

**KUNUNURRA HEAVY VEHICLE ROUTE STAGE 1 WESTERN LINK
OFFSET PROPOSAL FOR PURPOSE PERMIT
CPS 2892/1**

Project:	<p>The project comprises of provision of a single carriageway heavy vehicle route, consisting of approximately 10 km of new road alignment and a 480 m bridge over the Ord River (Figure 1). The alignment is from Victoria Highway (west of Kununurra town site) to Weaber Plain Road (north of Kununurra town site). The bridge will be located approximately 7 km downstream of the Kununurra Diversion Dam.</p> <p>The current alignment of Victoria Highway extends along the southern edge of Kununurra. The primary objective of the new road alignment proposal is to provide an alternative heavy vehicle route around the townsite. This will result in increased road serviceability and improved road safety by providing a safer and more efficient transport network in the region.</p>
Date:	January 2011
Manager:	Owen McLean (owen.mclean@mainroads.wa.gov.au ; Office telephone (08) 9168 4721; Mobile telephone 0427 382 166; Satellite telephone 0420 107 472)
Clearing location:	Purpose permit CPS 2892/1. Victoria Highway (west of Kununurra town site) to Weaber Plain Road (north of Kununurra town site). Six locations proposed to extract naturally occurring road building materials.
Offset location:	The offset comprises a 300 m wide strip of land extending from the proposed project road reserve to the north within Ivanhoe Station (King Location 710) for a distance of approximately 2,500 m (Figure 2). The offset has also been located adjacent to and along the entire length of the western boundary of King Location 781 (Lot 3002).
Offset description:	<p>Sixty seven ha of land comprising 27 ha of black soil is proposed to be offset (Figure 2). <i>Typhonium</i> sp. Kununurra and <i>Goodenia purpurascens</i> have been recorded within the proposed offset area which links with an existing environmental protection area.</p> <p>The offset area is shaped to enable a linkage with the existing flora reserve (Livistonia/Ngamooowalem Reserve) in the north, as well as enabling the mustering, stock movement and fencing requirements requested by the pastoralist. The offset has also been located adjacent to and along the entire length of the western boundary of King Location 781 (Lot 3002).</p> <p>The current lease manager of Ivanhoe Station (including King Location 710) is Mr Stirling Fearon. Mr Fearon is amenable to the proposed offset of a portion of Ivanhoe Station.</p> <p>Main Roads have initiated discussions with State Land Services (SLS) regarding the acquisition of the proposed environmental offset area for the purpose of being vested with the Conservation Commission of Western Australia (CCWA) for the protection of flora. Main Roads understands that this process can commence with the SLS assistance once the offset proposal has been agreed.</p>
Reason for offset & description of impacts:	<p>Main Roads WA propose to clear 60 ha of native vegetation for the purpose of constructing the Stage 1 (Western Link) of the Kununurra Heavy Vehicle Route (HVR). The single carriageway will consist of approximately 10 km of new road alignment and a 480 m bridge over the Ord River. Road building materials will be sourced from six Material Investigation Pits (named MIP 5 to MIP 10) (Figure 1).</p> <p>In accordance with Condition 8 of the Clearing Permit, Main Roads WA is to have regard to any advice or recommendations made by the EPA under section 39A(7) of the <i>Environmental</i></p>

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Protection Act 1986 (the EP Act) for project activities which will result in the clearing of native vegetation.

The EPA (2009) advised that the proposal was *Not Assessed: Public Advice Given and Managed under Part V of the EP Act*. In their advice, the EPA stated that

“the EPA considers that an environmental offset is necessary in order to potentially reduce the overall impact of the project...” (p. 2).

This advice was in regard to the protection of a number of significant flora species and habitat for these flora: *Typhonium* sp. Kununurra (now DRF); *Iphigenia indica* (range extension); and, *Goodenia purpurascens* (Priority 3).

A section of the proposed HVR purpose permit area comprises a traverse of the upper reaches of a catchment to the west of the Ord River which contains 11 hectares of black soil (Figure 2). The EPA advice (2009) states that *Typhonium* sp. Kununurra

“is only found in association with black soil on the west side of the Ord River” (p. 2).

Furthermore, the DEC (2009) states *T. sp. Kununurra*

“is known to be dependant on the hydrological regime of the local area” (p.4).

Goodenia purpurascens is thought to require a similar habitat (and therefore similar hydrological regime) to *T. sp. Kununurra* (EPA, 2009). It has not previously been recorded in the Kununurra area, but was recorded by GHD (2009) in an MIP (number 6) and at 5 locations within the proposed road alignment as well as a private property, King Location 781. The black soil habitat of MIP 6 was subsequently excised and is not included in the purpose permit area.

