

1 August 2018

[REDACTED]
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**MOOREBANK PRECINCT EAST: STAGE 1 RAIL CORRIDOR HIBBERTIA
PRE-CLEARANCE SURVEYS**

Dear [REDACTED]

Cumberland Ecology
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The purpose of this letter is to provide the results of the pre-clearance surveys, conducted by Cumberland Ecology between 9 and 14 November 2017, for threatened *Hibbertia* species within the Stage 1 Moorebank Precinct East (MPE) Rail Corridor of the Moorebank Intermodal Project as well as an assessment of the suitability of the Wattle Grove offset area to meet the full quantum of biodiversity offset credits required.

As you are aware, during the Land and Environment Court (LEC) proceedings for Case 2017/81889, the Minister proposed, and Qube has agreed to, a condition of consent for Stage 1 MPE of the Moorebank Intermodal Project that requires pre-clearance surveys for *Hibbertia fumana* and *Hibbertia puberula* be conducted under a Hibbertia Species Survey Plan prepared in consultation with the NSW Office of Environment and Heritage (OEH) to the satisfaction of the Secretary.

On 13 March 2018 the LEC delivered judgment confirming the grant of consent to State Significant Development application SSD 6766. One condition of approval, Condition C23, requires pre-clearance surveys for the *Hibbertia* species. Specifically Conditions C23 states that '*Prior to the commencement of clearing within the railway corridor between the southern boundary of the terminal site and the eastern side of the approved Moorebank Avenue Bridge, the Applicant must prepare and implement a Hibbertia Species Survey Plan to determine the number of individual plants of each Hibbertia species present within the corridor and confirm that the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each Hibbertia species can be achieved. The survey plan, including the survey method, must be prepared in consultation with OEH to the satisfaction of the Secretary. Results of the survey must be included in the Biodiversity Offset Package required by C23A*'.

As the draft conditions of approval were agreed between the Applicant and Respondent in October 2017, this condition of approval was known in spring 2017.

Both *Hibbertia* species are cryptic and so surveys are required to be conducted during flowering to maximise counts of above ground individuals. In 2017, the best available information indicated that:

- *Hibbertia fumana* flowers between September and November, and
- *Hibbertia puberula* flowers in November 2016.

Therefore, November was chosen for the surveys because of the flowering period of the two species. Following consultation with Greg Steenbeeke, senior botanist at OEH, the pre-clearance surveys were conducted from 9-14 November 2017.

The pre-clearance surveys provided detailed, updated estimates of numbers of plants of each species within the development footprint. After the completion of the pre-clearance surveys, additional surveys were conducted by Cumberland Ecology within the proposed offset areas to confirm that sufficient biodiversity offset credits were available for each *Hibbertia* species within the Wattle Grove offset area (also known as the 'Bootland') in November 2017 and January 2018. Further offset site surveys were also conducted by Arcadis in early 2018. The offset site surveys and related calculations confirm that sufficient credits are generated for each species within the Wattle Grove offset area to fully meet the of biodiversity offset credits required for each species.

The results of our pre-clearance surveys and offset surveys are detailed in **Appendix A** to this letter. Figures showing locations of the *Hibbertia* species are provided in **Appendix B**, photographs are provided in **Appendix C**, correspondence with [REDACTED] (OEH) in relation to the pre-clearance survey methodology is provided in **Appendix D**, a summary of pre-clearance field data is provided in **Appendix E** and correspondence between Cumberland Ecology, Arcadis, Tactical Group, OEH and Department of Planning & Environment in relation to the 'Area of Occupancy' methodology for offsets is provided in **Appendix F**.

The compliance with all components of Condition C23 is summarised in **Table 1** below.

Table 1 Assessment of Compliance

Condition C23 Component	Compliance
1. Prepare <i>Hibbertia</i> Species Survey Plan (HSSP)	HSSP prepared by Cumberland Ecology: Document REF: 17068 Let6, dated 5 June 2018. Updated document with compliance Table and OEH correspondence as per DPE letter dated: 8 June 2018 REF: 17068 Let6v2, dated 22 June 2018, 17068 Let6v3, dated 1 August 2018
2. Determine the number of individual plants of each <i>Hibbertia</i> species present within the corridor	Preclearance surveys of the rail corridor conducted to determine numbers of individual plants of each <i>Hibbertia</i> species. The Methodology and results of the preclearance surveys are described in Sections A.2.1, A.2.2 and A.3.1 of Appendix A and in Figure 1 and Figure 3 of Appendix B of the HSSP. Correspondence with OEH on approval for pre-clearance survey methods is provided in Appendix D and field notes from preclearance surveys is provided in Appendix E .
3. Confirm that the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each <i>Hibbertia</i> species can be achieved	An assessment, based on the Area of Occupancy method defined by OEH during a meeting on 16 May 2018, confirmed that the required quantum of biodiversity offset credits can be achieved. The methodology and results for determining quantum of credits are described in Sections A 2.3, A 2.4, A.3.2, A.3.3, A.3.4, A.4.1 and A.4.2 of Appendix A and in Figure 4 of Appendix B . Correspondence with OEH in relation to the suitability of the 'Area of Occupancy' method is provided in Appendix F .
4. The survey plan, including the survey method, must be prepared in consultation with OEH	Correspondence and OEH approval for the pre-clearance field survey method is provided in Appendix D . Correspondence and OEH approval of the 'Area of Occupancy' method for determining quantum of offsets is provided in Appendix F .
5. Results of the survey must be included in the Biodiversity Offset Package required by C23A	The most recent HSSP (Ref: 17068 Let6, dated 22 June 2018) will be included in the Biodiversity Offset Package being prepared by Arcadis

If any further information is required, or if you would like to discuss this matter further, please do not hesitate to contact myself, or Dr [REDACTED] on (02) 9868 1933.

Yours sincerely

Gitayuli Kokrak

[REDACTED]
[REDACTED]
[REDACTED]

Appendix A

MPE Stage 1 Rail Link: Hibbertia Pre-
clearance Survey

A.1 Background

Cumberland Ecology was requested by Qube Property Management Services (Qube) to conduct a pre-clearance assessment for the Stage 1 Rail Link of the Moorebank Precinct East (MPE) component of the Moorebank Intermodal Terminal project.

The pre-clearance surveys were conducted to fulfil the field component requirements of a proposed Condition 23 as agreed to by the Minister and Qube during the Land and Environment Court (LEC) proceedings for Case 2017/81889 and which was subsequently imposed by the LEC in the judgment in the proceedings delivered on 13 March 2018.

Condition 23a states that '*Prior to the commencement of clearing within the railway corridor between the southern boundary of the terminal site and the eastern side of the approved Moorebank Avenue Bridge, the Applicant must prepare and implement a Hibbertia Species Survey Plan to determine the number of individual plants of each Hibbertia species present within the corridor and confirm that the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each Hibbertia species can be achieved. The survey plan, including the survey method, must be prepared in consultation with OEH to the satisfaction of the Secretary. Results of the survey must be included in the Biodiversity Offset Package required by C23A.*'

Hibbertia fumana is listed as Critically Endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act) (replacing the repealed NSW *Threatened Species Conservation Act 1995*) while *Hibbertia puberula* ssp. *puberula* (hereafter referred to as *Hibbertia puberula*) is listed as Endangered under the BC Act. Neither species is currently listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

In spring 2017, the best available information indicated that:

- *Hibbertia fumana* flowers between September and November, and
- *Hibbertia puberula* flowers in November.

Therefore, although a final decision on the proposed condition C23a was yet to be made as part of the LEC proceedings at the time, it was considered prudent to conduct the pre-clearance surveys in November 2017.

Cumberland Ecology contacted OEH (email from [REDACTED] to senior botanist [REDACTED] dated 6 November 2017) to determine a suitable field methodology for the pre-clearance surveys. OEH approval of the survey period and proposed field methodology was granted via email on 6 November 2017 (email from [REDACTED] to [REDACTED] following clarification and a phone discussion on 6 November between [REDACTED] and [REDACTED] (see **Appendix D** for correspondence with OEH).

A.2 Methodology

A.2.1 Pre-clearance Surveys

The pre-clearance surveys of the MPE Stage 1 Rail corridor (the rail corridor) were conducted over three days from 9 - 14 November 2017 by Cumberland Ecology Senior Ecologist (REDACTED) (9th, 13th, 14th), and Botanists (REDACTED) (9th) and (REDACTED) (13-14th).

Surveys were limited to parts of the rail corridor to the east of Moorebank Avenue from the southern boundary of the terminal site and the eastern side of the approved Moorebank Avenue Bridge. Prior to the pre-clearance surveys, the alignment of the rail corridor along with an additional work 'buffer,' was marked out by a surveyor, using orange 'witches hats' and spray painting the ground.

The area within the surveyors' marked-up alignment was completely traversed by the attending ecologists. Hand-held GPS units were utilised to maintain track logs to verify that all areas of the marked up rail corridor alignment were traversed (**Figure 1 of Appendix B**). Photographs and GPS locations of areas deemed unlikely to support *Hibbertia* species (eg creekline areas, areas with dense understorey) were taken during the surveys.

The locations of all *Hibbertia* individuals detected were individually recorded by GPS. Each recorded individual was also tagged with a small numbered metal tag (either on the *Hibbertia* individual itself if feasible or on vegetation immediately adjacent to it) and high visibility pink flagging tape was utilised to mark the locations of the recorded individuals.

A.2.2 *Hibbertia* field identification

At the time of the pre-clearing surveys in November 2017 and subsequent offset site surveys in November 2017 and January 2018, Qube had undertaken not to clear any vegetation within Lot 4 of DP 1197707. Therefore, plant samples could not be collected for laboratory identification and individuals had to be identified in the field. The characteristics summarised in **Table 2** below were examined in the field, using hand lenses as required, to distinguish between individuals of *Hibbertia fumana* and *Hibbertia puberula*. These characteristics comprise a combination of characteristics as defined on the National Herbarium of NSW (PlantNet) profiles for each species, descriptions provided in the journal article on *Hibbertia* species by Toelken and Miller (2012) and observations from previous surveys.

Table 2 Field identification characteristics for *Hibbertia* species

<i>Hibbertia fumana</i>	<i>Hibbertia puberula</i>
Flower (including dried or dropped individuals) with 5 -7 stamens	Flower (including dried or dropped individuals) with 9+ stamens
Buds with elongated peduncle or remnant peduncle if bud/flower dropped	Buds without elongated peduncle or buds in clusters (2+)
Outer calyx lobes without ridge	Outer calyx lobes 'beaked' with ridge near apex

Table 2 Field identification characteristics for *Hibbertia* species

<i>Hibbertia fumana</i>	<i>Hibbertia puberula</i>
Stellate and simple hairs present	Only simple hairs present

It is noted that these characteristics could not be conclusively identified on some smaller individuals in the field, due to limitations of field equipment. These individuals are therefore listed as *Hibbertia* species.

