

Proposed Ravensthorpe Heavy Haulage Route, Targeted Spring Flora Survey

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EXECUTIVE SUMMARY

South Coast Highway (SCH) is the main inter-regional route between the Goldfields-Esperance and Great Southern Regions and it links the towns of Albany, Ravensthorpe and Esperance. It also provides a link between the Wheatbelt and Esperance via the Brookton Highway.

This project is required to address issues of safety and level of service arising from trucks losing traction on the steep hill through Ravensthorpe town site and provides an alternative heavy vehicle route around Ravensthorpe which eliminates the "stall" risk for heavy vehicles.

Several options have been considered for this project, however, the preferred is to construct a dedicated heavy haulage route to the north of the Ravensthorpe town site; herein referred as the Ravensthorpe heavy haulage route (RHHR).

Also included in the project is the realignment of the Hopetoun Road with the SCH. The Hopetoun Road currently intersects with the SCH in a "Y" Junction configuration opposite the Ravensthorpe School. These intersection types are poor in design and safety standards. The opportunity to realign the Hopetoun Road intersection with the SCH is being undertaken to improve the safety and level of service of this intersection. The new intersection will be at right angles to the SCH and will form part of a roundabout with the SCH/RHHR intersection. Additionally, the intersection and Hopetoun Road are relocated away from the Primary School.

An out of season flora survey was conducted by Great Southern Bio Logic associate Gil Craig in June 2013. This survey was suitable to identify perennial species however unable to identify annual species and native grasses. Two priority species of *Austrostipa* were identified as occurring within 20km of the project area, *Austrostipa* sp. Carlingup Road (S. Kern & R. Jasper LCH 18459) P1 and *Austrostipa* sp. Ravensthorpe Range (A. Markey & J. Allen 6261) P1. Accordingly a recommendation was made to undertake a targeted survey, intended to assess the presence of priority Austrostipa species and priority annual species.

Great Southern Bio Logic associate Libby Sandiford conducted the targeted spring survey on 24 September 2013.

- 87 annual, geophytic and/or grass or introduced species were recorded within the proposed Ravensthorpe Heavy Haulage Route (RHHR) during this spring survey, which had not been recorded in previous surveys (Craig 2013). These species included:
 - 50 native species
 - 37 introduced species
- One introduced species: *Ornithogalum umbellatum (Star of Bethlehem) was a new record for Western Australia. This species is listed as prohibited species (C1 category exclusion) under the Biosecurity and Agricultural Management Act 2007(BAM Act 2007). The Dept. of Agriculture and Food Western Australia (DAFWA) and GHD were informed at the time and Both the Department of Parks and Wildlife (DPaW) and DAFWA were involved in the formal identification. DAFWA have undertaken subsequent searches for this species and occurrences spread over 4ha of agricultural land, beyond the alignment, were identified and treated.



- One declared pest plant **Carthamnus lanatus,* previously identified in Section 1 during the initial survey (Craig 2013) was also recorded in the western portion of Section 2.
- No conservation species were recorded.

Eight A*ustrostipa* species were recorded but these did not include the conservation species known from the Ravensthorpe region: *Austrostipa* sp. Carlingup Road (S. Kern & R. Jasper LCH 18459) P1 or *Austrostipa* sp. Ravensthorpe Range (A. Markey & J. Allen 6261) P1.



1 INTRODUCTION

South Coast Highway (SCH) is the main inter-regional route between the Goldfields-Esperance and Great Southern Regions and it links the towns of Albany, Ravensthorpe and Esperance. It also provides a link between the Wheatbelt and Esperance via the Brookton Highway.

The main driver for this project is the steepness of the hill in the Ravensthorpe town site. The hill is approximately 150 m long. Most of the incline has a grade of 9%, however, the grade increases dramatically to 11% near the apex of the hill.

Anecdotal reports of between 20 and 50 heavy vehicles per year are stranded (either stall or lose traction) while attempting the incline and require assistance (a tow) to get off the hill. The trucks losing traction pose a risk to businesses, pedestrians and the primary school located at the bottom of the hill. There are considerable risks in recovering stranded heavy vehicles from the steep hill, with numerous tow chains snapping during this process.

This project is required to address issues of safety and level of service arising from trucks losing traction on the steep hill through Ravensthorpe town site and provides an alternative heavy vehicle route around Ravensthorpe which eliminates the "stall" risk for heavy vehicles.

