



**HASTINGS**  
Technology Metals Limited

**APPENDIX 1-3**

**GDE Memo**



30 January 2017

Our ref: 11133-3397-15L

Lara Jefferson  
 Environment Manager  
 Hastings Technology Metals  
 C/- Wave International  
 306 Murray Street, Perth  
 Western Australia 6000

Dear Lara

**IMPACT OF POST MINING GROUNDWATER DRAWDOWN ON GROUNDWATER DEPENDANT ECOSYSTEMS**

During 2015, Ecoscape conducted Level 2 Flora, Vegetation and Fauna assessments within Hastings’ Yangibana study area, in the Gascoyne region of Western Australia. Since then, the post mining groundwater drawdown modelling has been conducted. This document presents the results of this modelling with regards to the potential impacts to Groundwater Dependiant Ecosystems (GDEs).

As outlined by Ecoscape (2016), vegetation types with the phreatophytic species *Eucalyptus camaldulensis* were considered to represent a GDE whilst vegetation characterised by *Eucalyptus victrix* were considered potentially representative of a GDE. The **EcMgCc** vegetation type was dominated by *Eucalyptus camaldulensis* and is therefore considered as a GDE. The **EvCc** and **EvReMg** vegetation types were characterised by *Eucalyptus victrix* whilst the **AcEt** and **AcAsCc** occasionally contained this species and may therefore represent a GDE.

The modelled post mining groundwater drawdown is presented in the maps attached (**Figure 4, Figure 5, Figure 6** and **Figure 7**). This mapping demonstrates that, of the GDEs (or potential GDEs) identified within the Yangibana study area, only the **AcEt** vegetation type intersects the modelled post mining drawdown. This includes 19.05 ha at ‘Bald Hill’, 22.09 ha at ‘Frasers’ and 100.61 ha at ‘Yangibana’ (total of 141.74 ha).


The **AcEt** vegetation type is primarily dominated by *Acacia cyperophylla* which is not known or considered to be a groundwater dependant species. This vegetation type was only occasionally observed to contain scattered or isolated individuals of *Eucalyptus victrix*, more commonly this species was absent. Therefore, it is considered unlikely that the **AcEt** vegetation type represents a groundwater dependant, at least in most cases. The potential impact of post mining groundwater drawdown on GDE’s is therefore considered likely to be negligible or nil.

