Water Corporation

Vasse Diversion Drain

Proposal Variation Summary Report

May 2018

Table of contents

Table index

Appendices

1. Introduction

1.1 Project background

The Water Corporation (the Corporation) is proposing to upgrade the Vasse Diversion Drain which is located in the City of Busselton approximately 220 km south of Perth, in the south-west of Western Australia. The Vasse Diversion Drain (VDD) is a 6 km manmade channel and commences just north of the Busselton Golf Course with the diversion headworks, in the form of a barrier levee (Vasse River Diversion Dam (VRDD)) and extends to the ocean at Geographe Bay. The purpose of the drain is to divert the Vasse and Sabina River toward the west of Busselton and provide flood protection for the town.

Based on triggers in the Department of the Environment and Energy (DEE) guidelines, the project was referred under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 11 May 2017. The DEE determined the project would be assessed as a Controlled action (EPBC 2017/7932) due to potential impacts on listed Threatened species. Following this determination by DEE, the Corporation modified the project footprint so it no longer aligns with the referral documentation. The project footprint has been refined to reduce the total clearing of native vegetation which supports significant habitat for the threatened Western Ringtail Possum and three species of Black Cockatoo as well as for operational requirements.

1.2 Purpose of this report

The purpose of this report is to provide additional information to support the new refined project footprint. This will incorporate a consolidated summary of previous surveys to support the analysis. It is intended that this report will be submitted with the EPBC Act referral variation memorandum to the DEE as a variation of the original Vasse Diversion Drain EPBC Act referral.

1.3 Project footprint

The original development footprint as defined in referral [2017/7932] for the proposed upgrade of the VDD encompassed a section of the existing VDD easement, approximately 5.6 km in length, commencing at the VRDD in the vicinity of the Busselton Golf Club where the drain joins the Vasse River and running northward to the northern side of New River (adjacent to the Queen Elizabeth Avenue bridge). The average width of the original footprint was approximately 70 m. The total area of the original development footprint was 39.62 ha, of which 6.34 ha is made up of the existing VDD channel.

The project footprint has been modified to allow for operational requirements of the project. The new proposed action has increased the project footprint to a total of 42.01 ha, of which approximately 6.14 ha is made up of the existing VDD channel. The northern boundary of the new project footprint has been extended by a further 50 m whilst the southern boundary has been reduced by approximately 80 m. The average width of the alignment has increased to approximately 80 m with some areas reduced in width.

The need to revise the footprint provided an opportunity to further refine the project boundary where possible to reduce the impacts to native vegetation considered as significant habitat for threatened fauna (Black Cockatoo's and Western Ringtail Possum). For example, the southern section of the project footprint has been largely refined and reduced by approximately 3.57 ha to avoid fauna habitat. The revised project footprint is shown in Figure 1, Appendix A.

The project footprint represents the maximum disturbance area associated with the proposed action.

1.4 Report limitations

This report has been prepared by GHD for the Water Corporation and may only be used and relied on by the Water Corporation for the purpose agreed between GHD and the Water Corporation as set out in the accepted GHD proposal.

GHD otherwise disclaims responsibility to any person other than the Water Corporation arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by the Water Corporation and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Previous studies

A number of biological and other associated studies have been undertaken as part of the Vasse Diversion Drain project. The relevant surveys and studies which have been carried out for the project are listed in Table 1.