Previous surveys of *Iphigenia indica* indicate that its habitat in the vicinity of the purpose permit area coincides with *T. sp. Kununurra* although it was not recorded in 2009 (GHD, 2009).

Clearing for the HVR or MIPs will not occur within close proximity of the Declared Rare Flora *Typhonium* sp. Kununurra. However, a known population of approximately 40 plants of this species is located on the black soils within King Location 781, Valentine Falls Estate and Ivanhoe Station (Figure 2). A majority of the individuals within this population were recorded hydrologically downstream and north of the proposed HVR. This population is considered to be highly significant to the continued survival of the species (DEC, 2009, p.3).

The potential indirect impact of the HVR on changes to the local hydrological regime of *T. sp. Kununurra* will be managed through Condition 11 of the Clearing Permit which requires preparation, implementation and adherence to a Hydrology Management Strategy Plan.

The environmental offset provided in this document has been prepared in accordance with the requirements of Condition 8 of the Clearing Permit:

- Clearing will not occur within close proximity of the Declared Rare Flora *Typhonium* sp. Kununurra. However, approximately 5 individuals of the P3 species *Goodenia purpurascens* have been recorded within the purpose permit area. *Iphigenia indica* has not been recorded within the purpose permit area.
- 11 ha of black soils are within the purpose permit area. Sixty seven hectares of land comprising 27 ha of black soil is proposed to be offset. *Typhonium* sp. Kununurra and *Goodenia purpurascens* have been recorded within the proposed offset area which links with an existing environmental protection area.

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Offset Principles addressed:	<p>Principle A Environmental offsets should only be considered after all reasonable attempts to mitigate adverse impacts have been exhausted.</p>	<p>Planning for a suitable heavy vehicle route around Kununurra townsite has been carried out over many years and a number of road and bridge alignment options have been considered. The proposed alignment best optimises community interests, complex Aboriginal heritage issues surrounding Kununurra, the environment and technical and safety needs for the project.</p> <p>Proposed on site management measures which will mitigate adverse impacts to <i>Typhonium</i> sp Kununurra, <i>Iphigenia indica</i>, <i>Goodenia purpurascens</i> and <i>T. sp</i> Kununurra habitat:</p> <ol style="list-style-type: none"> a) The area in which <i>Typhonium</i> sp. Kununurra has been identified has been excised from the purpose permit area to ensure no direct impact on this species occurs as a result of this proposal. b) Clearing will not occur within close proximity of the Declared Rare Flora <i>Typhonium</i> sp. Kununurra. c) Design to ensure encroachment of the road formation on <i>T. sp</i> Kununurra habitat is minimised. d) The potential indirect impact of the HVR on changes to the local hydrological regime of <i>T. sp</i> Kununurra will be managed through Condition 11 of the clearing permit which requires preparation, implementation and adherence to a Hydrology Management Strategy Plan. e) Management and performance criteria for rehabilitation of the purpose permit area no longer being required for road maintenance and associated activities are stipulated in Condition 12 of the clearing permit.
	<p>Principle B An environmental offsets package should consider direct offsets and contributing offsets, as appropriate.</p>	<p>Residual impact: 11 ha of <i>T. sp</i> Kununurra habitat is within the purpose permit area. Due to the nature of the type of clearing permit, not all of this area is likely to be cleared.</p> <p>Direct Offset: Acquisition of 67 ha of land to be dedicated as a flora reserve. Twenty seven ha of this area comprises <i>T. sp</i> Kununurra habitat. As this area is greater than 11 ha, it more than counterbalances the loss of <i>T. sp</i> Kununurra habitat which may be impacted in the purpose permit area.</p>
	<p>Principle C Environmental offsets should ideally be 'like for like or better'.</p>	<p>See "Comparison of offset area with impacted site" section. The offset fulfils the requirements of being 'like for like or better':</p> <ul style="list-style-type: none"> • The offset comprises a greater area of <i>Typhonium</i> sp. habitat than that within the purpose permit area. • The vegetation type in the <i>T. sp</i> Kununurra habitat of the offset area is the same as that within the purpose permit area. • The <i>T. sp</i> Kununurra habitat of the offset area is in very good to excellent condition, which is better than the condition of this habitat within the purpose permit area. • The <i>T. sp</i> Kununurra habitat of the offset area is likely to have a better ecological function than that of the purpose permit area. The lower grazing pressure in the proposed offset has resulted in this area not being as disturbed by weed species. The ecological function of the vegetation, fauna and soils in the <i>T. sp</i> Kununurra habitat is likely to be greater than that in the purpose permit area.

