Appendix 3
Strategen JBS&G Flora survey report

Covalent Lithium

Earl Grey Lithium Mine Regional Flora Survey

19 July 2019

56666-123293

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

www.jbsg.com.au

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1. Introduction

This report presents the findings of a targeted flora survey undertaken to support the development of the Covalent Lithium Earl Grey mine. Flora surveying was conducted at a regional level across multiple locations within the Eastern Wheatbelt (Figure 1.1).

1.1 Background

Covalent Lithium (Covalent), the Proponent, proposes to develop the Earl Grey Lithium Project (the Proposal) situated at the previously abandoned Mt Holland Gold Mine located 105 km south of Southern Cross (Shire of Yilgarn). The Proposal involves open cut mining and processing of lithium ore. The Proposal Development Envelope (DE) encompasses 1,984 ha and will require clearing of 386 ha of native vegetation and use 277 ha of existing infrastructure and disturbed areas. The additional clearing is predominately required for expansion of the existing mine pit, waste dumps, Tailings Storage Facility (TSF) and ancillary infrastructure.

The proposed layout will have impacts to the Threatened flora species *Banksia sphaerocarpa* var. *dolichostyla* and to the Priority 1 flora species *Microcorys* sp. Mount Holland.

Following consultation with the Department of Biodiversity Conservation and Attractions (DBCA), it was determined that regional surveys would be required to gain additional information about the potential for areas of freehold land within the region to offset impacts to *Banksia sphaerocarpa* var. *dolichostyla* and *Microcorys* sp. Mount Holland.

1.2 Scope

The scope of this flora survey was to undertake a field assessment of potential locations that may support populations of *Banksia sphaerocarpa* var. *dolichostyla* and / or *Microcorys* sp. Mt Holland, with the purpose of identifying potential offset sites for inclusion in the Covalent offset strategy. The objectives were to:

- search potential sites for *Banksia sphaerocarpa* var. *dolichostyla* and *Microcorys* sp. Mt Holland individuals
- collect and identify any occurrences of the above flora
- define the abundance and distribution of any Threatened or Priority flora populations
- if Threatened and Priority fora species occur, describe associated vegetation types
- classify the vegetation condition within surveyed areas
- provide recommendations on the potential for lots to be included within the Covalent offsets strategy.

Figure 1.1: Survey Site Locations

N

Scale 1:600,000 at A3

0 6 12 km

Coordinate System: GDA 1994 MGA Zone 50

Date: 4/07/2019

Legend

- Potential Threatened and Priority Flora Locations
  - Sites included in this survey
  - Sites not included in this survey
  - Nature Reserve
- Previously identiied potential lot for Banksia offset
- Roads surveyed
- Major road
- Minor road

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2. Methodology

Regional flora surveys were conducted across two separate surveys in June and July 2019 (Table 2.1, Figure 1.1) with a total of 24 separate sites surveyed.

Table 2.1: Regional surveys conducted

Survey date	Number of personnel	Areas surveyed
24 June – 5 July 2019	Strategen JBS&G x 2	Sites 3, 4, 6, 7, 10, 11, 12
11 – 12 July 2019	Mattiske Consulting x 3 Strategen JBS&G x 2	Sites 1, 2, 5, 8, 9, 13 - 24

Surveys were undertaken in accordance with relevant requirements of *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016).

Site selection for surveying was based on the following parameters:

- freehold land tenure
- proximity to known locations of each target species
- presence of remnant vegetation
- proximity to the Ironcap Hills vegetation complexes (Mt Holland, Middle, North and South Ironcap Hills, Digger Rock and Hatter Hill) (banded ironstone formation) Priority Ecological Community (PEC).

Whilst a comparison of the land systems and vegetation complexes within the mapped PEC and the Proposal Development Envelope determined a low correlation between the land systems and vegetation communities in the EGLP DE and the PEC, it is not yet understood whether any particular flora species are associated with the PEC. For this reason, the mapped PEC boundary was used as one of the criteria in identifying potential offset areas for *Banksia sphaerocarpa* var. *dolichostyla* and *Microcorys* sp. Mt Holland in the regional area.

Surveys were conducted within roadside vegetation, or of vegetation visible from lot boundaries.