A.2.3 Offset Site surveys

Following the pre-clearance surveys, additional surveys were conducted by Cumberland Ecology staff [REDACTED] and [REDACTED] within the Wattle Grove offset area (also known as the Bootland) on 27-28 November 2017. The focus of the offset site surveys was to determine any additional areas that support both *Hibbertia* species to ensure that the biodiversity credits needed to offset for the surveyed number of individual plants of each *Hibbertia* species can be achieved.

The surveys involved random meander surveys in the parts of the Bootland to the east and south of the known occurrences of *Hibbertia puberula* and *Hibbertia fumana* as recorded in 2016 and 2017 surveys by Arcadis (Arcadis 2017). The locations of any individuals detected were recorded using a hand-held GPS unit and vegetation adjacent to the *Hibbertia* individuals was marked using pink flagging tape.

Additional surveys to verify the area of occupancy of *Hibbertia puberula* were conducted by Cumberland Ecology staff [REDACTED] and [REDACTED] on 25 January 2018. The purpose of these surveys was to confirm the occurrence of *Hibbertia puberula* across the entirety of the main occupancy zone as mapped by Arcadis.

The survey area was roughly divided into nine sampling zones (**Figure 2 of Appendix B**) based on the known records of *Hibbertia puberula* recorded by Arcadis in 2016 and early 2017 and random point locations were generated within the mapped sampling zones using GIS. A total of 112 random point locations were distributed across the 9 sampling zones.

The random points were located in the field using a hand-held GPS unit and occurrence of *Hibbertia puberula* in the vicinity of each random point was noted. Opportunistic observations of *Hibbertia puberula* within the nine sampling zones while meandering between random points were also noted.

A.2.4 Credit Requirement calculations

i. Credit Ratios

As all works within the BioBanking calculator to date, as required under the Framework for Biodiversity Assessment (FBA) for the MPE project, have been conducted by Arcadis, a formal

calculation of credit requirements has not been run through the BioBanking calculator. However the credit requirements for each species as outlined in the 2017 BAR prepared by Arcadis have been utilised to determine that the proposed offsets are sufficient to meet the credit requirements for each species.

It is noted that the credit ratios provided in the 2017 BAR relate to credit requirements per individual. However it is understood that, following discussions with DPE and OEH on 16 May 2018, a change in the unit of measurement from individual plants to area of habitat (i.e 1 plant to 1 ha) has been deemed suitable by OEH (see **Appendix F** for correspondence). Therefore the credit ratios/individual as listed in the 2017 BAR have been converted to credit ratios/ha for each species.

ii. Area of Occupancy

The area of occupancy polygons for *Hibbertia fumana* and *Hibbertia puberula* within the development footprint and offset sites were derived by applying a 30 metre buffer to each of the existing records for each species (as recorded in various surveys conducted by Arcadis, WSP Parsons Brinkerhoff and Cumberland Ecology) and dissolving the overlapping boundaries, a method consistent with Section 6.4.1.29 of the Biodiversity Assessment Method 2017.

Mapping of the area of occupancy was conducted by Arcadis and WSP Parsons Brinkerhoff and reviewed by Cumberland Ecology.

A.3 Results

A.3.1 Pre-clearance surveys

The marked up rail alignment corridor was completely traversed by Cumberland Ecology staff (**Figure 1 of Appendix B**). During the surveys it was observed that both *Hibbertia* species were absent from areas with extremely dense exotic grass cover (**Figure 1** – PP1 and PP2), damp low-lying areas (PP3), areas of extremely dense bush (PP4 – PP5) and in the vicinity of Anzac Creek (PP6 – PP8). Photographs showing conditions at these eight photopoint locations are provided in **Appendix C**.

All recorded individuals of *Hibbertia fumana* in the rail alignment were concentrated in the disturbed 'slashed zone' immediately south of the terminal site (**Figure 3 of Appendix B**). *Hibbertia puberula* individuals largely occurred in the 'slashed zone' as well as bushland areas south of Anzac Creek with some scattered individuals located in bushland north of Anzac Creek (**Figure 3**).

Hibbertia puberula was largely in bud during surveys. Flowering individuals largely occurred only in the bushland areas south of Anzac Creek which was surveyed on 14 November 2017. No flowering individuals of *Hibbertia fumana* were recorded. The condition of *Hibbertia fumana* individuals varied with some having dried/dropped flowers at the base while others appeared to be coming into bud.

A total of 383 *Hibbertia* individuals were recorded within the rail alignment. Of this 171 individuals were confirmed as *Hibbertia fumana* and 180 were confirmed as *Hibbertia puberula*. A further 13 individuals were tentatively identified as *Hibbertia fumana* and six as *Hibbertia puberula* based on visible field characteristics. As the characteristics used for identification were limited on these individuals, further laboratory analysis of samples would be required to verify these identifications. A further 13 individuals lacked sufficient material to make any tentative field identifications. A summary of recorded individuals is provided in **Appendix E**.

New growth was recorded in parts of the slashed zone. However due to the sprawling nature of both *Hibbertia* species, newly sprouted growth could not always be conclusively determined as part of a sprawling individual or as a new individual without risking damage to the plants due to excessive handling. Tagging of such plants was also not feasible due to the size of the new sprouts and lack of suitable adjacent vegetation. Therefore recording of these new sprouts was limited to notations of occurrence adjacent to the closest tagged individual (**Appendix E**).

A.3.2 Offset site surveys

The offset site surveys, conducted on 27-28 November 2017, were largely concentrated in the eastern and southern parts of the Bootland.

Both *Hibbertia fumana* and *Hibbertia puberula* were recorded at new locations in the eastern parts of the 'Bootland'. Additional records of both species were also found the southern 'Bootland', resulting in minor extensions to the area of occupancy of both species, as recorded by Arcadis.

A total of 125 *Hibbertia fumana* (122 confirmed and three tentative) and 82 *Hibbertia puberula* individuals were recorded within the 'Bootland' area during the November 2017 surveys. While some records may overlap with those previously recorded by Arcadis, a conservative estimate is that at least 100 *Hibbertia fumana* and 70 *Hibbertia puberula* comprise newly recorded individuals.

The January 2018 surveys conducted by Cumberland Ecology confirmed the presence of *Hibbertia puberula* across the entirety of the nine sampling zones. No targeted surveys were conducted outside these sampling zones. However it is understood that further detailed targeted surveys were conducted by Arcadis in late 2017 – early 2018 in the wider Bootland area and additional individuals of *Hibbertia puberula* were recorded to the east and north-east of the nine zones surveyed by Cumberland Ecology in January 2018.

A.3.3 Area of Occupancy

The area of occupancy of each individual species within the rail corridor and Wattle Grove offset area, as mapped by Arcadis and WSP Parsons Brinkerhoff and reviewed by Cumberland Ecology, is provided in **Figure 4** of **Appendix B**. It should be noted that mapped areas of occupancy for both species that extend outside the boundaries of the proposed rail corridor and the offset site are not indicated in this figure.

A total of 13 *Hibbertia* individuals recorded within the rail corridor during the pre-clearance surveys were not identified to species level due to insufficient material for field identification.

Hibbertia fumana is listed as Critically Endangered under the BC Act whereas *Hibbertia puberula* is listed as Endangered under the BC Act. Under the FBA trading rules, it is permissible to offset impacts for a species by providing offsets for a related species of equal or higher listing. Thus impacts for removal of *Hibbertia puberula* can be offset by providing additional offsets for *Hibbertia fumana*. Therefore a precautionary approach has been taken and it is assumed that the 13 unidentified individuals comprise *Hibbertia fumana*. These individuals all occur within the mapped area of occupancy for *Hibbertia fumana* and therefore are included in the area of occupancy calculations for *Hibbertia fumana* within the development site.

Based on the provided occupancy mapping, the following areas of occurrence outlined in Table 3, have been calculated for each *Hibbertia* species within the development site and offset site.

Table 3 **Area of Occupancy of *Hibbertia* species**

Location	Species	Area of Occupancy (ha)
Development Site	<i>Hibbertia fumana</i>	0.40
Offset Site	<i>Hibbertia fumana</i>	10.20
Development Site	<i>Hibbertia puberula</i>	0.95
Offset Site	<i>Hibbertia puberula</i>	24.66

A.3.4 Credit Estimates

Based on the values provided in the 2017 BAR and approval of the change in unit of measurement by OEH, the offset ratios in **Table 4** below have been utilised for credit calculations within this report.

Table 4 **Credit ratios for *Hibbertia* species**

Area	Species	Credits
Development Site	<i>Hibbertia fumana</i>	77 credits/ha of habitat removed
Development Site	<i>Hibbertia puberula</i>	40 credits/ha of habitat removed
Offset Site	<i>Hibbertia fumana</i>	7 credits/ha of habitat conserved
Offset Site	<i>Hibbertia puberula</i>	7 credits/ha of habitat conserved

A.4 Impact Assessment and Credit Balances

A.4.1 *Hibbertia fumana*

Based on the credit requirement estimate of 77 credits/ha for *Hibbertia fumana* in the development site, the removal of ~0.40 ha of habitat equates to a credit requirement of 31 credits for *Hibbertia fumana*.

Based on the credit generation estimate of seven credits/ha for *Hibbertia fumana* in the offset site, the area of occupancy of ~10.20 ha within the Biobank site equates to a credit generation of 72 credits. This leaves a surplus balance of 41 credits for *Hibbertia fumana* within the Biobank Site.

Therefore, there are sufficient credits generated within the Bootland offset to meet the credit requirement for the removal of ~0.40 ha of *Hibbertia fumana* habitat within the rail corridor. A credit balance of 41 credits remains after impacts from the removal of ~0.40 ha of *Hibbertia fumana* habitat is offset. This is summarised in Table 5 below.

Table 5 Credit Balances for *Hibbertia fumana*

Area of Occupancy (ha)	Credit ratio/ha	Credits required/generated*	Credit Balance
0.40	77	31	41
10.20	7	72	

* Estimated credits are rounded off to the nearest whole number

A.4.2 *Hibbertia puberula*

Based on the credit requirement estimate of ~40 credits/ha for *Hibbertia puberula* in the development site the removal of ~0.95 ha of habitat equates to a credit requirement of 38 credits for *Hibbertia puberula*.

Based on the credit generation estimate of seven credits/individual for *Hibbertia puberula* in the offset site, the area of occupancy of ~24.66 ha within the Biobank site equates to a credit generation of ~175 credits. This leaves a surplus balance of 137 credits for *Hibbertia puberula* within the Biobank Site.

Therefore there are sufficient credits generated within the Bootland offset to meet the credit requirement for the removal of ~0.95 ha of *Hibbertia puberula* habitat within the rail corridor. A credit balance of 137 credits remains after impacts from the removal of ~0.95 ha of *Hibbertia puberula* habitat is offset as summarised in **Table 6** below.