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	<p>Principle D Positive environmental offset ratios should apply where risk of failure is apparent.</p>	<p>The ratio of the offset to the impacted area is greater than 1:1, and is in the order of 1:3. It is likely that the offset will achieve a 'net environmental benefit' outcome.</p>
	<p>Principle E Environmental offsets must entail a robust and consistent assessment process.</p>	<p>This offset proposal fulfils the requirements of Principle E. It clearly provides detail against the following aspects:</p> <ul style="list-style-type: none"> • Aim of the offset; • Type of offset; • Governance Requirements; • Feasibility/Risk assessment; and • Consultation.
	<p>Principle F Environmental offsets must meet all statutory requirements.</p>	<p>This offset meets all statutory, planning and regulatory requirements. It is acceptable to the key stakeholders:</p> <ul style="list-style-type: none"> • Ivanhoe Station pastoral lease manager - Mr Stirling Fearon; and • Crown land manager – State Land Services.
	<p>Principle G Environmental offsets must be clearly defined, publicly registered, transparent, auditable and enforceable.</p>	<p>The land proposed to be offset will be acquired through Main Roads WA State Land Services (SLS) and vested with CCWA. Main Roads will provide funding to progress the land transfer. This process will commence once the offset proposal has been finalised and agreed.</p> <p>The DEC will be responsible for all management requirements associated with the land after it has been vested with the CCWA. As DEC estate, it is expected that the benefit of this offset will be ongoing and its success ensured.</p>
	<p>Principle H Environmental offsets must ensure a long lasting benefit.</p>	<p>The land to be offset will be vested with the CCWA, and will become part of the DEC estate. Therefore, the benefit of the offset will be ongoing, its success ensured, and the risks associated with successful implementation are likely to be low.</p>
<p>Comparison of offset area with impacted site (in accordance with Principle C)</p>	<p><i>Typhonium</i> sp. Kununurra habitat and vegetation in its vicinity within purpose permit CPS 2892/1</p>	<p><i>Typhonium</i> sp. Kununurra habitat and vegetation in its vicinity within the offset area (Ivanhoe Station)</p>
<p>Area:</p>	<p><i>Typhonium</i> sp. Kununurra habitat: 11 ha (all within King Location 781)</p> <p>Area proposed to clear CPS 2892/1: 60 ha</p>	<p><i>Typhonium</i> sp. Kununurra habitat: 27 ha</p> <p>Total offset area: 67 ha</p>
<p>Species, Community Type & Condition:</p>	<ul style="list-style-type: none"> • Dominant species: <i>Murdannia graminea</i>, <i>Commelina ciliata</i>, <i>Cyanotis axillaris</i>, <i>Crimum</i> sp., <i>Goodenia malvina</i>, <i>Drosera petiolaris</i>, <i>Cyperus pulchellus</i>, <i>Cyperus oxycarpus</i>, <i>Fimbristylis microcarya</i>, <i>Rhynchosia</i> sp., <i>Xyris</i> sp., <i>Themeda</i> sp., <i>Sorghum</i> sp., <i>Heteropogon</i> sp. (GHD, 2008). • Other species: <i>Bauhinia cunninghamii</i>, 	<ul style="list-style-type: none"> • Dominant species: <i>Murdannia graminea</i>, <i>Commelina ciliata</i>, <i>Cyanotis axillaris</i>, <i>Crimum</i> sp., <i>Goodenia malvina</i>, <i>Drosera petiolaris</i>, <i>Cyperus pulchellus</i>, <i>Cyperus oxycarpus</i>, <i>Fimbristylis microcarya</i>, <i>Rhynchosia</i> sp., <i>Xyris</i> sp., <i>Themeda</i> sp., <i>Sorghum</i> sp., <i>Heteropogon</i> sp. (GHD, 2008). • Other species: <i>Bauhinia cunninghamii</i>,