Roads within and between each site were traversed by vehicle until the presence of any threatened flora was confirmed. Transects were traversed on foot to accurately assess the number of plants and extent of the population. Where a population of target flora was identified, the following floristic and environmental parameters were noted:

- GPS location
- soil type and colour
- vegetation type and composition
- vegetation quality and sources of degradation
- likelihood of threatened flora persisting within the lot.

Specimens were collected of targeted flora at each location to confirm their classification as either *Banksia sphaerocarpa* var. *dolichostyla* or *Microcorys* sp. Mt Holland. All plant specimens collected during the survey were identified using appropriate reference material or through comparisons with pressed specimen housed at the Western Australian Herbarium where necessary. Nomenclature of the species recorded is in accordance with Western Australian Herbarium (1998 -)

3. Results

3.1 Site 1

Surveying of roadside vegetation within site 1 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.2 Site 2

Surveying of roadside vegetation within site 2 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.3 Site 3

Surveying within site 3 identified 466 *Banksia sphaerocarpa var. dolichostyla* individuals across six discreet populations within the site (Figure 3.1, Table 3.1, Plate 1, Plate 2, Plate 3). No *Microcorys* sp. Mount Holland individuals were identified. Given the extensive distribution of *Banksia sphaerocarpa var. dolichostyla* within this site, it is considered likely that further populations persist within remnant vegetation across the site.

Table 3.1: Site 3 environmental parameters

Subject	Detail
Population 1.	
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	282
Soil type	Light brown sand
Vegetation type	Low heath of (1 m) *Banksia* spp., *Melaleuca* spp., *Isopogon spp., Hakea* spp., *Xanthorrhoea* sp.
Vegetation condition	Good
Population 2.	
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	4
Soil type	Light brown sand
Vegetation type	Low heath of (1 m) *Banksia* spp., *Melaleuca* spp., *Isopogon spp., Hakea* spp., *Xanthorrhoea* sp.
Vegetation condition	Good
Population 3.	
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	6
Soil type	Light brown sand
Vegetation type	Low heath of (1 m) *Banksia* spp., *Melaleuca* spp., *Isopogon spp., Hakea* spp., *Xanthorrhoea* sp.
Vegetation condition	Good
Population 4.	
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	6
Soil type	Light brown sand.
Vegetation type	Low heath of (1 m) *Banksia* spp., *Melaleuca* spp., *Isopogon spp., Hakea* spp., *Xanthorrhoea* sp.
Vegetation condition	Good
Population 5.	
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	90
Soil type	Light brown sand
Vegetation type	Heath of (2 m) *Banksia* spp., *Melaleuca* spp., *Isopogon* spp., *Hakea* spp., *Xanthorrhoea* spp., *Allocasuarina campestris*
Vegetation condition	Good
Population 6.	
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	78

Subject	Detail
Soil type	Light brown sand
Vegetation type	Heath of (2 m) *Banksia* spp., *Melaleuca* spp., *Isopogon* spp., *Hakea* spp., *Xanthorrhoea* spp., *Allocasuarina campestris*
Vegetation condition	Good

Plate 1: Site 3 vegetation and *Banksia sphaerocarpa var. dolichostyla*

Plate 2: Site 3 vegetation and *Banksia sphaerocarpa var. dolichostyla*

Plate 3: Site 3 vegetation and *Banksia sphaerocarpa var. dolichostyla*

Figure 3.1: Site 3

N

Scale 1:82,500 at A3

km
0 0.5 1

Coordinate System: GDA 1994 MGA Zone 50
Date: 5/07/2019

Legend

- Nature Reserve
- Previously identified potential lot for Banksia offset
- Transect surveyed
- *Banksia sphaerocarpa* var. *dolichostyla*

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3.4 Site 4

Surveying within site 4 (inclusive of sites 4a – 4d depicted in Figure 1.1) identified 8 *Banksia sphaerocarpa var. dolichostyla* individuals within remnant vegetation, in addition to those individuals previously listed by DBCA (Figure 3.2, Table 3.2, Plate 4, Plate 5, Plate 6). Despite similar vegetation types and condition elsewhere within site 4, no additional populations were identified. No *Microcorys* sp. Mount Holland individuals were identified.

