Hancock Prospecting Pty Ltd
Roy Hill Additional SRE Survey Report

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EXECUTIVE SUMMARY

Hancock Prospecting Pty Ltd (HPPL) holds Exploration Licence E47/1326 for Roy Hill, which is located approximately 100 km north-east of Newman. During June 2006, *ecologia* Environment (*ecologia*) conducted a baseline short-range endemic (SRE) survey for HPPL at Roy Hill. The survey revealed very few potential SRE species and total absence of mygalomorph spiders. This result was queried by representatives of the Department of Environment and Conservation (DEC) and, consequently, an additional opportunistic SRE survey was conducted in October 2008. The aims of the additional survey were:

1. To determine if the habitat was suitable for mygalomorph spiders.
2. To determine prospective sites for more thorough, systematic SRE survey in 2009.

Parallel transects were performed in areas where disturbance from the proposed mining operations are expected (Figure 1-2).

These included:

- four closed-spaced drilling areas;
- areas in and around Kulbee Creek (both above and below the proposed diversion);
- areas in and around the three proposed dams; and
- the most south-eastern positioned crusher.

Opportunistic sampling was also conducted around mesa formations in the north-eastern parts of the tenement and within the proposed waste dump.

The results of the survey showed that much of the land within the Roy Hill lease was degraded and therefore largely unsuitable for ground dwelling SRE species such as mygalomorph spiders. The two main causes of the land degradation were overgrazing by cattle from Roy Hill station and a bushfire that appeared to have swept through large areas of the tenement in the last few years. An extreme example of such disturbance was found during the clearance survey in the four proposed closed-space drilling areas (CSDA) which revealed no evidence of SRE species habitat due to heavily compacted ground, large trees burnt by the fire and/or leaf litter being trampled or removed completely.

In spite of the overall degraded state of the area, *ecologia* located several isolated sites of less disturbance. Overall, ten sites have been selected for further systematic surveying in 2009. In one of these sites, a single female specimen of a mygalomorph spider from the genus *Conothele* was found. The specimen was collected from a small creek line in the south-eastern corner of the lease and it belongs to a new and/or undescribed species. In order to confirm taxonomic resemblance with other undescribed species of *Conothele* in the Pilbara, collection of adult males will be required. This creek line showed the least evidence of damage by cattle, however neighbouring creek lines were degraded and

unlikely to support SRE species, therefore the spider population is expected to be quite small and isolated.

In summary, the additional SRE survey confirmed that mygalomorph spiders are rare to non-existent in most parts of the Roy Hill tenement. However, further systematic sampling is required in 2009 after the wet season to complete the survey.

1.0 INTRODUCTION

1.1 Overview

Hancock Prospecting Pty Ltd (HPPL) holds an exploration licence for Roy Hill (E47/1326), which is located approximately 100 km north-east of Newman. During 2006, *ecologia* Environment (*ecologia*) conducted a short-range endemic (SRE) survey for HPPL at Roy Hill. The survey revealed very few potential SRE species and total absence of mygalomorph spiders. This result was queried by representatives of Department of Environment and Conservation (DEC) and consequently an additional opportunistic SRE survey was conducted in October 2008.

The aims of the additional survey were:

1. To determine if the habitat was suitable for mygalomorph spiders.
2. To determine prospective sites for more thorough, systematic SRE survey in 2009.

1.2 Climate

Roy Hill is situated in the Pilbara region of Western Australia and experiences an arid-tropical climate with two distinct seasons; a hot summer from October to April and a mild winter from May to September. Annual evaporation exceeds rainfall by as much as 500 mm per year. Seasonally low but unreliable rainfall, together with high temperatures and high diurnal temperature variations are also characteristic climatic features of the region. This region has experienced no rainfall in any month of the year in the past, which is typical of a desert climate (Beard 1975). Within the Pilbara, the temperature range is large and maxima are high. Summer temperatures may reach as high as 46°C at Newman, with a mean maximum of 31.3°C. Light frosts occasionally occur during July and August. The climate experienced throughout the year is usually very dry since high temperature and humidity seldom occur simultaneously (Figure 1-1).

Table 1-1 Summary of Climatic Data for Newman. Rainfall in mm and Temperature in °C. (Source: Bureau of Meteorology website).