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<p><i>Typhonium</i> sp. Kununurra, <i>Goodenia purpurascens</i>, <i>Ophioglossum costatum</i>, branching sedges, <i>Commelina ensifolia</i>, <i>Fimbristylis schultzei</i>, <i>Brachychiton tuberculatus</i> (GHD, 2009).</p> <ul style="list-style-type: none"> • The habitat is comprised of black soil (grey cracking clay) plains within the Ord River Floodplain, which are waterlogged in summer and inundated after rain (GHD, 2009). The black soil habitat of <i>Typhonium</i> sp. Kununurra comprises scattered <i>Bauhinia cunninghamii</i> trees over perennial grasses, and/or grassy vegetation surrounding gilgai (small shallow depressions) in the black soil. • The vegetation type is described as Black Soil Swamp which is a mixed sedge and herbland, dominated by <i>Murdannia graminea</i>, <i>Commelina ciliata</i>, <i>Cyanotis axillaris</i>, <i>Crinum</i> sp., <i>Goodenia malvina</i>, <i>Drosera petiolaris</i> with sedges <i>Cyperus pulchellus</i>, <i>Cyperus oxycarpus</i>, <i>Fimbristylis microcarya</i>, <i>Rhynchosia</i> sp., <i>Xyris</i> sp., with grasses dominated by <i>Themeda</i>, <i>Sorghum</i> and <i>Heteropogon</i> (GHD, 2008). • The condition of the <i>Typhonium</i> sp. Kununurra habitat within the purpose permit area is "Good: Vegetation structure significantly altered by very obvious signs of multiple disturbances retains basic vegetation structure or ability to regenerate it" (Keighery, 1994) (GHD, 2008). The health of the habitat was observed to be in worse condition on King Location 781 than Ivanhoe Station (GHD, 2009). The major difference observed is considered to be due to the trampling of habitat by livestock (cattle and horses) during grazing activities on King Location 781. In addition, King Location 781 has a higher proportion of disturbance response taxa in the <i>Typhonium</i> sp. Kununurra habitat. This is also likely due to the grazing activities. 	<p><i>Typhonium</i> sp. Kununurra, <i>Goodenia purpurascens</i>, <i>Ophioglossum costatum</i>, branching sedges, <i>Commelina ensifolia</i>, <i>Fimbristylis schultzei</i>, <i>Brachychiton tuberculatus</i> (GHD, 2009).</p> <ul style="list-style-type: none"> • The habitat is comprised of black soil (grey cracking clay) plains within the Ord River Floodplain, which are waterlogged in summer and inundated after rain (GHD, 2009). The black soil habitat of <i>Typhonium</i> sp. Kununurra comprises scattered <i>Bauhinia cunninghamii</i> trees over perennial grasses, and/or grassy vegetation surrounding gilgai (small shallow depressions) in the black soil. • The vegetation type is described as Black Soil Swamp which is a mixed sedge and herbland, dominated by <i>Murdannia graminea</i>, <i>Commelina ciliata</i>, <i>Cyanotis axillaris</i>, <i>Crinum</i> sp., <i>Goodenia malvina</i>, <i>Drosera petiolaris</i> with sedges <i>Cyperus pulchellus</i>, <i>Cyperus oxycarpus</i>, <i>Fimbristylis microcarya</i>, <i>Rhynchosia</i> sp., <i>Xyris</i> sp., with grasses dominated by <i>Themeda</i>, <i>Sorghum</i> and <i>Heteropogon</i> (GHD, 2008). • The condition of the <i>Typhonium</i> sp. Kununurra habitat within the offset area is "Very Good to Excellent: Vegetation structure altered, obvious signs of disturbance to Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species" (Keighery, 1994) (GHD, 2008). The health of the habitat was observed to be in better condition on Ivanhoe Station than at King Location 781 (GHD, 2009). The grazing pressure on Ivanhoe Station is lower than on King Location 781, which appears to have lessened the impacts of livestock trampling and invasion of disturbance response species on the native vegetation.
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<p>Ecological function:</p>	<ul style="list-style-type: none"> • Clay soils become waterlogged in summer and inundated after rain, supporting the ecosystem comprising <i>Typhonium</i> sp. habitat. • Soils contain and store nutrients from various sources (inherent in the soil, in water flowing across them, from decomposition) and supply them to vegetation. • Soils contain microorganisms important in decomposition processes, and which may be a food source for animals. • Due to varying conditions (e.g. aerobic vs anaerobic) in the soil profile, soils provide niches for microecosystems. • Vegetation filters water flowing into the area, maintaining water quality. • Vegetation in a good condition can enable invasion of disturbance response species, is a source of nutrients through decomposition and provides conditions for microecosystems to function. • Disturbance response species reduce the ecological function of the vegetation. • Fauna use the habitat afforded by the ecosystem for food and shelter. They maintain ecosystem balance through controlling flora and fauna populations, and supplying nutrients through decomposition and the breakdown of organic matter. • Livestock (cattle and horses) trample and graze within the <i>Typhonium</i> sp. habitat, and may compete with native fauna. They reduce the ecological function of the vegetation, fauna and soils. 	<ul style="list-style-type: none"> • Clay soils become waterlogged in summer and inundated after rain, supporting the ecosystem comprising <i>Typhonium</i> sp. habitat. • Soils contain and store nutrients from various sources (inherent in the soil, in water flowing across them, from decomposition) and supply them to vegetation. • Soils contain microorganisms important in decomposition processes, which may be a food source for fauna. • Due to varying conditions (e.g. aerobic vs anaerobic) in the soil profile, soils provide niches for microecosystems. • Vegetation filters water flowing into the area, maintaining water quality. • Vegetation in a very good to excellent condition aids in preventing invasion of disturbance response species, is a source of nutrients through decomposition and provides conditions for microecosystems to function. • Fauna use the habitat afforded by the ecosystem for food and shelter. They maintain ecosystem balance through controlling plant and animal populations, and supplying nutrients through decomposition and the breakdown of organic matter. • Livestock (cattle and horses) trample and graze within the <i>Typhonium</i> sp. habitat, and may compete with native fauna. They reduce the ecological function of the vegetation, fauna and soils. This is to a lesser extent on Ivanhoe Station than on King Location 781, as the grazing pressure is lower. When the offset area is fenced, this threat to the ecological function will be removed.
<p>Other values:</p>	<p><u>Significant flora species</u> Priority 3: <i>Goodenia purpurascens</i></p> <p><u>Habitat for significant flora species</u> <i>Typhonium</i> sp. Kununurra habitat</p>	<p><u>Significant flora species</u> DRF: <i>Typhonium</i> sp. Kununurra Priority 3: <i>Goodenia purpurascens</i></p> <p><u>Habitat for significant flora species</u> <i>Typhonium</i> sp. Kununurra habitat</p>

