Pardoo Irrigated Agriculture Project – Stage 3
Environmental Management Plan

Pardoo Beef Corporation Pty Ltd

P07-J08

25 May 2018




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REPORT DETAILS

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SUMMARY

Table 1 below provides a summary of the proposal, environmental factors and key provisions of this Environmental Management Plan.

Table 1. Environmental Management Plan Summary

Item	Details		
Title of the proposal	Pardoo Irrigated Agriculture Project – Stage 3		
Proponent name	Pardoo Beef Corporation Pty Ltd		
Purpose of the EMP	Submitted with Referral under Part IV of *Environmental Protection Act (1986)*		
Key Environmental Factors and Objectives	**Factor**		**EPA Objective**
	LAND	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
		Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.
		Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
	WATER	Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
		Inland waters Environmental Quality	To maintain the quality of groundwater and surface water so that environmental values are protected.
	PEOPLE	Social Surroundings	To protect social surroundings from significant harm.
Key Provisions of the Plan			
Factor and Provision No.	**Potential Impact**	**Outcome/Objective**	**Criteria / Management Actions**
Flora and Vegetation – Provision 1 (Outcome Based)	Weeds - Spread of Rhodes Grass	Rhodes grass will not colonise environments outside the project area	Trigger Criterion: • 1 occurrence of Rhodes grass detected in monitoring transects. Threshold Criterion: • > 1 occurrence of Rhodes grass detected in monitoring transects.
Flora and Vegetation – Provision 2 (Management Based)	Weeds - General	Avoid spread of weeds surrounding the Development Envelope due to Stage 3 activities.	Machinery/vehicles will be washed and/or brushed down to remove weed seeds and propagules, prior to mobilising to site and when leaving pivot crop areas to mobilise off site.
Flora and Vegetation – Provision 3 (Management Based)	Fire	No fires will be started due to human activity on site and any naturally occurring fires will be controlled where practicable.	A Fire Management Plan will be implemented prior to commencement of construction of Stage 3
Flora and Vegetation – Provision 4 (Management Based)	Inappropriate Rehabilitation	If operations cease, the site will be appropriately rehabilitated	A Closure and Rehabilitation Plan will be developed and approved by DWER at least 1 year before planned decommissioning and closure of the site

Factor and Provision No.	Potential Impact	Outcome/Objective	Criteria / Management Actions
Terrestrial Environmental Quality – Provision 5 (Outcome Based)	Soil salinity	The Stage 3 project does not cause unacceptable soil salinity	Trigger Criterion: • Soil salinity levels within the Development Envelope do not exceed 400mS/m in surface (0-10cm depth) or 600mS/m in subsurface (10-30cm depth) soils. Threshold Criterion: • Soil salinity levels within the Development Envelope do not exceed 600mS/m in surface (0-10cm depth) or 800mS/m in subsurface (10-30cm depth) soils.
Terrestrial Environmental Quality – Provision 6 (Outcome Based)	Soil Sodicity	The Stage 3 project does not cause unacceptable soil sodicity	Trigger Criterion: • Soil sodicity levels five years after commencement of irrigation do not exceed an Exchangeable Sodium Percentage (ESP) of 6% in surface (0-10cm depth) soils or 13% in subsurface (10-30cm depth) soils. Threshold Criterion: • Soil sodicity levels five years after commencement of irrigation do not exceed an Exchangeable Sodium Percentage (ESP) of 10% in surface (0-10cm depth) soils or 16% in subsurface (10-30cm depth) soils.
Terrestrial Fauna – Provision 7 (Management Based)	Fauna mortality during clearing	Prevent mortality of burrow dependent conservation fauna species during clearing	Pre-clearance surveys, in particular for burrows, will be undertaken by a fauna specialist prior to ground disturbance activities. Where Bilby and Mulgara are recorded within the impact area, individuals will be relocated or otherwise managed in a way which is approved by DBCA.
Terrestrial Fauna – Provision 8 (Management Based)	Vehicle / equipment strikes	Minimise vehicle / equipment strikes of fauna	Vehicles and equipment will not be driven at night, will be restricted to designated roads/tracks and will comply with an on site speed limit of 60 km/hr. In addition, site personnel will be trained in fauna awareness including preventing fauna strike.
Terrestrial Fauna – Provision 9 (Management Based)	Entrapment	Prevent fauna entrapment in trenches and behind fences	Trenches dug for water pipelines will not be left open (pipelines will be immediately installed and buried) and fencing will be installed in long linear stretches without “alcoves” in which fauna become trapped.
Terrestrial Fauna – Provision 10 (Management Based)	Feral fauna	Prevent increases in feral fauna due to the Stage 3 project	Feral fauna control will be undertaken on an annual basis in consultation with the local DBCA office including: • Shooting of wild dogs / foxes. • Strategic baiting or trapping of cats; and • If Cane Toad spreads to the region, implementing a station Cane Toad management and reporting system

Factor and Provision No.	Potential Impact	Outcome/Objective	Criteria / Management Actions
Hydrological Processes – Provision 11 (Outcome Based)	Changes to surface water hydrological processes within or surrounding the project area.	The Stage 3 project will not cause changes to surface water hydrological processes within or surrounding the project area.	Trigger Criterion: • Surface water inundation or flooding is evident within Stage 3 Development Envelope when no rainfall has occurred in the preceding 8 weeks. Threshold Criterion • Surface water inundation or flooding is evident outside the Stage 3 Development Envelope (within a 1 km buffer) when no rainfall has occurred in the preceding 10 weeks.
Hydrological Processes – Provision 12 (Outcome Based)	Over irrigation causing changes to hydrological processes	Soil Moisture Levels within the pivots should be maintained ideally between 15 and 20% volumetric water content (except when preceding rainfall has occurred) and should always be lower than 30% (except when preceding rainfall has occurred).	Trigger Criterion: • Soil moisture levels above 25% volumetric water content (except when rainfall has occurred in the preceding week). Threshold Criterion: • Soil moisture levels above 30% volumetric water content (except when rainfall has occurred in the preceding week).
Inland Waters Environmental Quality – Provision 13 (Management Based)	Changes in water quality of the Broome Aquifer due to the Stage 3 project	No unacceptable impacts on groundwater quality of the Broome Aquifer as a result of the Stage 3 project.	Implement monitoring of Broome Aquifer water quality, downstream of project activities including 3 Broome Aquifer bores and all potential contaminants from the Stage 3 Project (salt, hydrocarbons, nutrients and herbicides). Compare the results to available baseline data and ongoing monitoring trends. If monitoring indicates contamination is occurring, investigate this and take appropriate corrective and preventative action.
Inland Waters Environmental Quality – Provision 14 (Management Based)	Changes in water quality of the surface water in the adjacent Ramsar area (when flooded) due to the Stage 3 project	No unacceptable impacts on groundwater quality of surface water in the adjacent Ramsar area (when flooded) as a result of the Stage 3 project.	Implement monitoring of surface water quality (in particular salinity and nutrients), downstream of project activities when surface water is available (after flooding rainfall events). Compare the results to available baseline data and ongoing monitoring trends. If monitoring indicates contaminants (salts and nutrients) are increasing beyond expected baseline/background trends, investigate this and take appropriate corrective and preventative action.

Factor and Provision No.	Potential Impact	Outcome/Objective	Criteria / Management Actions
Inland Waters Environmental Quality – Provision 15 (Management Based)	Spills of hydrocarbons, fertiliser or herbicides	Ensure appropriate prevention and management of spills of hydrocarbons, fertiliser or herbicides.	Potential contaminants will be managed as follows: • hydrocarbons contained within bunds according to the requirements of Australian Standard 1940; • liquid nitrogen tanks within a concrete bund which will capture 110% of the volume stored; • granular fertilisers stored on a hard stand within a shed; • herbicides will not be stored on site (they will be brought to site in when needed); and • a Spill Response Procedure will be in place including appropriate staff training, appropriate spill clean up kits, waste disposal, spill reporting and corrective and preventative actions.
Social Surroundings – Provision 16 (Management Based)	Accidental damage to an Aboriginal Heritage Site	Avoid accidental damage to an Aboriginal Heritage Site	• Prior to any land disturbance undertake appropriate Aboriginal Heritage Surveys. • Wherever possible avoid any Aboriginal Heritage Sites identified. • Where not possible to avoid sites, obtain a Section 18 Licence to disturb a heritage site under the *Aboriginal Heritage Act 1972*, prior to any disturbance occurring.

1 CONTEXT SCOPE AND RATIONALE

1.1 PROPOSAL

This Environmental Management Plan is in relation to Stage 3 of the Pardoo Irrigated Agriculture Project. Pardoo Station is located north of the Great Northern Highway, approximately 100 kilometres (km) east-north-east of Port Hedland and 365 km south west of Broome (Figure 1).

The pastoral lease contains large tracts of prime grazing land. However, the pastoral station requires a dry-season feeding capability to improve cattle welfare, condition and throughput during the dry-season when dry conditions result in limited cattle feed availability. Therefore, the owner of Pardoo Station, Pardoo Beef Corporation Pty Ltd (PBC), is proposing to develop a centre-pivot irrigated feed crop production facility.

1.1.1 DESCRIPTION

Stage 3 of the Pardoo Irrigated Agriculture Project is located approximately 4 km inland from the coast (Figure 1) with a footprint of 280 ha in total including:

- Three 50 ha pivots, one 40 ha pivot and two 38 ha pivots (total of 266 ha); and
- 14 ha for proposed support infrastructure such as fencing, pipelines, bores and roads (Figure 2).

The crop proposed to be grown in the Stage 3 pivots is Rhodes grass (*Chloris gayana*), a summer-growing, stoloniferous perennial, whose runners provide good soil cover for erosion control. Rhodes grass is adapted to a wide range of soils and provides excellent quality fodder for cattle (Department of Agriculture and Fisheries Qld, 2017).

1.1.2 SITE LAYOUT

The site layout (Figure 2) consists of:

- A fenced Development Envelope of 368 ha.
- A fenced main access road and ring road surrounding the central pivot (Pivot 18) which allows access into all of the pivot areas via gates.
- Five fenced cattle holding paddocks containing the five perimeter pivots (Pivot numbers 13, 14, 15, 16, and 17) and small amounts of additional land around each pivot which act as dry resting ground for cattle.
- A fenced central pivot (Pivot 18). This pivot does not have additional area fenced around it (only the pivot itself is fenced), which means that cattle need to be moved frequently to other paddocks to access dry resting ground.
- Three groundwater abstraction bores (PB8, PB9 and PB10) and pipelines to the centre of each pivot.
- Access roads to the centre of each pivot.
- A laydown area for equipment and vehicles located along the main access road.