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Monthly Records 1965-2003												
Rainfall	51.4	80.1	38.6	25.3	23.2	25.0	12.6	10.5	4.1	3.9	9.8	27.0
Average Monthly Records 1965-1997												
Temp. Max.	39.0	37.2	35.8	31.6	26.0	22.4	22.3	24.8	29.2	33.6	36.6	38.3
Temp. Min.	25.3	24.4	22.4	18.4	13.0	9.6	8.1	10.1	13.7	17.9	21.4	23.9
Records for 2008												
Total Rainfall	15.6	124.6	35.4	1.2	0.0	34.6	0.0	6.2	0.8	1.0		
Average daily Temp. Max.	42.7	36.8	35.7	32.9	29.6	22.6	24.0	24.0	30.7	35.3		
Average daily Temp. Min.	27.4	23.5	22.0	18.4	11.2	9.3	6.2	7.8	13.4	19.7		

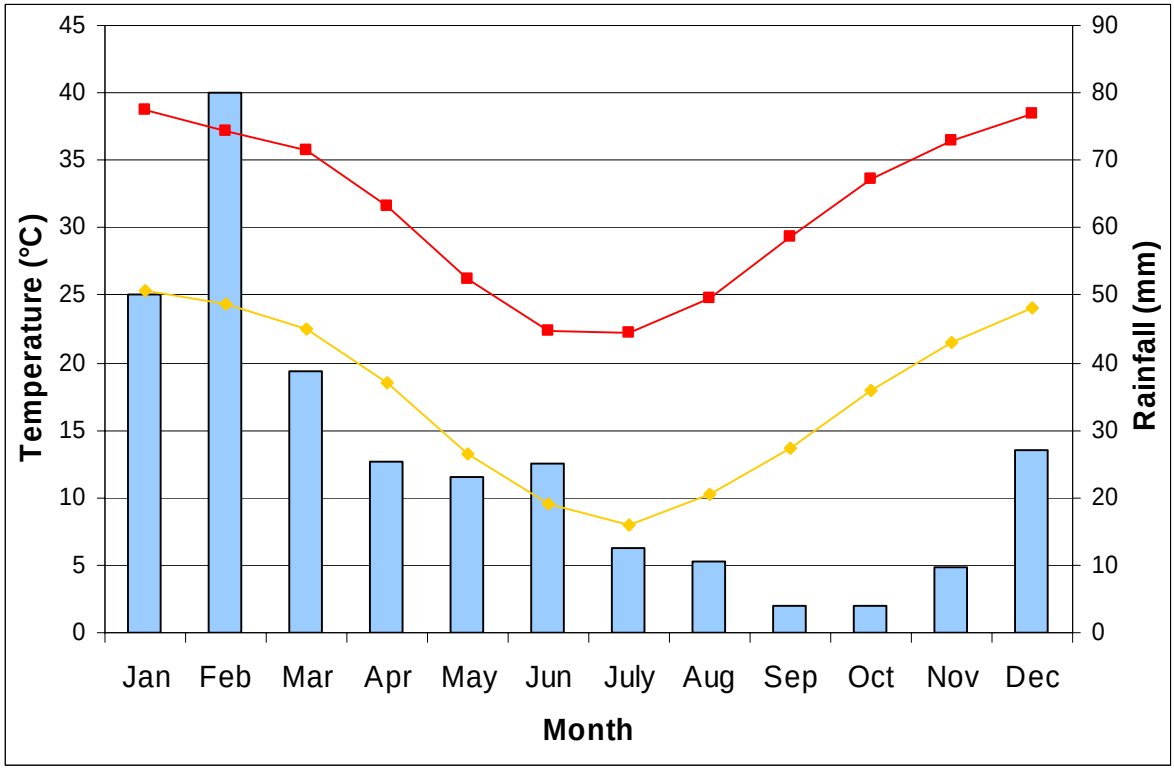
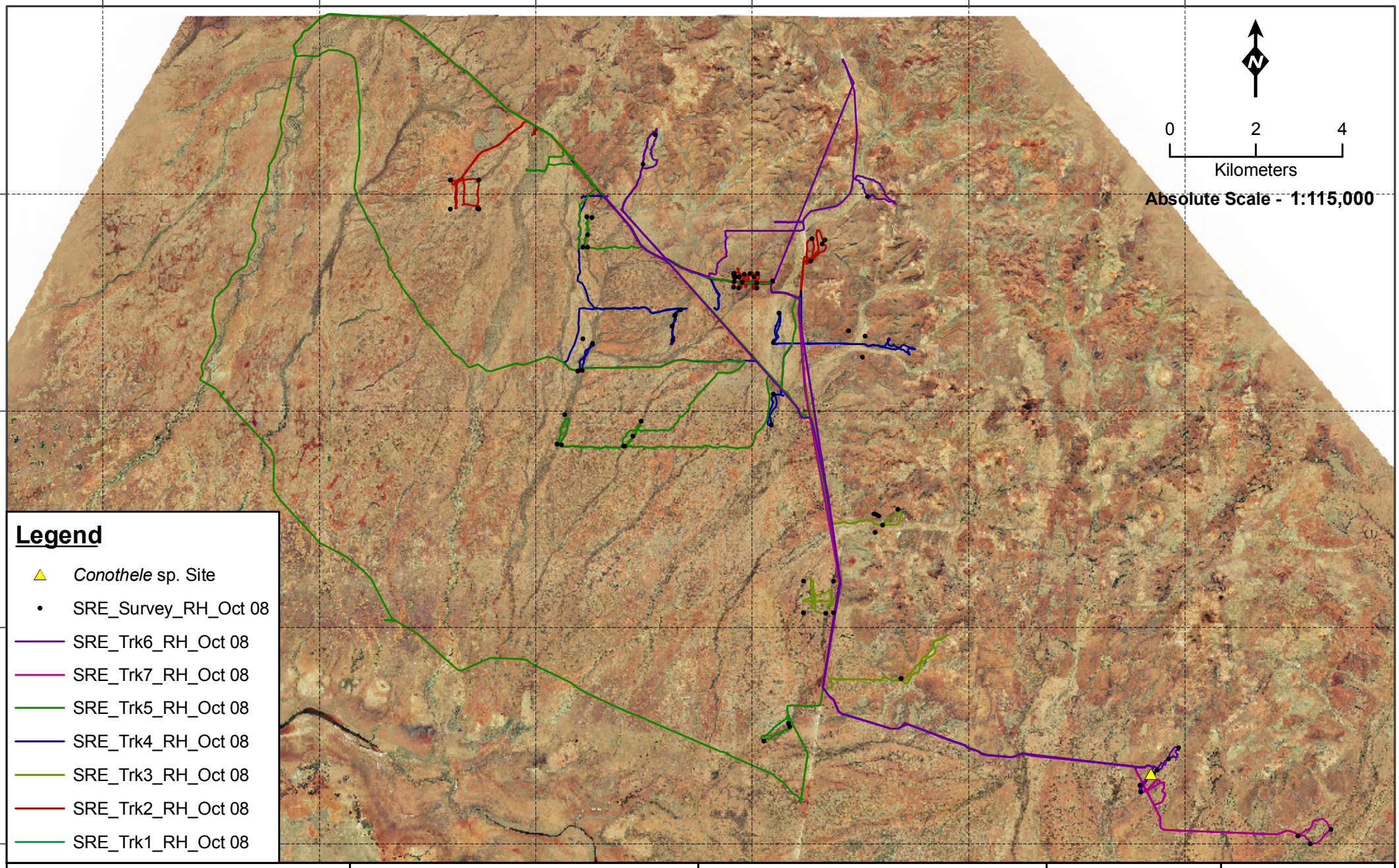