Table 6 Credit Balances for *Hibbertia puberula*

Area of Occupancy (ha)	Credit ratio/ha	Credits required/generated*	Credit Balance
0.95	40	38	137
24.66	7	175	

* Estimated credits are rounded off to the nearest whole number

A.5 Conclusion

A total of ~0.40 ha of *Hibbertia fumana* habitat and ~0.95 ha of *Hibbertia puberula* habitat will be removed from within the MPE Stage 1 rail corridor.

Based on the area of occupancy of *Hibbertia fumana* (~10.20 ha) and *Hibbertia puberula* (~24.66 ha) within the Bootland offset site, the required quantum of biodiversity credits needed to provide an offset for the surveyed number of *Hibbertia fumana* and *Hibbertia puberula* individuals within the rail corridor is achieved.

A.6 References

Arcadis (2017). Sydney Intermodal Terminal Alliance (SIMTA) Moorebank Project East Stage 1: Biodiversity Assessment Report, dated October 2017.

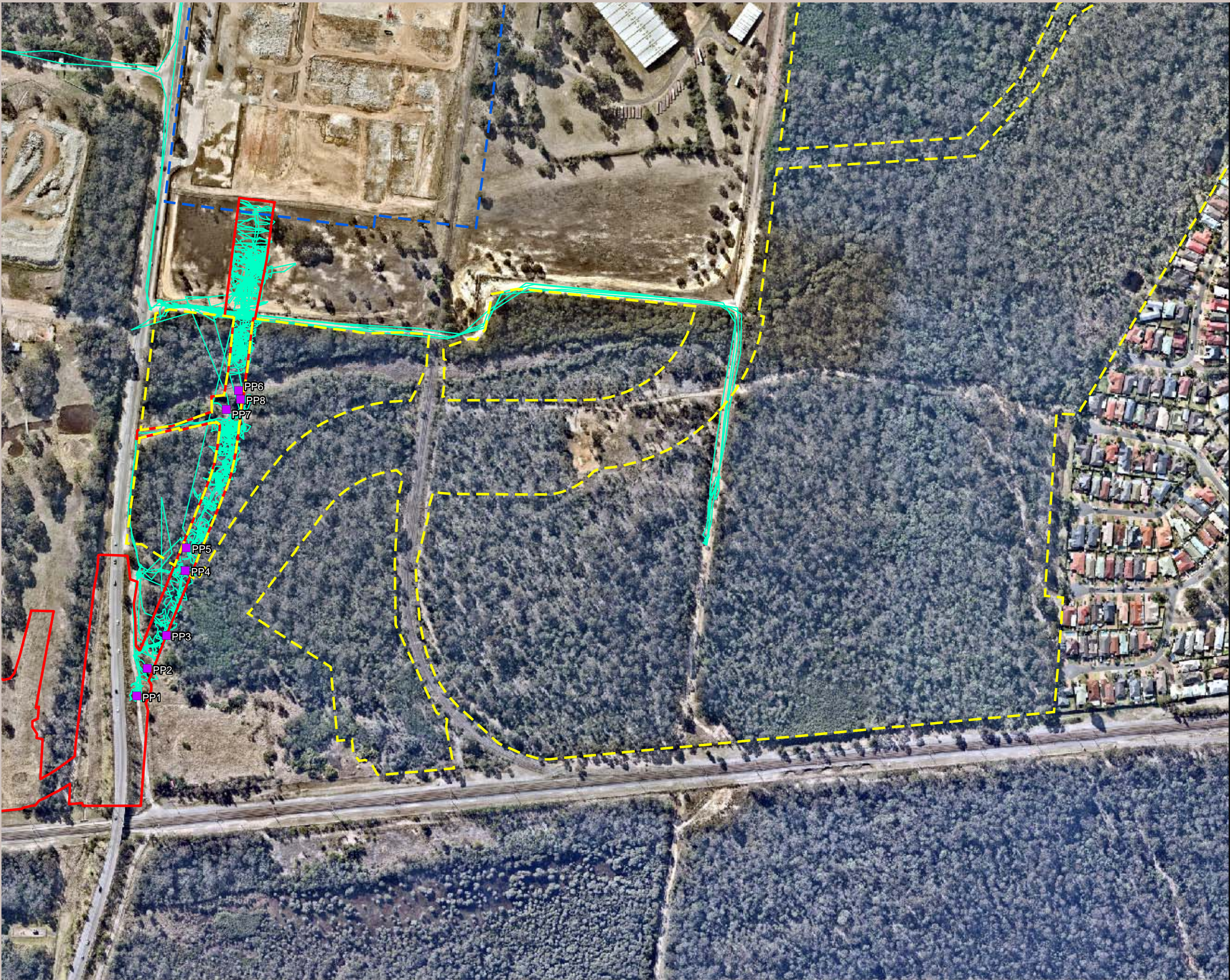
Toelken, H.R. and Miller R.T. (2012). Notes on *Hibbertia* (Dilleniaceae) 8. Seven new species, a new combination and four new subspecies from subgen *Hemistemma*, mainly from the central coast of New South Wales. *Journal of the Adelaide Botanic Gardens* 25: 71-96.

Plantnet (2017): *Hibbertia fumana*. <http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Hibbertia~fumana>

Plantnet (2017): *Hibbertia puberula* ssp *puberula*. <http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=in&name=Hibbertia~puberula+subsp.~puberula>

Appendix B

Figures



Legend

- MPE Stage 1 Rail Corridor
- MPE Stage 1 Construction Area
- Wattle Grove Offset Area

Survey Locations

- Survey Tracks
- Photopoints

Image Source:
Image © NearMap
(09/08/2017)

Data Source:
Arcadis
(2016, 2017, 2018)

Coordinate System: MGA Zone 56 (GDA 94)

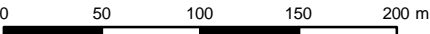
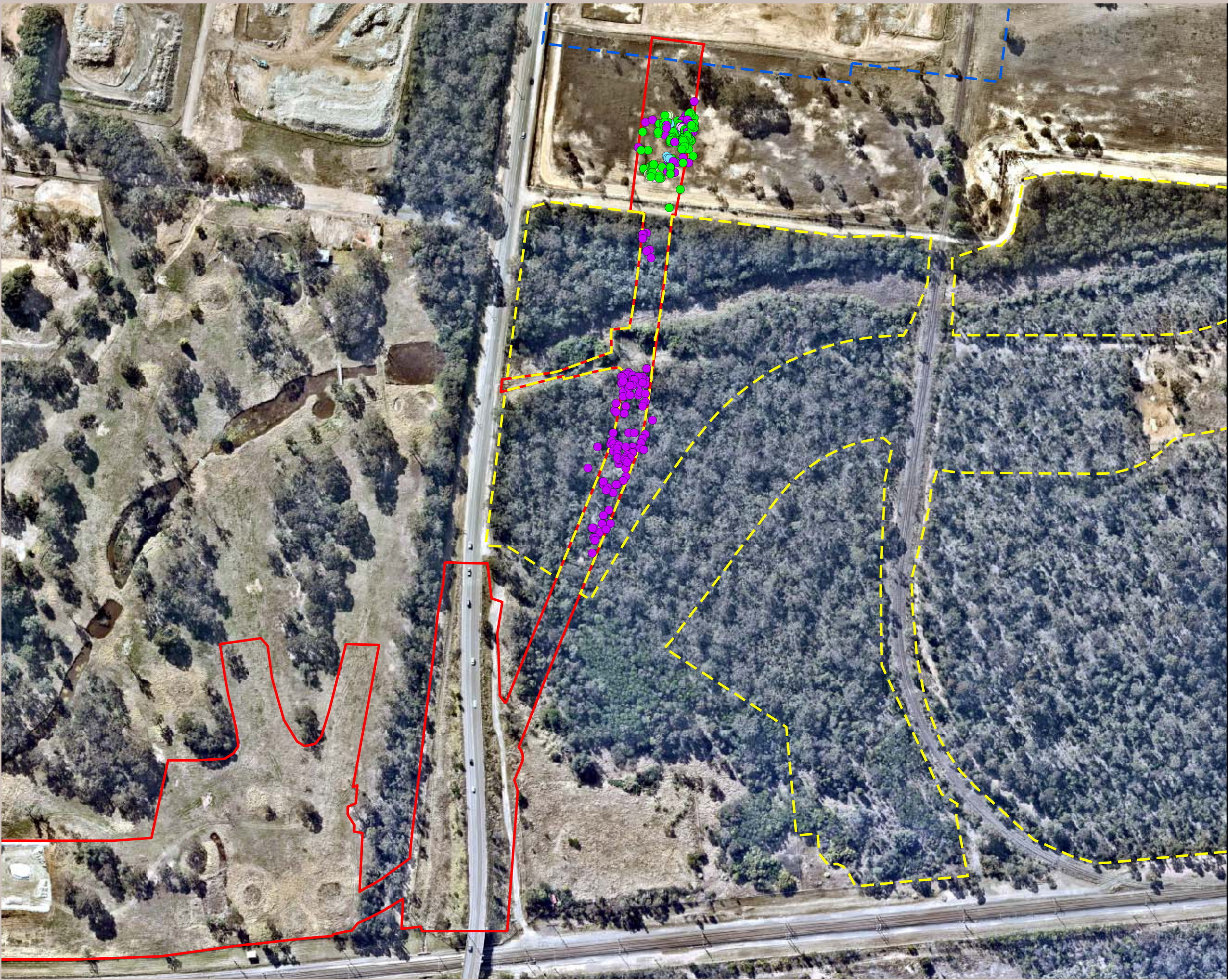


Figure 1. Pre-clearance survey effort within MPE Stage 1 Rail Corridor



Figure 2. Hibbertia puberula density estimate survey zones



Legend

- MPE Stage 1 Rail Corridor
- MPE Stage 1 Construction Area
- Wattle Grove Offset Area

Threatened Flora Records (CE)

- Hibbertia fumana
- Hibbertia fumana?
- Hibbertia puberula subsp. puberula
- Hibbertia puberula subsp. puberula?
- Hibbertia sp

Image Source:
Image © NearMap
(09/08/2017)

Data Source:
Arcadis
(2016, 2017, 2018)



Coordinate System: MGA Zone 56 (GDA 94)

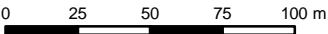


Figure 3. Hibbertia species within MPE Stage 1 Rail Corridor (Nov 2017 Pre-clearance records)