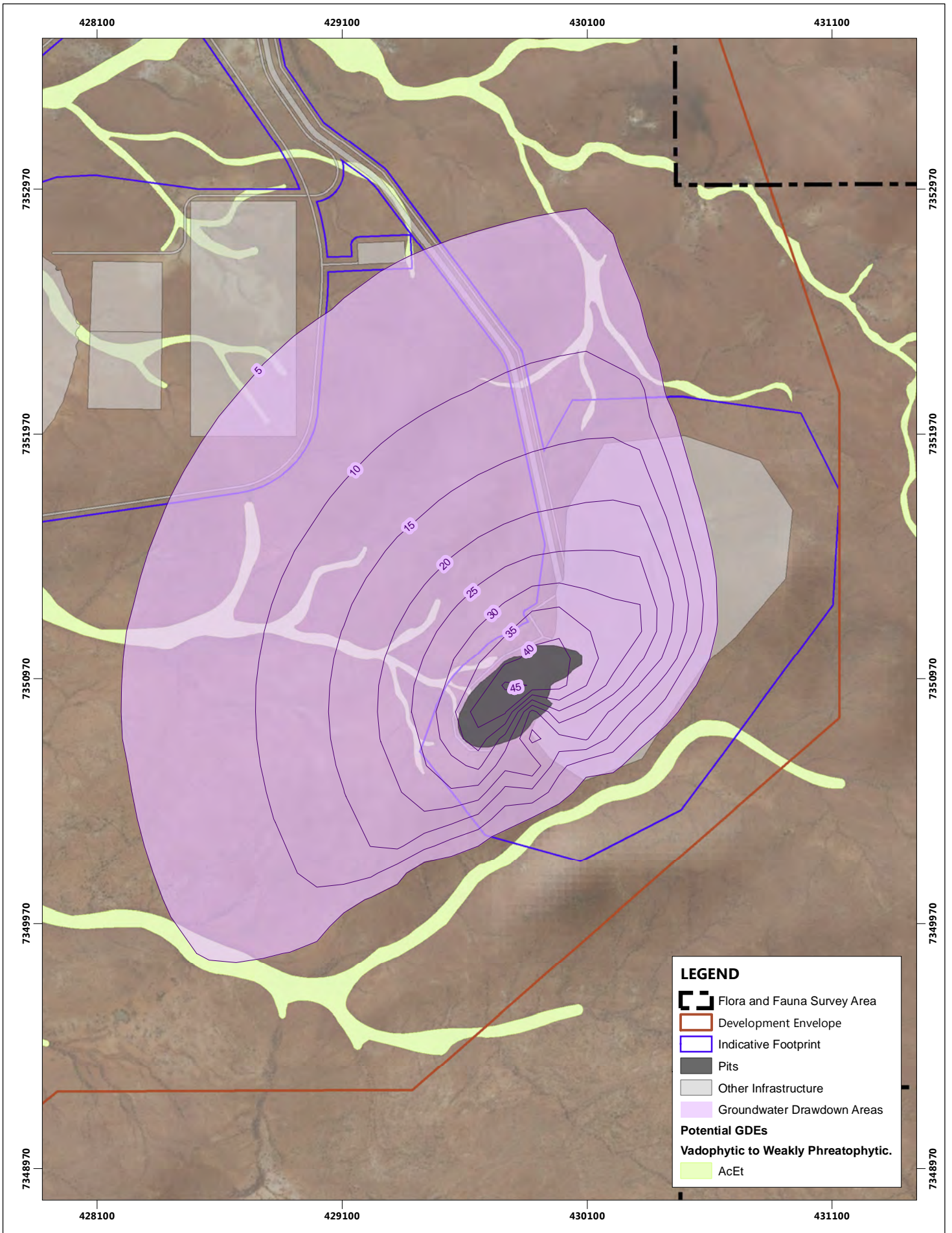
Yours sincerely

**Ecoscape (Australia) Pty Ltd**



STEPHEN KERN  
 Senior Botanist, Team Leader

<b>QA Approved by:</b>	Lyn Atkins Associate Environmental Scientist		<b>Date:</b>	30/01/2017
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SCALE: 1:20,000 @ A4  
 COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METER

**DATA SOURCES:**  
 SERVICE LAYERS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA, USGS, AEX, GETMAPPING, AEROGRIID, IGM, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY



