




Department of
Environment and Conservation

Our environment, our future 

Biodiversity values of basic raw material sites within Cape Range National Park

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Frontispiece: Entrance to Cape Range National Park by the means of Yardie Creek Road

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EXECUTIVE SUMMARY

The Shire of Exmouth owns and maintains Yardie Creek Road, the main road that services the west coast of North West Cape, including Cape Range National Park (CRNP). The cost of maintaining Yardie Creek Road may be reduced by sourcing basic raw materials (BRM) from borrow pits within CRNP. The areas immediately adjacent to eight existing borrow pits within CRNP and two sites on Unallocated Crown Land (UCL) were assessed for the biodiversity and nature conservation values.

Five Priority Flora taxa were recorded in the area around the extant BRM pits, with at least one priority taxon present at each site except Pit Four and Rehabilitation Pit. No records of threatened or priority ecological communities were observed, however, potential karst features, which indicate possible presence of threatened stygofauna and troglifauna, were recorded at three sites (Entrance Pit, Pit Two and Mandu Pit). The majority of BRM pits can not be seen from Yardie Creek Road and are hidden by existing vegetation.

Based upon the biodiversity and conservation values, and pending targeted flora surveys, the two pits in the UCL (Commonwealth and 5 Mile) and two pits within the national park (Pit Three and Pit Four) are suitable for BRM extraction for the annual maintenance of Yardie Creek Road. Four pits within the national park (Entrance Pit, Pit One, Milyering and Pit Two) are suitable for small scale gravel extraction for park management purposes only, pending minimisation of further clearing and management of visual impacts.

BACKGROUND

The Department of Environment and Conservation (DEC) and the Shire of Exmouth (the Shire) wish to determine appropriate areas for Basic Raw Material (BRM) extraction from the eight (8) existing borrow pits within the Cape Range National Park (CRNP). An additional two locations outside the national park and within the Unallocated Crown land (UCL) to the north, were identified by the Shire as potential locations for BRM extraction.

The Shire owns and maintains Yardie Creek Road, which services the west coast of North West Cape, including CRNP. The Shire has expressed concerns about the need to maintain access to BRM within a reasonable and economically viable distance of the Yardie Creek Road. The cost of maintaining this road has increased in recent years, which is partly attributed to the cost of purchasing and hauling road base material.

The cost of maintaining Yardie Creek Road may be reduced by sourcing BRM from borrow pits close to areas of need along the road, which for the southern part of the road, would necessitate sourcing BRM from within CRNP. The CRNP Management Plan (in preparation) indicates that there is a general presumption against the use of BRM from within the park, and such extractive activities should only be considered if the material is to be used within the park (or the road reserve servicing the park) for uses directly related to the park's management purpose (e.g. conservation or recreation). Approval must be given by the Conservation Commission of Western Australia.

The purpose of this project is to provide information to inform decision making on access to gravel resources within CRNP. The information derived from the project

will be used to seek advice from the Conservation Commission of Western Australia as to whether it is appropriate to source gravel from CRNP for the maintenance of Yardie Creek Road. This is on the basis that Yardie Creek Road may be considered to provide a service to CRNP and Ningaloo Marine Park by allowing access for visitors, as well as supporting management.

The aim of the project is to assess the biodiversity and nature conservation values of areas immediately adjacent to the existing borrow pits within CRNP and provide information to assist with the assessment of whether gravel extraction and expansion of borrow pits is appropriate and can proceed without impacting on biodiversity and nature conservation values.

METHODS

Prior to this project, a survey of proposed borrow pits within CRNP was conducted by Keighery (1996). In this report, vegetation and priority flora were described for seven sites within the national park. These sites consisted of inactive and active pits located on the coastal plain. Recommendations for each site were made based upon the presence of priority flora and proximity to the base of the range. In the current project, all the sites surveyed by Keighery (1996) were revisited (Table 1).

A survey for priority flora was conducted from September 21st to October 1st 2009 within a 100m buffer around the extant pits and areas of proposed excavation. The pit footprints and buffers were mapped using ARCGIS 9.2. A total of 18 priority taxa, as defined by Atkins (2008), have been recorded from Cape Range (Table 2). Those priority taxa commonly found on the coastal plains and limestone hills are most likely to be found in the habitat surrounding the borrow pits. Growth form and cover were recorded for dominant taxa in each strata (tallest, mid- and lower) for each borrow

pit. The data were used to describe the plant communities following McDonald *et al.* (1990). In addition, opportunistic collections were undertaken of vascular taxa within the buffer zone and later identified at the Western Australian Herbarium (PERTH) (Appendix A). Nomenclature follows Paczkowska and Chapman (2000). Priority taxa were recorded on Rare Flora Report Forms (Appendix B).

Presence of any karst features, such as limestone fissures, were noted. These are potentially associated with Threatened Ecological Communities (TEC) and the presence of threatened stygofauna and troglofauna.

Presence of TEC and Priority Ecological Communities (PEC) were assessed using the Species and Communities Branch ARCGIS database.

Limitations

This survey was conducted in late spring, towards the end of flowering season. Ideally, a survey earlier in the season would record and collect more flowering specimens enabling better identification of some of the taxa. In addition, the assessment of the priority fauna was limited by the inference that the presence of karst features indicates the potential presence of stygofauna and troglofauna. Ideally, sampling of stygofauna and troglofauna should be conducted using bores but this was not feasible within the scope of the project. In this survey, the presence of karst feature makes a sufficient surrogate.

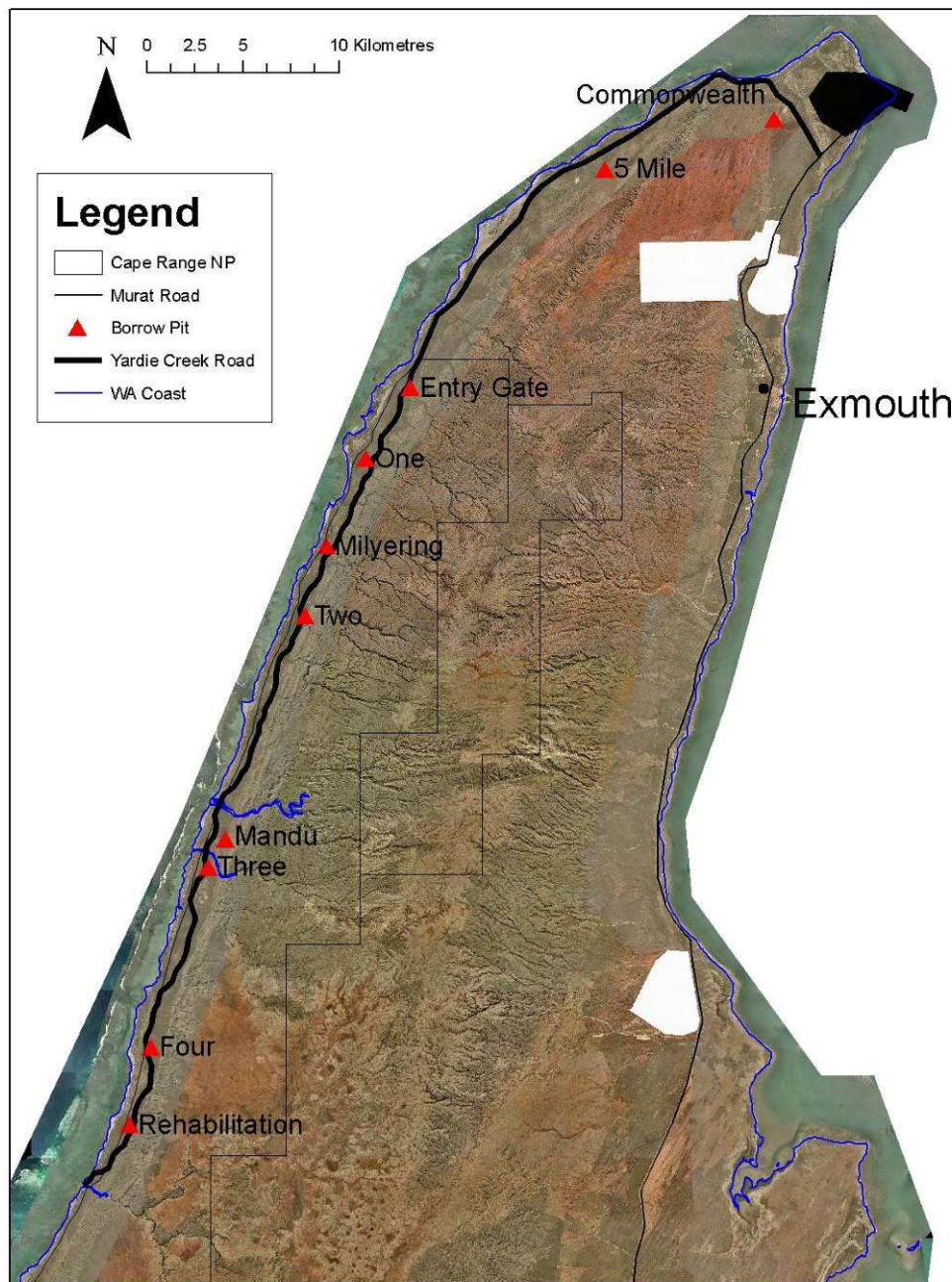


Figure 1. Location of existing and proposed borrows pits within and adjacent to Cape Range National Park. Blacked out and whitened areas are Defence (Commonwealth) lands.