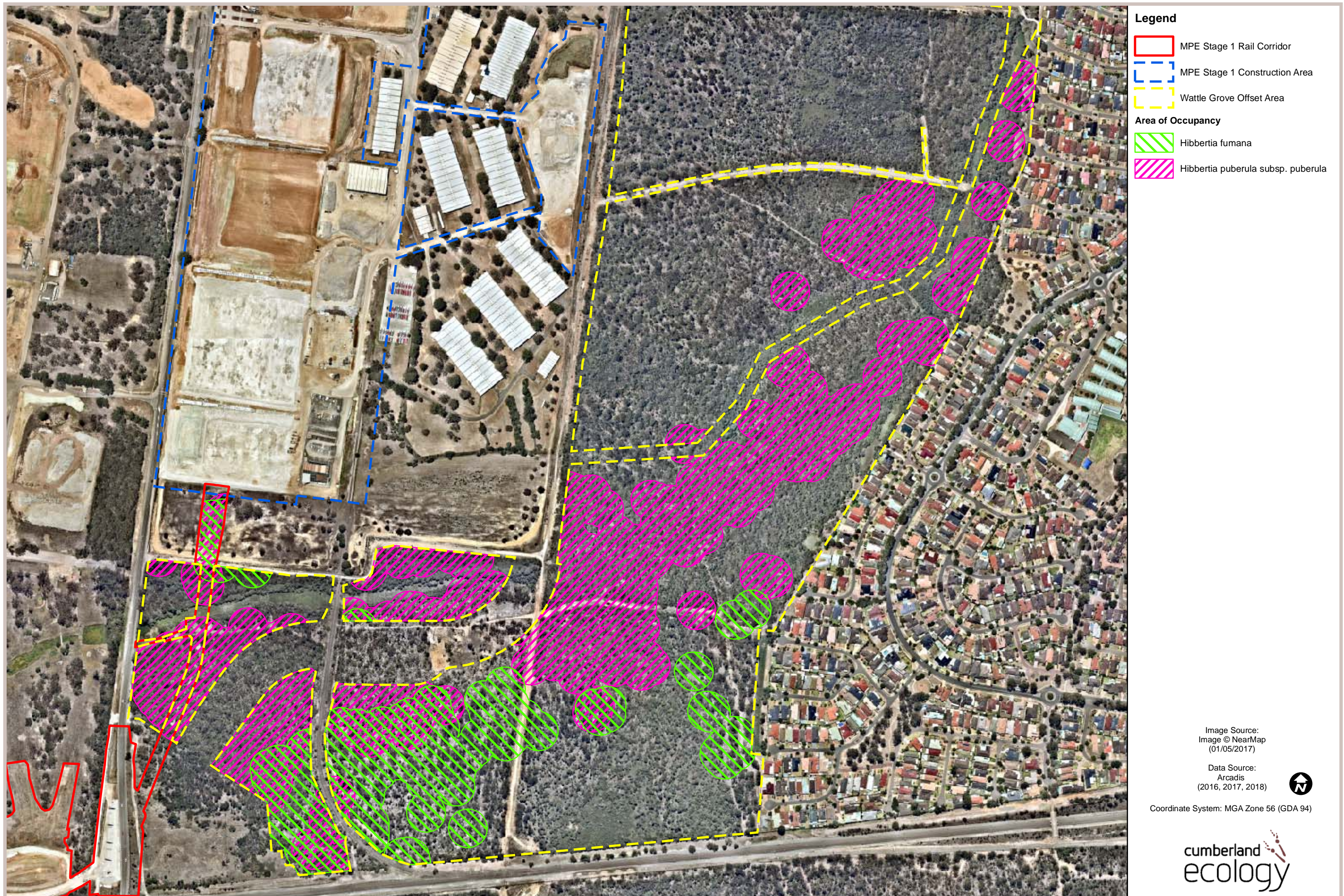


Figure 4. Hibbertia species - Area of occurrence within Wattle Grove offset area and Rail Corridor

Appendix C

Photographs



Photograph 1 Embankment from Moorebank Avenue dominated by *Eragrostis curvula* and *Cenchrus clandestinus* (PP1)



Photograph 2 Exotic dominated vegetation within Railcorp land (PP2)



Photograph 3 *Hydrotyle bonariensis* in damp low-lying areas (PP3)



Photograph 4 Dense vegetation near RailCorp Land fenceline (PP4)



Photograph 5 **Dense vegetation north of Railcorp land (PP5)**



Photograph 6 ***Typha* and sedge dominated vegetation and adjacent Bamboo grove along Anzac Creek (PP6)**



Photograph 7 **Southern side of Bamboo grove (PP7)**



Photograph 8 **Close up of Bamboo density (PP8)**



Photograph 9 *Hibbertia fumana* bud with elongated peduncle (November 2017)



Photograph 10 *Hibbertia puberula* with multiple bud clusters (November 2017)



Photograph 11 **Remnant peduncle on *Hibbertia fumana* (November 2017)**



Photograph 12 ***Hibbertia puberula* flower with 9+ stamens (November 2017)**



Photograph 13 Tagged *Hibbertia puberula* individual (November 2017)



Photograph 14 Sprawling *Hibbertia puberula* individual (November 2017)

Appendix D

Correspondence with OEH: Pre-clearance
surveys

From: [REDACTED]
To: [REDACTED]
Cc: [REDACTED]
Bcc: [REDACTED]
Subject: RE: OEH input for MPE Stage 1 Hibbertia pre-clearance surveys
Date: Monday, November 6, 2017 2:53:00 PM

Hi [REDACTED]

To clarify your queries:

- The surveyors will be marking out the centreline of the rail track using spray marks and will be marking up the boundaries of the rail corridor using plastic witches hats. No vegetation will be cleared for these works.
- As per our discussion earlier today, for the pre-clearance surveys – we propose to ‘section’ the rail corridor into 5 -10m ‘blocks’ (running roughly north-south). The surveys will be done by two ecologists, with each ecologist surveying alternate ‘blocks’. This is mainly to help concentrate survey effort and ensure that the entire rail corridor is traversed.
- We will be using tags/GPS waypoint for each individual plant and will be using different coloured flagging tape to indicate the locations of the two different species.

The data you requested for the abundance estimates for *H.fumana* is not held by Cumberland Ecology – I’ve notified the client of your request and will hopefully be able to get back to you on this shortly.

Regards,

[REDACTED] | Senior Project Manager/Ecologist

Cumberland Ecology | Sydney - Brisbane
t 02 9868 1933

From: [REDACTED]
Sent: Monday, 6 November 2017 10:11 AM
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: OEH input for MPE Stage 1 Hibbertia pre-clearance surveys

Hello [REDACTED]

I appreciate you sending this through to me, and agree, time is of the essence. The recent rainfall will assist with inducing both species into flower, so that will also be advantageous.

I have a couple of questions which I hope that you / Qube can answer to my satisfaction also.

- With regard to the surveyor marking out the boundary of the corridor, are they to implement standard practice of cutting sight lines, or will they be merely running flagging through the existing vegetation to demarcate the alignment? If they are cutting vegetation to put through

a sight line, can they please put any cut woody vegetation (shrubs etc.) on the outside of the alignment to ensure that none of the ground is obscured when undertaking the survey. Some of the undergrowth density of shrubs is quite high and that would result in a reasonably large amount of material within the targeted area for search. I would also request that the minimum amount of trampling occur in running that alignment.

- With regard to the sectioning of the corridor, how large are these sections, or how many are you contemplating? Thank you for obtaining and keeping track logs.
- Thank you for recording all individuals individually. Please use a unique identifier code and a separate GPS record for each plant of *H. fumana* in particular, but both species if possible (I recognise that there are likely 2 orders of magnitude difference in counts of each). I do not wish to have single points representing multiple individuals of *H. fumana* (although the code for *H. puberula* could be constructed such that the code contains a recognition of individuals within the nominated unit square).

I am in the office today (6th) but not tomorrow. If you have any questions I am more than happy to discuss these and any matters of your own design you wish to elaborate upon.

As an aside, would it be possible to forward the data from all quadrats assessed earlier from which the data was used to determine abundance and distribution of *H. fumana*? I would like to look at the data in relation to the survey method and results presented previously to confirm to myself that the density and abundance data are as presented in item 76 of the Expert Report that David prepared (before I update the profile page for the species). I didn't get enough clarity in the information presented in the BAR and the ER about how the null-find quadrats were accounted for in the determining of the density and zones.

Thanks in advance, [REDACTED]

[REDACTED]
Senior Threatened Species Officer
Ecosystems and Threatened Species Team
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[REDACTED]

From: [REDACTED]
Sent: Monday, 6 November 2017 8:17 AM
To: [REDACTED]
Cc: [REDACTED]
Subject: IMP: OEH input for MPE Stage 1 Hibbertia pre-clearance surveys
Importance: High

Hello [REDACTED]

As you are aware, the Minister has proposed (and Qube has agreed to) a condition of consent for

Stage 1 MPE of the Moorebank Intermodal Project that requires pre-clearance surveys for *Hibbertia fumana* and *Hibbertia puberula* under a Hibbertia Species Survey Plan prepared in consultation with OEH to the satisfaction of the Secretary (Condition 23a as agreed to by the Minister and Qube, but not yet imposed by the Court is provided verbatim below).

Qube has requested Cumberland Ecology to conduct these surveys. The available information to date indicates that *Hibbertia fumana* was flowering in Sep-Oct 2017 and was flowering in Nov 2016. *Hibbertia puberula* was also confirmed as flowering in Nov 2016.

As the extent of the flowering period for *Hibbertia fumana* is unknown, we believe it is prudent to commence pre-clearance surveys in November in order to more readily detect both Hibbertia species and gain a more accurate count of the number of each Hibbertia species present within the rail corridor. It is our understanding that a surveyor will be marking out the boundary of the corridor, with an additional buffer. Our proposed methodology for the planned November pre-clearance surveys is:

- The rail corridor will be divided into 'sections' for survey
- Each section will be completely traversed by an ecologist (a hand-held GPS with track log will be utilised to confirm the section is traversed completely) targeting *Hibbertia fumana* and *Hibbertia puberula*
- The locations of all individuals detected will be recorded using the GPS and will also be tagged in the field. Tags will include small metal tags (either on the Hibbertia individual itself or on vegetation immediately adjacent to it. Hi-vis flagging tape on adjacent/overhanging vegetation will also be used to mark the location of recorded individuals)
- In the event that *Hibbertia puberula* is not yet flowering at the time of the planned November surveys, the process is to be repeated for this species once flowering is confirmed.

Could you please confirm that the proposed field methodology above is satisfactory. This methodology will be incorporated into the Hibbertia Species Survey Plan along with a schedule for follow up surveys if deemed necessary. If you consider that further refinement of the field methodology is required, would you be available to discuss this matter on 6th or 7th Nov as we are currently planning to conduct an initial round of surveys commencing 9th Nov.

I wish to emphasise that the carrying out of the proposed surveys does not mean that clearing work in connection with the rail corridor is imminent. Rather, Qube wishes to carry out survey work at a time when flowering of the species is expected to be occurring and thereby to ensure that accurate surveying can take place.