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<p>Feasibility/risk assessment:</p>	<p>The land proposed to be offset is on Ivanhoe Station, which is managed by State Land Services. The lease manager of this land is Mr Stirling Fearon:</p> <ul style="list-style-type: none"> • Mr Fearon is amenable to the proposed offset of a portion of Ivanhoe Station. • SLS have confirmed that they will assist with vesting the proposed environmental offset with CCWA for the purposes of the protection of flora. <p>The land transfer will occur as soon as practical and within 24 months of the finalisation and agreement of the proposed environmental offset proposal. If due to the land transfer process further time is required, Main Roads will seek agreement in writing with the DEC for any further extensions of time to resolve the land transfer process.</p> <p>As the land to be offset will be vested with the CCWA, the benefit will be ongoing, its success ensured, and the risks associated with successful implementation are likely to be low.</p>
<p>Monitoring commitments:</p>	<p>The land to be offset will become DEC estate. Development of monitoring commitments will be made by DEC.</p>
<p>Management commitments:</p>	<p>The land to be offset will become DEC estate. Development of management commitments will be made by DEC.</p>
<p>Agencies consulted & submissions received:</p>	<p>Office of the Environmental Protection Authority (OEPA)</p> <p>The OEPA have been consulted from the outset of the project in October 2007. Initially, this was to discuss significant environmental issues relating to the proposal that could possibly warrant referral to the EPA. The OEPA indicated the advantages in MRWA referring the proposal. However the OEPA suggested that if MRWA decided to refer the proposal, the level of assessment would be low provided adequate information is supplied through comprehensive environmental assessments.</p> <p>The Environmental Impact Assessment and Environmental Management Plan for the project was referred to the EPA under Section 38 of the <i>Environmental Protection Act 1986</i>, who determined that the project was “<i>Not Assessed: Public Advice Given and Managed under Part V of the EP Act (Clearing)</i>” on 22 June 2009 (crn 2217927). They further advised that no public appeals were received against this determination and provided advice in a letter dated 28 July 2009.</p> <p>Included in the EPA advice was the statement that</p> <p align="center"><i>“the EPA considers that an environmental offset is necessary in order to potentially reduce the overall impact of the project” (p.2).</i></p> <p>This statement was made in the context of protection of a number of significant flora species and habitat for these flora: <i>Typhonium</i> sp. Kununurra (DRF); <i>Iphigenia indica</i> (range extension); and, <i>Goodenia purpurascens</i> (Priority 3). Furthermore, the EPA stated that it expected Main Roads WA, with the involvement of the Department for Planning and Infrastructure (State Land Services), to investigate part or full acquisition of King Location 781, for the purpose of being vested in the Conservation Commission of Western Australia (CCWA) for the protection of flora.</p> <p>In August 2009, Main Roads WA committed to investigating appropriate environmental offsets, and consideration of the EPA advice in regard to King Location 781. This offset proposal has been prepared at the culmination of these investigations.</p> <p>Department of Environment and Conservation, Native Vegetation Conservation Unit (NVCU)</p> <p>The NVCU assessed the clearing permit application (purpose permit) for this project, and publicly advertised the granted permit on 16 July 2009 (CPS2892/1), with the duration between 16 August 2009 and 16 August 2014. No public appeals were received against the permit or the</p>

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conditions on the permit. Condition 8 of the clearing permit effectively captured the EPA's advice, as it states:

"Where the Permit Holder intends to clear native vegetation under this Permit for a project activity that is incorporated in a proposal referred to the EPA, then the Permit Holder must have regard to any advice or recommendations made by the EPA under section 39A(7) of the EP Act."