BORROW PITS

Commonwealth

The Commonwealth Pit is located on the northern point of Cape Range (Figure 1) within the northern extent of the Pleistocene red sandplains. The entrance is located approximately 3.7 km west of the intersection of Yardie Creek Road with Murat Road. The site is dominated by sparse shrubland of *Acacia bivenosa*, *Senna glutinosa* subsp. *pruinosa* over mid dense hummock grassland of *Triodia epactia* and *Triodia basedowii* on deep red sands. Towards the western side of the survey area was a small limestone rise covered in a sparse shrubland of *Acacia bivenosa* over dense hummock grassland and shrubland of *Triodia epactia* and *Acacia gregorii*. As the limestone rise progresses south, the vegetation grades into shrubland and hummock grassland of *Acanthocarpus humilis*, *Melaleuca cardiophylla* and *Acacia gregorii*. Towards the southern border of the survey area, the dominant shrubs of *Acacia bivenosa* are replaced with *Acacia tetragonophylla* and *Stylobasium spathulatum*.

Two priority taxa were recorded from this area. A small scattered population of *Eremophila forrestii* subsp. *capensis* (< 10 plants) was located on the low limestone rise (Figure 2). One priority taxa, *Corchorus congener* was also recorded within the survey area.

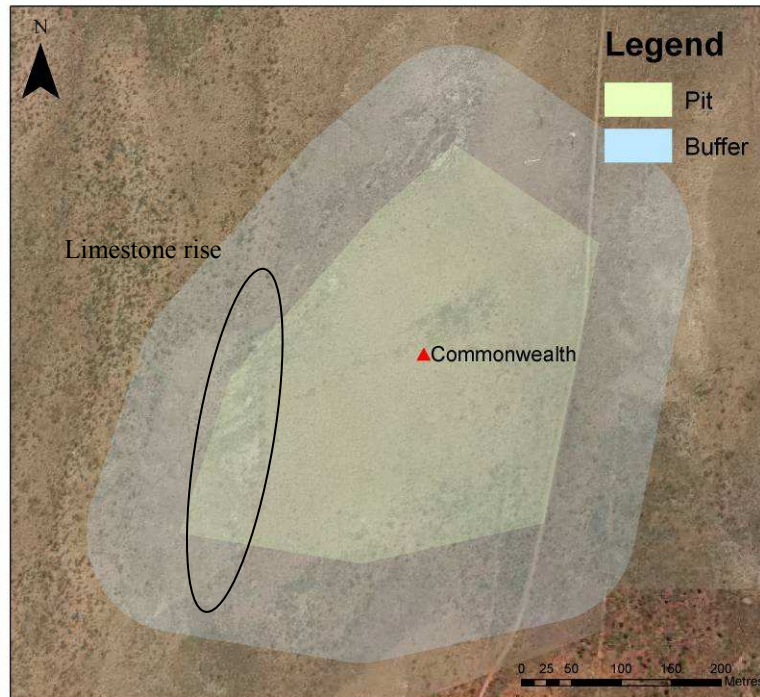


Figure 2. The proposed excavation site and buffer of the Commonwealth Pit. The low limestone rise is located on the western side of the survey area and is where the priority species, *Eremophila forrestii* subsp. *capensis*, was found.

Recommendation

The low number of *Eremophila forrestii* subsp. *capensis* and the location of additional populations on the range means the removal of this population would not have an adverse affect on the taxon.

The site is located adjacent to a large limestone quarry on Defense (Commonwealth) land. This is the site of a proposed large quarry that would be a major source of BRM for Yardie Creek Road maintenance and would minimize the number of borrow pits required within CRNP. This site is suitable and recommended for gravel extraction, however a targeted survey of *Corchorus congener* is recommended to determine the population size and possible impacts prior to any expansion of the pit on or in the vicinity of the limestone rise.

Five Mile

The Five Mile pit is located on the eastern side of Yardie Creek Road opposite Five Mile Road and within UCL. It is the site of a disused borrow pit adjacent to a low limestone rise to the south east (Figure 3). Extensive tracts of Buffel grass (*Cenchrus ciliaris*) occur on the plain.

The limestone hill is characterised by an isolated shrubland of *Acacia bivenosa* over mid dense shrubland and hummock grassland of *Indigofera monophylla* and *Triodia wiseana*, while the low coastal plain is described as low very sparse shrublands of *Acacia bivenosa* and *Acacia tetragonophylla* over mid dense hummock and tussock grassland of *Triodia epactia* and *Cenchrus ciliaris* (Figure 4).

One priority taxa, *Corchorus congener*, was recorded from the low limestone hill.

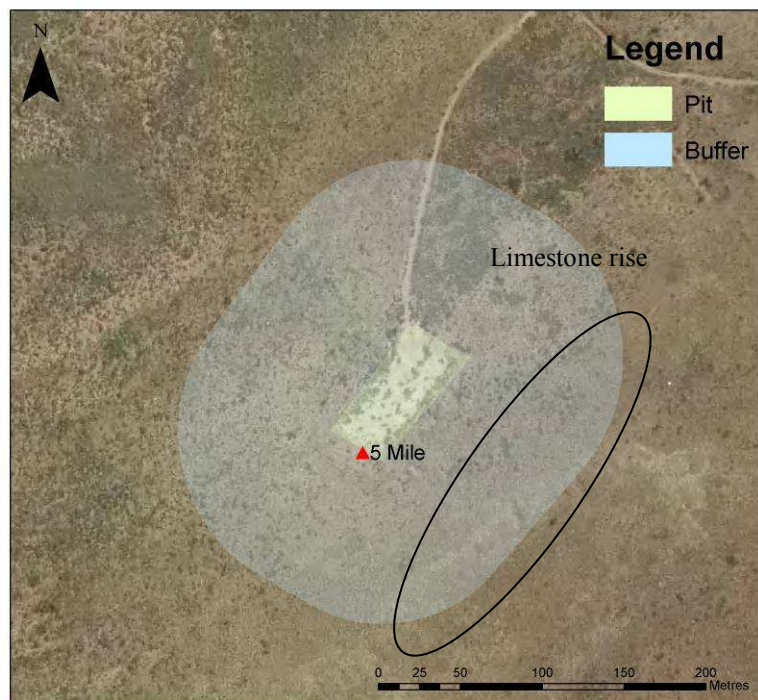


Figure 3. The existing pit and buffer of Five Mile pit, located outside the national park on UCL.



Figure 4. Typical vegetation on the plain at Five Mile Pit, low very sparse shrublands of *Acacia bivenosa* and *Acacia tetragonophylla* over mid dense hummock and tussock grassland of *Triodia epactia* and *Cenchrus ciliaris*.

Recommendation

This location is within UCL and not visible from the road therefore any proposed excavation would be hidden from view. This pit is suitable for gravel extraction for the annual maintenance of Yardie Creek Road. An additional survey is recommended to determine the abundance of *Corchorus congener* and possible impacts on this species should the pit be further developed on or in the vicinity of the limestone rise, otherwise there is no impediment to the expansion of the site.

Entrance Pit

This pit is the closest existing pit to the northern entrance of CRNP. The entrance to the pit is located approximately 1.5 km from the park entry gate.

To the west of the pit is a low limestone rise followed by an exposed limestone bench with skeletal soil (Figure 5). The northern buffer is a very old pit that has completely regenerated. The low hill is characterised by a sparse shrubland of *Acacia bivenosa* and *Acacia tetragonophylla* over hummock grassland of *Triodia epactia* while the

bench has isolated shrubland of *Acacia bivenosa* over hummock grassland and shrubland of *Triodia wiseana* and *Diplopeltis eriocarpa* (Figure 6).

The west of the extant pit is a mixed shrubland of *Acacia bivenosa*, *Alectryon oleifolius* subsp. *oleifolius* over *Triodia basedowii* and occasional shrubs of *Melaleuca cardiophylla* on soft brown sand (Figure 7).

A single priority taxon, *Brachychiton obtusilobus*, was recorded within the buffer area.