Table 1 Previous surveys and studies relevant to the project

Report title and author(s)	Date	Survey Type
Vasse Diversion Drain – Carbunup King Spider Orchid Targeted Survey (GHD 2017a)	October 2017	A targeted Carbunup King Spider Orchid survey was undertaken to identify presence/absence of the orchid within the survey area. The survey area covered 39.62 hectares and aligned with the project area within the EPBC Act referral submitted for the project (EPBC Ref: 2017/7932).
Vasse Diversion Drain Fauna and Vegetation Assessment – Additional Survey Area (GHD 2017c)	April 2017	The survey area included additional areas around the VDD (southern part of the development area). The survey area along the drainage line was widened in certain area from one to several meters. The survey included a vegetation assessment to identify and describe the dominant vegetation units and assess vegetation condition. The field survey was undertaken on 8 March 2017, which identified native vegetation, fauna habitats, fauna evidence and environmental features for threatened fauna, targeting the presence of black cockatoos and Western Ringtail Possum.
Vasse Diversion Drain Upgrade Flora and Fauna Study (GHD 2017b)	April 2017	The survey area encompassed a corridor approximately 40-60 m wide along the length of the VDD, a total survey area of approximately 31.9 hectares. The survey area incorporated the area assessed in the 2009 flora and fauna survey, as well as an additional area not previously surveyed. The biological survey assessed the key flora, vegetation and fauna values, specifically the presence of black cockatoos and Western Ringtail Possum habitat within the drain areas proposed for upgrade. The survey was undertaken on the 28 and 29 September 2016.
Vasse Diversion Drain Upgrade Flora and Fauna Study (GHD 2010)	January 2010	The survey involved a Level 2 flora and vegetation survey and a Level 1 fauna survey. The survey area included a 6.3 km section of the VDD from the ocean outfall point at Geographe Bay in the north to the Busselton

Report title and author(s)	Date	Survey Type
		Golf Club course in the south. The level 1 fauna survey included a targeted survey for Western Ringtail Possums and their dreys. The survey was conducted between the 15 and 16 October 2009.
Busselton Flood Protection Project Vasse Diversion Drain Upgrade – Acid Sulphate Soils Investigation (GHD 2009)	September 2009	GHD was engaged in 2009 to investigate the potential presence of Acid Sulphate Soils (ASS) along the VDD alignment prior to upgrade works on the VDD, as part of the Busselton Flood Protection Project (BFPP). Two phases of soil investigation were undertaken; Phase 1 (January 2007) was conducted in conjunction with geotechnical investigations and Phase 2 (May 2007) involved a supplementary investigation to further define the extent of ASS identified in the Phase 1 investigations.
Freshwater Mussels (*Westralunio carteri*) in the catchments of Geograph Bay, south-western Australia (Murdoch University) (Lymbery et al. 2008)	November 2008	Following a survey undertaken by the WA Museum in 2006 which identified the presence of the freshwater mussel *Westralunio carteri* within the VDD, the Murdoch University was contracted to conduct further studies of the mussel populations. The scope of works included the resampling of sites within the VDD that were found to contain mussel populations and provide more accurate density estimation of the species within the drain as well as additional surveys to determine presence and establish population densities within the Vasse River and other adjacent river systems. Mussel samples were also undertaken for genetic studies. The report provided recommendations for actions required to mitigate any impacts of upgrade works in the VDD.
Survey of the Non-marine Molluscan Fauna of the Vasse Diversion Drain, Busselton, Western Australia (WA Museum) (Slack-Smith 2006)	January 2006	During planning for the proposed upgrading of the VDD, the Water Corporation became aware of the possible presence of a species of freshwater mussel in the drain. The Western Australian Museum was contracted to carry out a survey of the non-marine molluscs of the VDD. The fieldwork section of this survey was carried out by S. Slack-Smith and C. Whisson of the Museum's Department of Aquatic Zoology on January 10, 2006. This survey identified the presence of the freshwater mussel *Westralunio carteri.*

3. Methodology

The potential impact associated with the revised project footprint has been determined through two process. Where the project footprint extends outside the original development footprint referred to DEE, extrapolation occurred. Within the original development footprint the vegetation and habitat mapping was refined to more accurately quantify vegetation and habitat extents.

Section 4 (Results) compares the potential impacts associated with the revised project footprint against the original development footprint referred to DEE.

3.1 Extrapolation

The project footprint has been widened along the majority of the project footprint. Based on current aerial imagery and previous surveys conducted in the area, GHD have extrapolated existing field results to update vegetation type, vegetation condition and fauna habitat type mapping.

3.2 Mapping refinement

The original vegetation, condition and fauna habitat mapping undertaken for the project was completed on a large scale and is therefore considered to overstate the actual amount present in some instances. As a result the vegetation types, vegetation condition and fauna habitat types mapped within the project footprint have been refined on a small scale based on the most current aerial imagery to more accurately represent the potential impacts associated with the project.