Figure 1-1 Summary of climatic data for Newman (Source: Bureau of Meteorology website)



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Surveyed Sites at Roy HIII

Figure: 1-2
Project ID: 1034

Drawn: SG
Date: 20/11/08

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

A4

2.0 SURVEY METHODS

2.1 Timing

The survey was conducted at the end of a dry season (October) when most invertebrate SRE species are inactive; therefore systematic pitfall trapping could not be used as a sampling method. Instead, transect mapping within designated areas and opportunistic sampling targeting prospective SRE habitats were used.

2.2 Site selection and methodology

The list of sites and survey methodology used is summarised in Table 2-1. The survey site location is shown in Fig 1-2.

Table 2-1 Sites and survey methodology

Site	Method
Closed Spaced Drilling Area 1	closed-spaced transect mapping (5-10 m apart)
Closed Spaced Drilling Area 2	closed-spaced transect mapping (5-10 m apart)
Closed Spaced Drilling Area 3	closed-spaced transect mapping (5-10 m apart)
Closed Spaced Drilling Area 4	closed-spaced transect mapping (5-10 m apart)
Area above Kulbee Creek diversion	opportunistic targeted sampling
Proposed dam east	opportunistic targeted sampling
Proposed dam north	opportunistic targeted sampling
Proposed dam south	opportunistic targeted sampling
Proposed waste dump	opportunistic targeted sampling
Creek 1st east to No Name Creek	three parallel transects (20-50 m apart, 700 m long)
Creek 2nd east to No Name Creek	three parallel transects (20-50 m apart, 700 m long)
Creek between Marble Bar Rd. and Southern Spur	three parallel transects (20-50 m apart, 700 m long)
Creek E of Airport Rd. and Access Rd. intersection	three parallel transects (20-50 m apart, 700 m long)
Creek receiving K. cr. diversion (loc. between Kulbee and No Name crks.)	three parallel transects (20-50 m apart, 700 m long)
Kulbee Creek below diversion	three parallel transects (20-50 m apart, 700 m long)
No Name Creek	three parallel transects (20-50 m apart, 700 m long)
Creek E of the most SE proposed crushers	three parallel transects (20-50 m apart, 700 m long) and opportunistic targeted sampling