This offset proposal has been prepared as it is a requirement under Condition 8.

John Kirby, leaseholder of King Location 781

John Kirby has been consulted during Main Roads WA's consideration of the EPA's advice regarding investigation of part or full acquisition of King Location 781. This land parcel has an approximate area of 400 hectares, and it will be necessary to excise 30 hectares of land for the road reserve of the HVR (Figure 2).

Mr Kirby is resistant to any additional land on the King Location 781 lease being acquired as an offset for the project, due to the relatively small size of the lease (approximately 400 hectares) and the implications this would have in terms of residual grazing land.

A number of parcels of land contain *Typhonium* sp. Kununurra habitat surrounding the project area, including King Location 781, Valentine Falls Estate, and Ivanhoe Station. The grazing lease of King Location 781 is small relative to Ivanhoe Station. Both parcels of land contain *Typhonium* sp. Kununurra habitat, and the leaseholder of Ivanhoe Station has agreed to the acquisition of a portion of his land for the purposes of an offset for the project.

Stirling Fearon, lease manager of Ivanhoe Station

Stirling Fearon has been consulted during Main Roads WA's consideration of the EPA's advice regarding an environmental offset to potentially reduce the impact of the project. Ivanhoe Station is located immediately west of King Location 781 and contains *Typhonium* sp. Kununurra habitat (Figure 2), and contains the land proposed to be offset. Mr Fearon is amenable to the proposed offset of this portion of Ivanhoe Station.

Department for Planning and Infrastructure, State Land Services Branch

State Land Services (SLS) is a centre for the strategic and operational management of State land throughout Western Australia, with one of their key functions being strategic and operational management of the Crown estate to support the needs of the community of Western Australia.

- SLS have confirmed that they will assist with vesting the proposed environmental offset with CCWA for the purposes of the protection of flora.

As the managers of the land proposed to be offset, SLS has been consulted regarding the proposal. SLS have confirmed that they will assist with vesting the proposed environmental offset with CCWA for the purposes of the protection of flora.