4. Results

4.1 Vegetation type

Five vegetation types have been mapped within the project footprint, as well as the Vasse drain (watercourse) and highly disturbed vegetation. Although the total project footprint has increased by 2.41 ha, the clearing of remnant native vegetation has reduced, with the majority (74%) of the project footprint consisting of highly disturbed (or cleared) vegetation.

A summary of the vegetation types recorded in the revised project footprint is provided in Table 2 with updated mapping provided in Figure 2, Appendix A.

Table 2 Summary of the vegetation types mapped in the original proposal area and the proposed variation.

Vegetation Type	Original project footprint (ha)	Revised project footprint (ha)	Change in area
Acacia and Peppermint Shrubland	3.44	2.77	-0.67
Marri and Flooded Gum Woodland	3.57	1.20	-2.37
Peppermint Woodland over Sedgeland	0.11	0.28	+0.17
Peppermint Woodland	0.69	0.06	-0.63
Tall Melaleuca Shrubland	0.74	0.31	-0.43
Vasse Drain (watercourse)	6.34	6.14	-0.20
Highly disturbed/cleared	24.65	31.25	+6.60
Total area	**39.6**	**42.01**	**+2.41**

4.2 Vegetation condition

A large proportion of the project footprint has been mapped as completely degraded. The vegetation structure is severely impacted by disturbances such as historical clearing and weed invasion (GHD 2017c). There has been a very slight increase in the clearing of vegetation rated as Very Good to Good condition (0.02 ha) which is associated with the *Acacia* and Peppermint Shrubland.

A summary of the vegetation condition rating mapped within the revised project footprint is provided in Table 3 with updated mapping provided in Figure 3, Appendix A.

Table 3 Vegetation condition rating mapped within the project footprint

Vegetation Condition	Original project footprint (ha)	Revised project footprint (ha)	Change in area (ha)
Very Good-Good	0.26	0.28	+0.02
Good-Degraded	0.53	0.36	-0.17
Degraded	1.77	1.35	-0.42
Degraded-Completely Degraded	2.16	1.45	-0.71
Completely Degraded	28.53	32.44	+3.91
Vasse Drain / (watercourse)	6.34	6.14	-0.20
Total area	**39.6**	**42.01**	**+2.41**

4.3 Fauna habitat

The project footprint includes five habitat types, which are closely aligned with the vegetation types described within the project footprint.

A summary of the habitat type extents for the revised project footprint is provided in Table 4 and mapped in Figure 4, Appendix A.

Table 4 Sumary of fauna habitat types mapped within the revised project footprint.

Fauna habitat type	Previously surveyed area (ha)	Revised project footprint (ha)	Change in area (ha)
Marri and Flooded Gum Woodland	3.64	1.20	-2.44
Peppermint Woodland	4.24	3.11	-1.13
Tall Melaleuca Shrubland	0.74	0.31	-0.43
Vasse Drain (Watercourse)	6.34	6.14	-0.20
Highly disturbed	24.65	31.25	+6.60
Total area	**39.6**	**42.01**	**+2.41**

4.3.1 Conservation significant fauna

Black Cockatoo Assessment

Three threatened species of Black Cockatoo are known to occur in the project footprint, Carnaby's Black Cockatoo, Baudin's Black Cockatoo and Forest Red-tailed Black Cockatoo. Previous surveys have mapped the extent of Black Cockatoo foraging and roosting habitat and identified potential habitat trees within the previous project area. A description of the extent of habitat for these species within the total revised project footprint is summarised in Table 5 and mapped in Figure 5, Appendix A.

Table 5 Black Cockatoo habitat within the total development footprint

Habitat type	Previously surveyed area (ha)	Revised project footprint (ha)	Change in area (ha)
Foraging habitat	7.88 ha (3.64 ha high value habitat and 4.24 ha low value habitat)	4.31 ha (1.20 ha high value habitat and 3.11 ha of low value habitat)	-3.57 ha
Potential breeding habitat	74 trees (3 with large hollows suitable for breeding)	49 trees (two with large hollows suitable for breeding)	Reduction of 25 trees, one with a hollow
Roosting habitat	3.64 ha	1.20 ha	-2.44

Western Ringtail Assessment

The Western Ringtail Possum has previously been recorded within the project footprint (GHD 2017b and 2017c). Scats were recorded throughout the project footprint in the Peppermint Woodland and Marri and Flooded Gum Woodland (GHD 2017b). Evidence of this species (scats and dreys) previously recorded by GHD have been mapped and provided in Figure 5, Appendix A. A summary of Western Ringtail Possum habitat within the revised project area is provided in Table 6.