Condition 23a

Prior to the commencement of clearing within the railway corridor between the southern boundary of the terminal site and the eastern side of the approved Moorebank Avenue Bridge, the Applicant must prepare and implement a Hibbertia Species Survey Plan to determine the number of individual plants of each Hibbertia species present within the corridor and confirm that the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each Hibbertia species can be achieved. The survey plan, including the survey method, must be prepared in consultation with OEH to the satisfaction of the Secretary. Results of the survey must be included in the Biodiversity Offset

Package required by C23a.

Regards,

[REDACTED]

Senior Project Manager/Ecologist



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PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL

Appendix E

Hibbertia Pre-clearance Survey - Field ID
notes

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
9/11/2017	21	638	1	<i>Hibbertia puberula</i>	All within a 1m ² area Tags on adjacent vegetation
9/11/2017	21	639	2	<i>Hibbertia puberula</i>	All within a 1m ² area Tags on adjacent vegetation
9/11/2017	21	640	3	<i>Hibbertia puberula</i>	All within a 1m ² area Tags on adjacent vegetation
9/11/2017	21	641	4	<i>Hibbertia puberula</i>	All within a 1m ² area Tags on adjacent vegetation
9/11/2017	21	642	5	<i>Hibbertia puberula</i>	All within a 1m ² area Tags on adjacent vegetation
9/11/2017	21	643	6	<i>Hibbertia puberula</i>	Tag above plant
9/11/2017	21	644	7	<i>Hibbertia puberula</i>	buds
9/11/2017	21	645	8	<i>Hibbertia puberula</i>	Buds
9/11/2017	21	646	9	<i>Hibbertia puberula</i>	Tag on adjacent sapling
9/11/2017	21	647	10	<i>Hibbertia puberula?</i>	Looks different, Conservatively ID'd as potential <i>H. puberula</i> . Photos 890-893 - bud without peduncle visible
9/11/2017	21	648	11	<i>Hibbertia puberula</i>	Hairs simple
9/11/2017	21	649	12	<i>Hibbertia fumana</i>	Photo 894-897
9/11/2017	21	650	13	<i>Hibbertia fumana</i>	Slightly elongated peduncle, stellate hairs, ID verification required. Photo 898-900
9/11/2017	21	651	14	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	652	15	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	653	16	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	654	17	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
9/11/2017	21	655	18	<i>Hibbertia fumana</i>	Photo 901-902, Likely <i>H. fumana</i> (slightly elongated peduncle)
9/11/2017	21	656	19	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	657	20	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	658	21	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	659	22	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	660	23	<i>Hibbertia fumana?</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	661	24	<i>Hibbertia fumana</i>	No buds but stellate hairs visible
9/11/2017	21	662	25	<i>Hibbertia fumana</i>	Photo 905-906
9/11/2017	21	663	30	<i>Hibbertia fumana</i>	Photo 907-908
9/11/2017	21	664	31	<i>Hibbertia fumana</i>	Photo 909-910. Bud with start of peduncle but appears beaked - conservatively ID'd as <i>H. fumana</i>
9/11/2017	21	665	32	<i>Hibbertia fumana</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	666	33	<i>Hibbertia fumana</i>	ID verification required - no buds but hairs appear stellate
9/11/2017	21	667	34	<i>Hibbertia fumana</i>	No buds but stellate hairs visible
9/11/2017	21	668	35	<i>Hibbertia puberula</i>	Some unusual bud clusters but leaves similar. Photo 911-914
9/11/2017	21	670	41	<i>Hibbertia puberula</i>	Def - Buds (Photo 915-16)
9/11/2017	21	671	42	<i>Hibbertia fumana?</i>	No buds/ dead flowers. ID verification required
9/11/2017	21	672	43	<i>Hibbertia fumana?</i>	No buds/ dead flowers. ID verification required
9/11/2017	21	673	44	<i>Hibbertia puberula</i>	Def - Cluster of 3-4 buds
9/11/2017	21	674	45	<i>Hibbertia puberula</i>	Def - no buds but dead flower with >7 stamens
9/11/2017	21	675	50	<i>Hibbertia puberula</i>	Dead flowers with ~10 stamens

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
9/11/2017	21	676	51	<i>Hibbertia fumana</i>	Flower with slightly elongated peduncle
9/11/2017	21	677	52	<i>Hibbertia fumana</i>	Very small, no buds, ID verification required
9/11/2017	21	678	53	<i>Hibbertia fumana</i>	Very small, no buds, ID verification required
9/11/2017	21	679	54	<i>Hibbertia fumana?</i>	Very small, no buds, ID verification required
9/11/2017	21	680	55	<i>Hibbertia fumana</i>	Dead flowers with ~6 stamens
9/11/2017	21	681	61	<i>Hibbertia puberula</i>	Cluster of buds
9/11/2017	21	682	62	<i>Hibbertia fumana</i>	No buds or dead flowers, ID verification required
9/11/2017	21	683	63	<i>Hibbertia fumana</i>	No buds or dead flowers, ID verification required
9/11/2017	21	684	64	<i>Hibbertia fumana</i>	No buds or dead flowers, ID verification required
9/11/2017	21	685	65	<i>Hibbertia fumana</i>	Dead flower with elongated peduncle
9/11/2017	21	686	68	<i>Hibbertia fumana</i>	Dead flower with elongated peduncle
9/11/2017	21	687	69	<i>Hibbertia fumana</i>	Dead flower with elongated peduncle
13/11/2017	21	688	70	<i>Hibbertia fumana</i>	No material, ID verification required
13/11/2017	21	689	71	<i>Hibbertia fumana</i>	No material, ID verification required
13/11/2017	21	690	74	<i>Hibbertia fumana</i>	Dead flower with elongated peduncle
13/11/2017	21	691	75	<i>Hibbertia fumana</i>	No flower/bud material, ID verification required
13/11/2017	21	692	76	<i>Hibbertia fumana</i>	No flower/bud material, ID verification required
13/11/2017	21	693	77	<i>Hibbertia fumana</i>	Some dead flower at base for new plant sprouting adj
13/11/2017	21	694	78	<i>Hibbertia fumana</i>	Flowering - 6 stamens
13/11/2017	21	695	79	<i>Hibbertia fumana</i>	Flowering - 6 stamens

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	21	696	80	<i>Hibbertia puberula</i>	No material, ID verification required, simple hairs
13/11/2017	21	697	89	<i>Hibbertia fumana</i>	Dead flowers, ~4 visible stamens, clustered on one side
13/11/2017	21	698	96	<i>Hibbertia fumana</i>	Dead flowers, ~4 visible stamens, clustered on one side
13/11/2017	21	699	97	<i>Hibbertia puberula</i>	Dried 3 bud cluster + flower with >10 stamens
13/11/2017	21	700	98	<i>Hibbertia puberula</i>	Flower with 9 stamens + 3 bud cluster (Photo 917-920)
13/11/2017	21	701	99	<i>Hibbertia fumana</i>	No flower but remnant long peduncle
13/11/2017	21	702	101	<i>Hibbertia fumana</i>	No flower but remnant elongated peduncle (Photo 926)
13/11/2017	21	703	102	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	704	103	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	705	104	<i>Hibbertia puberula</i>	2 bud cluster
13/11/2017	21	706	105	<i>Hibbertia fumana</i>	Flower with 6 stamens
13/11/2017	21	707	110	<i>Hibbertia puberula</i>	Buds with short pedicel
13/11/2017	21	708	111	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	709	123	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	710	124	<i>Hibbertia fumana</i>	Flower with 6 stamens
13/11/2017	21	711	125	<i>Hibbertia puberula</i>	2 bud cluster
13/11/2017	21	712	126	<i>Hibbertia puberula?</i>	No material, hairs appear simple ID verification required
13/11/2017	21	713	127	<i>Hibbertia puberula</i>	Flower with >10 stamens
13/11/2017	21	714	128	<i>Hibbertia puberula</i>	2-3 bud cluster
13/11/2017	21	715	129	<i>Hibbertia puberula?</i>	Insufficient ID material - verification required. Immediately adj to other <i>H. puberula</i>

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	21	716	130	<i>Hibbertia puberula?</i>	Insufficient ID material - verification required. Immediately adj to <i>H. puberula</i>
13/11/2017	21	717	131	<i>Hibbertia puberula</i>	Flowering, also new growth starting nearby
13/11/2017	21	718	132	<i>Hibbertia puberula</i>	Flowering, also new growth starting nearby
13/11/2017	21	719	133	<i>Hibbertia fumana</i>	Flowering
13/11/2017	21	720	134	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	721	120	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	722	122	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	723	135	<i>Hibbertia fumana</i>	Flowering
13/11/2017	21	724	136	<i>Hibbertia fumana</i>	Remnant peduncle
13/11/2017	21	725	137	<i>Hibbertia puberula?</i>	Beaked buds, ID verification required
13/11/2017	21	726	138	<i>Hibbertia puberula</i>	Flowering
13/11/2017	21	727	139	<i>Hibbertia fumana</i>	No bud/flower material, poss elongated peduncle, ID verification required
13/11/2017	21	728	140	<i>Hibbertia puberula</i>	Beaked bud with no peduncle
13/11/2017	21	729	154	<i>Hibbertia puberula?</i>	No material, hairs appear simple ID verification required
13/11/2017	21	730	155	<i>Hibbertia puberula</i>	Flowering
13/11/2017	21	731	156	<i>Hibbertia puberula</i>	hairs appear simple,
13/11/2017	21	732	157	<i>Hibbertia puberula</i>	Dried flower with >10 stamens
13/11/2017	21	733	158	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	734	159	<i>Hibbertia puberula</i>	Bud with no peduncle, beaked
13/11/2017	21	735	160	<i>Hibbertia puberula</i>	Bud with no peduncle, beaked

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	21	736	161	<i>Hibbertia fumana</i>	No buds but remnant elongated peduncle
13/11/2017	21	737	162	<i>Hibbertia fumana</i>	No buds but remnant elongated peduncle
13/11/2017	21	738	163	<i>Hibbertia fumana</i>	No buds but remnant elongated peduncle
13/11/2017	21	739	164	<i>Hibbertia fumana</i>	Dried flower with 6 stamens
13/11/2017	21	740	165	<i>Hibbertia fumana</i>	Dried flower with 5-6 stamens
13/11/2017	21	741	166	<i>Hibbertia fumana</i>	Dried flower with 5-6 stamens
13/11/2017	21	742	167	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	743	168	<i>Hibbertia fumana</i>	Dried flower with 5 stamens
13/11/2017	21	744	169	<i>Hibbertia fumana</i>	Dried flower with 5 stamens
13/11/2017	21	745	170	<i>Hibbertia fumana</i>	Dried flower with 5 stamens
13/11/2017	21	746	186	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	747	187	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	748	188	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	749	189	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	750	190	<i>Hibbertia fumana</i>	Flower with 5 stamens
13/11/2017	21	751	191	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	752	192	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	753	193	<i>Hibbertia fumana</i>	ID verification required, beginning of elongated peduncle on buds
13/11/2017	21	754	194	<i>Hibbertia fumana</i>	Very sprawling, unclear of multiple plants, elongated ped.
13/11/2017	21	755	195	<i>Hibbertia fumana</i>	Elongated peduncle on bud