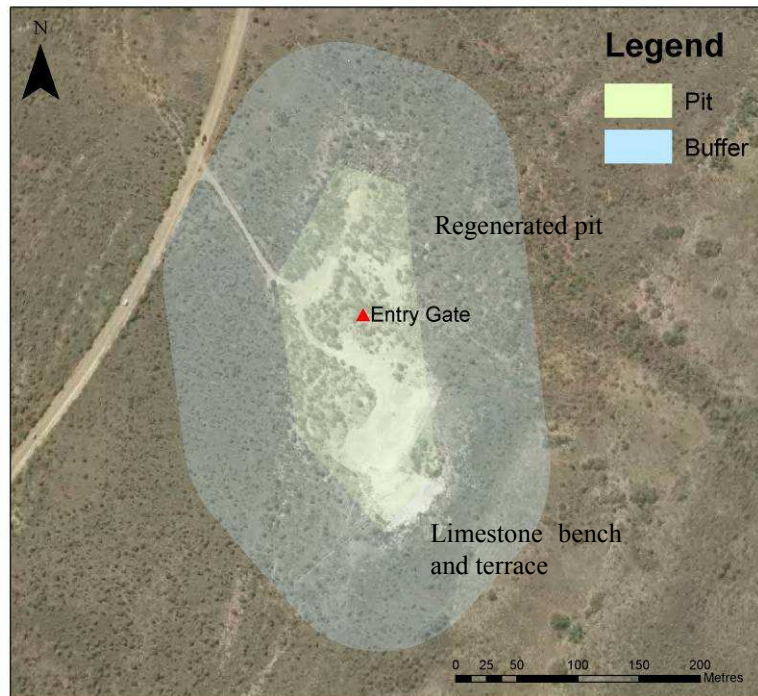


Figure 5. The existing pit and buffer of the Entrance Pit. The regeneration area is located northeast of the existing pit. The Yardie Creek Road is visible on the north western edge of the buffer.



Figure 6. Typical vegetation on the limestone bench at the Entrance Pit.



Figure 7. Typical vegetation at the western edge of the Entrance Pit, mixed shrubland of *Acacia bivenosa*, *Alectryon oleifolius* subsp. *oleifolius* over *Triodia basedowii* and occasional shrubs of *Melaleuca cardiophylla*.

Recommendation

Due to the close proximity of the pit to a massive limestone bench, potential karst features could be adversely affected by any further expansion of this pit. In addition, this site is located close to Yardie Creek Road and excavations would be visible to visitors to the national park. The expansion of this pit of a scale required for annual and ongoing maintenance of Yardie Creek Road is not recommended, however small

scale taking of gravel for park management purposes would be suitable where there is no further clearing and as long as the extraction is in an area away from the limestone terrace.

Pit One

The pit is located approximately 3.8 km south from the park entrance. This site is located close to Yardie Creek Road (Figure 8) on deep sandy loam of the coastal plain. This pit corresponds to Pit One in Keighery (1996). It is a large open pit with the south western and western side dominated by Buffel grass and *Atriplex* spp. The vegetation of the remaining buffer area is characterised as open shrubland of *Acacia bivenosa* and *Acacia tetragonophylla* over a hummock grassland of *Triodia epactia* and a tussock grassland of Buffel (Figure 9). The cover of shrubs is greater towards the eastern side of the pit. *Brachychiton obtusilobus*, a priority four taxon, was recorded on the northern eastern side of the pit within the dense shrublands of *Acacia bivenosa*.

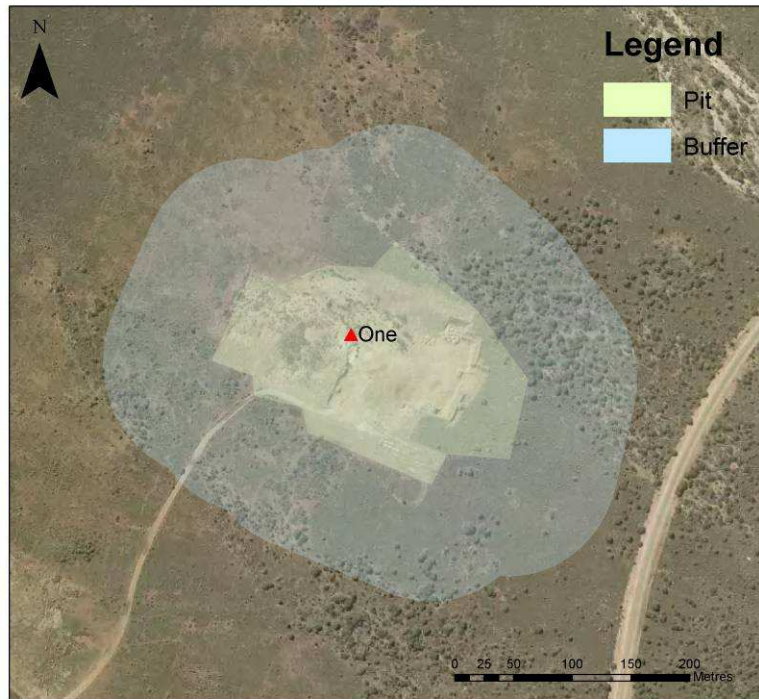


Figure 8. The extant pit and buffer of Pit One. The Yardie Creek Road is visible to the east of the pit.



Figure 9. Vegetation on the northern side of Pit One, with *Acacia tetragonophylla* in the foreground over tussocks of Buffel. In the background, the existing wall of the pit is visible.

Recommendation

Currently, this pit is being used for the storage of road base and other material for use within the national park. Ongoing extraction and future expansion of a scale required for the annual maintenance of Yardie Creek Road is not recommended as works within the pit would impact on the view shed from Yardie Creek Road and be highly visible to visitors of the national park. However, small scale taking of gravel for park management purposes would be suitable as long as there is no further clearing and no additional visual impact.

Milyering

This pit is located 250 m northeast of the Milyering Visitors Centre and is currently used as a storage, equipment lay down and waste management site by DEC (Figure 10). The extant pit is situated on the coastal plain, and is surrounded by shrublands of *Acacia bivenosa* and *Acacia tetragonophylla* over an open hummock grassland of *Triodia epactia* and tussock grassland of Buffel (Figure 11). The northern side of the pit has extensive degraded areas of dead *Acacia bivenosa* and abundant Buffel. A creek line dominated by *Triodia angusta*, a hummock grass commonly found within drainage channels occurs on the western side.

Brachychiton obtusilobus was the only priority taxa recorded.

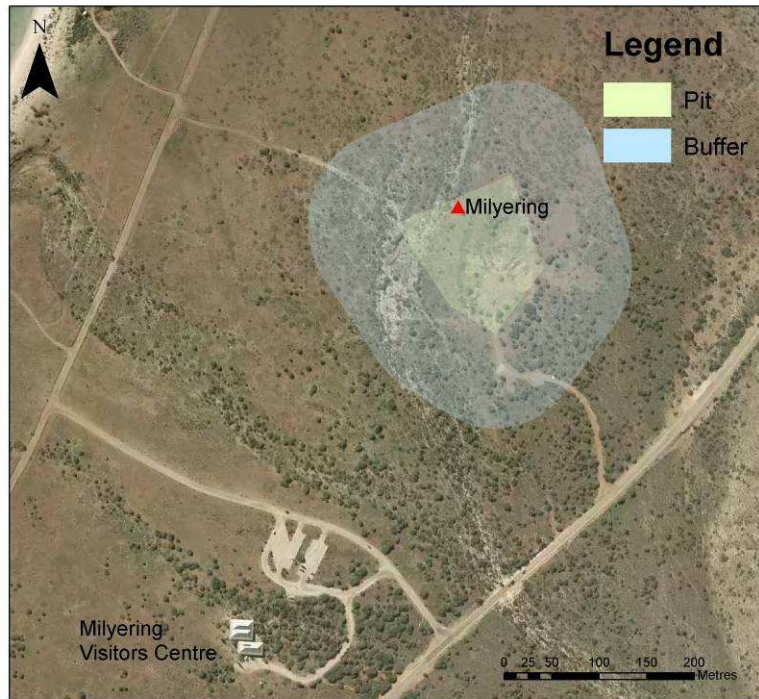


Figure 10. The extant pit and the buffer of the Milyering Pit. The Milyering Visitors Centre is located south west of the pit and any extraction would be highly visible to visitors of the national park.



Figure 11. Typical vegetation surrounding the existing Milyering pit.

Recommendation

This pit is close to the Milyering Visitors Centre and if utilised for BRM extraction, would be highly visible to visitors of the park. Further BRM extraction of a scale

required for the annual maintenance of Yardie Creek Road is not recommended. However small scale taking of gravel for park management purposes would be suitable as long as there is no further clearing and no additional visual impact

Pit Two

The entrance to this pit is located approximately 3.5 km south of the Milyering Visitors Centre and is situated close to the base of the range (Figure 7). This pit corresponds to Pit Two in Keighery (1996). A hundred metres south of the main pit is a disused dumping ground which was included within the survey area. A large area of former pit has regenerated with shrubs of *Acacia bivenosa* although there is little understorey. Closer to the road, Buffel is present as an understorey to *Acacia bivenosa*. The main vegetation is characterised as shrubland of *Acacia tetragonophylla* and *Acacia bivenosa* over hummock grassland of *Triodia wiseana* and shrubland of *Alectryon oleifolius* subsp. *oleifolius* (Figure 13).