References

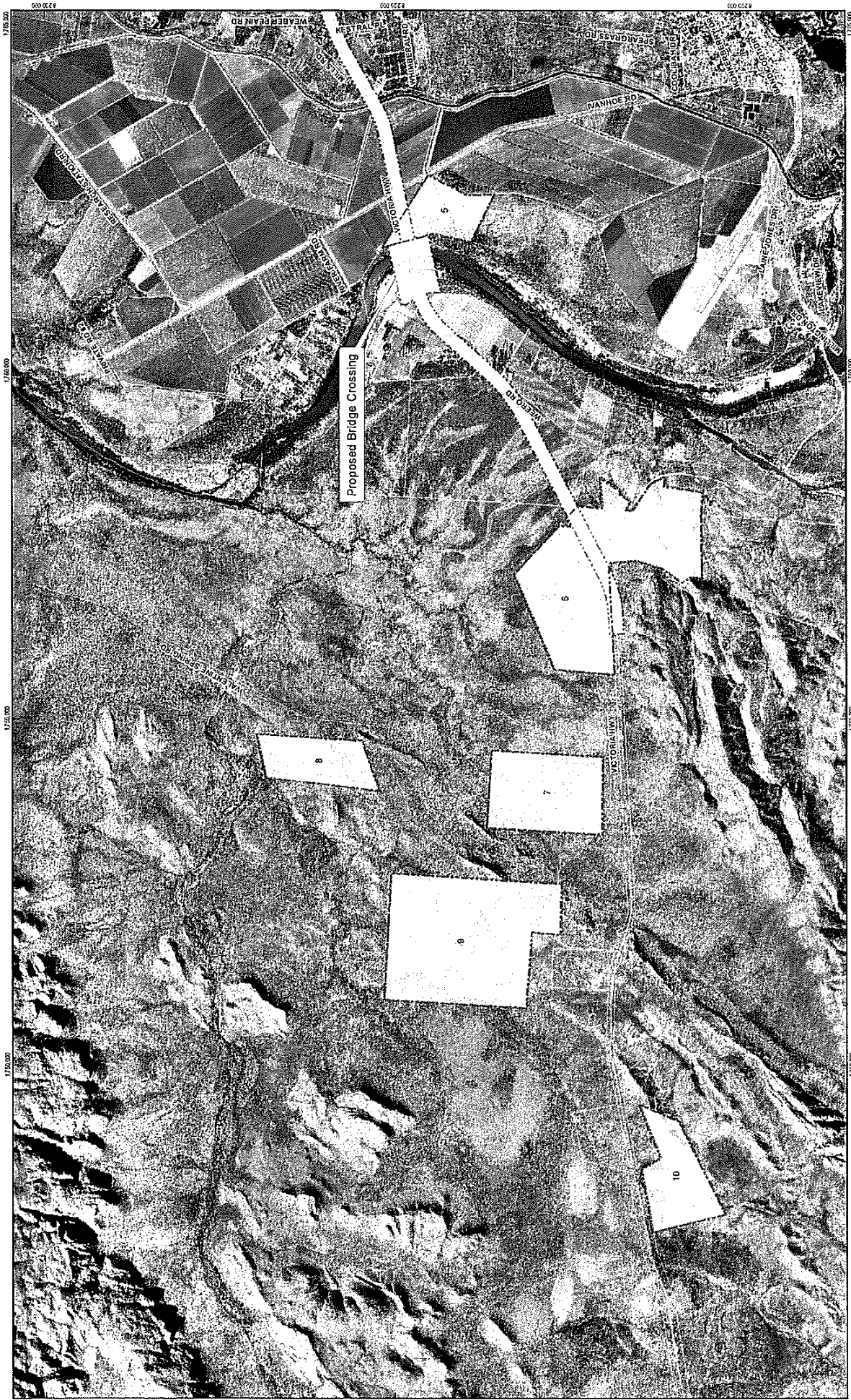
DEC (2009). Permit to Clear Native Vegetation under the *Environmental Protection Act* 1986. Unpublished letter to Main Roads Western Australia, 16 July 2009. Reference number CPS2892/1.

EPA (2008). Public Advice: Kununurra Heavy Vehicle Route – Stage 1 Western Link. Unpublished letter to Main Roads Western Australia, 28 July 2009. Reference number crn221927.

GHD (2008). *Kununurra Heavy Vehicle Route: Flora and Fauna Survey*. Report prepared for Main Roads WA, Report number 61/22043/77144.

GHD (2009). *Report for Kununurra Heavy Vehicle Route – Western Link: Additional Flora and Fauna Information*. Report prepared for Main Roads WA, Report number 61/23516/13983

Keighery, B. J. (1994). *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of Western Australia, Nedlands.



Proposed Bridge Crossing

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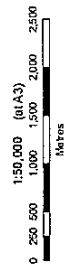
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LEGEND
Cadastral
CPS 2892/1 Purpose Permit Area
Boundaries Correspond to Different Investigation Areas