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	21	756	196	<i>Hibbertia fumana</i>	Elongated peduncle on bud, flower with 5 stamens
13/11/2017	21	757	197	<i>Hibbertia fumana</i>	Elongated peduncle on bud, flower with 5 stamens
13/11/2017	21	758	201	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	759	202	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	760	203	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	761	204	<i>Hibbertia fumana?</i>	No material present, hairs unclear if stellate, ID verification required
13/11/2017	21	762	205	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	763	212	<i>Hibbertia puberula</i>	Sprawling specimen, unclear if single or multiple beaked buds with short ped, flower with >10 stamens
13/11/2017	21	764	213	<i>Hibbertia puberula</i>	Sprawling specimen, unclear if single or multiple beaked buds with short ped, flower with >10 stamens
13/11/2017	21	765	214	<i>Hibbertia fumana</i>	Buds with start of elongated ped, ID verification required
13/11/2017	21	766	215	<i>Hibbertia fumana</i>	Buds with start of elongated ped, ID verification required
13/11/2017	21	767	242	<i>Hibbertia fumana</i>	Flower with 6 stamens
13/11/2017	21	768	243	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	769	244	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	770	245	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	771	246	<i>Hibbertia fumana</i>	Flowers with 5-6 stamens and elongated ped
13/11/2017	21	772	247	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	773	248	<i>Hibbertia fumana</i>	Flower with 5 stamens
13/11/2017	21	774	249	<i>Hibbertia fumana</i>	Bud with slightly elongated peduncle
13/11/2017	21	775	250	<i>Hibbertia fumana</i>	No bud/flower material, hairs poss stellate, ID verification required

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	21	776	251	<i>Hibbertia fumana</i>	Bud with slightly elongated peduncle, new growth nearby
13/11/2017	21	777	252	<i>Hibbertia fumana</i>	Potential remnant elongated peduncle, ID verification required
13/11/2017	21	778	253	<i>Hibbertia fumana</i>	Potential remnant elongated peduncle, ID verification required
13/11/2017	21	779	254	<i>Hibbertia puberula</i>	Cluster of buds
13/11/2017	21	780	255	<i>Hibbertia puberula</i>	Buds without ped, dried flower with >10 stamens
13/11/2017	21	781	-	<i>Hibbertia puberula</i>	Outside alignment
13/11/2017	21	782	256	<i>Hibbertia fumana</i>	No bud/flower mat, hairs unclear, poss rem along ped, ID verification required
13/11/2017	21	783	257	<i>Hibbertia fumana</i>	Flower with 5 stamens
13/11/2017	21	784	258	<i>Hibbertia fumana</i>	Flower with 5 stamens
13/11/2017	21	785	259	<i>Hibbertia fumana</i>	Flower with 5 stamens
13/11/2017	21	786	260	<i>Hibbertia puberula</i>	Buds in cluster
13/11/2017	21	787	261	<i>Hibbertia fumana</i>	Dried flower with 6 stamens
13/11/2017	21	788	262	<i>Hibbertia puberula</i>	Buds in cluster, 'beaked' flowers
13/11/2017	21	789	263	<i>Hibbertia fumana</i>	Bud with elongated peduncle
13/11/2017	21	790	264	<i>Hibbertia fumana</i>	Dried flower with 5 stamens
13/11/2017	21	791	265	<i>Hibbertia puberula</i>	hairs appear simple,
13/11/2017	21	792	266	<i>Hibbertia puberula</i>	hairs appear simple,
13/11/2017	21	793	267	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	794	268	<i>Hibbertia fumana</i>	Remnant elongated peduncle
13/11/2017	21	795	269	<i>Hibbertia fumana</i>	Bud with start of elongated peduncle

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	21	796	270	<i>Hibbertia fumana</i>	Dried flower with elongated peduncle
13/11/2017	21	797	285	<i>Hibbertia fumana</i>	Buds with elongated peduncle
14/11/2017	21	802	281	<i>Hibbertia puberula</i>	Flowers
14/11/2017	21	803	282	<i>Hibbertia puberula</i>	In bud
14/11/2017	21	804	283	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	805	284	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	806	286	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	807	287	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	808	288	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	809	289	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	810	290	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	811	291	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	812	292	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
					individual or and multiple entwined
14/11/2017	21	813	293	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	814	294	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	815	295	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	816	296	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	817	297	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	818	298	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	819	299	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	820	300	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	821	301	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	822	302	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	823	303	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
					individual or and multiple entwined
14/11/2017	21	824	304	<i>Hibbertia puberula</i>	Flowering. Highly sprawling and entwined with other veg. Difficult to differentiate if large sprawling individual or and multiple entwined
14/11/2017	21	825	305	<i>Hibbertia puberula</i>	Very sprawling, quite spread out
14/11/2017	21	826	306	<i>Hibbertia puberula</i>	Very sprawling, quite spread out (photo 941)
14/11/2017	21	827	307	<i>Hibbertia puberula</i>	Very sprawling, coming out of both sides of tussock
14/11/2017	21	828	308	<i>Hibbertia puberula</i>	Ph 942-944
14/11/2017	21	829	309	<i>Hibbertia puberula</i>	Flowering/buds
14/11/2017	21	830	310	<i>Hibbertia puberula</i>	Flowering/buds
14/11/2017	21	832	326	<i>Hibbertia puberula</i>	Ph 947-948
14/11/2017	21	833	327	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	834	328	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	835	329	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	836	-	<i>Hibbertia puberula</i>	Just outside clearing line
14/11/2017	21	837	330	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	838	331	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	839	332	<i>Hibbertia puberula</i>	Petals fallen off but calyx/stamens present
14/11/2017	21	840	333	<i>Hibbertia puberula</i>	Petals fallen off but calyx/stamens present
14/11/2017	21	841	334	<i>Hibbertia puberula</i>	Petals fallen off but calyx/stamens present
14/11/2017	21	842	335	<i>Hibbertia puberula</i>	In bud

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
14/11/2017	21	843	336	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	844	-	<i>Hibbertia puberula</i>	Flowering and outside alignment
14/11/2017	21	845	337	<i>Hibbertia puberula</i>	Flowering, sprawling (possibly >1 ind)
14/11/2017	21	846	338	<i>Hibbertia puberula</i>	Flowering, very sprawling
14/11/2017	21	847	339	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	848	340	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	849	356	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	850	357	<i>Hibbertia puberula</i>	Not flowering, buds present
14/11/2017	21	851	358	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	852	359	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	853	360	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	854	361	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	855	362	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	856	363	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	857	364	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	858	365	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	859	366	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	860	367	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	861	368	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	862	369	<i>Hibbertia puberula</i>	Flowering

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
14/11/2017	21	863	370	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	864	376	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	865	377	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	866	378	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	867	-	<i>Hibbertia puberula</i>	Just outside alignment
14/11/2017	21	868	379	<i>Hibbertia puberula</i>	Very sprawled out, possible 2 ind
14/11/2017	21	869	380	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	871	381	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	871	382	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	872	391	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	873	392	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	874	393	<i>Hibbertia puberula</i>	Flowering
14/11/2017	21	876	394	<i>Hibbertia puberula</i>	Flowering
9/11/2017	23	24	26	<i>Hibbertia fumana</i>	ID required, stellate hairs on leaves axillary hair tufts Ph 25-27
9/11/2017	23	25	27	<i>Hibbertia fumana</i>	Stellate hairs on leaves axillary hair tufts Ph 28-29
9/11/2017	23	26	28	<i>Hibbertia fumana</i>	4 stamens, 1 side of 2 hairy ovaries on fallen dead flower, Ph 30-34
9/11/2017	23	27	29	<i>Hibbertia fumana</i>	Stellate hairs on leaves, axillary hair tuft
9/11/2017	23	28	36	<i>Hibbertia fumana</i>	Stellate hairs on leaves? Axillary hair tuft, 1 mature + 5 young (not tagged too small)
9/11/2017	23	29	37	<i>Hibbertia fumana</i>	Unable to tell if stellate hairs
9/11/2017	23	30	38	<i>Hibbertia fumana</i>	Slightly pedicellate 1-2mm buds, calyx hairy

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
9/11/2017	23	31	39	<i>Hibbertia fumana</i>	6 stamens, 2 hairy carpels on 1 side (fallen dead flowers), calyx has stellate hairs
9/11/2017	23	32	40	<i>Hibbertia fumana</i>	6 stamens, 2 hairy carpels on 1 side (fallen dead flowers), calyx has stellate hairs
9/11/2017	23	33	46	<i>Hibbertia fumana</i>	6 stamens, 2 hairy carpels on 1 side (fallen dead flowers), calyx has stellate hairs
9/11/2017	23	34	47	<i>Hibbertia fumana</i>	Appears to be resprouting from roots after dying off - maybe more than 1 individual? Ph37
9/11/2017	23	35	48	<i>Hibbertia fumana</i>	6 stamens, 1 side 2 hairy carpels (fallen dead flowers)
9/11/2017	23	36	49	<i>Hibbertia puberula</i>	Short peduncle, 1mm. At least 10 stamens, 1 side 2 carpels (dead fallen flowers), Ph38-40
9/11/2017	23	37	56	<i>Hibbertia fumana</i>	Dead fallen flowers, 6 stamens, 1 side 2 carpels
9/11/2017	23	38	57	<i>Hibbertia fumana</i>	Dead fallen flowers, 6 stamens, 1 side 2 carpels
9/11/2017	23	39	58	<i>Hibbertia fumana</i>	Dead fallen flowers, 6 stamens, 1 side 2 carpels
9/11/2017	23	40	59	<i>Hibbertia fumana</i>	Dead fallen flowers, 6 stamens, 1 side 2 carpels
9/11/2017	23	42	60	<i>Hibbertia fumana</i>	Stellate hair. Leaves, 1 mature + 1 too small to tag
9/11/2017	23	41	66	<i>Hibbertia fumana</i>	Stellate hairs- leaves + 1 too small to tag
9/11/2017	23	43	67	<i>Hibbertia puberula</i>	9 stamens, 1 side 2 carpels
9/11/2017	23	44	72	<i>Hibbertia fumana</i>	Stellate hairs, + 1 too small to tag
9/11/2017	23	45	73	<i>Hibbertia fumana</i>	Stellate hairs on leaves
13/11/2017	20	38	81	<i>Hibbertia</i> sp.	Recurved leaf margin
13/11/2017	20	39	82	<i>Hibbertia fumana</i>	Pedunculated flower, recurved leaf
13/11/2017	20	40	83	<i>Hibbertia fumana</i>	Flower dropped, stellate hairs on leaf apex
13/11/2017	20	41	84	<i>Hibbertia fumana</i>	Five stamens, stellate hairs
13/11/2017	20	42	85	<i>Hibbertia fumana</i>	Stellate hairs, dropped flowers, ID required