The low limestone hill surveyed to the south was characterised by sparse shrubland of *Acacia bivenosa*, *Acacia tetragonophylla* and *Alectryon oleifolius* subsp. *oleifolius* over shrubland of *Diplopeltis eriocarpa* and *Acacia arida* over hummock grassland of *Triodia wiseana*.

A scattered population of *Eremophila forrestii* subsp. *capensis* was present within the survey area, mainly located along the drainage channel to the south of the main pit and on the limestone hill.

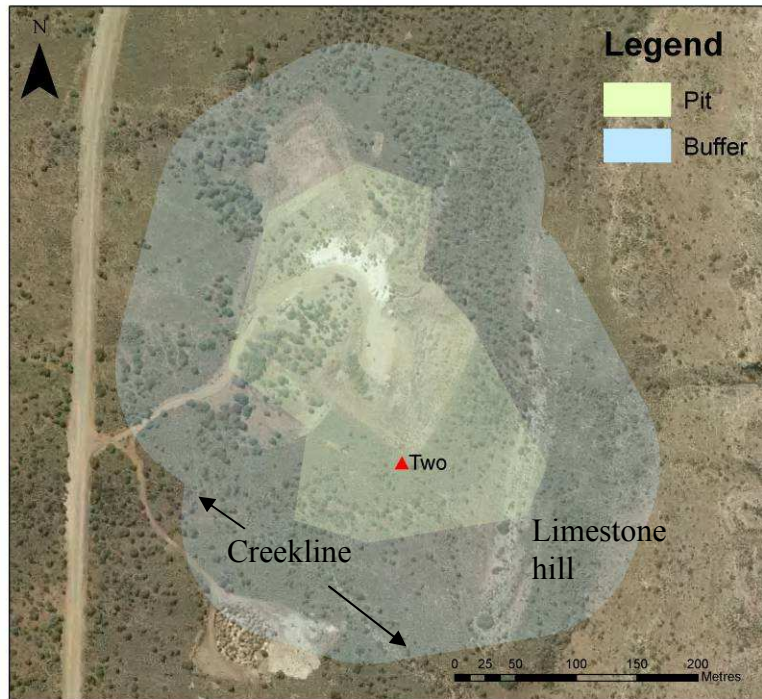


Figure 12. The extant pit and buffer of Pit Two. The survey was extended towards the creekline as part of the proposed expansion of the pit. Yardie Creek Road is visible to the west of the pit.



Figure 13. Main vegetation at Pit Two, shrubland of *Acacia bivenosa* over hummock grassland of *Triodia wiseana*.

Recommendation

Gravel extraction close to the massive limestone terrace to the east of the borrow pit could affect potentially karst features and contaminate the groundwater system. In addition, this site is highly visible from the road and any extraction and further development of a scale required for the annual maintenance of Yardie Creek Road would be visible to the public, and is therefore not recommended. However small scale taking of gravel for park management purposes would be suitable as long as there is no further clearing and no additional visual impact.

Mandu

This pit corresponds to Pits Three and Four from Keighery (1996), the entrance is located approximately 16 km south of the Milyering Visitors Centre and is situated close to the base of the range (Figure 14).

This pit is located in an area with high vegetation diversity with several vegetation systems represented within the buffer area. The flat is characterised as an open shrubland of *Acacia bivenosa*, *Acacia tetragonophylla* and *Ipomoea costata* over hummock grassland of *Triodia basedowii*. On the flat to the west, the hummock grassland is replaced by Buffel and the vegetation is dominated by *Acacia tetragonophylla*. This change in species abundance may reflect past grazing history.

To the north, the creek line has a different suite of species characterised by open shrubland of *Acacia bivenosa*, *Grevillea calcicola* (Priority 3) and *Corymbia hamersleyana* over open shrubland of *Acacia arida*, *Gossypium robinsonii*, *Senna artemisioides* subsp. *oligophylla*, *Acacia pyrifolia* and *Trichodesma zeylanicum* over hummock grassland of *Triodia angusta* (Figure 15).

The limestone terrace has elements represented of the massive tertiary limestones of Cape Range (Keighery & Gibson 1993). The terrace is charactered by a shrubland of *Ficus brachypoda*, *Acacia pyrifolia*, *Grevillea variifolia* subsp. *variifolia* and *Ipomoea costata* over hummock grassland of *Triodia wiseana* (Figure 16).

Four priority taxa, *Brachychiton obtusilobus*, *Grevillea calcicola*, *Tinospora esiangkara* and *Eremophila forrestii* subsp. *capensis*, were collected from the creek line. The vegetation is in good condition with only a small area supporting Buffel.

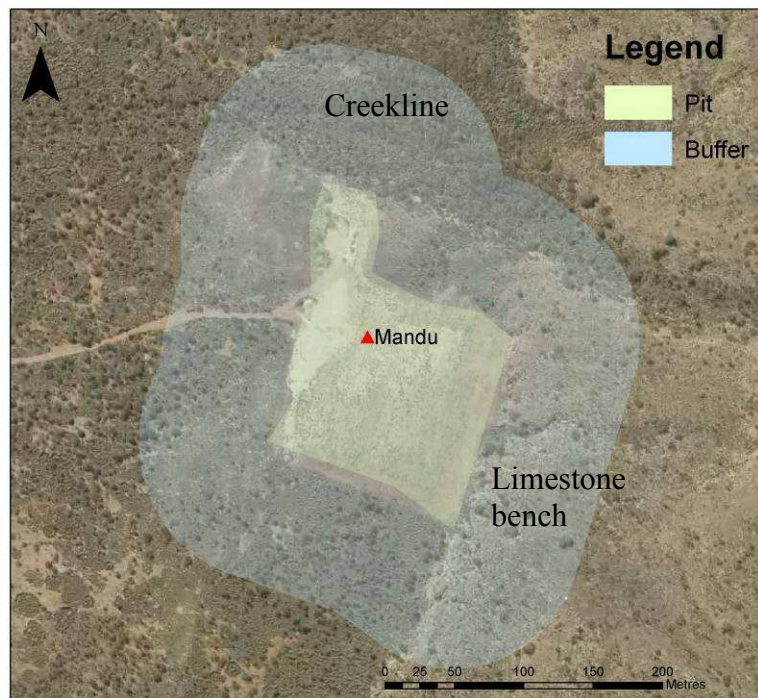


Figure 14. The extant pit and buffer of Mandu pit . The creek line, where several priority taxa were located, is north of the pit and the limestone bench on the eastern side.



Figure 15. Dense vegetation in the creekline within the buffer zone adjacent to the Mandu Pit.



Figure 16. Vegetation on the limestone terrace adjacent to the Mandu Pit. The main range can be seen in the background.

Recommendation

The proximity of the pit to limestone terraces and possible encroachment into karst features and the high biodiversity values of the site may present an unacceptable risk to ongoing and future use of this BRM source. It is recommended that the Mandu site not be used for any BRM extraction, either of a large scale extraction for the annual

maintenance of the Yardie creek road or small scale taking of gravel for park management.

Pit Three

This pit is located approximately 17.5 km south of the Milyering Visitors Centre. The appearance of Pit 3 is similar to that of an amphitheatre, with previous BRM extraction extending quite deep (Figures 17 & 18). The pit is located on the coastal plain and is characterised by open shrubland of *Acacia bivenosa* and *Acacia tetragonophylla* over hummock grassland of *Triodia epactia* and tussock grassland of Buffel (Figure 19). The vegetation is in reasonable condition. Four to five trees of *Brachychiton obtusilobus* are within the immediate vicinity of the old pit but all were in poor condition.

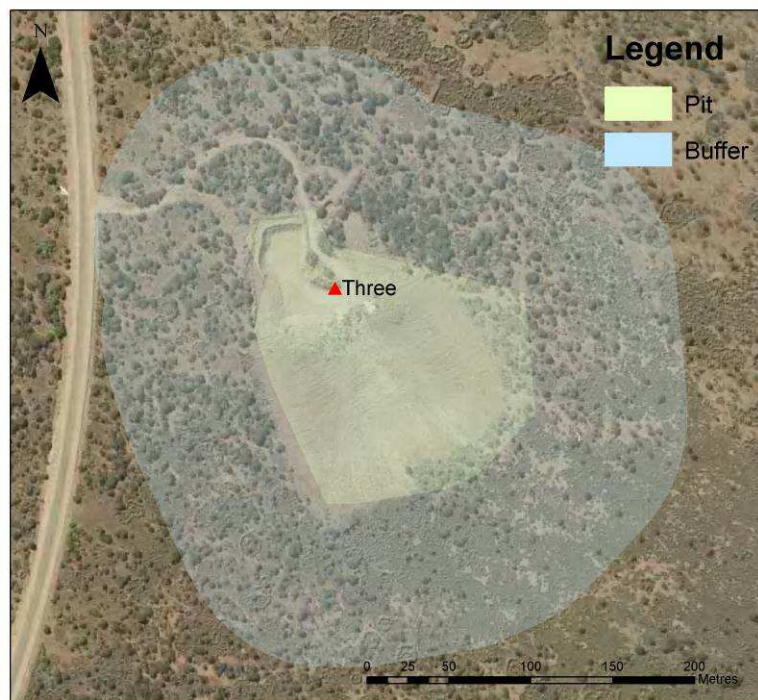


Figure 17. The extant pit and buffer of Pit Three. Yardie Creek Road is visible on the western side of the buffer.