Table 3.2: Site 4 environmental parameters

Subject	Detail
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	8
Soil type	Light brown sands and lateritic gravel
Vegetation type	Scrubland 2-3 m of *Allocasuarina campestris, Hakea* spp., *Grevillea* spp. and Mallee *Eucalyptus* sp. over dense 1-1.5m shrubs
Vegetation condition	Very Good

Plate 4: Site 4 vegetation and *Banksia sphaerocarpa var. dolichostyla*

Plate 5: Site 4 vegetation and *Banksia sphaerocarpa var. dolichostyla*

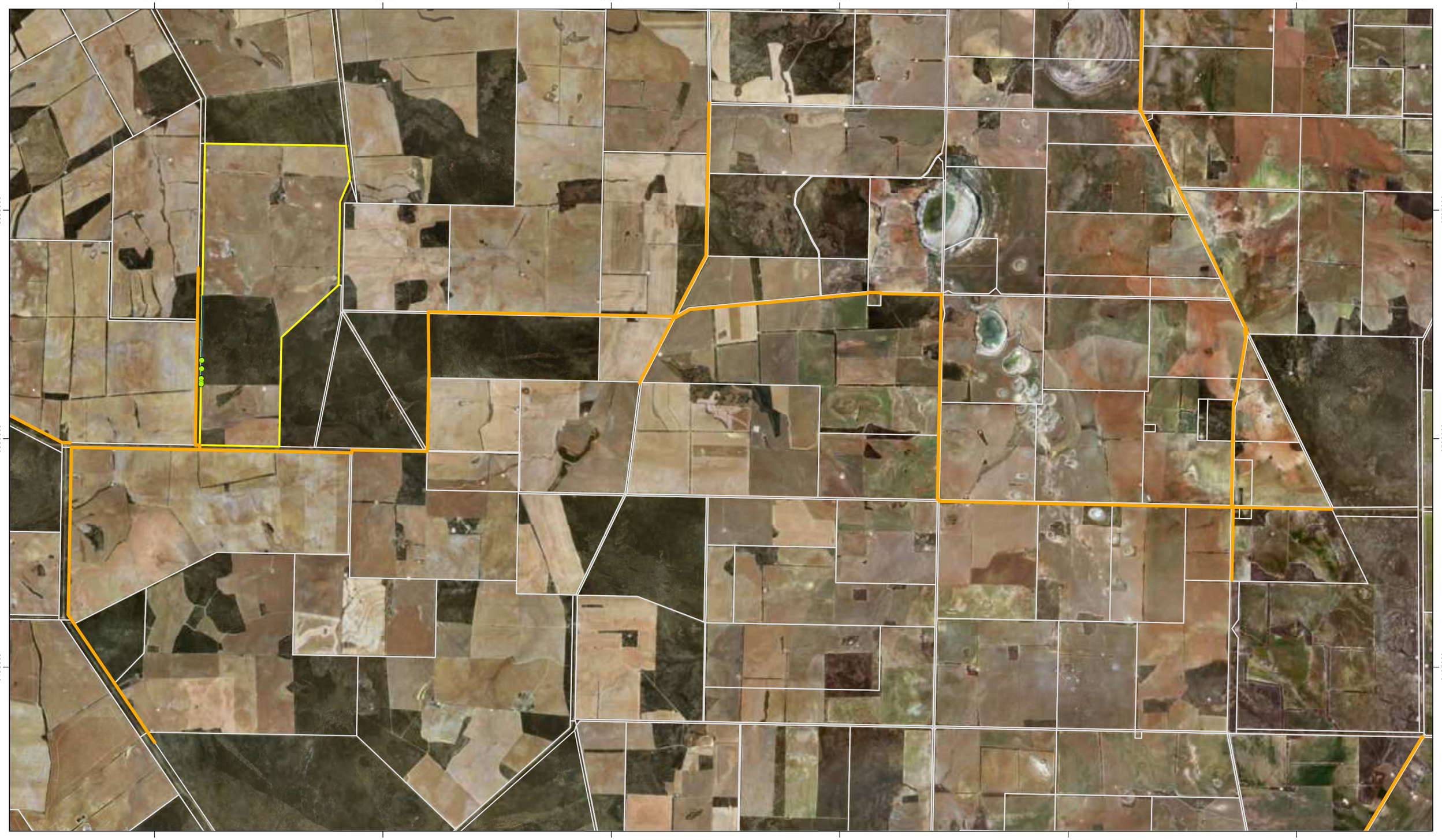
Plate 6: Site 4 vegetation and *Banksia sphaerocarpa var. dolichostyla*

675000 680000 685000 690000 695000 700000

6505000

6500000

6495000



675000 680000 685000 690000 695000 700000

Figure 3.2: Site 4

N

Scale 1:77,500 at A3

0 0.5 1 km

Coordinate System: GDA 1994 MGA Zone 50

Date: 3/07/2019

Legend

- Previously identified potential lot for Banksia offset
- Cadastral boundaries
- Transect surveyed
- *Banksia sphaerocarpa* var. *dolichostyla*

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3.5 Site 5

Surveying of roadside vegetation within site 5 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla*.