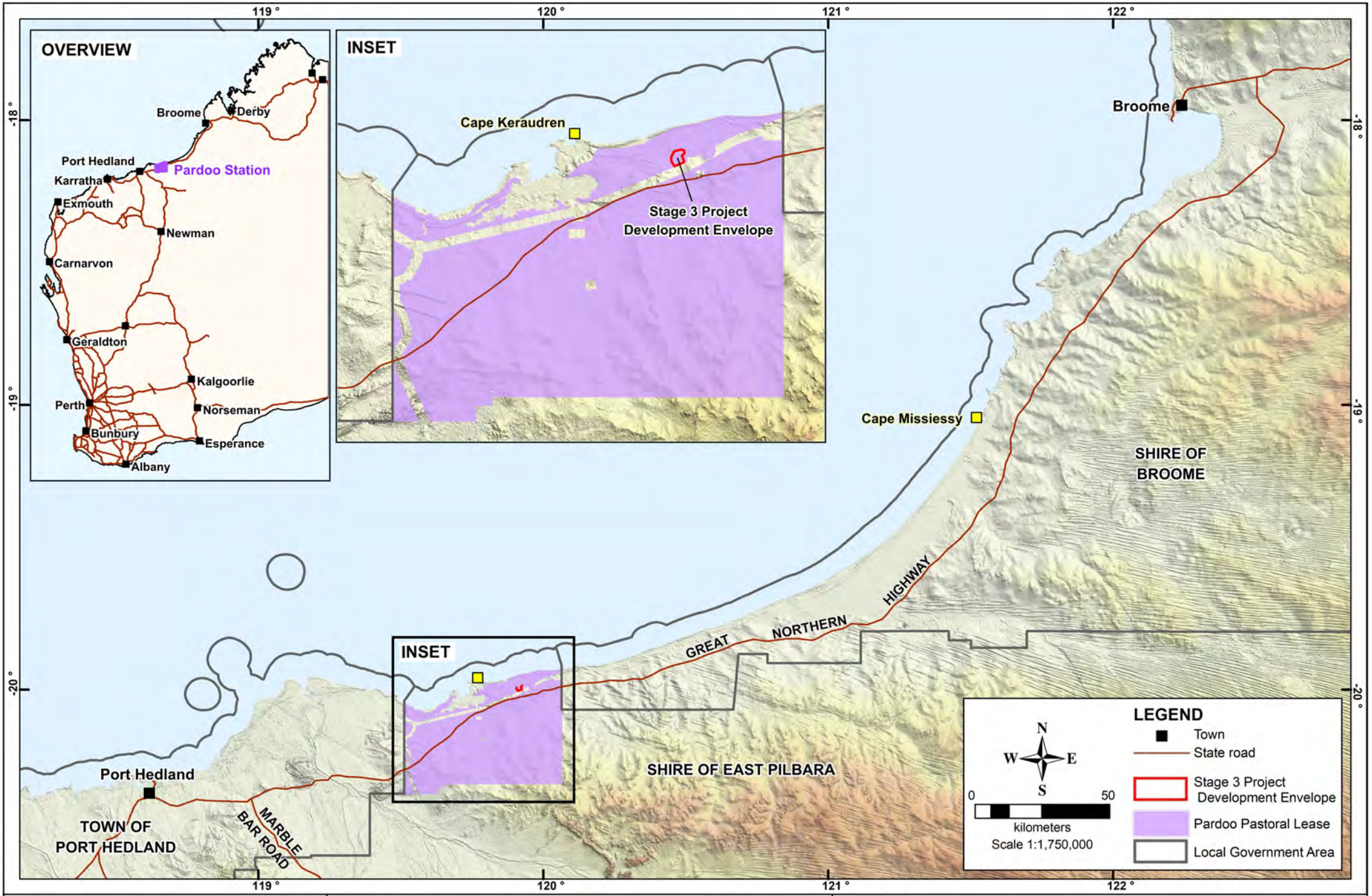

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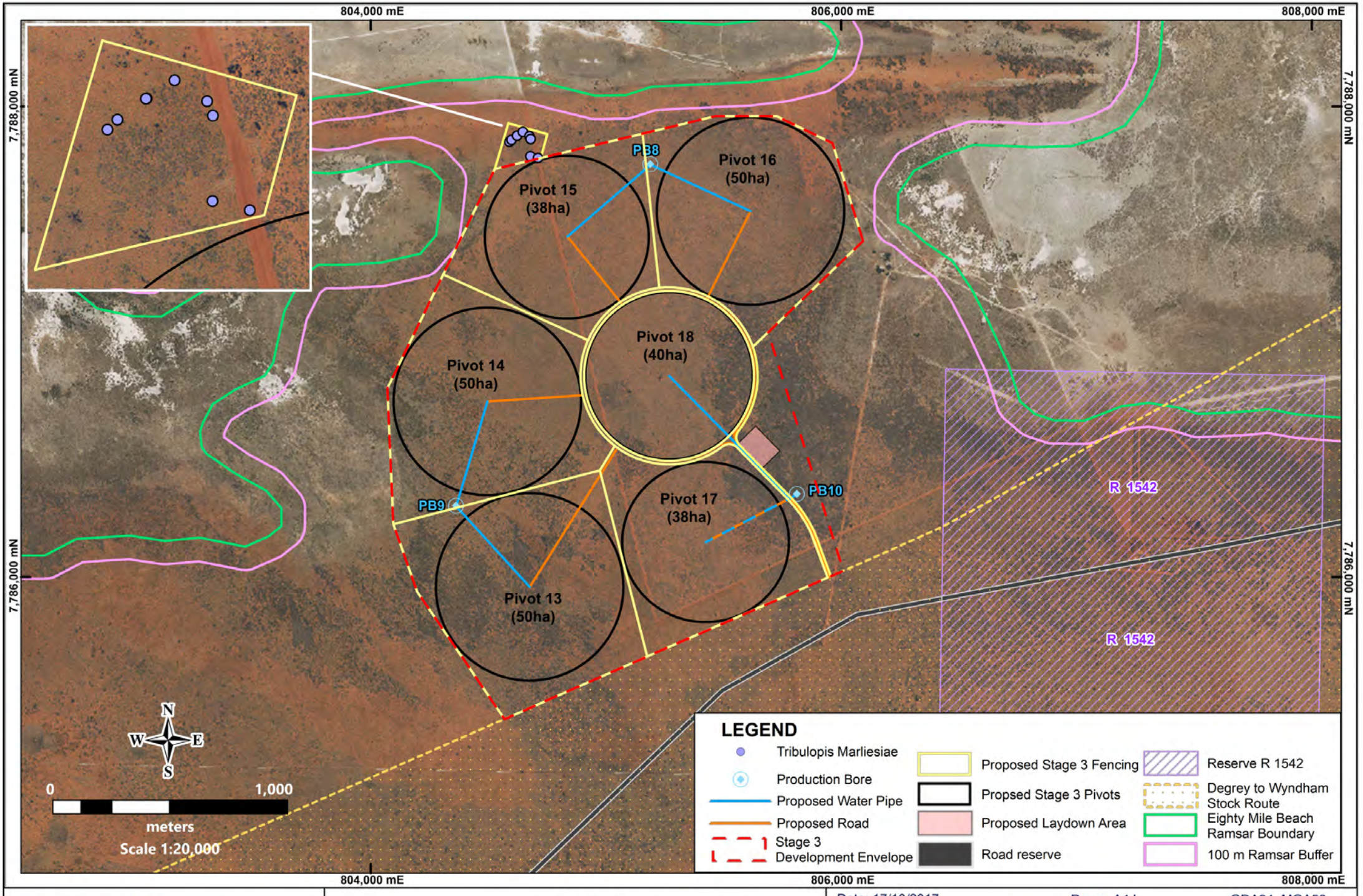
Figure 1. Pardoo Stage 3 Irrigation Project Location

Date: 18/10/2017 Paper: A4 L GDA94

Data Source: 4A, 4E, 6A, 8A, 9A, 17A

File Info:P07_J06_Location_20171004



EnviroWorks CONSULTING

Figure 2
Site Layout

Date: 17/10/2017 Paper: A4 L GDA94, MGA50

Data Source: 8A, 13D, 21AD, 23

File Info: P07-J06_Stage3Layout_20170929_AE.WOR

1.1.3 SITE ESTABLISHMENT

Site establishment involves:

- Installation of bores to supply groundwater for irrigation.
- Clearing of circular areas of land where crops are proposed to be grown.
- Fencing of paddocks around the pivot areas (including some additional land outside each pivot) in order to contain cattle.
- Planting of Rhodes grass seeds.
- Application of water and fertiliser.
- Growing of the crops until maturity.
- Allowing cattle into selected pivot crop areas to graze directly.

It should be noted that:

- Clearing is carried out in a way which minimises erosion. Both the initial clearing and replanting strategy is timed to prevent erosion.
- Irrigation is applied to all pivots in a manner which ensures the water is consumed in-situ by the crop (and does not infiltrate to the groundwater). This is achieved by soil moisture monitoring and leaf tissue analysis to ensure that only the bare minimum of water is applied to achieve crop growth.
- No pesticides will be used in the Stage 3 irrigation project. They are not necessary for effective operations.
- The only contaminant in use is diesel, required for the diesel generators which drive the pivots.
- If herbicides are required to managed weeds, the Department of Biodiversity, Conservation and Attractions (DBCA) will be consulted and only herbicides agreed with the DBCA will be applied.
- No other chemicals or hydrocarbons are required on site.
- The Stage 3 project will carry approximately 3,000 size cattle at 200 kilograms each. This will increase the overall cattle numbers on the station by approximately 3,000 cattle.

1.1.4 DESCRIPTION OF CATTLE OPERATIONS

Cattle will be herded into the Stage 3 Development Envelope via a fenced track from existing cattle station holding yards to the south east – this fenced track will be installed as part of normal cattle station activities under the conditions of the pastoral lease.

Cattle will be herded up the main access road and gates will be opened and shut to facilitate access into the desired pivot area. Cattle will then be allowed to graze on the selected pivot until it is deemed by the operations manager that they should be moved (based on cattle condition/weight and crop fodder remaining, in accordance with the pastoral station's operational objectives).

There will be no additional trampling or grazing by cattle outside the fenced Development Envelope as cattle movement frequency and density is unlikely to change outside the fenced Development Envelope (cattle already move and graze freely within the local area as part of normal station activities regulated under the pastoral lease and installation of the pivots will not change this).

However, within the fenced Development Envelope there may still be some localised areas of indirect impact which are unavoidable due to increased trampling of cattle around the pivots. The fenced areas around the pivots will be used to restrict cattle when grazing on the pivots. The cattle tend to graze preferentially within the pivot crops themselves as they offer more nutritious and high calorie feed than surrounding native vegetation. However, some cattle may move off the pivots to rest after grazing and may impact surrounding native vegetation via trampling within the fenced areas when being herded for movement in and out of the fenced areas.

1.1.5 KEY CHARACTERISTICS

Table 2: Summary of the Proposal

Summary of the proposal	
Proposal title	Pardoo Irrigated Agriculture Project - Stage 3
Proponent name	Pardoo Beef Corporation Pty Ltd (PBC)
Short description	It is proposed to develop a centre-pivot irrigated feed crop production facility to improve cattle welfare, condition and throughput at Pardoo Station, a pastoral lease located north of the Great Northern Highway, approximately 100 kilometres (km) east-northeast of Port Hedland and 365 km southwest of Broome. The proposal includes the construction of pivot irrigation areas and associated infrastructure/activities (*access roads; laydown areas; production bores; diesel generators; water pipelines; fencing; pivot irrigators; and cattle fodder crops*).

Table 3: Location and proposed extent of physical and operational elements

Element	Indicative location	Existing Approval	Proposed change	Proposed extent authorised
Physical elements				
6 pivot fodder cropping areas	Within the 368 ha Development Envelope shown in Figure 4	None	Not applicable	Up to 266 hectares
Ancillary infrastructure (*access roads; laydown areas; production bores; diesel generators; water pipelines; fencing; pivot irrigators; and cattle fodder crops*)	Within 368 ha Development Envelope shown in Figure 4	None	Not applicable	Up to 14 hectares
Fenced paddock areas (for cattle containment)	Within 368 ha Development Envelope shown in Figure 4	None	Not applicable	Up to 88 hectares
Operational elements				
Abstraction of groundwater for irrigation - proposed abstraction already licensed: GWL158616(16)	From the production bores, with irrigation onto 266 ha of pivots shown in Figure 4	14.8 GL per annum for Pardoo Station of which 4.123 GL will be used for Stage 3 (already licenced by Groundwater Well Licence 158717(16))	None	No additional water required
Application of NPK fertiliser	Onto 266 ha of pivots shown in Figure 4	None	Not applicable	Up to 186 t per annum Nitrogen Up to 5.3 t per annum Phosphorus Up to 53 t per annum Potassium
Power Generation	Diesel Generators	None	Not applicable	0.096 MW
Diesel Consumption (in generators)	Diesel Generators	None	Not applicable	30 kL

1.2 HISTORIC AND FUTURE APPLICATIONS

1.2.1 PREVIOUSLY APPROVED – STAGES 1 AND 2

Two previous irrigation capability stages have already been approved as follows and are currently being implemented by the proponent) – Figure 3:

- Stage 1 – 270 ha footprint
  - Two developed 40 ha pivots plus 10 ha of operational areas –approved under Clearing Permit Number CPS 4207 for 90 ha (issued 28 July 2011)
  - Four developed 40 ha pivots approximately plus 20 ha of operational areas – already approved under Clearing Permit Number CPS 6552 for 180 ha (issued 23 July 2015).

- Stage 2 – 400 ha
  - Five 55 ha pivots, one 45 ha pivot and one 35 ha pivot currently being constructed (total of 355 ha for pivots)
  - 45 ha of support infrastructure.
  - Clearing Permit Number CPS 7312/1 (issued 13 July 2017).