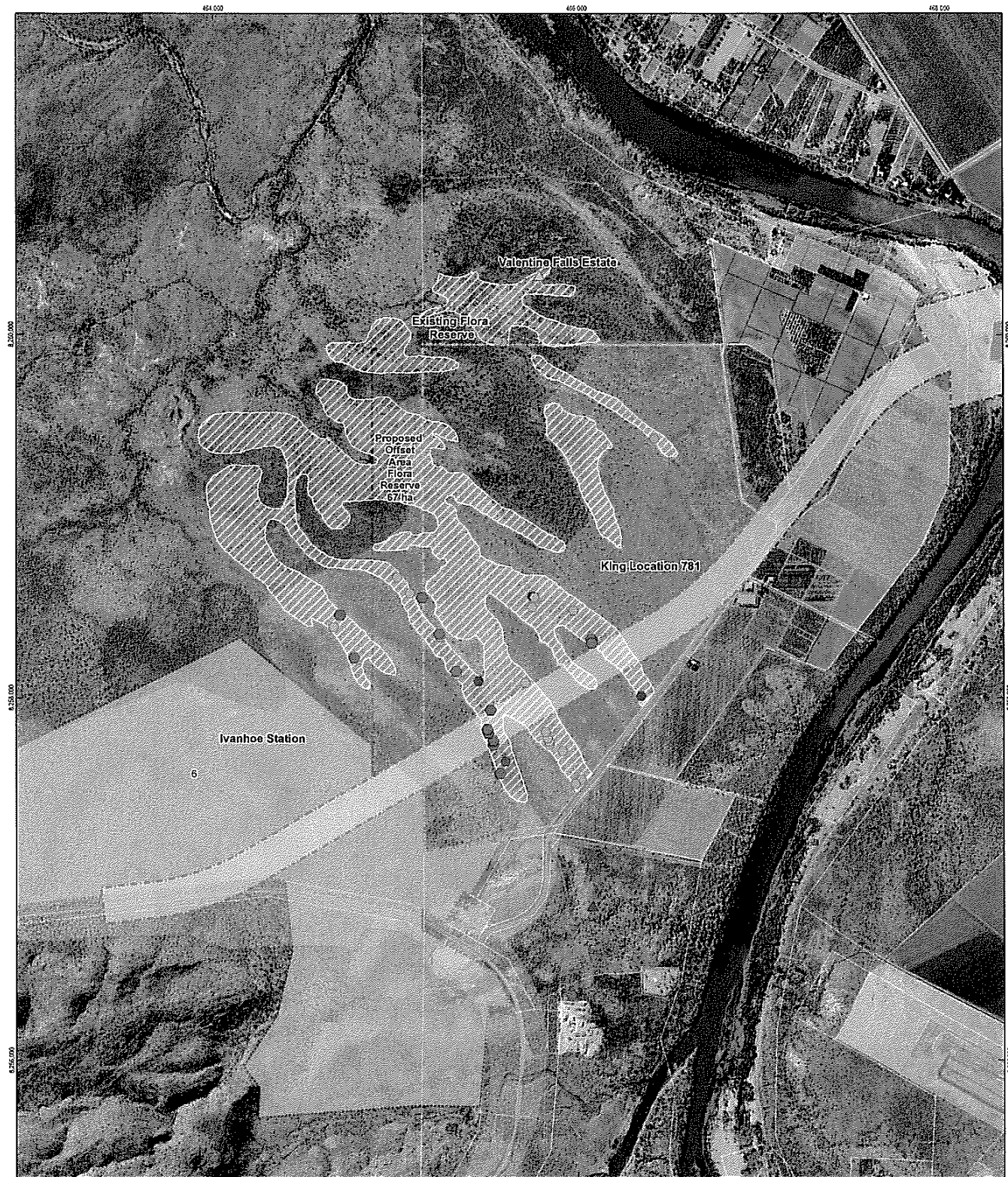
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Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 52
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© 2011, All the O-D data provided is to the best of our knowledge and belief.
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Main Roads WA
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Stage 1 Western Link Onset Package

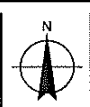
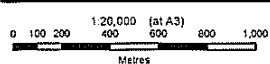
Job Number: 61-25906
Revision: 1
Date: 02 Jun 2011

CPS 2892/1 Purpose Permit Area Figure 1
239 Aodabidge Terrace Perth WA 6004 Australia T 61 8 6222 8222 F 61 8 6222 8555 E perms@mrhd.com.au W www.mrhd.com.au



LEGEND

Significant Species	WA Herbarium - DEC - 20080307	Cadastre	CPS 2892/1 Purpose Permit Area Numbers Correspond to Material Investigation Areas
● <i>Goodenia purpurescens</i> , Priority 3	△ Priority 1 - Poorly Known Taxa	King Location 781	Proposed Offset Area - Flora Reserve
● <i>Iphigenia indica</i> , RE	△ Priority 2 - Poorly Known Taxa	Existing Flora Reserve	<i>Typhonium sp</i> Kununurra Habitat
● <i>Typhonium sp.</i> Kununurra, Rare	△ Priority 3 - Poorly Known Taxa	Area surveyed 2009	Proposed offset Area - <i>Typhonium sp.</i> habitat 27ha
	▲ Priority 4 - Rare Taxa		Proposed Alignment - <i>Typhonium sp.</i> habitat 11ha



Main Roads WA
Kununurra Heavy Vehicle Route
Stage 1 Western Link Offset Package

Job Number | 61-25906
Revision | 0
Date | 09 Feb 2011

Proposed Offset Area in Relation to
CPS 2892/1 and Significant Flora Habitat

Figure 2

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Date Source: Landgate Kununurra - 2005 DEC, Significant Species 2005 WA Herbarium - 2008, GHD Kings Location - 2008/06/10 Existing Flora Reserve - 2010/11/04 Proposed Offset Area - Flora Reserve - 2010/11/04 Proposed Alignment - CPS 2892/1 - 2008/05/01 Typhonium Habitat - 2008/05/01 MRWA Cadastre 2009 Created by Mogue Flow cap/ber

