphic and ecological functions; (v) Maintain natural geomorphic processes: a. Accommodate natural watercourse functions; b. Maintain the natural bed and bank profile; c. Ensure the movement of sediment and woody debris is not inhibited; d. Do not increase scour and erosion of the bed or banks in any storm events; e. Avoid locating structures on bends in the channel; and f. Where bed degradation has occurred, address bed degradation to protect the structure and restore channel and bed stability; (vi) Maintain natural hydrological regimes: a. Accommodate site hydrological conditions; b. Do not alter natural bank full or floodplain flows or increase water levels upstream; c. Do not change the gradient of the bed except where necessary to address existing bed and bank degradation; and d. Do not increase velocities by constricting flows, for example filled embankments on approaches; (vii) Protect against scour: a. Provide any necessary scour protection, such as rock rip-

ECOLOGY		
Resource	**Potential Impact**	**Control Strategy**
		rap and vegetation; b. Ensure scour protection of the bed and banks downstream of the structure is extended for a distance of either twice the channel width or 20 metres whichever is the lesser; and c. If cutting into banks, protect cuttings against scour; and (viii) Stabilise and rehabilitate all disturbed areas including topsoiling, revegetation, mulching, weed control and maintenance in order to adequately restore the integrity of the riparian corridor.