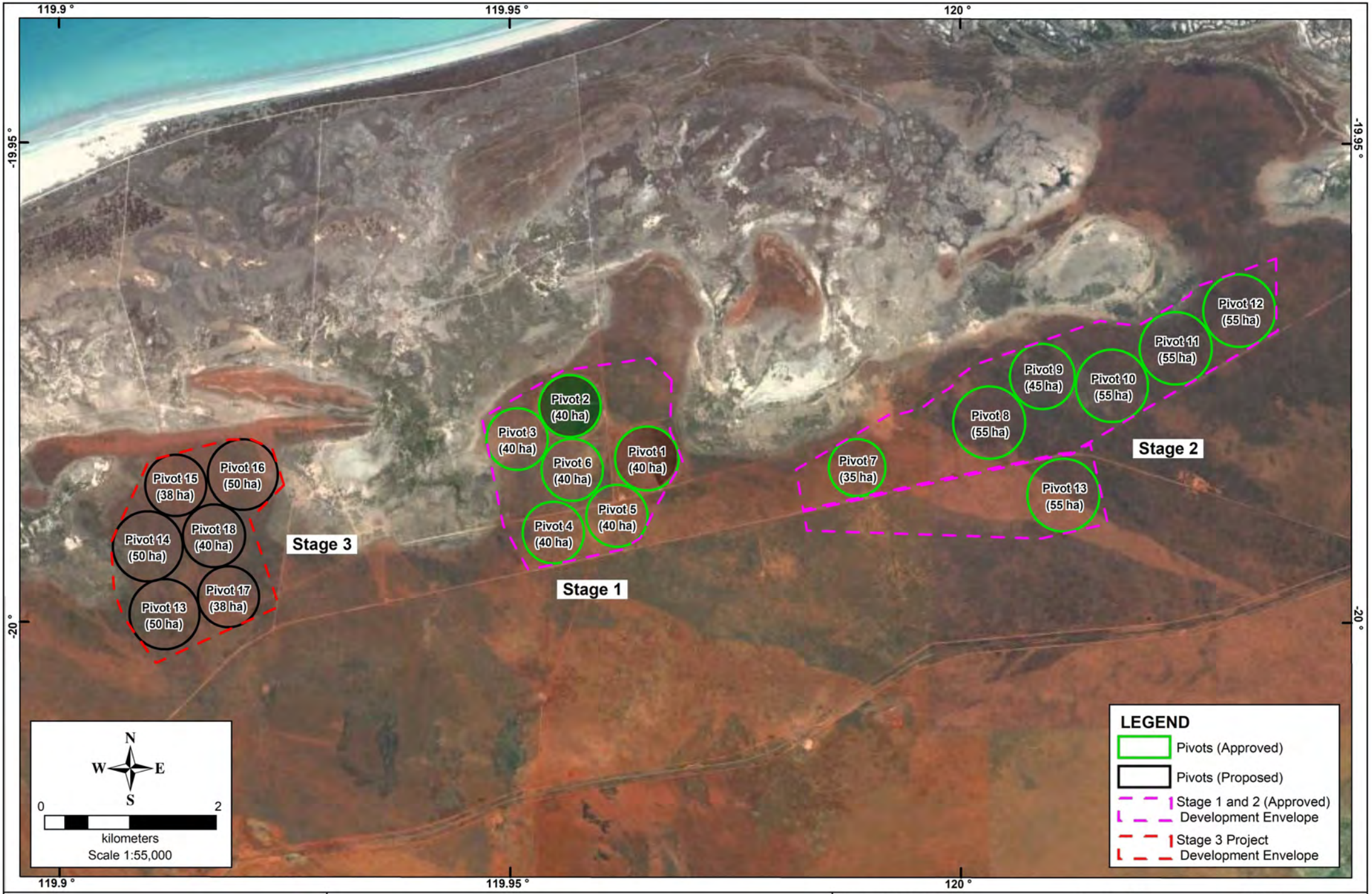
Stages 1 and 2 do not form part of the current proposal.

1.2.2 POTENTIAL FUTURE PROPOSAL – STAGES 4, 5 AND 6

PBC is currently considering future referral to the EPA of subsequent irrigation capability Stages 4, 5 and 6. The details of these stages have not yet been determined. However, it is possible that a future referral for Stages 4, 5 and 6 may involve approximately 17 pivots and a footprint of approximately 1000 ha.

These Stages would also occur within the Land Tenure Envelope, but the exact location and layout has not yet been decided.

Potential future Stages do not form part of the current proposal.



EnviroWorks CONSULTING

Figure 3. Pardoo Irrigation Historic Approvals

Date: 17/10/2017 Paper: A4 L GDA94

Data Source: GoogleEarth

File Info: P07_J06_HistoricalApprovals_20171017

1.3 KEY ENVIRONMENTAL FACTORS

Key environmental factors are described in the table below.

Table 4: Key Environmental Factors

Item	Description
Flora and Vegetation	
Proposal activities affecting factor	• Clearing of terrestrial vegetation (for pivot irrigation areas and related infrastructure); • Crop establishment; • Fertiliser storage and use; • Irrigation and changes to drainage patterns; • Movement and grazing of cattle associated with pivot operations; • Operational activities (e.g. vehicle movement); and • Storage and handling of contaminants (hydrocarbons and chemicals).
Key environmental values	• Vegetation structure, condition and diversity • Priority flora • Priority ecological community
Ecosystem health / condition	The Stage 3 Development Envelope: • Has been continuously grazed for over 100 years. • Is sparsely vegetated with areas of degradation due to long term historical cattle grazing, trampling and fire. • Was burnt by a severe wildfire in 2015 thought to be started via lightning strike (covering 139 ha) with most of the vegetation in the fire's path destroyed; • Contains 10.3 ha of completely degraded vegetation mostly around stock watering points or along cattle movement trails; and • Due to the existing impacts above, has quite sparse vegetation with an average vegetation density (foliage cover) of only 35%. Adjacent area of Ramsar Wetland: • Has been continuously grazed for over 100 years. • Is sparsely vegetated with areas of degradation due to long term historical cattle grazing, trampling and fire. • Contains 73.5 ha of completely degraded vegetation mostly around stock watering points or along cattle movement trails.
Key assumptions	• Extensive regional and local information was available and was consulted. • DBCA Threatened Flora and TEC Databases were searched. • The author had conducted several previous studies in the region. • All specimens identified to species level. • Floristic community types are assemblages as defined by Gibson et al. (1994) The presence or absence of individual taxa in standard areas (quadrats) is used to define floristic groupings (or community types) based on shared species. A total of 176 floristic quadrats (each 50 m x 50 m or 2500 m^2) were established within the native vegetation of the Stage 2 and 3 study areas. Within each quadrat all plant species were identified and their cover determined. • Structural vegetation mapping was conducted in the Ramsar Study area to the north to provide context regarding the surrounding environment.
Existing and/or potential uses	• Cattle grazing • Native fauna habitat (see factor below)
Terrestrial Environmental Quality	
Proposal activities affecting factor	• Mechanical disturbance during the clearing process; • Installation of equipment on site (generators, pipelines and irrigation equipment); • Trenching and burying water reticulation pipelines;

Item	Description
	• Fertiliser storage and use; • Waste generation and disposal; • Groundwater abstraction; • Operational activities (e.g. vehicle movement); and • Storage and handling of chemicals or hydrocarbons.
Key environmental values	• Surface and sub-surface soil condition and structure. • Surface and sub-surface soil quality.
Ecosystem health / condition	The Stage 3 Development Envelope: • Has been continuously grazed for over 100 years. • Has terrestrial areas of degradation due to long term historical cattle grazing, trampling and fire. • Contains 10.3 ha of completely degraded areas mostly around stock watering points or along cattle movement trails. Adjacent area of Ramsar Wetland: • Has been continuously grazed for over 100 years. • Has terrestrial areas of degradation due to long term historical cattle grazing, trampling and fire. • Contains 73.5 ha of completely degraded areas mostly around stock watering points or along cattle movement trails.
Key Assumptions	• Extensive regional and local information was available and was consulted. • Acid sulphate soil risk, surface geology and soil databases were searched. • Soil chemistry analysis was undertaken of 13 sub-surface soil samples in areas representative of the Stage 3 project area, the adjacent Ramsar area and the Stage 1 operational pivots. The soil chemistry analysis suite included: Colwell Phosphorous, Colwell Potassium, Sulphur (KCl 40), Organic Carbon (Walkley-Black), Nitrate Nitrogen, Ammonium Nitrogen, Electrical Conductivity, pH (water), pH (CaCl2), Boron, Trace elements (DTPA: Copper, Zinc, Manganese, Iron) Exchangeable Cations (Calcium, Magnesium, Sodium, Potassium, Aluminium), Phosphorous Buffering Index (PBI). • Soil infiltration testing was also conducted at two locations within the Stage 3 project area and two locations within the adjacent Ramsar area.
Existing and/or potential uses	• Cattle grazing • Native fauna habitat (see factor below)
Terrestrial Fauna	
Proposal activities affecting factor	• Clearing of terrestrial fauna habitat (for pivot irrigation areas and related infrastructure); • Installation of equipment on site (generators, pipelines and irrigation equipment); • Crop establishment; • Fertiliser storage and use; • Irrigation and changes to drainage patterns; • Operational activities (e.g. vehicle movement); and • Storage and handling of contaminants (hydrocarbons) – note no chemicals or pesticides are used on site.
Key environmental values	• Terrestrial fauna habitat within project area. • Seasonal grassland dependent migratory bird habitat adjacent to project • Occasional (flooded every 10 years) and short lived (flooded for 2 – 5 weeks) wetland habitat adjacent to the project.
Ecosystem health / condition	The Stage 3 Development Envelope: • Has been continuously grazed for over 100 years.

Item	Description
	• Is sparsely vegetated with areas of degradation due to long term historical cattle grazing, trampling and fire. • Was burnt by a severe wildfire in 2015 thought to be started via lightning strike (covering 139 ha) with most of the vegetation in the fire's path destroyed; • Contains 10.3 ha of completely degraded vegetation mostly around stock watering points or along cattle movement trails; and • Due to the existing impacts above, has quite sparse vegetation with an average vegetation density (foliage cover) of only 35%. Adjacent area of Ramsar Wetland: • Has been continuously grazed for over 100 years. • Is sparsely vegetated with areas of degradation due to long term historical cattle grazing, trampling and fire. • Contains 73.5 ha of completely degraded vegetation mostly around stock watering points or along cattle movement trails.
Key Assumptions	• Extensive regional and local information was available and was consulted. • DBCA Threatened Fauna database was searched. • The author had conducted several previous studies in the immediate region. • All vertebrate fauna observed were identified. • All major Vegetation and Substrate Associations were visited and significant species habitat and traces were identified. • Site was fully surveyed to the level appropriate for a level 1 assessment and for the proposed impact. • Survey intensity was deemed adequate due to the scale of the project and the amount of data available in the region.
Existing and/or potential uses	• Cattle grazing • Native fauna habitat
Hydrological Processes	
Proposal activities affecting factor	• Clearing and earthworks to create pivots, roads, fencing and pipelines; • Irrigation of the pivots; and • Groundwater abstraction.
Key environmental values	• Groundwater hydrological processes in the Broome and Wallal aquifers • Surface water hydrological processes in the adjacent Ramsar area when flooded approximately every 10 years for 2-5 weeks
Ecosystem health / condition	• Groundwater system health assumed satisfactory because it is managed by the Department of Water and Environmental Regulation (DWER) through groundwater allocation and licencing processes. • Surface water system health assumed satisfactory, because impacts to hydrological processes unlikely in the local area (lack of development, urbanisation and other threatening processes).
Key assumptions	• Extensive regional and local information, including local meteorological data, terrain data, satellite imagery and soil mapping was available and was consulted. • The authors are experienced in hydraulic modelling and water balancing. • The hydraulic model was run for the three historical rainfall events. The overall extent and rate of retreat of the modelled flood water matches reasonably well with the observed satellite imagery and validates the model assumptions. • The largest rainfall record was modelled to capture the flood extent and duration – indicative of future increased rainfall in response to climate change. • Hydrological processes were modelled in both local and regional contexts with regard to existing and future groundwater users in the area.