3.0 RESULTS

3.1 Overview

Much of the land within the Roy Hill tenement was extremely dry and degraded due to the combination of overgrazing by cattle, a recent fire, below average rainfall for 2008 (Table 1-1) and ground disturbance from exploration drilling. Evidence of deterioration from overgrazing was widespread throughout the tenement. Cattle were observed using creek lines and other shady areas, which would otherwise present microhabitats for ground dwelling SRE species, as corridors to move within the station (Appendix 2, Figures A2.3-5). Consequently, most areas comprised heavily compacted ground and trampled leaf litter with very little evidence of ground dwelling fauna. Evidence of fire damage was widespread throughout the lease, and some areas were severely affected with well established trees destroyed and undergrowth and leaf litter completely removed (Appendix 2, Figures A2.7-9). In addition, new growth appeared to be impeded by cattle grazing and natural regeneration was much slower than expected. In summary, all of these factors contributed to ground deterioration which has resulted in the habitat being unsuitable for most ground dwelling SRE species.

3.2 Closed Spaced Drilling Areas

No SRE species or prospective SRE habitat was found in any of the four Closed-Spaced Drilling Areas surveyed.

3.3 Mygalomorph spiders

A single live mygalomorph spider was found in a creek line east of the most south-eastern proposed crusher (location: S22°33.792', E120°03.316'); this creek has been called “Trapdoor Creek” for the purpose of this report. The specimen (Fig 3-1) and its burrow (Fig 3-2) were identified by Prof. Barbara York Main, University of Western Australia, as an undescribed species of the genus *Conothele*. The genus currently comprises a single species, *C. malayana*, from an island in the Kimberley. However, records of new, undescribed species exist from a number of locations in Western Australia and await formal descriptions (B.Y. Main, pers. comm.). Two records of *Conothele* exist from the Pilbara, at present tentatively called by B.Y. Main as *Conothele* “Marble Bar” and *Conothele* “Hamersley Range”. It is plausible that the specimen collected at Roy Hill may belong to one of these two species; however adult males are required for such taxonomic confirmation. As the species collected at Roy Hill is either a female or a juvenile male, no further taxonomic knowledge is available at this time in regards to this species distribution and conservation status.

Two additional burrows of the same species (*Conothele* sp.) were found in the same creek line, however both were old and abandoned (Fig 3-3). Such low population density indicates that the population of *Conothele* sp. in this area is declining. In addition, the surrounding creek lines were comparatively more damaged by cattle grazing and therefore “Trapdoor creek” is likely to present a small, isolated ‘island’ of suitable mygalomorph habitat.

Figure 3-1 *Conothele* sp. found at Roy Hill (Family: Ctenizidae; arrow points to saddle structure on tibia which is a defining characteristic of the genus)

Figure 3-2 Burrow of *Conothele* sp. found at Roy Hill (Family: Ctenizidae). Trapdoor closed (left) and open (right).

Figure 3-3 Two abandoned burrows of *Conothele* sp. at Roy Hill

3.4 Site Selection for 2009 Survey

While much of the habitat at Roy Hill did not appear suitable for mygalomorph spiders, several areas were identified as prospective for SRE groups such as Pseudoscorpions, Scorpions and Centipedes. Areas with other invertebrate species encountered during the survey, e.g. araneomorph spiders (Appendix 3) were also considered. Site selection was designed to include as wide a range of habitats as possible, focussing on areas where SRE species were most likely to occur. SRE invertebrates are generally found in isolated, damp habitats, which include (but are not limited to) south facing hill slopes, isolated patches of dense vegetation, areas of accumulated leaf litter, and river gullies. Within these habitats, SRE species are often further specialised to utilise specific microhabitats such as areas of permanent shade, under the bark of trees and inside decaying logs.