Table 6 Western Ringtail Possum habitat within the total development footprint

Habitat Type	Previously surveyed area (GHD 2017) (ha)	Revised project footprint (ha)	Change in area (ha)
Primary corridor and supportive habitat	7.88	4.31	-3.57

4.4 Existing offset site

During the assessment of the original referral, the DoEE identified that the project footprint intersects with a secure offset site. The offset site is for the Peppermint Park Residential Subdivision (2008/4028). The project footprint intersects the following four lots:

- Lot 599 – Reserve for conservation and drainage – 3.17 ha
- Lot 598 – Reserve for conservation and recreation – 1.65 ha
- Lot 593 – Reserve for conservation and drainage – 1.11 ha
- Lot 549 – Reserve for conservation and drainage – 1.75 ha

The four lots impacted by the project occur immediately adjacent to the existing Vasse drain and have a combined total area of 7.68 ha, with the overall offset area including a fifth Lot not intersected by the project footprint being 8.1 ha. The revised project footprint intersects a narrow strip of the eastern boundary of these lots, the widest point at approximately 12 m. The total area of the revised project footprint that intersects the offset site is 0.628 ha, therefore clearing approximately 7.75% of the offset area will be required. The vegetation along this strip has been mapped by GHD (2017b) as Acacia and Peppermint shrubland and cleared/highly disturbed. The vegetation condition has been mapped as Degraded to Completely Degraded (GHD 2017b).

The clearing of vegetation and fauna habitat within the offsets site is not expected to significantly alter the viability of the offset site for the persistence and survival of the Western Ringtail Possum, or exacerbate barrier or edge impacts associated with the Vasse drain.

5. References

GHD 2017a, *Vasse Diversion Drain – Carbunup King Spider Orchid Targeted Survey*, Unpublished report for Water Corporation, Western Australia.

GHD 2017b, *Vasse Diversion Drain Upgrade Flora and Fauna* Survey, Unpublished report for Water Corporation, Western Australia.

GHD 2017c, Vas*se Diversion Drain Fauna and Vegetation Assessment – Additional Survey Area,* Unpublished report for Water Corporation, Western Australia.

GHD 2010, *Vasse Diversion Drain Upgrade Flora and Fauna Study*, Unpublished report for Water Corporation, Western Australia.