Figure 18. The appearance of Pit 3 at the time of the survey, resembling an amphitheatre.



Figure 19. The dominant vegetation surrounding Pit 3.

Recommendation

The pit is situated close to the Yardie Creek Road but as previous excavations were deep, any future activity may be hidden from the view shed of the road (Figure 17). This pit is suitable for further expansion of a scale required for the annual maintenance of Yardie Creek Road as well as for park management purposes.

Pit Four

This pit is located approximately 27 km south of the Milyering Visitors Centre. The pit corresponds to Pit Six of Keighery (1994) and the vegetation is consistent with that report. The pit is located on the coastal plain and characterised by a sparse shrubland of *Acacia bivenosa* over *Olearia dampiera* subsp. *dampiera* ms over open hummock grassland of *Triodia epactia* (Figures 20 & 21).

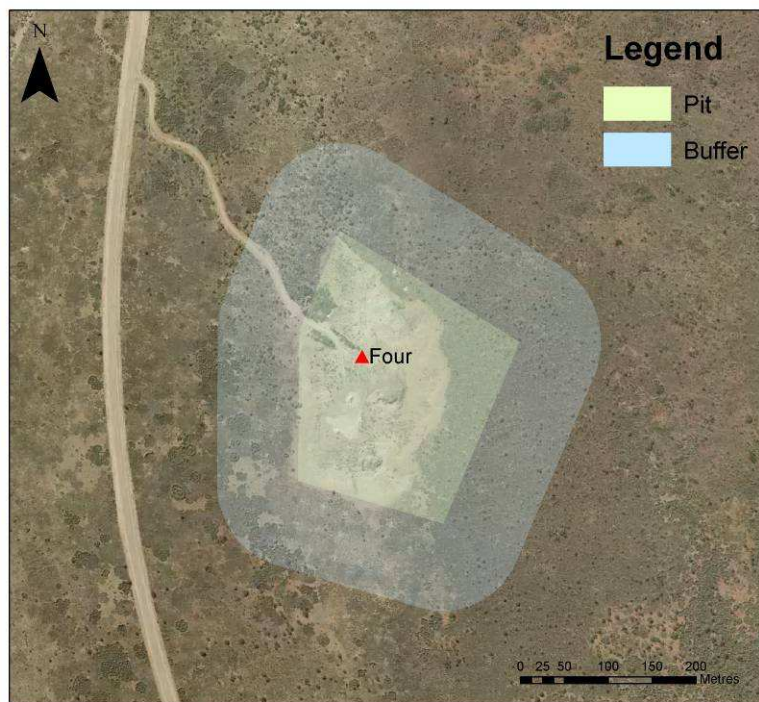


Figure 20. The extant pit and buffer of Pit Four. Yardie Creek Road is visible on the western side of the buffer.



Figure 21. The dominant vegetation surrounding Pit 4 is characterised as sparse shrubland of *Acacia bivenosa* over *Olearia dampiera* subsp. *dampiera* ms over open hummock grassland of *Triodia epactia*.

Recommendation

No Priority flora were found within the 100 m buffer zone. This pit is located close to the road and further excavations will possibly be visible to the public. If possible, future excavation could be conducted behind the low rises on the coastal plain which would block the activity from the view shed of the road. This pit is suitable for extraction of a scale required for the annual maintenance of Yardie Creek Road as well as for park management purposes.

Rehabilitation Pit

This is a disused BRM site located close to the Yardie Creek Road (Figure 22), approximately 3.5 km northeast of Yardie Creek camp site. This site corresponds to Pit 7 Seven in the Keighery (1996) report (Table 1). The vegetation in the buffer is characterised as hummock grassland of *Triodia epactia* and a tussock grassland of Buffel under scattered shrubs of *Acacia arida* and *Indigofera monophylla*.

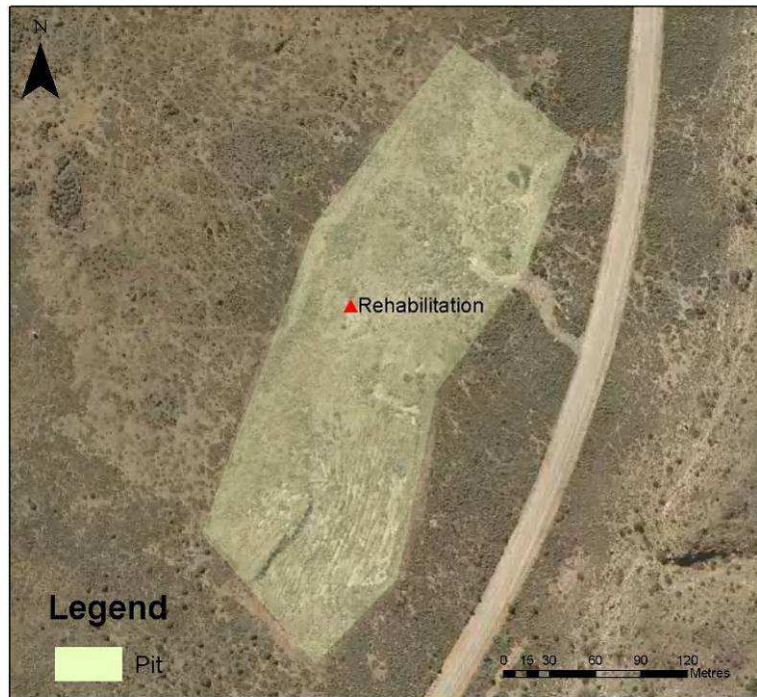


Figure 22. The Rehabilitation Pit adjacent to Yardie Creek Road.

Recommendation

Since this site has been rehabilitated and due to its proximity to the road, further expansion or extraction is not recommended .

ENVIRONMENTAL WEEDS

Buffel grass (*Cenchrus ciliaris*) is present at many of the pits and is the most serious environmental weed recorded. To prevent the spread of this grass, it is recommended that any soil removal from infested pits during future excavation expansions be stored *in situ* to limit further spread throughout the national park. Control of Buffel has been detailed in the management plan for the national park (in preparation).

THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

No records of threatened or priority ecological communities were observed within the buffer zones of the extant BRM pits, however, observations were limited to presence/absence of karst features. A number of specially protected subterranean fauna species and communities occur outside the park—at Cameron’s Cave in Exmouth, and the Bundera Sinkhole on Department of Defence land to the south of the national park.

PRIORITY FLORA

Five out of the eighteen Priority Flora taxa recorded from Cape Range, were found within the extant BRM pits and the 100 m buffer. *Brachychiton obtusilobus* (Priority 4) is a tree to 5 m endemic to Cape Range and occurs as isolated trees on the coastal plain and ranges (Figure 23). *Brachychiton obtusilobus* was recorded in seven of the ten BRM pits, with the four to five plants at Pit Three the maximum number recorded. This tree occurs throughout the national park. Due to the low numbers recorded at each pit, the removal of individual plants during pit expansions should have no adverse affects on the overall populations.



Figure 23. An example of a healthy tree of *Brachychiton obtusilobus*, located within the buffer zone of the Entrance Pit.

Grevillea calcicola is a Priority 3 tree with cream flowers in cylindrical inflorescences. It is commonly found on massive limestone on the range. Several plants were found at the Mandu Pit within the creek line. As ongoing extraction is not currently recommended for Mandu Pit this population should remain secure.



Figure 24. *Grevillea calcicola*, an endemic shrub to Cape Range, is commonly found on massive limestone. This plant was located on the hills behind the Milyering Visitors Centre.

Eremophila forrestii subsp. *capensis* is a Priority 3 shrub with distinct ovate leaves and spindly habit (Figure 25). It was recorded from five of the ten borrow pits surveyed. The largest population was recorded from Pit Two within the creek line. It was also commonly associated with the limestone rises at the Pit Three, Commonwealth, 5 Mile and Mandu pits. This taxon has been recorded elsewhere on Cape Range and further searches would likely find more plants on the massive limestone hills of the range. Removal of the small number of plants found in this survey would not have an adverse affect on the species.

Corchorus congener is a Priority 2 spreading shrub to 75 cm found on Cape Range and Barrow Island (Figure 26). This taxon was found at the two proposed pits (Commonwealth and 5 Mile) on UCL. This species may be confused with other taxa such as *Sida* spp. and further targeted surveys will be required to determine the size of the populations at each site.