Item	Description
	• Extensive groundwater investigations have been ongoing on Pardoo Station since 2008 as part of the process of obtaining groundwater licences to abstract groundwater for irrigation purposes for the Pardoo Irrigation Project Stages 1, 2 and 3.
Existing and/or potential uses	• Cattle grazing • Neighbouring pastoral stations abstract groundwater • Adjacent Ramsar wetland flood periodically after heavy prolonged rainfall providing temporary waterbird habitat for a small number of birds
Inland Waters Environmental Quality	
Proposal activities affecting factor	• Clearing and earthworks to create pivots, roads, fencing and pipelines; • Irrigation of the pivots; • Application of fertiliser to crops; • Storage, use and disposal of hydrocarbons; • Waste generation and disposal; and • Groundwater abstraction.
Key environmental values	• Groundwater quality in the Broome and Wallal aquifers • Surface water hydrological processes in the adjacent Ramsar area when flooded approximately every 10 years for 2-5 weeks
Ecosystem health / condition	Groundwater and surface water system health assumed satisfactory because impacts to water quality are unlikely in the local area (lack of contaminating processes such as industry, urbanisation and mining).
Key assumptions	• Extensive regional and local information, including local meteorological data, terrain data, satellite imagery and soil mapping was available and was consulted. • The authors are experienced in hydraulic modelling and nutrient impact assessment. • Extensive groundwater investigations have been ongoing on Pardoo Station since 2008 as part of the process of obtaining groundwater licences to abstract groundwater for irrigation purposes for the Pardoo Irrigation Project Stages 1, 2 and 3. • Groundwater quality has been monitored in the vicinity of the project since 2011, at production and monitoring bores for the existing Stage 1 irrigation project located approximately 2 km to the east of the proposed Stage 3.
Existing and/or potential uses	• Cattle grazing • Neighbouring pastoral stations abstract groundwater
Social Surroundings	
Proposal activities affecting factor	• All land disturbance, excavation and construction activities
Key environmental values	• Cultural heritage sites
Ecosystem health / condition	• Assumed satisfactory as cultural heritage management measures ensure impacts to cultural heritage sites do not occur.
Key assumptions	• An online search for relevant Aboriginal Heritage information was performed using the Department of Planning, Lands, and Heritage Aboriginal Heritage Inquiry System. The system incorporates both the Heritage Site Register and the Heritage Survey Database. • Appropriate heritage surveys are currently being planned.
Existing and/or potential uses	• Cattle grazing • Neighbouring pastoral stations abstract groundwater • Indigenous cultural heritage

The Eighty-mile Beach site was established as a Ramsar wetland under the Ramsar Convention in 1990. (Environment Australia, 2001). The majority of the Eighty-mile Beach Ramsar Wetland boundary occurs along the coastal strip of Eighty-mile Beach. However, an area of coastal plain south of Cape Keraudren and extending 4 km inland, is included in the wetland boundary, adjacent to the Stage 3 Development Envelope. It should be noted that:

- The predominant wetland values which resulted in the Ramsar Wetland listing are located along the coastal strip of eighty-mile beach 4 km away from the Stage 3 Project Development Envelope. Most of these values are related to the tidal mudflat and coastal beach environment which creates habitat for migratory birds and flatback turtle (Appendix B).
- The area of the Ramsar wetland adjacent to the proposed project is a coastal floodplain that only floods approximately every 10 years (Water Technology, 2017).
- Much of the adjacent Ramsar site supports dense acacia and melaleuca thickets. This means that even when flooded, migratory waterbirds that rely on wetland environments would find only small areas of open, shallow wetlands in grasslands. By cross-referencing vegetation types (EnviroWorks Consulting, 2017), with flood modelling conducted (Water Technology, 2017), within a 1 km buffer from the Stage 3 Development Envelope, there are 20.8 ha of salt pans/grasslands which would flood for 1 – 2 weeks and 12.6 ha of salt pans which would flood for 3-5 weeks (when the area floods approximately every 10 years). The abundance of waterbirds that use these short lived, ephemeral wetlands adjacent to the project is not expected to be high due to the small area of suitable habitat and infrequency of flooding (Bamford Consulting Ecologists, 2017).
- The abundance of grassland-dependent waterbirds is also not expected to be high, as the area of dry grassland adjacent to the project is small, but such species are likely to occur regularly in the September to November period (pre-Wet season). Only three listed migratory birds are likely to occur regularly, and all are grassland-dependent species that forage (mostly on invertebrates) on dry grasslands. These are the Oriental Plover, Little Curlew and Oriental Pratincole (Bamford Consulting Ecologists, 2017).
- Large but very rare aggregations of these grassland species are possible, but the likelihood of such aggregations meeting the Ramsar criterion for any of these species adjacent to Stage 3 is extremely low (Bamford Consulting Ecologists, 2017).
- The Eighty Mile Beach Ramsar Site is listed on the basis of large aggregations of migratory waterbirds on the coastal flats and beaches 4 km away from the Stage 3 project (Bamford Consulting Ecologists, 2017).
- A buffer for Stage 3 Development Envelope of 100 m from the Ramsar Wetland boundary is proposed.
- Values of the Ramsar Wetland that have the potential to be impacted by the Stage 3 project have been assessed in this management plan and are related to the Key Environmental Factors listed in Table 4 above. That is, these potential impacts are in the areas of flora and vegetation, terrestrial environmental quality, terrestrial fauna, hydrological processes and inland waters environmental quality. Values related to these Key Environmental Factors have been identified in Section 2 and used to identify trigger and threshold criteria for the early identification of and response to potential impacts to the Eighty-mile Beach Ramsar site for the purpose of protecting Ramsar site conservation values and are related to the Key Environmental Factors discussed in the remainder of this management plan.

Groundwater abstraction has not been assessed as part of the Part IV *Environmental Protection Act 1986* impact assessment for this project. Groundwater abstraction for the project is already approved under the groundwater licence for the project (Groundwater Well Licence 158616(16) issued on 25 January 2017) under the *Rights in Water and Irrigation Act 1914*. Groundwater monitoring is regulated separately under this licence using a Groundwater Operating Strategy (GWOS). For this reason, groundwater abstraction and related monitoring is not addressed in this management plan and is not mentioned in any of the sections below.

1.4 CONDITION REQUIREMENTS

This project is at the stage of referral to the Environmental Protection Authority (EPA) under Part IV of *Environmental Protection Act (1986).* Therefore, no Ministerial Statement or other conditions exist in relation to this project currently.

2 EMP PROVISIONS

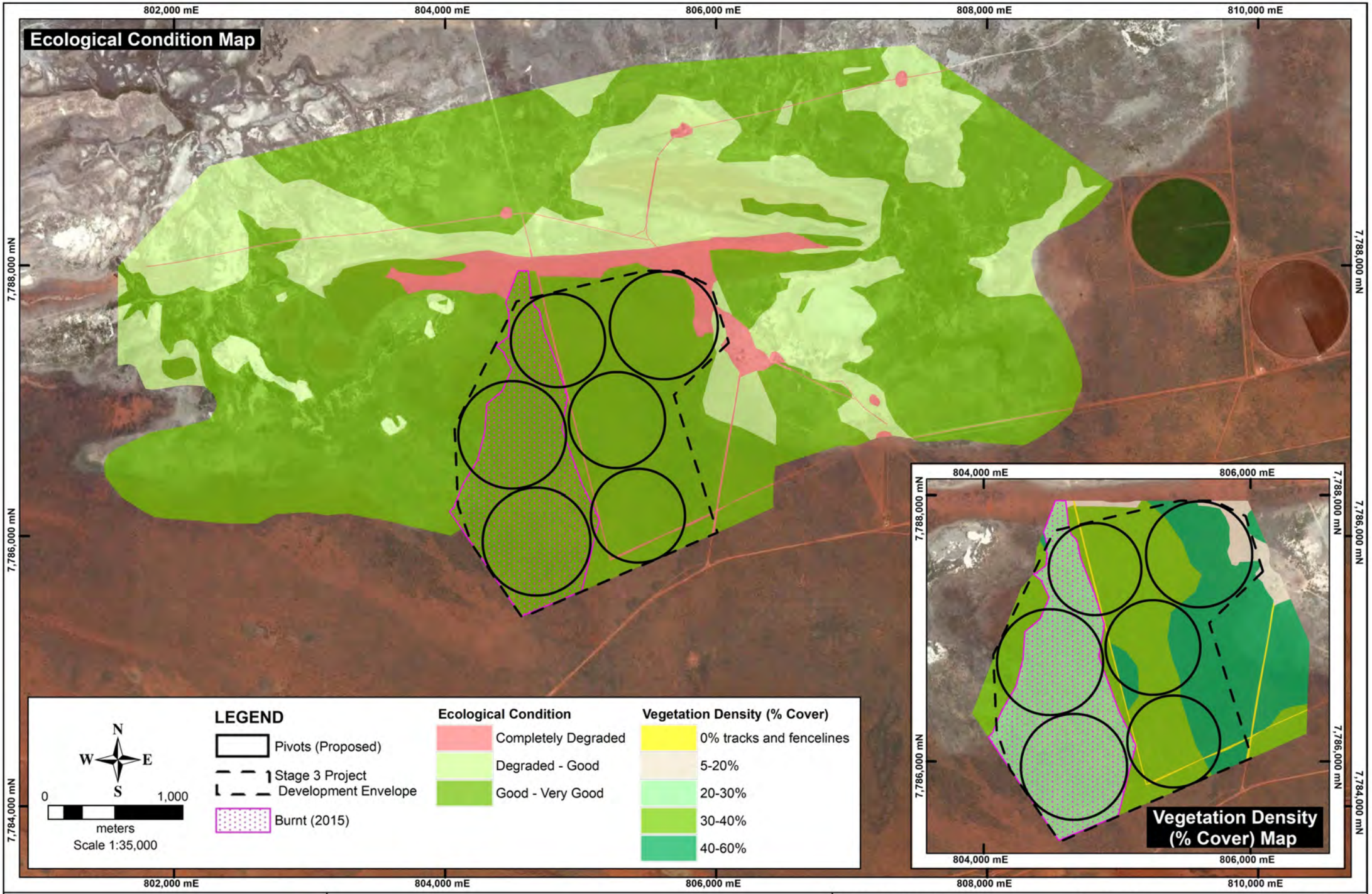
The sub-sections below outline the proposed EMP provisions and the rationale for their selection.

2.1 FLORA AND VEGETATION

Table 5: Flora and Vegetation Objectives and Rationale

Objectives and Rationale for Provisions	Details
EPA Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Project Objectives	• To contain impacts to flora and vegetation within the Development Envelope as far as practicable. • To minimize impacts of the Stage 3 project on vegetation and flora surrounding the Development Envelope.
Baseline Monitoring/Studies	Completed: • Detailed (Level 2) Flora and Vegetation Assessment (EnviroWorks Consulting, 2017a). o Desktop review of available datasets. o Detailed Flora and Vegetation Survey including 176 floristic quadrats (50 m x 50 m each) 11th – 21st July 2016 o Targeted Priority Flora Survey including regional searches 25th – 28th August 2016 o Reconnaissance (Level 1) Flora and Vegetation Survey of Ramsar area to the north of the project area 21 – 23rd September. o Primary survey timing selected to occur after significant rainfall. Proposed additional monitoring/studies prior to proposal implementation: • None.
Study Findings (EnviroWorks Consulting, 2017a)	• Within Stage 3 Development Envelope, four floristic community types were identified by multivariate analysis. • Within the Ramsar study area to the north, 6 structural vegetation communities were identified. • The native plant communities present range from degraded to very good in ecological condition. Completely degraded vegetation covers 84 ha and occurs in association with cattle station activity and stock watering points (Figure 4). • Percentage foliage cover (vegetation density), varies from 0% in areas completely devoid of vegetation (e.g. tracks, fence lines, agricultural infrastructure) to 40-60% in Pindan Shrublands. A fire in 2015 reduced cover in the western Pindan Shrublands to 20-30%. On average the vegetation cover across the Stage 3 development envelope is estimated to be 35% (Figure 4). • No Threatened or Priority Ecological Communities (TEC's/PEC's) were identified within the Stage 3 Development Envelope. • The scale of impacts to vegetation is considered to be small in a regional context, with only 0.15 and 0.002% of regional Pre-European Vegetation communities Pindan 32 and Mandora Coastal Plain 73 proposed to be impacted. These vegetation communities are not considered under threat, with 100% of their original extents remaining. • 129 native plant species representing 79 genera and 35 families were recorded within the study areas.