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	20	43	86	<i>Hibbertia fumana</i>	Stellate hairs, dropped flowers, ID required
13/11/2017	20	44	87	<i>Hibbertia fumana</i>	Stellate hairs, dropped flowers, ID required
13/11/2017	20	45	88	<i>Hibbertia puberula</i>	Hairs, dropped, recurved margins
13/11/2017	20	46	90	<i>Hibbertia fumana</i>	Tufted at hair at base of peduncle
13/11/2017	20	47	91	<i>Hibbertia fumana</i>	Tufted at hair at base of peduncle
13/11/2017	20	48	92	<i>Hibbertia puberula</i>	Hairs not stellate, recurved margin
13/11/2017	20	49	93	<i>Hibbertia fumana</i>	5 stamens, bud not beaked
13/11/2017	20	50	94	<i>Hibbertia</i> sp.	ID required (no flowers)
13/11/2017	20	51	100	<i>Hibbertia puberula</i>	921-925 <i>H. Puberula</i> , mag stamens
13/11/2017	20	52	106	<i>Hibbertia fumana</i>	6 stamens, others sprouting around
13/11/2017	20	53	107	<i>Hibbertia fumana</i>	Has flowers, 6 stamens
13/11/2017	20	54	95	<i>Hibbertia</i> sp.	ID required (no flowers)
13/11/2017	20	55	109	<i>Hibbertia puberula</i>	Many stamens
13/11/2017	20	56	112	<i>Hibbertia fumana</i>	Stellate hairs on leaf recurved margin, no flowers
13/11/2017	20	57	113	<i>Hibbertia fumana</i>	Has flowers, 6 stamens (others sprouting)
13/11/2017	20	59	114	<i>Hibbertia fumana</i>	Stellate hairs, no flowers (others sprouting around)
13/11/2017	20	60	115	<i>Hibbertia</i> sp.	ID required (no flowers), lots sprouting around
13/11/2017	20	61	116	<i>Hibbertia</i> sp.	No flowers, bare individual
13/11/2017	20	62	117	<i>Hibbertia</i> sp.	No flowers, bare individual
13/11/2017	20	64	118	<i>Hibbertia fumana</i>	Stellate hairs of leaf recurved margin

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	20	63	141	<i>Hibbertia fumana</i>	Stellate hairs, no flowers (others sprouting around)
13/11/2017	20	65	142	<i>Hibbertia fumana</i>	Stellate hairs, no flowers (marg flowers?)
13/11/2017	20	93	206	<i>Hibbertia fumana</i>	Peduncle present, ID may be required
13/11/2017	20	94	207	<i>Hibbertia fumana</i>	Peduncle present, ID may be required
13/11/2017	20	95	208	<i>Hibbertia fumana</i>	Peduncle present, bud not beaked
13/11/2017	20	96	185	<i>Hibbertia fumana</i>	ID may be required
13/11/2017	20	97	198	<i>Hibbertia fumana</i>	Bud not beaked, peduncle present
13/11/2017	20	98	199	<i>Hibbertia fumana</i>	Peduncle present
13/11/2017	20	99	200	<i>Hibbertia fumana</i>	Peduncle present
13/11/2017	20	100	216	<i>Hibbertia</i> sp	ID required
13/11/2017	20	101	217	<i>Hibbertia fumana</i>	5-6 stamens, flower present
13/11/2017	20	102	218	<i>Hibbertia fumana</i>	6 stamens, flower present
13/11/2017	20	103	219	<i>Hibbertia fumana</i>	5 stamens, flower present
13/11/2017	20	105	210	<i>Hibbertia fumana</i>	6 stamens, flower present
13/11/2017	20	104	211	<i>Hibbertia fumana</i>	6 stamens, flower present
13/11/2017	20	106	209	<i>Hibbertia fumana</i>	ID required
13/11/2017	20	107	220	<i>Hibbertia fumana</i>	Peduncle present, ID required
13/11/2017	20	108	222	<i>Hibbertia fumana</i>	Tuffed hairs at leaf intervals
13/11/2017	20	109	223	<i>Hibbertia fumana</i>	Peduncle present
13/11/2017	20	110	224	<i>Hibbertia fumana</i>	Peduncle present

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	20	111	225	<i>Hibbertia puberula</i>	Peduncle not present, no flowers
13/11/2017	20	112	226	<i>Hibbertia puberula</i>	Beaked bud
13/11/2017	20	113	227	<i>Hibbertia puberula</i>	Glabrous, sprawling habit, ID required
13/11/2017	20	114	228	<i>Hibbertia fumana</i>	Red peduncle obvious
13/11/2017	20	115	229	<i>Hibbertia puberula</i>	Glabrous, sprawling, no stellate hairs
13/11/2017	20	116	230	<i>Hibbertia puberula</i>	Glabrous, ID required
13/11/2017	20	117	231	<i>Hibbertia puberula</i>	Beaked buds
13/11/2017	20	118	232	<i>Hibbertia fumana</i>	Flowers 5 stamens
13/11/2017	20	119	233	<i>Hibbertia fumana</i>	peduncle, ID required, no flowers
13/11/2017	20	120	234	<i>Hibbertia puberula</i>	Beaked calyx, 9 stamens
13/11/2017	20	121	235	<i>Hibbertia fumana</i>	peduncle, ID required
13/11/2017	20	122	236	<i>Hibbertia fumana</i>	peduncle, ID required
13/11/2017	20	66	143	<i>Hibbertia fumana</i>	Stellate hairs on leaf recurved margin
13/11/2017	20	67	144	<i>Hibbertia puberula</i>	Hairs, no flowers, sprouting
13/11/2017	20	68	145	<i>Hibbertia</i> sp.	Many sprouting out of bare earth around
13/11/2017	20	69	146	<i>Hibbertia fumana</i>	ID may be required, stellate hairs
13/11/2017	20	70	147	<i>Hibbertia puberula</i>	Sessile atd flowers in a cluster (others sprouting around)
13/11/2017	20	71	148	<i>Hibbertia puberula</i>	Sessile, small peduncle hairless
13/11/2017	20	72	149	<i>Hibbertia fumana</i>	Stellate hairs on leaf margins (bare earth)
13/11/2017	20	73	150	<i>Hibbertia fumana</i>	Bud is not beaked, many in bare earth

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
13/11/2017	20	74	151	<i>Hibbertia</i> sp.	No flowers, ind in bare earth
13/11/2017	20	75	152	<i>Hibbertia</i> sp.	No flowers, ind in bare earth
13/11/2017	20	76	153	<i>Hibbertia fumana</i>	Stellate hairs
13/11/2017	20	77	119	<i>Hibbertia fumana</i>	Stellate hairs
13/11/2017	20	78	121	<i>Hibbertia fumana</i>	Stellate hairs
13/11/2017	20	79	171	<i>Hibbertia puberula</i>	Glabrous, sessile buds
13/11/2017	20	80	172	<i>Hibbertia</i> sp.	No flowers, ind in bare earth
13/11/2017	20	81	173	<i>Hibbertia</i> sp.	No flowers, ind in bare earth
13/11/2017	20	82	174	<i>Hibbertia</i> sp.	No flowers, ind in bare earth
13/11/2017	20	83	175	<i>Hibbertia fumana</i>	Stellate hairs. Number of small plants around 175
13/11/2017	20	84	176	<i>Hibbertia puberula</i>	Normal hairs. None stellate
13/11/2017	20	85	177	<i>Hibbertia puberula</i>	Normal hairs. None stellate
13/11/2017	20	86	178	<i>Hibbertia fumana</i>	peduncle present
13/11/2017	20	87	179	<i>Hibbertia fumana</i>	peduncle present
13/11/2017	20	88	180	<i>Hibbertia fumana</i>	Bud not beaked
13/11/2017	20	89	181	<i>Hibbertia fumana</i>	peduncle present
13/11/2017	20	90	182	<i>Hibbertia fumana</i>	peduncle present
13/11/2017	20	92	183	<i>Hibbertia fumana</i>	peduncle present
13/11/2017	20	91	184	<i>Hibbertia puberula</i>	peduncle not present
14/11/2017	20	134	273	<i>Hibbertia puberula</i>	Small leaves, many stamens, buds clumped sessile

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
14/11/2017	20	135	276	<i>Hibbertia puberula</i>	Small leaves, flowering
14/11/2017	20	136	277	<i>Hibbertia puberula</i>	Small leaves, flowering
14/11/2017	20	137	274	<i>Hibbertia puberula</i>	Small leaves, flowering
14/11/2017	20	138	275	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	139	280	<i>Hibbertia puberula</i>	Flowering, big and sprawling
14/11/2017	20	140	278	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	141	311	<i>Hibbertia puberula</i>	Flowering, beaked buds
14/11/2017	20	142	312	<i>Hibbertia puberula</i>	Flowering, sprawling, next to H. rip
14/11/2017	20	143	313	<i>Hibbertia puberula</i>	Flowering, big and sprawling
14/11/2017	20	144	322	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	145	323	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	146	325	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	147	314	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	148	317	<i>Hibbertia puberula</i>	Flowering, big and spreading
14/11/2017	20	149	320	<i>Hibbertia puberula</i>	Flowering, big and spreading
14/11/2017	20	150	315	<i>Hibbertia puberula</i>	Flowering - snake under log
14/11/2017	20	151	321	<i>Hibbertia puberula</i>	Flowering, big and spreading
14/11/2017	20	152	355	<i>Hibbertia puberula</i>	Flowering, big and spreading
14/11/2017	20	153	-	<i>Hibbertia puberula</i>	Flowering, just outside of line
14/11/2017	20	154	-	<i>Hibbertia puberula</i>	Flowering, just outside of line, big sprawling

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
14/11/2017	20	155	341	<i>Hibbertia puberula</i>	Flowering, many stamens
14/11/2017	20	156	316	<i>Hibbertia puberula</i>	Many stamens
14/11/2017	20	157	342	<i>Hibbertia puberula</i>	Many stamens
14/11/2017	20	158	319	<i>Hibbertia puberula</i>	Many stamens
14/11/2017	20	160	343	<i>Hibbertia puberula</i>	Many stamens, potentially 2 plants 159
14/11/2017	20	161	344	<i>Hibbertia puberula</i>	Many stamens, small
14/11/2017	20	162	345	<i>Hibbertia puberula</i>	Many stamens, small, covered in litter
14/11/2017	20	163	346	<i>Hibbertia puberula</i>	Many stamens, small
14/11/2017	20	164	347	<i>Hibbertia puberula</i>	Many stamens, small
14/11/2017	20	165	348	<i>Hibbertia puberula</i>	Many stamens, small
14/11/2017	20	166	349	<i>Hibbertia puberula</i>	Many stamens, centre trunk, small
14/11/2017	20	167	350	<i>Hibbertia puberula</i>	No flowers, just dropped
14/11/2017	20	168	351	<i>Hibbertia puberula</i>	Flowering, small, covered in litter and plants
14/11/2017	20	169	352	<i>Hibbertia puberula</i>	Lots of stamens, healthy plant
14/11/2017	20	170	353	<i>Hibbertia puberula</i>	Lots of stamens, very little plant
14/11/2017	20	171	354	<i>Hibbertia puberula</i>	Many stamens, one-three stems, very little plant
14/11/2017	20	172	371	<i>Hibbertia puberula</i>	Many stamens, healthy plant
14/11/2017	20	173	372	<i>Hibbertia puberula</i>	Many stamens, one, two stems
14/11/2017	20	174	373	<i>Hibbertia puberula</i>	Could be two plants - difficult to differentiate
14/11/2017	20	175	375	<i>Hibbertia puberula</i>	Small plant, under <i>Melaleuca nodosa</i>