Figure 25. *Eremophila forrestii* subsp. *capensis* is an endemic shrub to Cape Range. This taxon was found at several potential BRM sites. (Photography by J. English. Image used with the permission of

the Western Australian Herbarium, Department of Environment and Conservation (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Monday, 30 November 2009.).



Figure 26. *Corchorus congener* is an endemic shrub to Cape Range. It was recorded from the two BRM site located within the UCL. (Photography by E. Wajon. Image used with the permission of the Western Australian Herbarium, Department of Environment and Conservation (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Monday, 30 November 2009.).

Tinospora esiangkara is a Priority 2 slender woody climber with small green flowers (Figure 27). It found growing on rocky limestone outcrops and ridges and often near creeklines. This taxon is restricted to the North West Cape in Western Australia, but is also found in Arnhem Land in the Northern Territory and Cape Yorke Peninsula in Queensland. In this survey it was recorded from the flat at the Mandu Pit.



Figure 27. *Tinospora esiangkara* is a Priority Two climber restricted to the north west cape in Western Australia. (Photography by M. Maier. Image used with the permission of the Western Australian Herbarium, Department of Environment and Conservation (<http://florabase.dec.wa.gov.au/help/copyright>). Accessed on Monday, 4 January 2010.).

PRIORITY FAUNA

Although no TECs or PECs are found within the park, those pits close to the base of the range and close to massive limestone, have the potential to disturb subterranean fauna habitat. This fauna is commonly found in fissures, cavities and cracks within the limestone (troglofauna) or within the groundwater system (stygofauna).

There are three threatened and three Priority subterranean fauna species known within the park. The threatened species include two arachnids, the western Cape Range Bamazomus (*Bamazomus vespertinus*) and the western Cape Range Draculoides

(*Draculoides julianneae*), and a millipede (*Stygiochiropus sympatricus*). The Cape Range blind cockroach (*Nocticola flabella*), the spear-beaked cave shrimp (*Stygiocaris stylifera*) and the Cape Range schizomid spider (*Draculoides vinei*) are all listed as Priority species.

None of these species were recorded during this survey as the sampling strategy was not designed to record this fauna.

REHABILITATION

As part of the draft management plan, it is recommended that the extant disused BRM pits be reclaimed and rehabilitated. If BRM extraction continues to occur within the national park then a separate Rehabilitation plan will need to be developed and tailored specifically for each site. This is part of the overall strategy for the use of BRM within the park.

There are several basic steps that need to be undertaken for the rehabilitation of sites. During the excavation of BRM, a vital step is the retention and storage of topsoil for future rehabilitation. In arid soils, 80 to 90 % of soil stored seeds are located in the upper 2 cm of the soil (Kemp 1989), therefore the topsoil is a valuable resource essential for successful rehabilitation. It is also important during this step that any soil contaminated with weeds, such as Buffel, will need to be quarantined to prevent further infestation.

Site preparation is important for successful rehabilitation. Compaction from heavy machinery traffic needs to be ameliorated by breaking up the excavated surface through deep ripping. Deep ripping is necessary to increase water infiltration and plant root penetration in the substrate. Reshaping and stabilising the site to conform

with the surrounding landscape will be required to maximise water capture and retention (but not ponding) and minimise soil erosion.

Following this site preparation, the stockpiled topsoil will need to be respread, ideally returned to the same area where it was taken, and avoiding the resspreading of weed infested topsoil, if possible. If needed, reseedling of native species may be required. The use of local native species is mandatory in any seeding program and the species list for each BRM pit (see Appendix A) will provide a valuable starting point to inform on what grew species where.

The restoration of any site may take many years and it is essential that a target for completion is decided upon during preparation of a rehabilitation plan. A target may be a specified cover of dominant species in the vegetation determined prior to excavation or from the vegetation surrounding the already existing pits. Monitoring is necessary to determine the progression of the site. The site will also need to be closed from public access and signage established indicating rehabilitation in progress.

RECOMMENDATIONS

Based upon the biodiversity, conservation values and landscape amenity, there are no significant impediments to BRM excavation and extraction at Commonwealth, Five Mile, Pit Three and Pit Four for the annual maintenance of Yardie Creek Road. Targeted surveys of the priority flora taxon, *Corchorus congener*, to identify population size and possible impact, should be undertaken at Commonwealth Pit and Five Mile before excavations are undertaken in the limestone ridge areas. It is recommended that the high biodiversity values at the Mandu Pit, with four Priority Flora recorded, and the proximity to the base of the range, should preclude this site

from further excavation, including BRM extraction for use within the national park. The remaining pits, Entrance, Pit One, Milyering and Pit Two are suitable for small scale gravel extraction, pending minimisation of further clearing and management of visual impacts.

Five Priority Flora taxa were recorded in the area around most extant BRM pits, with at least one taxon present at each site except Pit Four and Rehabilitation Pit. No records of threatened or priority ecological communities were observed, however, potential karst features, which indicate possible presence of threatened stygofauna and troglofauna, were recorded at three sites (Entrance Pit, Pit Two and Mandu Pit). The majority of BRM pits can not be seen from Yardie Creek Road and are hidden by existing vegetation. However, those borrow pits that are located close to this significant public road (Entry Pit, Pit 1, Pit 3, Pit 4 and Rehabilitation Pit) are likely to be visible during large excavation works. However Pit Three can be situated out of the view shed of the road and Pit Four can be hidden from view by landform features and these should be preferentially developed if extraction of gravel is required from Cape Range National Park.

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APPENDIX 1

Flora list for the ten borrow pits surveyed within Cape Range National Park. * introduced taxa. Definition of Conservation Codes outlined in Table 3.

Pit location	Commonwealth	5 Mile	Entrance Pit	Pit One	Milyering	Pit Two	Mandu	Pit Three	Pit Four	Rehabilitation
Amaranthaceae										
<i>Ptilotus obovatus</i>			*	*	*		*	*		
Asclepiadaceae										
<i>Sarcostemma viminalis</i> subsp. <i>australe</i>				*						
Asteraceae										
<i>Olearia dampieri</i> subsp. <i>dampieri</i> ms		*	*						*	
<i>Pluchea dunlopia</i>										*
<i>Pluchea ferdinandi-muelleri</i>		*								
<i>Pterocaulon sphaeranthoides</i>		*				*	*		*	
<i>Senecio magnificus</i>					*					
<i>Streptoglossa decurrens</i>						*		*		
<i>Streptoglossa liatroides</i>	*									
Boraginaceae										
<i>Trichodesma zeylanicum</i>			*		*	*	*			
Caesalpiniaceae										
<i>Senna artemisioides</i> subsp. <i>helmsii</i>	*									
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>			*	*	*		*	*		
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>glutinosa</i>								*		
<i>Senna artemisioides</i> subsp. <i>oligophylla</i> x <i>helmsii</i>						*				
<i>Senna glutinosa</i> subsp. <i>glutinosa</i>			*		*			*		
<i>Senna glutinosa</i> subsp. <i>pruinosa</i>	*		*		*					
Capparaceae										
<i>Capparis spinosa</i> var. <i>nummularia</i>					*					
Convolvulaceae										
<i>Convolvulus angustissimus</i>							*			
<i>Ipomoea costata</i>					*	*	*	*	*	
<i>Ipomoea yardiensis</i>							*			
Dasygogonaceae										
<i>Acanthocarpus humilis</i>	*									
<i>Acanthocarpus verticillatus</i>		*	*		*			*		

Biodiversity values of basic raw material sites within Cape Range National Park

Pit location	Commonwealth	5 Mile	Entrance Pit	Pit One	Milyering	Pit Two	Mandu	Pit Three	Pit Four	Rehabilitation
Dilleniaceae										
<i>Hibbertia spicata</i> subsp. <i>spicata</i>					*					
Euphorbiaceae										
<i>Adriana urticoides</i> var. <i>urticoides</i>	*									
<i>Euphorbia tannensis</i> subsp. <i>eremophila</i>			*		*		*			
<i>Mallotus nesophilus</i>					*					
<i>Phyllanthus</i> sp. Coastal North West (J.Z. Weber 4919)			*				*			
Goodeniaceae										
<i>Dampiera incana</i> var. <i>incana</i>	*	*								
<i>Lechenaultia subcymosa</i>	*									
<i>Scaevola cunninghamii</i>	*									
<i>Scaevola spinescens</i>									*	
Loranthaceae										
<i>Amyema miquelii</i>								*		
<i>Amyema preissii</i>			*		*			*	*	
Malvaceae										
<i>Abutilon cunninghamii</i>		*	*							
<i>Gossypium robinsonii</i>			*		*	*	*			
<i>Hibiscus</i> aff. <i>solanifolius</i>	*									
<i>Hibiscus sturtii</i> var. <i>platyklamys</i>	*									
<i>Malvastrum americanum</i>				*						
<i>Sida fibulifera</i>	*									
<i>Sida rohlena</i>							*			
Menispermaceae										
<i>Tinospora esiangkara</i>							*			
Mimosaceae										
<i>Acacia arida</i>							*			
<i>Acacia bivenosa</i>			*	*	*	*	*	*	*	
<i>Acacia bivenosa</i> x <i>sclerosperma</i>									*	
<i>Acacia gregorii</i>			*				*		*	
<i>Acacia pyrifolia</i> var. <i>pyrifolia</i>			*	*	*	*	*	*		
<i>Acacia sericophylla</i>	*		*	*	*	*	*	*	*	
<i>Acacia synchronicia</i>		*		*						
<i>Acacia tetragonophylla</i>	*	*	*	*	*	*	*	*	*	*
* <i>Vachellia farnesiana</i>				*						
Moraceae										
<i>Ficus brachypoda</i>			*		*		*			
Myoporaceae										
<i>Eremophila forrestii</i> subsp. <i>capensis</i> (P3)	*	*				*	*	*		
<i>Eremophila longifolia</i>			*		*	*	*	*		