Overall, *ecologia* identified ten potential sites for the 2009 systematic SRE survey at Roy Hill:

- RH01: north-east part of tenement, east of Marble Bar Road;
- RH02 & RH03: Proposed Waste Dump;
- RH04 & RH05: Proposed Dam North;
- RH06 & RH07: Proposed Dam East;
- RH08 & RH09: Proposed Dam South; and
- RH10: “Trapdoor Creek”.

The exact locations of the sites will be provided in 2009 prior to the survey.

4.0 DISCUSSION AND CONCLUSIONS

The discovery of *Conothele* sp. in the south-eastern corner of the tenement is of interest and further sampling will need to be conducted in the area in 2009 in order to collect adult males for taxonomic identification. As the conservation status of this species can not be determined at present, it is recommended to follow the precautionary principle (*"Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.")* (EPA 2004), and relocate the easternmost crushers to a location of less potential impact to SRE species.

Results from the surveys conducted in the four Closed-Spaced Drilling Areas and the areas in and around the proposed Kulbee Creek diversion, suggest that future exploration activities are unlikely to adversely impact SRE habitat as the ecosystems are already degraded and unlikely to support invertebrate SRE species.

Recommendations for other proposed infrastructure areas, namely the three dam sites and crusher areas cannot be made until the systematic SRE survey is completed in 2009.

5.0 REFERENCES

Beard, J. S. 1975. Pilbara. Explanatory notes to Sheet 4, 1:1,000,000 Series *Vegetation Survey of Western Australia*. Univ. of W.A. Press., Nedlands.

EPA. 2004. Guidance for the Assessment of Environmental Factors No. 56: *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia.* Environmental Protection Authority, Perth.

Appendix 1: Descriptions of ten Potential Sampling Sites for systematic survey in 2009

Figure A1.1 **RH01**: North-east, above diversion, East of Marble Bar Rd Potential SRE habitat in one of the gullies. Presence of spinifex usually deters cattle.	
Figure A1.2 **RH02** & **RH03** Waste Dump Spinifex; Rocky on the surface but soft ground underneath.	
Figure A1.3 **RH04** & **RH05** Dam North Area further into mesa very rocky with spinifex. Area observed to provide habitat for centipedes, and probably good for pseudoscorpions.	

Figure A1.4 **RH06** & **RH07** Dam Middle Creek disturbed by cattle, therefore survey would focus on the vegetated but very rocky head.	
Figure A1.5 **RH08** & **RH09** Dam South Head undisturbed and rocky with spinifex. Possible habitat for pseudoscorpions.	
Figure A1.6 **RH10** "Trapdoor Creek" The creek where *Conothele* sp. was found. Area not damaged by cattle.	

Appendix 2: Disturbed Sites

Figure A2.1: near Fortescue marsh Arrow points to excessive amount of dust in the air.	
Figure A2.2: near Fortescue marsh Due to the presence of cattle in this area, habitat is not suitable for ground dwelling SRE species.	
Figure A2.3: near Fortescue marsh Cattle migrating along creek lines.	

Figure A2.4: CSD west Area that would normally present a good habitat for SRE species greatly disturbed and overgrazed by cattle.	
Figure A2.5: near Fortescue marsh Cattle migrating along creek lines.	
Figure A2.6: creek between Kulbee & No-Name Creek Arrow shows one of the many well-used cattle trails at Roy Hill.	

Figure A2.7: 1st transect near "Trapdoor Creek" One of the degraded creek lines near "Trapdoor Creek" which has been affected by fire.	
Figure A2.8: Dam south The creek area has been affected by fire although the rocky area towards the mesa is more suitable for future surveying.	
Figure A2.9: Kulbee Creek Ground previously burnt by fire and extremely disturbed by cattle and exploration. No prospect of ground dwelling SRE species.	

Figure A2.10: Kulbee Creek Ground previously burnt by fire and extremely disturbed by cattle and exploration activities. No prospect of ground dwelling SRE species.	

Appendix 3: Other invertebrates found at Roy Hill

Figure A3.1: CSD south Burrow of Araneomorph spider	
Figure A3.2:Creek 2nd east to No-Name creek *Urodacus* scorpion burrow	
Figure A3.3:CSD1 Wolf Spider and burrow (Lycosidae) Araneomorphae	

Figure A3.4: CSD1 Araneomorph spider	
Figure A3.5: North-east, above diversion, East of Marble Bar Rd Araneomorph spider burrow	
Figure A3.6: Tailings dam Wolf Spider and burrow (Lycosidae) Araneomorphae