Objectives and Rationale for Provisions	Details
	• Four weed species were recorded (*Aerva javanica, Calotropis procera, Cenchrus ciliaris* and *Tamarix aphylla*). *Aerva javanica* and *Cenchrus cilliaris* are common weeds associated with grazing. • A record of the Eighty Mile Land System Priority 3 PEC occurs 320 m immediately north of the Stage 3 Development Envelope. The buffer of the PEC overlaps the Stage 3 Development Envelope, however the occurrence of the PEC does not. • *Bonamia oblongifolia* (Priority 1) was identified as occurring in the Stage 3 Development Envelope and also further afield at intervals along tracks and firebreaks (0.013% of the estimated regional population proposed to be impacted) • *Tribulopis marliesiae* (Priority 3) was located in a small area immediately north of the Stage 3 Development Envelope. No plants surveyed will be impacted.
Sensitive components of factor or values	• *Tribulopis marliesiae* (Priority 3) – small local population with regional population unknown due to lack of surveys. Local surveyed population is not within Stage 3 Development Envelope and will be fenced to prevent cattle damage. • Eighty Mile Land System Priority 3 PEC 320 m immediately north of the Stage 3 Development Envelope. There will be no additional trampling or grazing by cattle outside the fenced Development Envelope as cattle movement frequency and density is unlikely to change in these areas (cattle already move and graze freely within the local area as part of normal station activities regulated under the pastoral lease and installation of the pivots will not change this).
Key impacts and risks	Clearing, trampling, weeds, inappropriate fire regimes and dust deposition.
Management approach	The mitigation hierarchy (avoid, minimise and rehabilitate) has been applied.
Project design impact avoidance measures	• All clearing for the Stage 3 project will be contained within the Development Envelope. The Development Envelope is located 100 m from the adjacent Ramsar wetland boundary and 320 m from the Eighty Mile Land System Priority 3 PEC record. • All cattle grazing on the Stage 3 pivots will be contained within the fenced Development Envelope to avoid damage to vegetation outside the Development Envelopment. • The local surveyed population of *Tribulopis marliesiae* (Priority 3) is located outside the Development Envelope and will be fenced to prevent cattle damage.
Rationale for provisions	• Outcome based provisions capable of objective measurement and reporting have been proposed for: trampling of native vegetation and spread of Rhodes Grass (the proposed crop and a potential weed). • Management based provisions for actions which are less measurable have been proposed for: weeds, fire and rehabilitation. • Hydrological changes and contamination are covered under Hydrological Processes (Section 2.4) and Inland Waters Environmental Quality (Section 0).



EnviroWorks CONSULTING

Figure 4. Vegetation Condition and Density

Date: 16/01/2018 Paper: A4 L GDA94, MGA50

Data Source: 21AD, GoogleEarth

File Info: P07-J06_Fig11_VegCondition&Density_20180116

Table 6: Flora and Vegetation Outcome Based Provisions

Potential Impacts	Proposal Specific Outcome	Criteria	Response Actions	Monitoring	Reporting
Weeds - Spread of Rhodes Grass	Rhodes grass will not colonise environments outside the project area	Trigger Criterion: 1 occurrence of Rhodes grass detected in monitoring transects. Threshold Criterion: > 1 occurrence of Rhodes grass detected in monitoring transects.	Trigger Action: • Targeted survey by trained on site staff to determine if any other infestations of Rhodes grass have occurred away from the transect. • Eradication of Rhodes grass with a DBCA approved herbicide. Threshold Actions: • Eradication of Rhodes grass with a DBCA approved herbicide. • Re-evaluation of irrigation and weed control methods, to prevent spread of Rhodes grass continuing further.	Annual post-wet season monitoring by trained on site staff of 3 vegetation monitoring transects extending from the edge of pivots into selected environments likely to be subject to sheet flow runoff and/or water-logging after heavy rainfall (Figure 5). After 5 years of operation, if no Rhodes grass has been detected outside of pivots, frequency of monitoring to decrease to every 2 years. After 10 years of operation, if no Rhodes Grass has been detected outside of pivots, frequency of monitoring to decrease to every 5 years.	Incident report to DWER if threshold criteria exceeded. Annual Ministerial Statement Compliance Assessment Report to DWER

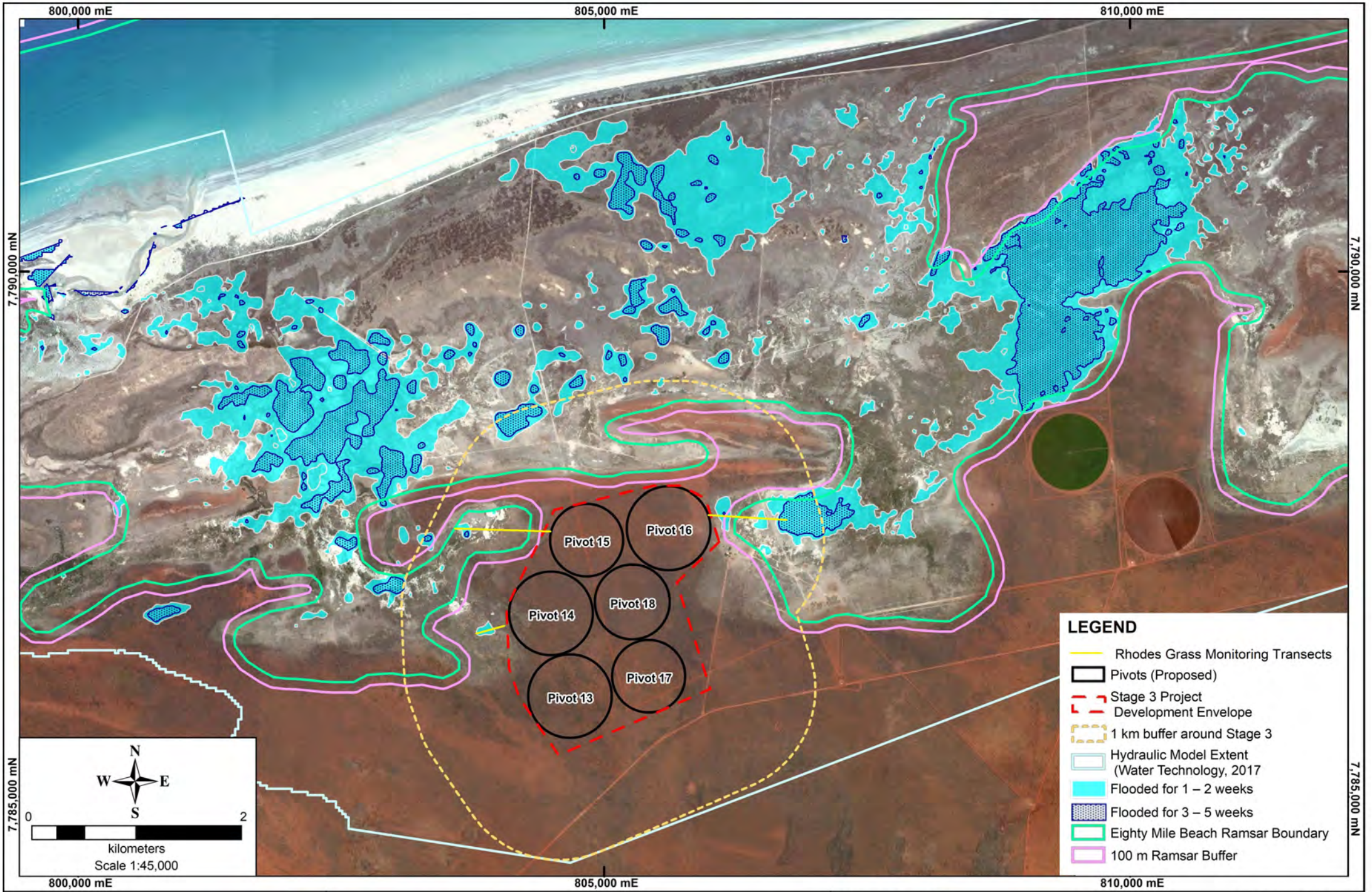


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Figure 5. Rhodes Grass Monitoring Transects and Flooding

Date: 17/01/2018 Paper: A4 L GDA94, MGA50

Data Source: 21AD, Google Earth

File Info: P07-J06_Fig21_FloodExtent_20180117

Table 7: Flora and Vegetation Management Based Provisions

Potential Impacts	Proposal Specific Objective	Management Actions	Management Targets	Monitoring	Reporting
Weeds - General	Avoid spread of weeds surrounding the Development Envelope due to Stage 3 activities.	Machinery/vehicles will be washed and/or brushed down to remove weed seeds and propagules, prior to mobilising to site and when leaving pivot crop areas to mobilise off site.	• Machinery/vehicle clean down checklists followed and signed prior to mobilisation to site and when leaving pivot crop areas to mobilise off site.	Monthly environmental inspections. Machinery/vehicle clean down checklists completed.	Annual Ministerial Statement Compliance Assessment Report to DWER.
Fire	No fires will be started due to human activity on site and any naturally occurring fires will be controlled where practicable.	A Fire Management Plan will be implemented prior to commencement of construction of Stage 3	• A Fire Management Plan will be developed and implemented prior to commencement of construction of Stage 3	Annual Ministerial Statement Compliance Assessment.	Annual Ministerial Statement Compliance Assessment Report to DWER.
Inappropriate Rehabilitation	If operations cease, the site will be appropriately rehabilitated	A Closure and Rehabilitation Plan will be developed and approved by DWER at least 1 year before planned decommissioning and closure of the site	• A Closure and Rehabilitation Plan will be developed and approved by DWER at least 1 year before planned decommissioning and closure of the site.	Annual Ministerial Statement Compliance Assessment.	Annual Ministerial Statement Compliance Assessment Report to DWER.

2.2 TERRESTRIAL ENVIRONMENTAL QUALITY

Table 8: Terrestrial Environmental Quality Objectives and Rationale

Objectives and Rationale for Provisions	Details
EPA Objective	To maintain the quality of land and soils so that environmental values are protected.
Project Objectives	• To maintain soil productivity and to ensure no decline in soil quality, as a result of the Stage 3 development.
Baseline Monitoring/Studies	Completed: • Desktop review of available datasets (surface geology, soil landscapes mapping, acid sulphate soils mapping) (EnviroWorks Consulting, 2017b). • Soil chemistry analysis of 13 sub-surface soil samples in areas representative of the Stage 3 project area, the adjacent Ramsar area and the Stage 1 operational pivots (EnviroWorks Consulting, 2017b). • Soil infiltration testing at two locations within the Stage 3 project area and two locations within the adjacent Ramsar area (Water Technology, 2017). Proposed additional monitoring/studies prior to proposal implementation: • None.
Study Findings (EnviroWorks Consulting, 2017b)	• Surface geology: o *Stage 3 project area:* Sand or gravel plains; may include some residual alluvium; quartz sand sheets commonly with ferruginous pisoliths or pebbles; local clay, calcrete, laterite, silcrete, silt, colluvium. This geology type is typical of that that found in the wider catchment and will not be altered by irrigation activities. o *Ramsar area:* paleo-tidal in nature, consists of Estuarine, tidal delta and lagoonal deposits (paeleo-tidal); coastal mud flats, silt and evaporite deposits (paeleo-tidal); may contain older vegetated black soils. • Acid Sulphate Soils: o *Stage 3 project area*: majority lies within an area of Extremely Low (1-5% chance) acid sulphate soil risk, with a small area of High (>70% chance) acid sulphate soil probability occurring in the western corner. There will be no excavation in the area of High probability, so the risk of acid generation is considered low. o *Ramsar area:* majority lies within an area of High (>70% chance) acid sulphate soil probability. • pH o *Stage 3 project area:* ranges from slightly acidic to neutral. o *Ramsar area:* ranges from neutral to slightly basic. • Infiltration rate o *Stage 3 project area:* sandy soils representative of the wider catchment, with very high infiltration rates (~155 mm/hour). These high infiltration rates hinder lateral movement of contaminants (i.e. fertiliser, hydrocarbon spills) to the neighbouring Ramsar area, but facilitate movement of contaminants into the soil profile (and possibly groundwater). o *Ramsar area:* low infiltration rates (~1 – 7 mm/hour).