Biodiversity values of basic raw material sites within Cape Range National Park

Pit location	Commonwealth	5 Mile	Entrance Pit	Pit One	Milyering	Pit Two	Mandu	Pit Three	Pit Four	Rehabilitation
Myrtaceae										
<i>Corymbia hamersleyana</i>							*			
<i>Melaleuca cardiophylla</i>	*		*							
<i>Thryptomene baeckeacea</i>							*		*	
Oleaceae										
<i>Jasminum</i> sp. Exmouth (G. Marsh 77)								*		
Papilionaceae										
<i>Indigofera monophylla</i>		*								*
Pittosporaceae										
<i>Pittosporum phylliraeoides</i>			*	*	*		*	*	*	
Poaceae										
* <i>Cenchrus ciliaris</i>					*					
<i>Cymbopogon ambiguus</i>			*		*					
<i>Enneapogon caerulescens</i>	*			*		*				
<i>Eragrostis eriopoda</i>	*									
<i>Eriachne mucronata</i>	*	*	*				*		*	
<i>Paraneurachne muelleri</i>	*									
<i>Triodia angusta</i>							*	*		
<i>Triodia basedowii</i>			*				*			
<i>Triodia epactia</i>	*	*	*		*			*		
<i>Triodia schinzii</i>									*	
<i>Triodia wiseana</i>		*	*			*				
Proteaceae										
<i>Grevillea calcicola</i> (P3)							*			
<i>Grevillea stenobotrya</i>	*									
<i>Grevillea variifolia</i> subsp. <i>variifolia</i>							*			
Santalaceae										
<i>Exocarpos aphyllus</i>			*			*	*	*		
<i>Santalum lanceolatum</i>					*					
Sapindaceae										
<i>Alectryon oleifolius</i> subsp. <i>oleifolius</i>			*	*	*	*	*	*	*	
<i>Diplopeltis eriocarpa</i>			*			*	*		*	
<i>Diplopeltis intermedia</i>	*									
Solanaceae										
<i>Solanum diversifolium</i>				*						
<i>Solanum ellipticum</i>				*						
<i>Solanum lasiophyllum</i>	*	*	*	*	*	*	*	*		
Sterculiaceae										
<i>Brachychiton obtusilobus</i> (P4)			*	*	*	*	*	*		

Biodiversity values of basic raw material sites within Cape Range National Park

Pit location	Commonwealth	5 Mile	Entrance Pit	Pit One	Milyering	Pit Two	Mandu	Pit Three	Pit Four	Rehabilitation
<i>Hannafordia quadrivalvis</i> subsp. <i>recurva</i>			*				*		*	
<i>Melhania oblongifolia</i>					*	*	*			
Surianaceae										
<i>Stylobasium spathulatum</i>	*	*								
Thymelaeaceae										
<i>Pimelea microcephala</i> subsp. <i>microcephala</i>			*			*	*	*	*	
Tiliaceae										
<i>Corchorus congener</i> (P2)	*	*								
<i>Corchorus crozophorifolius</i>					*	*				

APPENDIX 2

Rare Flora Field Report Forms for all populations of Priority taxa recorded in the survey.



RARE FLORA REPORT FORM

TAXON: Corchorus congener **DEFL POPULATION No.:** _____
 DRF Priority Species: P_3 Partial Survey Full Survey New Population
FROM: R.Meissner **TITLE:** _____ **SURVEY DATE:** 01 / Oct / 2009
REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth
LOCATION: _____ the eastern side of Yardie Creek Road opposite Five Mile Road and within UCL. _____
Reserve No.: _____

LATITUDE: 21 ° 50 ' 56 " S **LONGITUDE:** 114 ° 3 ' 19 " E **Map Used:** _____
GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____
 Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____
ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel
SOIL TYPE: Sand Loam Clay Peat Gravel
SOIL COLOUR: Red Brown Yellow White Grey
SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): isolated shrubland of *Acacia bivenosa* over mid dense shrubland and hummock grassland of *Indigofera monophylla* and *Triodia wiseana* _____
ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative
POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: site of possible gravel pit

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Brachychiton obtusilobus **DEFL POPULATION No.:** _____
 DRF Priority Species: P_4_ Partial Survey Full Survey New Population

FROM: R.Meissner **TITLE:** _____ **SURVEY DATE:** 24 / Sep / 2009

REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth

LOCATION: Located adjacent to an old gravel pit. The entrance to the pit is located approximately 1.5 km from the park entry gate. **Reserve No:** _____

LATITUDE: 21 ° 57 ' 3 " S **LONGITUDE:** 113 ° 57 ' 52 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____
 Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): mixed shrubland of *Acacia bivenosa*, *Alectryon oleifolius* subsp. *oleifolius* over *Triodia basedowii* and occasional shrubs of *Melaleuca cardiophylla*

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: 2 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____ difficult to assess population as the taxon occurs as isolated trees

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Corchorus congener **DEFL POPULATION No.:** _____
 DRF Priority Species: P_3 Partial Survey Full Survey New Population
FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 01 / Oct / 2009
REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth
LOCATION: approximately 4.2 km from the intersection of Yardie Creek Road and Murat Road

Reserve No: _____

LATITUDE: 21 ° 49 ' 30 " S **LONGITUDE:** 114 ° 7 ' 50 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____
 Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Sparse shrubland of Acacia bivenosa over dense hummock grassland and shrubland of Triodia epactia and Acacia gregorii

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: possible gravel pit

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Eremophila forrestii subsp. capensis **DEFL POPULATION No.:** _____
 DRF Priority Species: **P3** Partial Survey Full Survey New Population
FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 01 / Oct / 2009
REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth
LOCATION: approximately 4.2 km from the intersection of Yardie Creek Road and Murat Road

Reserve No: _____

LATITUDE: 21° 49' 30" S **LONGITUDE:** 114° 7' 50" E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____
 Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvatile Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): Sparse shrubland of *Acacia bivenosa* over dense hummock grassland and shrubland of *Triodia epactia* and *Acacia gregorii*

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: 9 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: Gravel Extraction

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Brachychiton obtusilobus **DEFL POPULATION No.:** _____
 DRF Priority Species: P_4 Partial Survey Full Survey New Population

FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 23 / Sep / 2009

REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** _____

LOCATION: This population is located adjacent to an old borrow pit. The entrance is located approximately 16 km south of the Milyering Visitors Centre and is situated close to the base of the range _____

Reserve No: _____

LATITUDE: 22 ° 9 ' 42 " S **LONGITUDE:** 113 ° 52 ' 41 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____

Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): open shrubland of *Acacia bivenosa*, *Acacia tetragonophylla* and *Ipomoea costata* over hummock grassland of *Triodia basedowii* _____

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative
POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Eremophila forrestii subsp. capensis **DEFL POPULATION No.:** _____
 DRF Priority Species: P_3 Partial Survey Full Survey New Population
FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 23 / Sep / 2009
REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth

LOCATION: This population is located adjacent to an old borrow pit. The entrance is located approximately 16 km south of the Milyering Visitors Centre and is situated close to the base of the range

Reserve No: _____

LATITUDE: 22 ° 9 ' 42 " S **LONGITUDE:** 113 ° 52 ' 41 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____

Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): _____

ASSOCIATED SPECIES open shrubland of *Acacia bivenosa*, *Grevillea calcicola* (Priority 3) and *Corymbia hamersleyana* over open shrubland of *Acacia arida*, *Gossypium robinsonii*, *Senna artemisioides* subsp. *oligophylla*, *Acacia pyrifolia* and *Trichodesma zeylanicum* over hummock grassland of *Triodia angusta*.