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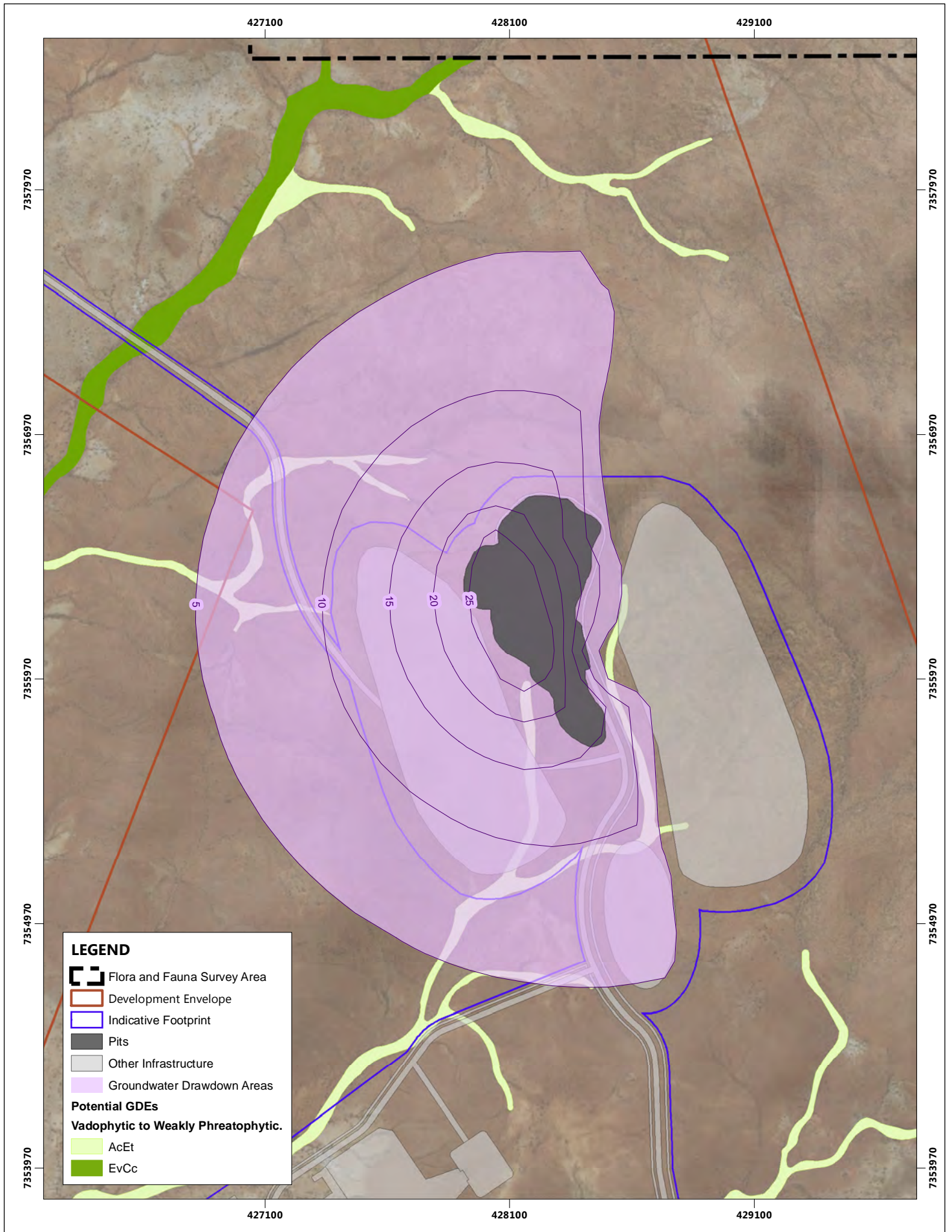


## FRASERS POST MINING GROUNDWATER DRAWDOWN

**YANGIBANA RARE EARTHS PROJECT**  
 CLIENT: HASTINGS

**FIGURE**  
**04**





SCALE: 1:20,000 @ A4  
 COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METER

**DATA SOURCES:**  
 SERVICE LAYERS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA, USGS, AEX, GETMAPPING, AEROGRIID, IGM, IGP, SWISSOTOPO, AND THE GIS USER COMMUNITY