Several options have been considered for this project, however, the preferred is to construct a dedicated heavy haulage route to the north of the Ravensthorpe town site; herein referred as the Ravensthorpe heavy haulage route (RHHR).

A number of public meetings and consultation with key stakeholders have been undertaken to determine the preferred option for the heavy haulage route.

Also included in the project is the realignment of the Hopetoun Road with the SCH. The Hopetoun Road currently intersects with the SCH in a "Y" Junction configuration opposite the Ravensthorpe School. These intersection types are poor in design and safety standards. The opportunity to realign the Hopetoun Road intersection with the SCH is being undertaken to improve the safety and level of service of this intersection. The new intersection will be at right angles to the SCH and will form part of a roundabout with the SCH/RHHR intersection. Additionally, the intersection and Hopetoun Road are relocated away from the Primary School.

Funding for the project has been provided in the 2012/13, 2013/14 and 2014/15 financial years. The project must be completed by 30 June 2015. It is proposed that construction is scheduled to commence in November 2013 (Section 1) and finish in April 2015.

An initial vegetation and flora survey for the proposed Ravensthorpe Heavy Haulage Route (RHHR) was undertaken by Great Southern Bio Logic Associate, Dr. Gil Craig in June 2013 (Craig 2013). Due to the time of survey it was not then possible to identify all annuals or *Austrostipa* species and therefore not possible to ascertain if the conservation species *Austrostipa* sp. Carlingup Road (S. Kern & R. Jasper LCH 18459) P1 and/or *Austrostipa* sp. Ravensthorpe Range (A. Markey & J. Allen 6261) P1 or any annual conservation species were present. Thus this targeted flora survey for *Austrostipa* species, annuals and geophytes was undertaken on the recommendation of the previous report.



2 METHOD

The proposed clearing zone for the new RHHR was traversed on foot on 24/9/2013, using a projected shapefile displayed on a hand held GPS to determine location. The eastern portion of Section 1, which was under crop at the time of survey, and most of the fallow paddock north of the highway were not surveyed as these areas were unlikely to include the targeted conservation species.

All introduced species, native annuals, geophytes and grasses were noted as encountered, with GPS locations recorded for species that could not be identified in the field. These species were later identified using relevant texts, the Albany Regional Herbarium, Western Australian Herbarium (Perth) and with assistance from relevant specialists. All *Austrostipa* specimens collected were identified or confirmed by Alex Williams, Research Associate and *Austrostipa* expert, WA Herbarium on 25/10/2013. Nomenclature follows current WA herbarium usage.



3 RESULTS AND DISCUSSION

The targeted survey identified 87 annuals, geophytes and/or grasses and weeds which had not been recorded in the previous survey (Craig 2013) (Appendix A & B). These species included 50 native and 37 introduced species including one new record for Western Australia: *Ornithogalum umbellatum* (Star of Bethlehem).

3.1 Native Species

- There were 48 native annuals recorded in Section 2 with 36 of these species only recorded in this section. This section has the greatest diversity in vegetation types and most vegetation is in very good to excellent condition (Craig 2013).
- No annual or grass conservation species were recorded.
- Eight Austrostipa species were recorded: A. elegatissima, A. puberula, A. eremophila, A. exilis, A. arociliata, A. hemipogon. A. trichophyla and A. variabilis. Not all of these species were distinguishable in the field as many lacked the distinctive mature awn shapes or indumentum due to the young age of flowers and some required microscopic examination to measure anther lengths to differentiate species.

Some *A. eremophila* and *A. puberula* specimens exhibited variation in characters that made it hard to determine species whilst a number of *A. puberula* specimens exhibited atypical hairy leaves as well as single anther development. This unusual stamen development has previously only been reported in a few *A. puberula* specimens from Ravensthorpe and in the conservation species *A.* sp.Carlingup Rd and *A.* sp. Ravensthorpe Range (A. Williams, WA Herbarium pers. comm).

3.2 Introduced Species

An additional 37 introduced species were recorded during this survey with 15 new species recorded in both Section 1 and 3 and 22 species recorded in Section 2 (Appendix B).

Ornithogalum umbellatum (Star of Bethlehem) was recorded in the paddock north of the South Coast Hwy in Section 1 (See Figure 1). It is a prohibited Declared Pest under the under the BAM Act (2007) with a C1 category (Exclusion) listing (Appendix C). This species was tentatively identified on 29/9/2013, confirmed on basis of photographs by Greg Keighery (DPaW) on 30/9/2013, and confirmed by viewing a pressed specimen by John Moore (DAFWA) on 1/10/2013. This is the first recording of this species in Western Australia.