3.6 Site 6

Surveying of roadside vegetation within site 6 did not identify any occurrences of either Microcorys sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla*.

3.7 Site 7

Surveying of roadside vegetation identified a population of 16 *Banksia sphaerocarpa var. dolichostyla* individuals. No *Microcorys* sp. Mount Holland individuals were identified within the survey area (Figure 3.3, Table 3.3, Plate 7).

Table 3.3: Site 7 environmental parameters

Subject	Detail
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	16
Soil type	Yellow / red loam
Vegetation type	*Allocasuarina* scrubland between 3 to 4 m. Open scrubland including *Allocasuarina campestris, Hakea spp., Banksia* spp., *Santalum* sp. and *Eucalyptus* spp.
Vegetation condition	Good

Plate 7: Site 7 vegetation and *Banksia sphaerocarpa var. dolichostyla*

630000 635000 640000

6475000

6470000

630000 635000 640000

Figure 3.3: Site 7

N

Scale 1:44,500 at A3

km
0 0.5

Coordinate System: GDA 1994 MGA Zone 50
Date: 3/07/2019

Legend

- Cadastral boundaries
- Transect surveyed
- *Banksia sphaerocarpa* var. *dolichostyla*

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3.8 Site 8

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.9 Site 9

Surveying of roadside vegetation within site 9 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.10 Site 10

Site 10 is situated in close proximity to both the Mount Holland Development Envelope (Figure 1.1) and the Ironcap Hills vegetation complexes PEC.

Surveying of roadside vegetation within site 10 did not identify any occurrences of either Microcorys sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla*.

3.11 Site 11

Site 11 is situated in close proximity to both the Mount Holland Development Envelope (Figure 1.1) and the Ironcap Hills vegetation complexes PEC.

Surveying of roadside vegetation within site 11 did not identify any occurrences of either Microcorys sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla*.

3.12 Site 12

Surveying of roadside vegetation within site 12 identified one *Banksia sphaerocarpa var. dolichostyla* individual and no *Microcorys* sp. Mount Holland individuals (Table 3.4). Given the significant extent of native vegetation to the south and west of the identified individual, it is likely that additional plants persist within these lots.

Table 3.4: Site 12 environmental parameters

Subject	Detail
Threatened Flora	*Banksia sphaerocarpa var. dolichostyla*
Number identified	1
Soil type	Light brown lateritic clay-loam
Vegetation type	2-3 m scrubland of *Allocasuarina* with *Hakea*, *Santalum* and occasional mallee (*E. burracoppinensis*)
Vegetation condition	Excellent

680000 685000 690000 695000 700000

6490000

6485000

6480000

MOUNT HAMPTON NATURE RESERVE

680000 685000 690000 695000 700000

Figure 3.4: Site 12

N

Scale 1:66,500 at A3

0 0.5 1 km

Coordinate System: GDA 1994 MGA Zone 50

Date: 3/07/2019

Legend

- Nature Reserve
- Cadastral boundaries
- Transect surveyed
- *Banksia sphaerocarpa* var. *dolichostyla*

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3.13 Site 13

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.14 Site 14

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.15 Site 15

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.16 Site 16

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.17 Site 17

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.18 Site 18

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.19 Site 19

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.20 Site 20

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.21 Site 21

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.22 Site 22

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.23 Site 23

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

3.24 Site 24

Surveying of roadside vegetation within site 8 did not identify any occurrences of either *Microcorys* sp. Mount Holland or *Banksia sphaerocarpa var. dolichostyla.*

4. Discussion

4.1 *Banksia sphaerocarpa var. dolichostyla*

The regional flora surveys were undertaken in June and July 2019, directly following the prime flowering time for the species; i.e. March through May (WAH 1998-). As such, both persistent inflorescences and fruits were clearly visible from roads, allowing for ease of identification during surveying.