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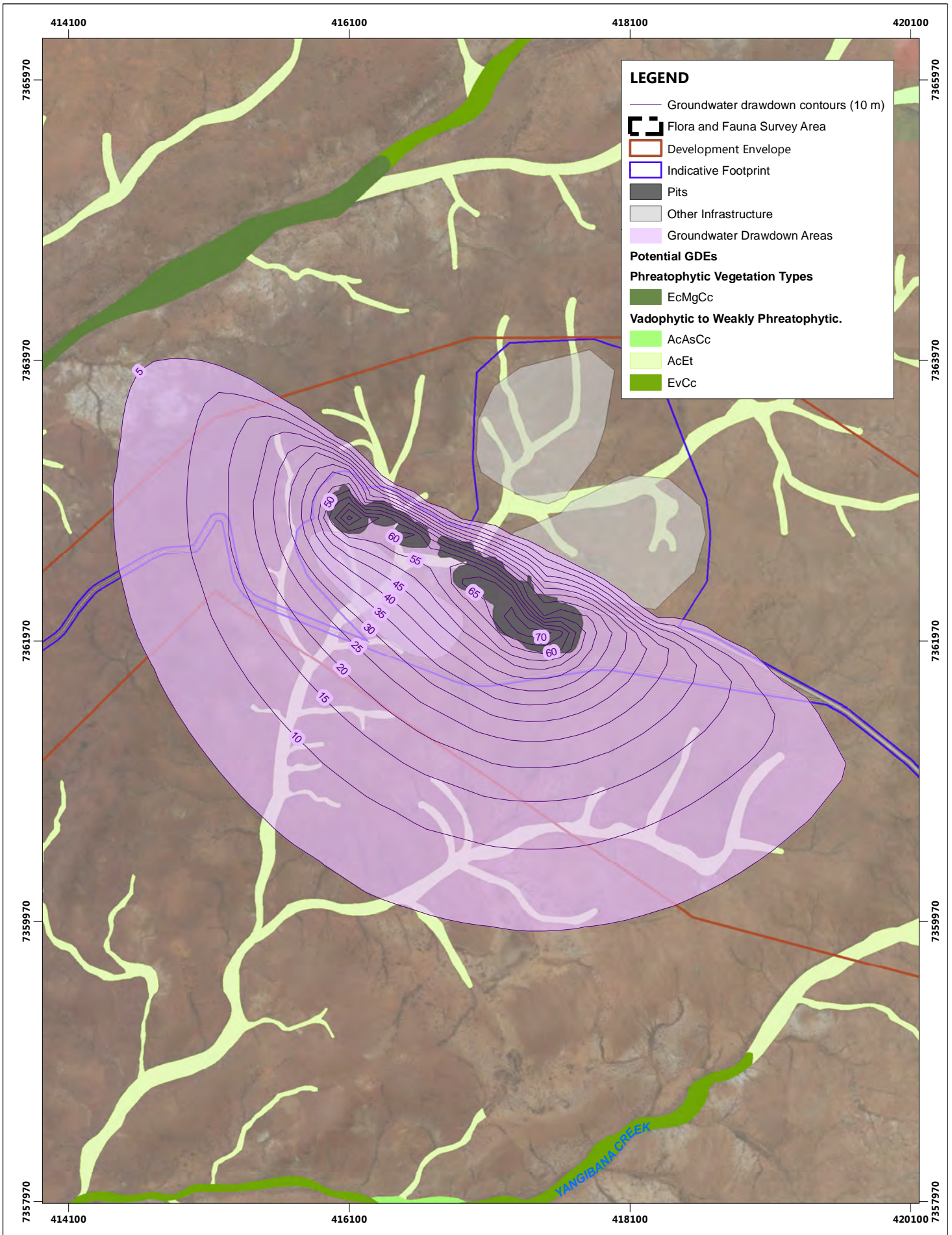


**BALD HILL POST MINING  
 GROUNDWATER  
 DRAWDOWN**

**YANGIBANA RARE EARTHS PROJECT**  
 CLIENT: HASTINGS

**FIGURE  
 05**





SCALE: 1:35,000 @ A4  
 COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METER

**DATA SOURCES:**  
 SERVICE LAYERS: SOURCE: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED, USDA, USGS, AEX, GETMAPPING, AEROGRID, IGM, IGP, SWISSTOPO, AND THE GIS USER COMMUNITY