No. of PLANTS: Mature: 2 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Grevillea calcicola **DEFL POPULATION No.:** _____
 DRF Priority Species: P_3 Partial Survey Full Survey New Population

FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 23 / Sep / 2009

REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth

LOCATION: This population is located adjacent to an old borrow pit. The entrance is located approximately 16 km south of the Milyering Visitors Centre and is situated close to the base of the range

Reserve No: _____

LATITUDE: 22 ° 9 ' 42 " S **LONGITUDE:** 113 ° 52 ' 41 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____

Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): open shrubland of *Acacia bivenosa*, *Grevillea calcicola* (Priority 3) and *Corymbia hamersleyana* over open shrubland of *Acacia arida*, *Gossypium robinsonii*, *Senna artemisioides* subsp. *oligophylla*, *Acacia pyrifolia* and *Trichodesma zeylanicum* over hummock grassland of *Triodia angusta*.

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH



RARE FLORA REPORT FORM

TAXON: Brachychiton obtusilobus **DEFL POPULATION No.:** _____
 DRF Priority Species: P 4 Partial Survey Full Survey New Population

FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 24 / Sep / 2009

REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth

LOCATION: The trees were located adjacent an old disused gravel pit. This pit is located 250 m northeast of the Milyering Visitors Centre

Reserve No: _____

LATITUDE: 22 ° 1 ' 28 " S **LONGITUDE:** 113 ° 55 ' 31 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____

Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvatile Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): shrublands of *Acacia bivenosa* and *Acacia tetragonophylla* over an open hummock grassland of *Triodia epactia* and tussock grassland of Buffel

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: some evidence of drought stress

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

Please return completed form to Director General, DEC, Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983

RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Brachychiton obtusilobus **DEFL POPULATION No.:** _____
 DRF Priority Species: P 4 Partial Survey Full Survey New Population

FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 24 / Sep / 2009

REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** Exmouth

LOCATION: The population is located surrounding an old gravel pit. The pit is located approximately 3.8 km south from the park entrance.

Reserve No: _____

LATITUDE: 21 ° 59 ' 98 " S **LONGITUDE:** 113 ° 56 ' 37 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____
 Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvatile Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): open shrubland of *Acacia bivenosa* and *Acacia tetragonophylla* over a hummock grassland of *Triodia epactia* and a tussock grassland of Buffel _____

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: 6 Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals
 Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

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RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Eremophila forrestii subsp. capensis **DEFL POPULATION No.:** _____
 DRF Priority Species: P_3_ Partial Survey Full Survey New Population

FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** ____/____/____

REGION: _____ **DISTRICT:** _____ **SHIRE:** _____

LOCATION: _____

Reserve No: _____

LATITUDE: 21 ° 3 ' 26 " S **LONGITUDE:** 113 ° 54 ' 54 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____
 Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): shrubland of *Acacia tetragonophylla* and *Acacia bivenosa* over hummock grassland of *Triodia wiseana* and shrubland of *Alectryon oleifolius* subsp. *oleifolius*

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

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Biodiversity values of basic raw material sites within Cape Range National Park



RARE FLORA REPORT FORM

TAXON: Tinospora esiangkara **DEFL POPULATION No.:** _____
 DRF Priority Species: P_2 Partial Survey Full Survey New Population
FROM: R. Meissner **TITLE:** _____ **SURVEY DATE:** 23 / Sep / 2009
REGION: Pilbara **DISTRICT:** Exmouth **SHIRE:** _____

LOCATION: This population is located adjacent to an old borrow pit. The entrance is located approximately 16 km south of the Milyering Visitors Centre and is situated close to the base of the range _____

Reserve No: _____

LATITUDE: 22 ° 9 ' 42 " S **LONGITUDE:** 113 ° 52 ' 41 " E **Map Used:** _____

GPS DATUM: AGD84 GDA94 GDA94-Compatible (e.g. WGS84) Unknown None

LAND STATUS: Nature Reserve Private Gravel Res. MRD Rail Reserve
 National Park Pastoral Lease Gravel Res. Shire Rd. Verge Shire
 State Forest UCL Other Shire Res. Rd. Verge MRD
 Water Reserve Other Specify: _____ SLK _____ to _____

Landowner/manager present during inspection:

LANDFORM: Hilltop Cliff Slope Valley Swamp
 Outcrop Breakaway Low Plain Gully Riverbank
 Ridge Sand Dune Flat Drainageline Lake Edge
 Firebreak Other Specify: _____

ROCK TYPE: Laterite Granite Dolerite Limestone Other: _____

ROCK FORM: Sheet Boulder Fluvialite Gravel Concretionary Gravel

SOIL TYPE: Sand Loam Clay Peat Gravel

SOIL COLOUR: Red Brown Yellow White Grey

SOIL CONDITION: Moist Inundated Dry Saline Other: _____

VEGETATION CLASSIFICATION (Muir's): open shrubland of *Acacia bivenosa*, *Acacia tetragonophylla* and *Ipomoea costata* over hummock grassland of *Triodia basedowii* _____

ASSOCIATED SPECIES: _____

No. of PLANTS: Mature: _____ Seedlings: _____ Dead: _____ Actual Estimate Area Occupied: _____
 (Leave blank if unable to observe, or no attempt made to count plants)

REPRODUCTIVE STATE: Clonal Flower bud Flower Immat. fruit Fruit Old Fruit Vegetative

POLLINATORS: Native bees Honey bees Other insects Birds Mammals

Other observations: _____

CONDITION OF POPULATION: Healthy Moderate Poor Disturbed Comment: _____

POTENTIAL THREATS: Firebreaks Mining Recreation Roadworks Grazing Weeds
 Salinity Disease Prescribed Burning Other Comment: _____

FIRE HISTORY: Not known Burnt in 19____ Summer Autumn Winter Spring

FENCING: Not Required Fenced Required Replace/Repair

ROADSIDE MARKERS: Not Required Present Required Replace Reposition

OTHER COMMENTS (include action taken/required): _____

VOUCHER SPECIMEN: Regional Herb. District Herb. WA Herb. Other

ATTACHED: Map Mudmap Illustration Photo Field Notes

COPY SENT TO: Regional Office District Office Other Specify: _____

Signed: R. Meissner Date: 4 / Dec / 2009

NOTE: Map or further information may be attached or given on the back of this form.

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RECORDS: PLEASE FORWARD TO ADMINISTRATIVE OFFICER, FLORA, SPECIES AND COMMUNITIES BRANCH

TABLES

Table 1. Comparison of pits surveyed within the current project and pits surveyed in Keighery (1996).

This study	Keighery (1996)
Pit One	Pit 1
Pit Two	Pit 2
Mandu Pit	Pit 3&4
Pit Three	Pit 5
Pit Four	Pit 6
Rehabilitation Pit	Pit 7

Table 2. Priority taxa and their habitat found on Cape Range. Definitions of Conservation Codes outlined in Table 3.

Species	Conservation Code	Endemic to Cape Range	Habitat
<i>Abutilon</i> sp. Cape Range (A.S. George 1312)	P2	Y	Gullies and creek lines
<i>Acacia alexandri</i>	P3	Y	Stony creeks and limestone slopes
<i>Acacia ryaniana</i>	P2		Coastal sand dunes
<i>Acacia startii</i>	P3		Stony creeks and watercourses
<i>Acanthocarpus rupestris</i>	P3		Limestone hills and creek lines
<i>Brachychiton obtusilobus</i>	P4	Y	Coastal plains and hills
<i>Corchorus congener</i>	P3		Coastal plains and hills
<i>Crinum flaccidum</i>	P2		Swamps and creeks
<i>Daviesia pleurophylla</i>	P2		Red sand dunes
<i>Eremophila forrestii</i> subsp. <i>capensis</i>	P3	Y	Limestone hills and plains
<i>Eremophila occidentis</i>	P2		Limestone hills
<i>Eremophila youngii</i> subsp. <i>lepidota</i>	P4		Flats and plains
<i>Grevillea calcicola</i>	P3	Y	Limestone hills
<i>Harnieria kempeana</i> subsp. <i>rhadinophylla</i>	P2	Y	Base of gorges and limestone hills
<i>Rhynchosia bungarensis</i>	P3		Floodplains and creeks
<i>Stackhousia umbellata</i>	P3	Y	Limestone hills
<i>Tinospora esiangkara</i>	P2	Y	Creek lines
<i>Verticordia serotina</i>	P2	Y	Red sand dunes

Table 3. Definitions of the Conservation Codes for Western Australian Flora.

Conservation Code	Definition
R	<p>Declared Rare Flora – Extant Taxa</p> <p>Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.</p>
P1	<p>Priority One – Poorly Known Taxa</p> <p>Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as ‘rare flora’, but are in urgent need of further survey.</p>
P2	<p>Priority Two – Poorly Known Taxa</p> <p>Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as ‘rare flora’ but are in urgent need of further survey.</p>
P3	<p>Priority Three – Poorly Known Taxa</p> <p>Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as ‘rare flora’ but are in need of further survey.</p>
P4	<p>Priority Four – Poorly Known Taxa</p> <p>Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia) are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years.</p>