Ornithogalum umbellatum is prohibited as it is an alternate host for barley leaf rust and thus has potential to cause significant crop losses and can be toxic to live stock (John Moore pers. comm).

As a Declared Pest there is a requirement to report presence or suspected presence under the BAM Act 2007. This requirement has been satisfied by the involvement of both DPaW and DAFWA in the identification process.

Following reporting of the weed, DAFWA undertook an independent search of the area and found the species distributed over a four hectare area of the paddock. It is understood that the affected area has been the subject of an eradication program including the spraying of herbicides.

The area where this species was found has a long history of disturbance and clearing associated with both agriculture and mining (Dr Gil Craig, Environmental Consultant



Ravensthorpe, John Moore DAFWA pers.comm.). It is unclear how long *Ornithogalum umbellatum* has been present, but given the past history of the location, bulbs and/or seed may have spread off site via soil and/or vehicles.



Plate 1 a,b c: Ornithogalum umbellatum (Star of Bethlehem), Declared Pest- prohibited.

One declared pest plant **Carthamnus lanatus* was found to be more widespread than initially reported (Craig 2013). It was recorded in the western portion of Section 2 as well as the previously reported Section 1. This species is listed as a "prohibited" "C3 management" species.



4 REFERENCES AND ACKNOWLEDGEMENTS

BAM Act (2007), Biosecurity and Agricultural Management Act. http://www.slp.wa.gov.au/legislation/statutes.nsf/main_mrtitle_2736_homepage.html

Craig, G (2013) *Ravensthorpe Heavy Haulage Route Botanical Survey,* unpublished report prepared for Great Southern Bio Logic and GHD, July 2013

The assistance of Alex Williams (Research Associate, WA Herbarium) in providing preliminary descriptions of the conservations Austrostipa species and in identifying the array of *Austrostipa*s collected is gratefully acknowledged. The assistance of Greg Keighery, (Science Division, Kensington), and John Moore (DAFWA, Albany) in confirming the identity of *Ornithogalum umbellatum* and assistance of Mike Hislop (WA Herbarium) in identifying *Bupleurum semicompositum* is also gratefully acknowledged.



5 LIMITATIONS

This report was prepared for GHD, on behalf of Main Roads WA, for the purposes set out in the introduction and it is not intended that any other person use or rely on the contents of this report.

Whilst the information contained in the Report is accurate to the best of our knowledge and belief, Great Southern Bio Logic and its agents cannot guarantee the completeness or accuracy of any of the descriptions or conclusions based on the information supplied to it or obtained during the site investigations, site surveys, visits and interviews. Furthermore, field and/or regulatory conditions are subject to change over time, and this should be considered if this report is to be used after any significant time period after its issue.

Great Southern Bio Logic and its agents have exercised reasonable care, skill and diligence in the conduct of project activities and preparation of this report. However, except for any non-excludable statutory provision, Great Southern Bio Logic and its agents provide no warranty in relation to its services or the report, and is not liable for any loss, damage, injury or death suffered by any party (whether caused by negligence or otherwise) arising from or relating to the services or the use or otherwise of this Report.

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Figures Proposed Ravensthorpe Heavy Haulage Route – Targeted Spring Flora Survey



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Date: 2/11/2013

Addendum Figure 1: Targeted Flora Survey - Ravensthorpe Heavy Haulage Route - Section 1

Ravensthorpe Heavy Haulage Route Targeted Flora Survey prepared for GHD, November, 2013

LEGEND

Species
Ornithogalum umbellatum
Carthamnus lanatus
Section_1_plz



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Addendum Figure 2: Targeted Flora Survey - Ravensthorpe Heavy Haulage Route - Section 2

Ravensthorpe Heavy Haulage Route Targeted Flora Survey prepared for GHD, November, 2013