**ecoscape**

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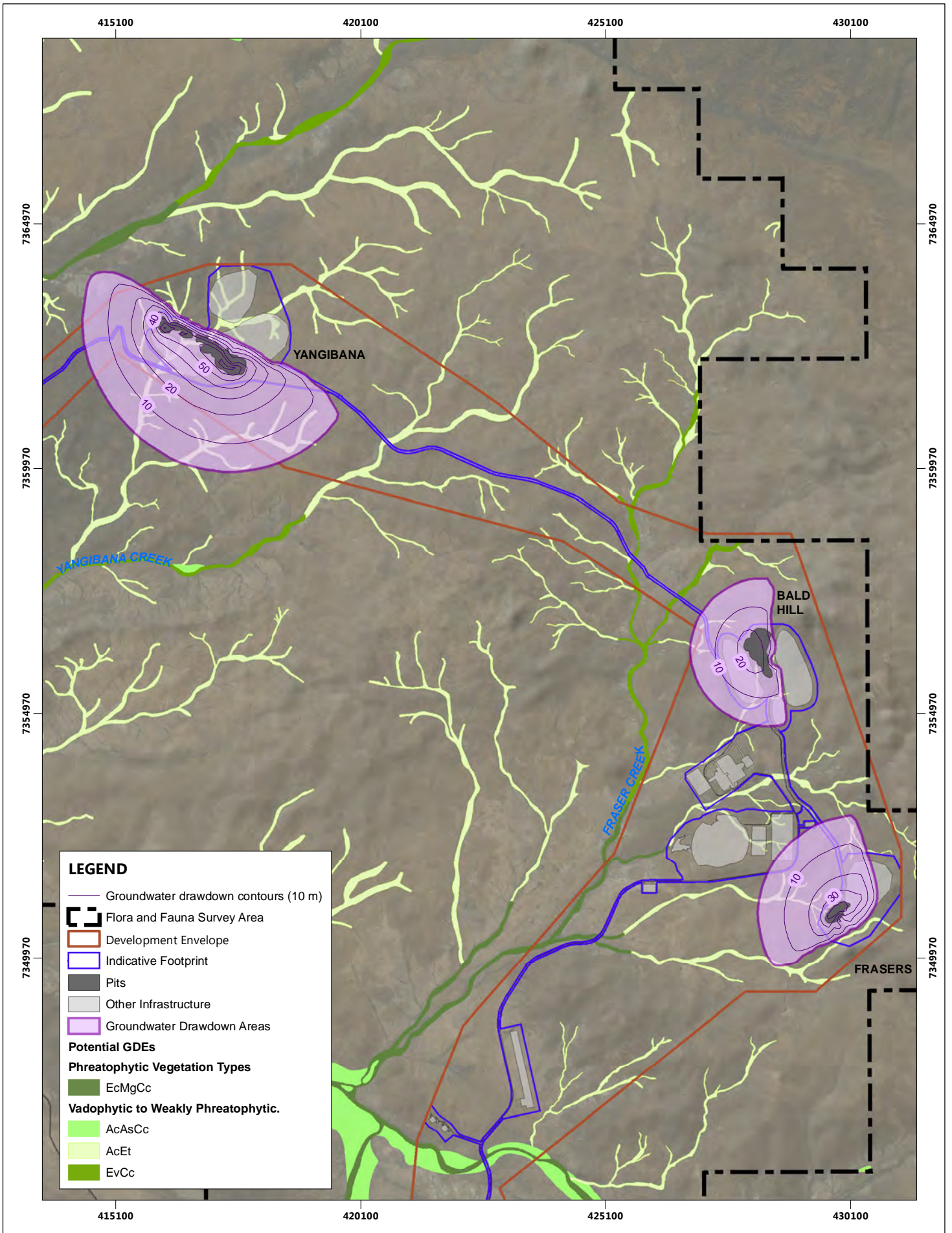


## YANGIBANA POST MINING GROUNDWATER DRAWDOWN

**YANGIBANA RARE EARTHS PROJECT**  
 CLIENT: HASTINGS

**FIGURE  
 06**





SCALE: 1:100,000 @ A4  
 COORDINATE SYSTEM: GDA 1994 MGA ZONE 50  
 PROJECTION: TRANSVERSE MERCATOR  
 DATUM: GDA 1994  
 UNITS: METER  
**DATA SOURCES:** SOURCE: ESRI, DIGITALGLOBE, GEOEYE, I-CUBED,  
 USDA, USGS, AEX, GETMAPPING, AEROGIRD, IGN, IGP, SWISSTOPO,  
 AND THE GIS USER COMMUNITY

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**POST MINING  
 GROUNDWATER  
 DRAWDOWN AND GDES**

**YANGIBANA RARE EARTHS PROJECT  
 CLIENT: HASTINGS**

**FIGURE  
 07**