Objectives and Rationale for Provisions	Details

	• Nutrients
	  o *Stage 3 project area:* nutrient levels within the Stage 3 pre-development soils are low.
	  o *Ramsar area:* elevated levels of nutrients, organics and salts (several orders of magnitude higher than the soils within the irrigation project area). The Ramsar area will not be disturbed.
	• The scale of impact to terrestrial environmental quality is considered to be small in a regional context, with only 0.025% of soil type 117 Nt proposed to be impacted regionally.
	• The scale of impact to terrestrial environmental quality is considered to be small in a local context, with only 0.22% of soil type 117 Nt proposed to be impacted on Pardoo Station.

Sensitive components of factor or values	• The high infiltration rates (~155 mm/hour) of the Stage 3 project area may facilitate rapid infiltration of contaminants (fertiliser, hydrocarbon spills) into the soil profile. • Areas of high acid sulphate soil probability could lead to acid generation if disturbed (via excavation) or dewatered (via groundwater abstraction or other hydrological changes). • Excessive application of fertilizer or water could result in nutrient accumulation, salination or sodicity. • Spills of contaminants (diesel, fertilizer or approved herbicides) could result in soil contamination.
Key impacts and risks	Soil degradation risks including erosion, salinisation, sodification, acid sulphate soil disturbance, nutrient accumulation and contamination.
Management approach	The mitigation hierarchy (avoid, minimise and rehabilitate) has been applied.
Project design impact avoidance measures	• Direct disturbance of the terrestrial environment will be avoided outside the Stage 3 Development Envelope, by fencing the Development Envelope to contain cattle within it. A buffer of 100 m is proposed from the adjacent Ramsar wetland. • The Stage 3 project is located on red sandy soils with a high infiltration rate. Because of their very high infiltration rate, and low clay content, these soils are not prone to surface water erosion, salinity or sodicity. • The only excavation required for the project is to install water pipelines (in trenches) from the bores to the centre of each pivot. None of these pipelines are located in an area of high ASS risk, therefore no excavation of high ASS risk areas will occur. • Irrigation volumes will be managed to prevent over irrigation leading to shallow water table rise and mobilization of naturally occurring salts (refer to Inland Waters Environmental Quality, Section 0). • Nutrient application rates will be managed to prevent nutrient build up (refer to Inland Water Environmental Quality, Section 0). • Potential contaminants will be appropriately stored and handled.
Rationale for provisions	• Outcome based provisions capable of objective measurement and reporting have been proposed for: salinity and sodicity. • Other potential impacts such as nutrient accumulation and other contamination have been covered under Inland Waters Environmental Quality (given the high infiltration rate of the soils will facilitate infiltration to groundwater).

Table 9: Terrestrial Environmental Quality Outcome Based Provisions

Potential Impacts	Project Specific Outcome	Criteria	Response Actions	Monitoring	Reporting
Soil salinity	The Stage 3 project does not cause unacceptable soil salinity	Trigger Criterion: Soil salinity levels within the Development Envelope do not exceed 400mS/m in surface (0-10cm depth) or 600mS/m in subsurface (10-30cm depth) soils. Threshold Criterion: Soil salinity levels within the Development Envelope do not exceed 600mS/m in surface (0-10cm depth) or 800mS/m in subsurface (10-30cm depth) soils.	Trigger Actions: • Identify the distribution of soil with salinity exceeding trigger levels. • Investigate the cause of the salinity levels. • Verify the adequacy of the estimated leaching rate in controlling salinity. • Identify whether remedial action is required • Implement remedial actions. • Increase monitoring to quarterly in key affected locations. Threshold Actions: • Identify the distribution of soil with salinity exceeding threshold levels. • Investigate the cause of the salinity levels. • Verify the adequacy of the estimated leaching rate in controlling salinity. • Identify whether remedial action is required • Implement remedial actions. • Incident report to DWER.	Annual soil sampling at representative locations across the Development Envelope. Increase frequency to quarterly in key affected locations if trigger criterion exceeded.	Incident report to DWER if threshold criteria exceeded. Annual Ministerial Statement Compliance Assessment Report to DWER

Potential Impacts	Project Specific Outcome	Criteria	Response Actions	Monitoring	Reporting
Soil Sodicity	The Stage 3 project does not cause unacceptable soil sodicity	Trigger Criterion: Soil sodicity levels five years after commencement of irrigation do not exceed an Exchangeable Sodium Percentage (ESP) of 6% in surface (0-10cm depth) soils or 13% in subsurface (10-30cm depth) soils. Threshold Criterion: Soil sodicity levels five years after commencement of irrigation do not exceed an Exchangeable Sodium Percentage (ESP) of 13% in surface (0-10cm depth) soils or 16% in subsurface (10-30cm depth) soils.	Trigger Actions: • Identify the distribution of soil with sodicity exceeding trigger levels. • Investigate the cause of the sodicity levels. • Verify the adequacy of the estimated leaching rate in controlling sodicity. • Identify whether remedial action is required • Implement remedial actions. • Increase monitoring to quarterly in key affected locations. Threshold Actions: • Identify the distribution of soil with sodicity exceeding threshold levels. • Investigate the cause of the sodicity levels. • Verify the adequacy of the estimated leaching rate in controlling sodicity. • Identify whether remedial action is required • Implement remedial actions. • Incident report to DWER.	Annual soil sampling at representative locations across the Development Envelope. Increase frequency to quarterly in key affected locations if trigger criterion exceeded.	Incident report to DWER if threshold criteria exceeded. Annual Ministerial Statement Compliance Assessment Report to DWER

2.3 TERRESTRIAL FAUNA

Table 10: Terrestrial Fauna Objectives and Rationale

Objectives and Rationale for Provisions	Details
EPA Objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Project Objectives	• To avoid impacts on the fauna and habitat within the Ramsar area to the North of the Stage 3 project. • To minimise other impacts on fauna and habitat as a result of the Stage 3 project.
Baseline Monitoring/Studies	Completed: • Level 1 Assessment (Bamford Consulting Ecologists, 2017): o Targeted survey for Greater Bilby and Brush-tailed Mulgara (fauna specialists walked transects 200 m apart in project area and surrounds) 12th – 14th July 2017. o Level 1 Survey of Stage 3 and Ramsar area to the North (Fauna specialists traversed as much of the area as possible to describe fauna habitat and make opportunistic observations. Targeted searches were also conducted for Greater Bilby, Mulgara and waterbirds. One evening also spent listening for rare fauna and spotlighting for reptiles) 18th – 21st September. Proposed additional monitoring/studies prior to proposal implementation: • During the month prior to clearing occurring, pre-clearance surveys (in accordance with DBCA guidelines) will be conducted by a fauna specialist for Mulgara and Greater Bilby within the Stage 3 Development Envelope. • Any individuals found during pre-clearance surveys will be moved on or relocated by a fauna specialist prior to the commencement of clearing in consultation with the DBCA.
Study Findings (Bamford Consulting Ecologists, 2017)	• Fauna assemblage is largely intact and moderately rich, but highly variable seasonally and annually. Assemblage includes elements of the Great Sandy Desert, Pilbara and Kimberley. • Desktop study identified 235 vertebrate fauna species as potentially occurring in the project area: 5 frogs, 44 reptiles, 148 birds and 38 mammals. • No invertebrate species of conservation significance are expected in the survey area based on database searches. • 43 species of conservation significance could be present, most are expected only as vagrants or irregular visitors. • Few conservation significant species expected to be regularly reliant on the Stage 3 project area and adjacent Ramsar area. The most notable are the Bilby, Brush-tailed Mulgara and Spectacled Hare-Wallaby (regular visitors to Stage 3) and some grassland-dependent migratory waterbirds (Oriental Plover, Little Curlew and Oriental Pratincole) that can be expected to be regular migrants visiting the dry grasslands of the adjacent Ramsar area • The Stage 3 area and Ramsar site represent quite different landscapes and support few but distinct Vegetation and Substrate Associations. o *The Stage 3 project area* occurs within an area characterised by Pindan (red sandy) soils which support acacia and mixed species shrublands over spinifex grasslands. The area does not flood and is not seasonally wet,

Objectives and Rationale for Provisions	Details
	due to the high infiltration rates of the pindan soil. The Stage 3 project area provides habitat values for species which utilise the dry, sandy, shrubland environment such as Bilby and Mulgara. o *The Ramsar area* contains a mixture of grasslands and shrublands, as well as small salt pans on white to grey clayey soil. This area can be categorised as a coastal floodplain which is seasonally damp and floods infrequently for short periods after heavy prolonged rainfall. It provides habitat values for grassland-dependent migratory waterbirds (Oriental Plover, Little Curlew and Oriental Pratincole) that can be expected to be regular migrants visiting the dry grasslands of the adjacent Ramsar site. • The area of habitat loss across the largely intact landscape is proportionately small, and therefore the impact upon fauna biodiversity from habitat loss is predicted to be negligible. The 1028 ha of disturbance/impact from Stages 1, 2 and 3 at Pardoo represents 1.7% of the 61,143 ha of native vegetation from the Nita Land System the within a 15km buffer around the three project areas. • The fauna assemblage does not appear to be reliant upon connectivity or existing habitat corridors, and therefore the threat from population fragmentation due to pivot development appears negligible. • Abundance of waterbirds is not expected to be high and the likelihood of meeting the criteria for Ramsar listing in terms of numbers of birds is extremely low. Instead, the criteria for Ramsar listing are met by the coastal mudflat areas of Eighty Mile Beach 4 km away. • Some of the fauna is sensitive to feral species such as Foxes and wild dogs/Dingoes. The pivots may represent an environment where such feral species will increase in abundance, either due to increased access to water or increased access to food.
Sensitive components of factor or values	• The closest coastal beaches and mudflats which meet the criteria for Ramsar listing in terms of numbers of migratory waterbirds are approximately 4 km away from the Stage 3 project (along Eighty Mile Beach). Due to distance they are unlikely to be affected by the project. • The Ramsar area 100 m to the north of the Stage 3 project: o Provides seasonal habitat values for small numbers of grassland-dependent migratory waterbirds (Oriental Plover, Little Curlew and Oriental Pratincole). o Provides occasional habitat values for small numbers of wetland-dependent waterbirds when flooded for periods of up to 5 weeks, approximately every 10 years. • The Stage 3 project area provides habitat for Mulgara and Bilby which are species which live and reproduce in burrows and are therefore sensitive to clearing activities if animals are not relocated/moved on from burrows before clearing commences.
Key impacts and risks	Habitat clearing, vehicle/equipment strike, entrapment, exposure to toxicants, behaviour changes, altered fire regimes and increases in feral species.
Management approach	The mitigation hierarchy (avoid, minimise and rehabilitate) has been applied.

Objectives and Rationale for Provisions	Details
Project design impact avoidance measures	• All clearing for the Stage 3 project will be contained within the Development Envelope. A buffer of 100 m is proposed from the Ramsar wetland boundary. All cattle grazing on the Stage 3 pivots will be contained within the fenced Development Envelope. • To avoid fauna behavioural changes, no project lighting will occur, all waste disposal will occur off site and no surface water ponding will occur as a result of irrigation (all irrigation water will infiltrate the soil). • No pesticides will be used on site and only DBCA approved herbicides will be used when it is necessary to control weeds.
Rationale for provisions	• Management based provisions for actions which are less measurable have been proposed for: preventing fauna mortality during clearing, vehicle/equipment strike, entrapment and feral fauna. • Other potential impacts such as hydrological changes and toxicant exposure (via contaminants) have been covered under Hydrological Processes (Section 2.4) and Inland Waters Environmental Quality (Section 0).

Table 11: Terrestrial Fauna Management Based Provisions

Potential Impacts	Proposal Specific Objective	Management Actions	Management Targets	Monitoring	Reporting
Fauna mortality during clearing	Prevent mortality of burrow dependent conservation fauna species during clearing	Pre-clearance surveys, in particular for burrows, will be undertaken by a fauna specialist prior to ground disturbance activities. Where Bilby and Mulgara are recorded within the impact area, individuals will be relocated or otherwise managed in a way which is approved by DBCA.	• Pre-clearance surveys undertaken by fauna specialist prior to ground disturbance. Any Bilby or Mulgara individuals are managed as approved by DBCA.	• Pre-clearance survey report.	Annual Ministerial Statement Compliance Assessment Report to DWER.