Table 7 **Hibbertia species – Field Identification notes**

Date	GPS	WP	Tag #	Species	Notes/Observations/Photo#
14/11/2017	20	176	374	<i>Hibbertia puberula</i>	Healthy plant under <i>Melaleuca nodosa</i>
14/11/2017	20	177	383	<i>Hibbertia puberula</i>	Sprawling, can't determine base
14/11/2017	20	178	384	<i>Hibbertia puberula</i>	Sprawling in litter
14/11/2017	20	179	385	<i>Hibbertia puberula</i>	Sprawling in litter

Appendix F

Correspondence with OEH: Area of Occupany
Methodology

From: [REDACTED]
To: [REDACTED]
Cc: [REDACTED]
Subject: FW: OEH Advice - SSD-6766 Moorebank MPE Stage 1 C23
Date: Monday, June 4, 2018 1:56:11 PM

Hi [REDACTED]

Please see below response to request for advice from OEH. Can you please review the advice and advise whether the latest version of the report you have submitted to DPE is consistent with the OEH advice, including whether the impacts and offsetting requirements for the Hibbertia species have been assessed using the area of occupancy method. If not, please update the report and resubmit accordingly.

Thanks [REDACTED]

[REDACTED]
Team Leader, Infrastructure Management
Department of Planning and Environment
Level 22, 320 Pitt Street | Sydney NSW 2000
GPO Box 39 | Sydney NSW 2001 | T [REDACTED]

cid:image001.jpg@01CFB7DD.BF14CAA0



From: [REDACTED]
Sent: Monday, 4 June 2018 10:34 AM
To: [REDACTED]
Cc: [REDACTED]
Subject: OEH Advice - SSD-6766 Moorebank MPE Stage 1 C23

Hello [REDACTED]

OEH have reviewed the *MPE Stage 1 Rail Link: Hibbertia Pre-clearance Hibbertia Survey* report (the report) dated 10 April 2018 and provide the following advice in response to your questions:

1. That the pre-clearance surveys undertaken by Cumberland Ecology between 9 and 17 November 2017 for threatened Hibbertia species and as reported in the Hibbertia Species Survey Plan are still appropriate to determine the number of individual plants of each Hibbertia species present, as required under condition C23;

OEH considers the pre-clearance surveys within the rail link corridor appropriate for identifying the type and number of Hibbertia species. The survey intensity and survey timing are considered adequate.

2. That the methodology used to determine the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each Hibbertia

species is appropriate for the calculation of the offset, post bush fire impact;

*The method used to estimate the density (and therefore the total number) of *Hibbertia puberula* in the proposed offset area (i.e. the proposed Wattle Grove biobank site) is considered acceptable. For *Hibbertia fumana*, however, the method used may have resulted in an over-estimate of the population but as the credits required to be offset (14,168) is only 25% of the (over)estimated total (56,504) this is not considered significant issue. In any case, and as advised at the 16 May meeting, OEH is amending the method of determining the offsetting requirement for these *Hibbertia* species from numbers of individual plants to area of occupancy. The area of occupancy is considered to be a 30 m radius around each individual, or 0.238 ha. The total area of occupancy for a population is a single polygon determined by dissolving these individual circles and then rounding up to the nearest hectare.*

3. That the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each *Hibbertia* species can be achieved; and

*Based on the information provided in the report, and subject to OEH's approval of the proposed Wattle Grove biobank site, OEH considers the requirements for offsetting impacts on each *Hibbertia* species can be achieved (OEH calculations indicate the proposed Wattle Grove biobank site will generate at least 3 and 5 times the required offsets for *H. fumana* and *H. puberula*, respectively). OEH recommends the report be redrafted to assess the impacts and offsetting requirements for the *Hibbertia* species using the area of occupancy method.*

Sincere apologies for not being able to provide this advice on Friday.

Regards

[REDACTED]
Senior Team Leader Planning, Greater Sydney
Regional Operations Group
Office of Environment and Heritage
PO Box 644
Parramatta NSW 2124
[REDACTED]

W: www.environment.nsw.gov.au

From: [REDACTED]

Sent: Wednesday, 16 May 2018 1:28 PM

To: Richard Bonner [REDACTED]

Cc: [REDACTED]
[REDACTED]
[REDACTED]

Subject: SSD-6766 Moorebank MPE Stage 1 C23

Hi [REDACTED]

Thanks very much for OEH initial advice at this morning's meeting with the Proponent and from earlier discussions, regarding consideration of the requirements of condition C23.

Condition C23 requires the *Hibbertia* Species Survey Plan, including the survey method to be prepared in consultation with OEH, to the satisfaction of the Secretary. The survey report, dated 10 April 2018 has been submitted to DPE for consideration. DPE has undertaken an initial review of the *Hibbertia* Species Survey Plan. The Survey report notes that the pre-clearance surveys were conducted from 9-17 November 2017. The report also notes that additional surveys to confirm that the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each *Hibbertia* species can be achieved, were conducted in Wattle Grove offset area (also known as the 'Bootland' which comprises the area between the southern boundary of the terminal site and the eastern side of the approved Moorebank Avenue Bridge) in November 2017 and January 2018.

Regarding consideration of meeting the requirements for consultation with OEH, DPE notes from the survey report that no final correspondence from OE has been documented, indicating that OEH agrees with the survey method. There also appears to be an outstanding requirement for information requested by OEH for review, regarding the data obtained from previous surveys and previous survey methods. It may be that Cumberland Ecology undertook the surveys prior to the data requested by OEH being provided and without a confirmation from OEH that it was satisfied with the methodology.

Since this time the project area has been impacted by bush fire in both the biodiversity impact and offset areas. DPE is seeking your advice, in order to advise the Proponent on an update to the *Hibbertia* Species Survey Plan.

Could you please advise on the following:

1. That the pre-clearance surveys undertaken by Cumberland Ecology between 9 and 17 November 2017 for threatened *Hibbertia* species and as reported in the *Hibbertia* Species Survey Plan are still appropriate to determine the number of individual plants of each *Hibbertia* species present, as required under condition C23;
2. That the methodology used to determine the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each *Hibbertia* species is appropriate for the calculation of the offset, post bush fire impact;
3. That the required quantum of biodiversity offset credits needed to provide an offset for the surveyed number of individual plants of each *Hibbertia* species can be achieved; and
4. Any additional points to assist DPE's consideration of condition C23.

Your earliest advice would be greatly appreciated. Please let me know if you require anything further.

Thanks a lot.

[REDACTED]

[REDACTED]

Team Leader, Infrastructure Management

[REDACTED]

Subject: RE: Methodology for Hibbertia surveys

From: [REDACTED]

Sent: Wednesday, June 6, 2018 4:13 PM

To: [REDACTED]

Subject: RE: Methodology for Hibbertia surveys

Hi [REDACTED]

I have just got off the phone to John Seidel. He has confirmed that there would be no need to round up to the nearest hectare for the area of impact/conservation. The only rounding is at a credit level (since you can't acquire a part of a credit) as we suspected. He also confirmed the statement on rounding was not in the response/advice that he provided to Susan.

Regards,

[REDACTED]
Arcadis | Level 16, 580 George Street, Sydney | NSW 2000 | Australia

www.arcadis.com/au



From: [REDACTED]

Sent: Monday, 4 June 2018 5:03 PM

To: [REDACTED]

Subject: RE: Methodology for Hibbertia surveys

Hi [REDACTED]

I've looked over the email from OEH and agree with Ed's comments below.

While the updated Hibbertia Survey Plan (dated 22 May 2018) addresses the updated area of occupancy requirements (ie 30m radius around each individual), the credit calculations/credit balances will be significantly affected if the total area of occupancy has to be rounded off to the nearest hectare.

As Cumberland Ecology was not present at the meeting with DPE and OEH, I'm not sure exactly what was discussed but we will require confirmation from OEH in relation to the nearest hectare rounding off for the area of occupancy as I am also not aware of this being listed as a requirement within the Biodiversity Assessment Method 2017.

Regards,

[REDACTED] Senior Project Manager/Ecologist

Cumberland Ecology | Sydney - Brisbane
t 02 9868 1933
[REDACTED]

From: [REDACTED]

Sent: Monday, June 4, 2018 4:39 PM

To: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Subject: RE: Methodology for Hibbertia surveys

Hi [REDACTED]

The last part of Susan's response to question two states:

The total area of occupancy for a population is a single polygon determined by dissolving these individual circles and then rounding up to the nearest hectare.

I don't believe the Biodiversity Assessment Method (2017) suggests that rounding is required. The only rounding I'm aware of is at a credit level, not a species polygon level. This has the potential to present an issue for *Hibbertia fumana* since the rounding would take our offset requirement to 77 credits for 1 hectare (up from 20 credits for 0.26 hectares in the current memo). The yield for the biobank site will also be 77 credits for 11 hectares (up from 72 credits for 10.20 hectares in the current memo) meaning there will be no surplus.

I think this needs to be confirmed with OEH.

Regards,

[REDACTED]
Arcadis | Level 16, 580 George Street, Sydney | NSW 2000 | Australia

[REDACTED]
www.arcadis.com/au



From: [REDACTED]

Sent: Monday, 4 June 2018 3:50 PM

To: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Subject: RE: Methodology for Hibbertia surveys

Importance: High

[REDACTED]

Please can you review the attached from OEH and confirm that these are addressed in the report previously prepared. My initial read of the comments is that the updated report (prepared to convert to habitat area) already addresses comments and if this is your interpretation we would simply ask that you append the email to report and update revision and date to note they have been included and re-issue. If they aren't, can you please review and revise to address the comments, and append and update per the first point and re-issue.

We are in very urgent need of this report to enable work to proceed on site, so if this can be prioritised with urgency it would be greatly appreciated. We would also appreciate a brief update on timing to close out either option above once you have had a chance to read the comments.

Regards,

[REDACTED]

DIRECTOR



LEVEL 15 | 124 WALKER STREET | NORTH SYDNEY | NSW | 2060

[REDACTED]

W www.tacticalgroup.com.au



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