LEGEND

Species Carthamnus lanatus -Section_2_plz



Appendix A – Species List – Native Annuals

Family	Species		Section 1	Section 2	Section 3
Apiaceae					
	Daucus glochidiatus			•	
Araliaceae	6				
	Hydrocotyle callicarpa			•	
	Hydrocotyle pilifera			•	
	Hydrocotyle rugulosa			•	
	Trachymene ornata			•	
	Trachymene pilosa			•	
Asparagaceae					
	Chamaescilla corymbosa			•	
	Thysanotus manglesianus			•	
Asphodelaceae	5 #				
	Buibine semibarbata			•	•
Asteraceae	Actinchala uliginasum			_	
	Actinobole uliginosum Acterides athrivioides				
	Blennospora drummondii			•	
	Calotis hispidula			•	
	Euchiton sphaericus		•		
	Hyalosperma demissum			•	
	Lagenophora huegelii			•	
	Millotia tenuifolia			•	
	Myriocephalus occidentalis			•	•
	Podolepis rugata			•	•
	Senecio glossanthus			•	
Brassicaceae					
	Lepidium rotundum			•	
Campanulaceae					
	Isotoma nypocrateriformis			•	
Controlonidaceae	wanienbergia preissii			•	
Centrolepidaceae	Centrolenis aristata			•	
Crassulaceae					
Chaobalaobao	Crassula closiana			•	
	Crassula exserta		•	•	•
	Crassula tetramera			•	
Cyperaceae					
	Schoenus nanus			•	
Euphorbiaceae					
	Euphorbia drummondii		•	•	•
Geraniaceae	Fradium arinitum				
Goodeniaceae				•	
Goodemaceae	Goodenia berardiana			•	
Haloragaceae					
Indiologuoodo	Gonocarous nodulosus			•	
Lamiaceae					
	Teucrium sessiliflorum			•	
Loganiaceae					
	Phyllangium divergens			•	
Orchidaceae					
	Caladenia attingens subsp.	gracillima		•	
	Caladenia horistes			•	•
	Cyanicula gemmala			•	
	Thelymitra vulgaris				
Phyllanthaceae					
i nyhantina oo ao	Poranthera microphylla			•	
Plantaginaceae	, ,				
	Plantago hispida			•	
Poaceae					
	Austrostipa acrociliata			•	•
	Austrostipa hemipogon				•
	Austrostipa trichophylla			•	•
	Austrostipa variabilis			•	
	nylluosperina caespitosum Bytidosperma pilosum		•	•	
Portulacaceae	πιγτιουορ ο πηα μποsuπη			-	
, unacaceae	Calandrinia brevipedata			•	
	Calandrinia eremaea			•	•
Stylidiaceae					
	Levenhookia pusilla			•	

Appendix B Species List - Introduced species

Family	Species	Section 1	Section 2	Section 3
Aizoaceae	•			
	*Mesembryanthemum nodiflorum		•	•
Apiaceae	,			
	*Bupleurum semicompositum		•	
Asparagaceae				
Asparagaecae	*Ornithogalium umbellatum			
Actoropoo	Omithoganum umbenatum	-		
Asleraceae	*Contouros molitonais		_	
	Centaurea mentensis			
	Hedyphois magadioloides	•	•	•
	"Lactuca serriola	•		
	^Monoculus monstrosus			•
	*Urospermum picroides	•	•	•
Brassicaceae				
	*Diplotaxis muralis	•		
	*Lepidium africanum			•
	*Sisymbrium orientale		•	
Caryophyllaceae				
	*Moenchia erecta		•	
	*Petrorhagia dubia			•
	*Silene nocturna		•	
Cucurbitaceae				
oucubhaceae	*Cucumis myriocarous		•	
Fabacaaa	Cucums mynocalpus			
abaceae	*Madiaaga palumaraha		-	
	Medicago polymorpha			•
			•	
- ·	" I ritolium repens	•	•	
Geraniaceae				
	*Erodium cicutarium	•		
	*Erodium moschatum		•	
Iridaceae				
	*Romulea rosea		•	
Lythraceae				
	*Lythrum hyssopifolia			•
Poaceae				
	*Aira caryophyllea		•	
	*Avellinia michelii			•
	*Avena barbata	•	•	•
	*Bromus rubens	•	•	•
	*Cenchrus clandestinus			
	*Ebrharta calvoina			
	*Hordoum loporinum		-	_
			•	
				•
	Pentamens airoides		•	
	*naiaris minor	•		
	"Pnaiaris paradoxa	•		
	*Schismus barbatus	•	•	
	*Vulpia myuros		•	
Rubiaceae				
	*Galium murale		•	
Solanaceae				
	*Solanum nigrum			•
1	-	s	,	

Appendix C Declared Pest Categories

C1 category (Exclusion) – Pest will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State

C2 category (Eradication) – pest will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility

C3 category (Management) – pests will be assigned to this category if they are established in Western Australi but it is feasible, or desirable, to manage them in order to limit their damage. Control measure can prevent a C3 pes from increasing in population sixe or density or moving from an area in which it is established to an area which currently is free of that pest.