Potential Impacts	Proposal Specific Objective	Management Actions	Management Targets	Monitoring	Reporting
Vehicle / equipment strikes	Minimise vehicle / equipment strikes of fauna	Vehicles and equipment will not be driven at night, will be restricted to designated roads/tracks and will comply with an on site speed limit of 60 km/hr. In addition, site personnel will be trained in fauna awareness including preventing fauna strike.	• No driving of vehicles / equipment at night. • Vehicles will be restricted to designated access roads. • Speed will be limited to 60 km/hr. • Training of personnel in fauna awareness including preventing fauna strike will occur.	• Daily inspections during clearing. • Monthly environmental inspections. • Training records.	Annual Ministerial Statement Compliance Assessment Report to DWER.
Entrapment	Prevent fauna entrapment in trenches and behind fences	Trenches dug for water pipelines will not be left open (pipelines will be immediately installed and buried) and fencing will be installed in long linear stretches without “alcoves” in which fauna become trapped.	• No trenches left open. • Fencing to be in long linear stretches without alcoves.	• Daily inspections during clearing and fence installation.	Annual Ministerial Statement Compliance Assessment Report to DWER.
Feral fauna	Prevent increases in feral fauna due to the Stage 3 project	Feral fauna control will be undertaken on an annual basis in consultation with the local DBCA office including: • Shooting of wild dogs / foxes. • Strategic baiting or trapping of cats; and • If Cane Toad spreads to the region, implementing a station Cane Toad management and reporting system	• Annual feral fauna control in consultation with the local DBCA office.	• Feral fauna control records.	Annual Ministerial Statement Compliance Assessment Report to DWER.

2.4 HYDROLOGICAL PROCESSES

Table 12: Hydrological Processes Objectives and Rationale

Objectives and Rationale for Provisions	Details
EPA Objective	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
Project Objectives	To ensure the Stage 3 project does not cause changes to the hydrological processes of the Broome or Wallal Aquifers. To ensure that the Stage 3 project does not cause changes to the hydrological processes of local surface water regimes.
Baseline Monitoring/Studies	Completed: • A hydrological assessment of surface water conditions including (Water Technology, 2017): o A review of meteorological, terrain, satellite imagery and soil mapping data available. o Characterisation of the catchment soils and hydrology. o Preparation of a hydraulic model to determine the extent, duration and frequency of local flooding. • Extensive groundwater investigations and monitoring have been ongoing on Pardoo Station since 2008 as part of the process of obtaining groundwater licences to abstract groundwater for irrigation purposes for the Pardoo Irrigation Project Stages 1, 2 and 3 (Groundwater Consulting Services, 2008, 2009, 2011, 2013, 2014a, 2014b, 2015, 2016a, 2016b, 2017a, 2017b). Proposed ongoing monitoring/studies: • A detailed groundwater monitoring program is in place under the Operating Strategy required by Groundwater Well Licence 158717(16).
Study Findings (Water Technology, 2017); (Groundwater Consulting Services, 2008, 2009, 2011, 2013, 2014a, 2014b, 2015, 2016a, 2016b, 2017a, 2017b).	• Clearing and earthworks will affect approximately 280 ha of land within the Pindan red sandy soil type, and irrigation will be carried out on 266 ha of the Pindan red sandy soil type. • The Pindan red sandy soil type has a very high infiltration rate of around 155 mm/hour. After clearing, earthworks and crop establishment, it is expected that the infiltration rate in these areas will not change significantly, because the soil will remain in situ. • The irrigation project is located on relatively flat terrain, which when coupled with the high soil permeability means that runoff is negligible (as is typical of desert catchments). Streamlines are not well defined and there are no signs of concentrated flow, and modelling shows that no significant surface flows occur across the proposed Stage 3. The land is unlikely to become saturated due a depth to groundwater in excess of 3 m and an average annual rainfall of approximately 320 mm. • The boundary of Eighty Mile Beach Ramsar Wetland occurs 100 m from the Stage 3 development. • Ponding occurs across parts of the adjacent Ramsar wetland due to the presence of more clayey soils and low infiltration rate (~1 – 7 mm/hour), however there is no obvious interaction between the two areas. • The combination of annual rainfall (320 mm) and irrigation on the pivot areas (1550 mm) results in 1,870 mm of water falling on the pivot areas annually. The area's potential evapotranspiration rate (APER) is around 1,755 mm/yr. Consequently, the annual 1,550 mm/m^2 of irrigation water will be used by the plants (or lost via evapotranspiration) and is unlikely to infiltrate to groundwater.

Objectives and Rationale for Provisions	Details
	• Irrigation application of water will be minimal (and timed to occur during periods of no rainfall). No post-development surface flows will be generated by the project because irrigation water will infiltrate to the plant root zone and will not create surface flow. Therefore, there will be no erosion due to surface water flows and no surface run-off related changes to flooding in the adjacent Ramsar wetland. • Likewise, there will be no significant changes in groundwater recharge or flows beneath the project due to surface irrigation. • The contours of the land will not be altered, therefore erosion and drainage lines will not be created. • There will also not be an artificial ecosystem created outside the project boundary as surface flows will not exist to sustain such an ecosystem. • Heavy rainfall will still infiltrate through the crop root zone to the groundwater (as is the case naturally within the Pindan soils prior to crop establishment). Therefore, the pivot irrigation is unlikely to have a significant impact on groundwater hydrological processes. • The surficial aquifer beneath the Stage 3 project area and coastal plain is known as the Broome aquifer which occurs within the Broome Sandstone, a cross-bedded sandstone, siltstone and conglomerate (its approximate thickness ranges from 30 – 70 m). Beneath the project area it is greater than 3 m depth below ground surface and flows in a northerly direction towards the coast. This is the receiving aquifer for any water or contaminant infiltration from the Stage 3 Project. •
Sensitive components of factor or values	• The Broome aquifer could be sensitive to hydrological changes caused by over irrigation of crops. • Local surface water processes could be affected if the project causes a change in infiltration of surface water on the red sandy pindan soils within the Stage 3 Development Envelope or flooding regimes on the adjacent clayey/silty soils within the Ramsar area.
Key impacts and risks	• Broome Aquifer – over irrigation leading to shallow water table rise causing salinity and/or flooding. • Surface Water – changes in contours leading to changes in flow paths/flooding, over irrigation leading to water logging/flooding, changes in soil structure leading to changes in infiltration.
Management approach	The mitigation hierarchy (avoid, minimise and rehabilitate) has been applied.
Project design impact avoidance measures	• Impacts to surface water processes have been avoided given no pre-development surface flows exist in the project area (due to high infiltration rates) and none will be created post-development (given the soil will remain in situ, infiltration rates will not change and irrigation rates are less than projected crop evapotranspiration rates). •
Rationale for provisions	• Outcome based provisions capable of objective measurement and reporting have been proposed for: changes to surface water hydrological processes and over-irrigation changing hydrological processes.

Table 13: Hydrological Processes Outcome Based Provisions

Potential Impacts	Proposal Specific Outcome	Criteria	Response Actions	Monitoring	Reporting
Changes to surface water hydrological processes within or surrounding the project area.	The Stage 3 project will not cause changes to surface water hydrological processes within or surrounding the project area.	Trigger Criterion: Surface water inundation or flooding is evident within Stage 3 Development Envelope when no rainfall has occurred in the preceding 8 weeks. Threshold Criterion Surface water inundation or flooding is evident outside the Stage 3 Development Envelope (within a 1 km buffer) when no rainfall has occurred in the preceding 10 weeks.	Trigger Actions: • Investigate the cause of the surface water inundation or flooding. • Undertake appropriate corrective action. Threshold Actions: • Investigate the cause of the surface water inundation or flooding. • Undertake appropriate corrective action. • Incident report to DWER	Weekly site inspections. Monthly environmental inspections. Dry season monthly review of satellite imagery for flooding extents and review of rainfall records in the preceding months.	Annual Ministerial Statement Compliance Assessment Report to DWER.
Over irrigation causing changes to hydrological processes	Soil Moisture Levels within the pivots should be maintained ideally between 15 and 20% volumetric water content (except when preceding rainfall has occurred) and should always be lower than 30% (except when preceding rainfall has occurred).	Trigger Criterion: Soil moisture levels above 25% volumetric water content (except when rainfall has occurred in the preceding week). Threshold Criterion: Soil moisture levels above 30% volumetric water content (except when rainfall has occurred in the preceding week).	Trigger Actions: • Investigate the reason for soil moisture levels above 25%. • If due to excessive irrigation, reduce irrigation rates. Threshold Actions: • Investigate the reason for soil moisture levels above 30%. • If due to excessive irrigation, reduce irrigation rates and report incident to Department of Water and Environment Regulation (DWER).	Soil moisture levels within the pivots to be modelled and monitored on a daily basis.	Annual Ministerial Statement Compliance Assessment Report to DWER.

2.5 INLAND WATERS ENVIRONMENTAL QUALITY

Table 14: Inland Waters Environmental Quality Objectives and Rationale

Objectives and Rationale for Provisions	Details
EPA Objective	To maintain the quality of groundwater and surface water so that environmental values are protected.
Project Objectives	• To maintain the quality of the Wallal aquifer so that no significant changes occur compared to background • To maintain the quality of the Broome aquifer so that no significant changes occur compared to background. • To maintain the quality of short-lived local surface water bodies (which occur after flooding approximately every 10 years) so that no significant changes occur compared to background.
Baseline Monitoring/Studies	Completed: • A hydrological assessment of surface water conditions including (Water Technology, 2017): o A review of meteorological, terrain, satellite imagery and soil mapping data available. o Characterisation of the catchment soils and hydrology. o Preparation of a hydraulic model to determine the extent, duration and frequency of local flooding. • Extensive groundwater investigations and monitoring have been ongoing on Pardoo Station since 2008 as part of the process of obtaining groundwater licences to abstract groundwater for irrigation purposes for the Pardoo Irrigation Project Stages 1, 2 and 3 (Groundwater Consulting Services, 2008, 2009, 2011, 2013, 2014a, 2014b, 2015, 2016a, 2016b, 2017a, 2017b). Proposed ongoing monitoring/studies: • A detailed groundwater monitoring program is in place under the Operating Strategy under Groundwater Licence 158717(16).
Study Findings (Water Technology, 2017); (Groundwater Consulting Services, 2008, 2009, 2011, 2013, 2014a, 2014b, 2015, 2016a, 2016b, 2017a, 2017b).	• There is no surface water within the project area, given all rainfall infiltrates quickly in the sandy pindan soils and reports to groundwater. • There will be no sedimentation caused by irrigation water (no surface water will be generated as all irrigation water will be utilised by the plant root zone and heavy rainfall will continue to infiltrate to groundwater). • Vegetation in the neighbouring Ramsar wetland area is indicative of brackish water quality, which may occur due to build-up of salts during evaporative processes. • Local groundwater quality monitoring indicates: o The Wallal aquifer: contains hard, but fresh water ranging from slightly acidic to slightly alkaline pH. Nitrate levels are very low (in most cases below detection). Total phosphorous varies, with most readings low (below 0.01 mg/L). o The Broome aquifer: can contain soft or hard water, which is marginally fresh or slightly brackish and slightly alkaline. Nitrate levels are naturally elevated in the Broome aquifer (with nitrate readings actually decreasing since irrigation commenced – likely to be due to natural variation due to rainfall recharge). Total phosphorous ranged from 0.01 – 0.03 mg/L. o There are no trends evident of increasing nutrient or salt levels in either the Broome or Wallal aquifers since the commencement of irrigation at Pardoo Stage 1 and 2