A total of 490 *Banksia sphaerocarpa var. dolichostyla* individuals across four sites were identified during the survey period. Populations were generally high in abundance although limited in range, suggesting the species is sensitive to small changes in soil type and/or topography.

Where *Banksia sphaerocarpa var. dolichostyla* populations were identified, vegetation condition ranged from Good to Excellent (Keighery 1994). Generally, where vegetation of Degraded quality or lower was located in close proximity to *Banksia sphaerocarpa var. dolichostyla* populations, no *Banksia* individuals were identified (Site 3, population 4).

Vegetation type was generally consistent between *Banksia sphaerocarpa var. dolichostyla* populations. Vegetation types typically consisted of heath or scrubland between 1 and 3 m, usually including *Allocasuarina* and *Hakea* spp. While *Eucalyptus* spp. were present within sites 4, 7 and 12, individuals were sparsely located and not considered dense enough to comprise a woodland vegetation type.

4.2 *Microcorys* sp. Mount Holland

No *Microcorys* sp. Mount Holland were identified during the survey period. Sites 10 and 11 were considered the most likely to contain individuals of the species due to both a similar vegetation type observed within these sites and the close proximity of each to the Ironcap Hills vegetation complexes PEC.

4.3 Recommendations

Of the 490 additional *Banksia sphaerocarpa var. dolichostyla* individuals that were identified as part of the survey, approximately 24 were confirmed to be within Freehold land able to be included in the Covalent offsets strategy (Sites 4 and 7). Further surveying of freehold land bordering road reserves containing known *Banksia sphaerocarpa var. dolichostyla* populations is recommended to identify additional populations of the species that can potentially be included in the Covalent Lithium offset strategy.

Sites 1 and 2 which both contain significant native vegetation are considered the most likely locations to contain *Microcorys* sp. Mount Holland populations, due to the close proximity (Site 2) and overlap (Site 1 and Jilbadji Nature reserve) of the sites with the Ironcap Hills vegetation complexes PEC. As such, further surveying of these areas is recommended as the best means to locate disjunct populations of *Microcorys* sp. Mount Holland beyond the development envelope, to better inform the Covalent Lithium offset strategy.

5. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, Strategen-JBS&G reserves the right to review the report in the context of the additional information.

6. References

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Western Australian Herbarium. (1998-). *Florabase, the Western Australia Flora*. Retrieved from https://florabase.dpaw.wa.gov.au/.

Appendix A Locations of *Banksia sphaerocarpa var. dolichostyla*

Table A.1: GPS coordinates of surveyed *Banksia sphaerocarpa* var. *dolichostyla*

Number of plants	MGA East	MGA North
2	676038.5665	6501718.656
3	676034.0457	6501532.061
1	676030.4407	6501319.294
1	676027.9671	6501231.247
1	676027.4177	6501189.996
1	690857.8101	6481329.968
13	671842.4477	6435171.457
13	671922.2972	6435161.591
13	672015.3903	6435147.273
13	672102.4043	6435125.559
13	672062.8924	6435098.915
13	671957.7143	6435121.713
13	671853.4664	6435137.14
4	672327.5392	6435061.443
2	672501.627	6435017.157
2	672574.5539	6435002.675
3	672648.8655	6434997.934
2	672650.6019	6435034.195
10	672730.0545	6434981.704
12	672795.7597	6434969.465
12	672856.0863	6434959.085
12	673040.459	6434931.473
4	675289.1742	6433709.593
6	675268.949	6432810.448
6	675408.9284	6430917.631
10	678592.8411	6430863.566
6	681690.2493	6427655.749
2	632636.7499	6472727.955
2	632614.385	6472730.93
2	632579.055	6472729.072
4	632543.8522	6472730.935
5	632474.8215	6472731.194
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
12	673040.459	6434931.473
10	678592.8411	6430863.566
10	678592.8411	6430863.566
10	678592.8411	6430863.566
10	678592.8411	6430863.566
10	678592.8411	6430863.566
10	678592.8411	6430863.566
10	678592.8411	6430863.566
10	678592.8411	6430863.566
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749

Number of plants	MGA East	MGA North
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749
6	681690.2493	6427655.749

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