Objectives and Rationale for Provisions	Details
	• The high infiltration rates (~155 mm/hour) of the Stage 3 project area may facilitate rapid infiltration of contaminants (fertiliser, hydrocarbon spills) into the soil profile, and possibly groundwater. • Based on an annual groundwater through-flow of 890,000 kL, approximately 0.0005 mg/L would be present from fertilisation of Stage 3 pivots in the Broome aquifer down gradient of the irrigation site. This is an insignificant amount of nitrate in the context of the naturally occurring nitrate levels in the Broome aquifer, which range from 0.2 to 4.9 mg/L • Cumulatively the three stages are not likely to increase nitrates in groundwater significantly, given the large flow of groundwater beneath the sites (due to annual aquifer replenishment from rainfall) and the modest amounts of fertiliser application which are unlikely to raise nutrient levels above natural background. • Salinisation could occur if over irrigation caused the shallow ground water table to rise, resulting in the mobilisation naturally occurring salts in the soil profile. However, as described above, irrigation will be limited to the minimal amounts needed for plant growth, such that no irrigation water will infiltrate to the groundwater. Therefore, the shallow water table will not rise as a result of the project.
Sensitive components of factor or values	• The Broome aquifer could be sensitive to water quality changes caused excessive fertigation of crops, salination due to over-irrigation, contamination by spills of hydrocarbons/fertiliser/herbicides or acid sulphate soil disturbance. • Surface water ponding areas in the adjacent Ramsar wetland area (when flooding occurs after heavy rainfall) could be sensitive to sedimentation, contamination by spills of hydrocarbons/fertilizer/herbicides or acid sulphate soil disturbance.
Key impacts and risks	Excessive fertigation of crops, salination due to over-irrigation, contamination by spills of hydrocarbons/fertiliser/herbicides or acid sulphate soil disturbance.
Management approach	The mitigation hierarchy (avoid, minimise and rehabilitate) has been applied.
Project design impact avoidance measures	• No pre-development surface flows exist in the project area and none will be created post-development. • The irrigation water applied to the project will not infiltrate to the groundwater. Therefore, over irrigation causing the shallow ground water table to rise and resulting in the mobilisation of salts will not occur. • Nutrient increases in the Broome aquifer will be minimised by only applying the minimum fertiliser needed for plant growth. • Spills of hydrocarbons/fertilizer/herbicides will be avoided by appropriate storage and handling. • Sedimentation will not occur given erosion will be avoided as described under Terrestrial Environmental Quality (Section 2.2). • Acid sulphate soils will not be disturbed as described under Terrestrial Environmental Quality (Section 2.2).
Rationale for provisions	• Management based provisions for actions which are less measurable have been proposed for: groundwater quality, surface water quality and spills of hydrocarbons/fertiliser/herbicides.

Table 15: Inland Waters Environmental Quality Management Based Provisions

Potential Impacts	Proposal Specific Objective	Management Actions	Management Targets	Monitoring	Reporting
Changes in water quality of the Broome Aquifer due to the Stage 3 project	No unacceptable impacts on groundwater quality of the Broome Aquifer as a result of the Stage 3 project.	Implement monitoring of Broome Aquifer water quality, downstream of project activities including 3 Broome Aquifer bores and all potential contaminants from the Stage 3 Project (salt, hydrocarbons, nutrients and herbicides). Compare the results to available baseline data and ongoing monitoring trends. If monitoring indicates contamination is occurring, investigate this and take appropriate corrective and preventative action.	• Monitor water quality of the Broome Aquifer downstream of the project. • Address any contamination appropriately.	• Quarterly water quality monitoring.	As stipulated in Groundwater Well Licence 158717(16) or subsequent revision of replacement of that licence. Annual Ministerial Statement Compliance Assessment Report to DWER.
Changes in water quality of the surface water in the adjacent Ramsar area (when flooded) due to the Stage 3 project	No unacceptable impacts on groundwater quality of surface water in the adjacent Ramsar area (when flooded) as a result of the Stage 3 project.	Implement monitoring of surface water quality (in particular salinity and nutrients), downstream of project activities when surface water is available (after flooding rainfall events). Compare the results to available baseline data and ongoing monitoring trends. If monitoring indicates contaminants (salts and nutrients) are increasing beyond expected baseline/background trends, investigate this and take appropriate corrective and preventative action.	• Monitor water quality (salinity and nutrients) of surface water downstream of the project when it exists. • Address any increase in contaminants (nutrients/salts) beyond expected baseline/background trends appropriately.	• Water quality monitoring (salinity and nutrients) when surface water exists.	Annual Ministerial Statement Compliance Assessment Report to DWER.

Potential Impacts	Proposal Specific Objective	Management Actions	Management Targets	Monitoring	Reporting
Spills of hydrocarbons, fertiliser or herbicides	Ensure appropriate prevention and management of spills of hydrocarbons, fertiliser or herbicides.	Potential contaminants will be managed as follows • hydrocarbons contained within bunds according to the requirements of Australian Standard 1940; • liquid nitrogen tanks within a concrete bund which will capture 110% of the volume stored; • granular fertilisers stored on a hard stand within a shed; • herbicides will not be stored on site (they will be brought to site when needed); and • a Spill Response Procedure will be in place including appropriate staff training, appropriate spill clean up kits, waste disposal, spill reporting and corrective and preventative actions.	• Appropriate storage of all contaminants. • Appropriate spill procedures will be followed in the event of an accidental spill.	• Weekly site inspections. • Monthly Environmental inspection. • Incident reporting of all spills.	Annual Ministerial Statement Compliance Assessment Report to DWER.

2.6 SOCIAL SURROUNDINGS

Table 16: Social Surroundings Objectives and Rationale

Objectives and Rationale for Provisions	Details
EPA Objective	To protect social surroundings from significant harm.
Project Objectives	To comply with the *Aboriginal Heritage Act 1972*.
Baseline Monitoring/Studies	Completed: • Desktop review of available datasets (aboriginal reserves, Aboriginal heritage sites and European heritage sites). • Discussions have also been ongoing with traditional owners (refer to Section 3 Stakeholder consultation). Proposed additional monitoring/studies prior to proposal implementation: • Aboriginal heritage surveys are planned to be conducted prior to ground disturbance.
Study Findings (EnviroWorks Consulting, 2017b)	• There are no known heritage sites intersecting the Stage 3 Project. • No Aboriginal reserves or communities occur in the vicinity of the Stage 3 Project. • Four Aboriginal heritage sites occur within 5 km of the Stage 3 Project. These heritage sites do not occur within the Stage 3 Development Envelope, so impacts are unlikely.
Sensitive components of factor or values	• Four Aboriginal heritage sites occur within 5 km of the Stage 3 Project. These heritage sites do not occur within the Stage 3 Development Envelope, so there will be no disturbance, excavation or construction near these sites and indirect impacts (such as altered hydrological processes) are unlikely. • Appropriate Aboriginal heritage surveys are currently being planned to determine if any other sensitive components exist.
Key impacts and risks	• Accidental damage to an Aboriginal Heritage Site
Management approach	The mitigation hierarchy (avoid, minimise and rehabilitate) has been applied.
Project design impact avoidance measures	• Heritage surveys will be undertaken. • The proponent will comply with the *Aboriginal Heritage Act 1972*.
Rationale for provisions	• Management based provisions for actions which are less measurable have been proposed for: accidental damage to Aboriginal Heritage sites.

Table 17: Social Surroundings Management Based Provisions

Potential Impacts	Proposal Specific Objective	Management Actions	Management Targets	Monitoring	Reporting
Accidental damage to an Aboriginal Heritage Site	Avoid accidental damage to an Aboriginal Heritage Site	• Prior to any land disturbance undertake appropriate Aboriginal Heritage Surveys. • Wherever possible avoid any Aboriginal Heritage Sites identified. • Where not possible to avoid sites, obtain a Section 18 Licence to disturb a heritage site under the *Aboriginal Heritage Act 1972*, prior to any disturbance occurring.	• Undertake Aboriginal Heritage Surveys. • Avoid sites where possible. • Where not possible to avoid sites obtain a Section 18 Licence to disturb a heritage site under the *Aboriginal Heritage Act 1972*, prior to any disturbance occurring.	• Aboriginal heritage survey reports. • Section 18 licence records.	Annual Ministerial Statement Compliance Assessment Report to DWER.

3 ADAPTIVE MANAGEMENT AND REVIEW

The Proponent will implement adaptive management to learn from the implementation of mitigation measures, monitoring and evaluation against trigger and threshold criteria, to more effectively meet the required outcomes and objectives.

The following approach will be adhered to:

- Monitoring data and records will be systematically reviewed and analysed on a continuous basis to determine and understand any trends or important results.
- Based on the analysis of this monitoring data and records, the Proponent will review and adjust the management measures in consultation with EPA Services, DWER.

4 STAKEHOLDER CONSULTATION

To date stakeholder communication and engagement has focussed on providing information to key stakeholders regarding:

- Proposed Project location and scale;
- Pardoo Beef Corporations's commitment to environmental management;
- Proposed approach for minimising and mitigating environmental impacts and risks; and
- Anticipated Project timing.

Table 18 below outlines the specific stakeholder consultation that has been undertaken.

Table 18: Stakeholder Consultation

Date	Issues/topics raised	Proponent response / outcome
Environmental Protection Authority (EPA)		
10/8/2017	• Overview of proposed project • Overview of environmental management measures	• EPA Chairman advised that referral to the EPA was likely warranted.
29/8/2017	• Details regarding proposed referral of Stage 3 of irrigation project	• EPA Chairman advised that Stage 3 could be referred if a transparent approach adopted regarding other subsequent stages.
Department of Water and Environmental Regulation (DWER) – Previously Department of Water (DoW) and Department of Environment Regulation (DER)		
2010 - 2011	• Application submitted to then DER for Stage 1 Clearing Permit • Ongoing discussion on details conducted	• Clearing Permit Number CPS 4207 for 90 ha issued 28 July 2011
2016 - 2017	• Application submitted to then DER for Stage 2 Clearing Permit • Ongoing discussion on details conducted	• Clearing Permit Number CPS 7312/1 issued 13 July 2017.
Feb 2017 – Aug 2018	• Application submitted to then DER for Stage 3 Clearing Permit • Ongoing discussion on details conducted	• DER advised referral of Stage 3 to EPA may be warranted. • PBC commenced discussions with EPA and withdrew Clearing Permit Application
2015 - 2017	• Application submitted to then DoW for Groundwater Licence for water abstraction • Ongoing discussion on details conducted	• Groundwater Well Licence 158616(11) was issued on 20 March 2015 for 7,740,000 kL/annum • Groundwater Well Licence 158616(14) was issued on 27 June 2016 for 10,000,000 kL/annum • Groundwater Well Licence 158717(16) was issued on 25 January 2017 for 14,822,250 kL/annum
Department of Biodiversity Conservation and Attractions (DBCA)		
Aug – Sept 2017	• Requested details regarding the boundary and values of the Eighty Mile Beach Ramsar Wetland	• Details provided regarding the coastal plain boundary and potential flooding of the coastal plain creating waterbird habitat.
Department of Planning, Lands and Heritage (DPLH)		
2015 - 2017	• Applications for Permits to Diversify Submitted • Ongoing discussion on details conducted.	• Permit to Diversify for Stage 1 issued 18 November 2015. • Permit to Diversify for Stage 2 issued 14 July 2017.

Date	Issues/topics raised	Proponent response / outcome
Pilbara Development Commission (PDC)		
April, August & Nov. 2017	• Held ongoing meetings and discussions regarding the project and potential benefits to the Pilbara.	• PDC have indicated they are supportive of the project and the potential benefits it brings to the region.
Pilbara Regional Council (PRC)		
April, August & Nov. 2017 and Jan. 2018	• Held ongoing meetings and discussions regarding the project and potential benefits to the Pilbara.	• PRC have indicated they are supportive of the project and the potential benefits it brings to the region.
Shire of East Pilbara		
2016	• Requested confirmation that a Shire Development Application was not required for the project.	• Shire confirmed a Development Application was not required on 28 October 2016
Ngarla Traditional owners		
2015 - 2017	• Indigenous Land Use Agreement (ILUA) negotiations. • Pardoo has attended meetings with the traditional owners (Ngarla people) legal entity the Wanparta Aboriginal Corporation (WAC) Board. These meetings discussed all aspects of Pardoo's proposed use of the land for its project and were to negotiate an agreement regarding Pardoo's engagement with the Ngarla People and benefits to be provided to them. These meetings occurred on 18 September 2015, 19 August 2016, 25-26 October 2016 and 23 March 2017. Pardoo and its lawyers also met with WAC's lawyers on 20 March 2017 and 14 November 2017 to discuss matters relating to the agreement and Pardoo's proposed activities on the freehold envelope.	• Traditional owners have been supportive of the proposed pastoral activities (including Stage 3) and the potential partnership opportunities that may arise from these activities. • No significant environmental or heritage issues have been raised by traditional owners during negotiations. • Appendix C includes copies of letters received during consultation with the traditional owners. • ILUA has been drafted. • It is expected that the ILUA will be signed in Quarter 1 2018.

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