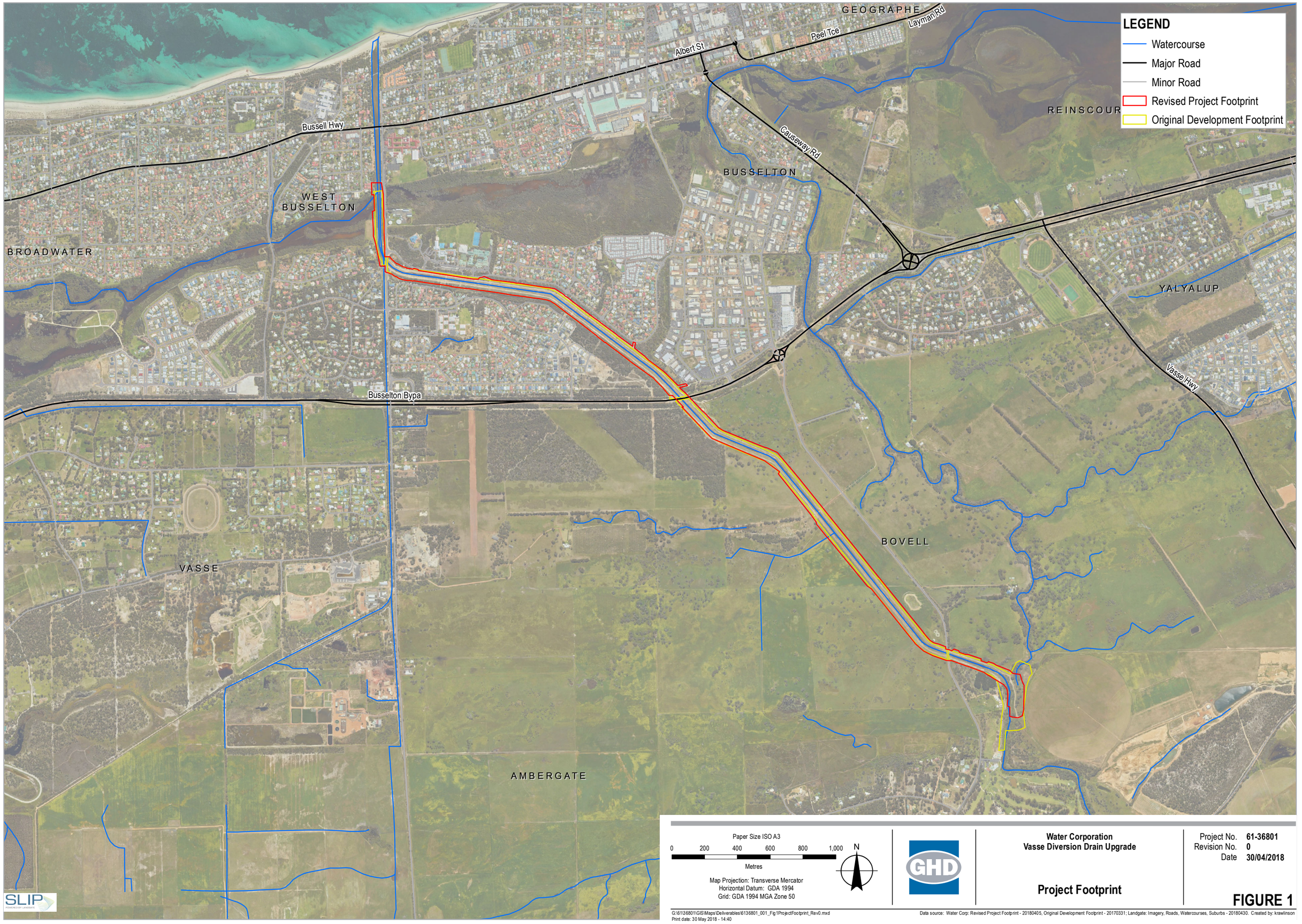
GHD 2009, *Busselton Flood Protection Project Vasse Diversion Drain Upgrade – Acid Sulphate Soils Investigation*, Unpublished report for Water Corporation, Western Australia.

Lymbery A, Lymbery R, Morgan D, Beatty S. 2008, *Freshwater mussels (Westralunio carteri) in the catchments of Geographe Bay, south-western Australia,* Fish Health Unit (Murdoch University), report to the Water Corporation, Western Australia.

Slack-Smith S.M, 2006, *Report on a survey of the Non-marine Molluscan Fauna of the Vasse Diversion Drain, Busselton, Western Australia*, Western Australian Museum, Perth.

Appendices

Appendix A – Figures



Paper Size ISO A3

0 200 400 600 800 1,000 Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

Water Corporation
Vasse Diversion Drain Upgrade

Project Footprint

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 1

G:\61\36801\GIS\Maps\Deliverables\6136801_001_Fig1ProjectFootprint_Rev0.mxd
Print date: 30 May 2018 - 14:40

Data source: Water Corp: Revised Project Footprint - 20180405, Original Development Footprint - 20170331; Landgate: Imagery, Roads, Watercourses, Suburbs - 20180430. Created by: krawlinson

Bussell Hwy

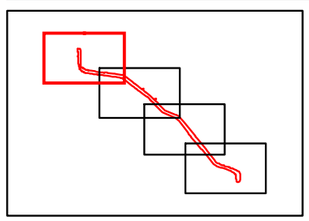
LEGEND

- Major Road
- Minor Road
- Project Footprint

Vegetation Type

- Acacia and Peppermint Shrubland
- Marri and Flooded Gum Woodland
- Peppermint Woodland Over Sedgeland
- Tall Melaleuca Shrubland
- Watercourse
- Highly Disturbed

SLIP



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

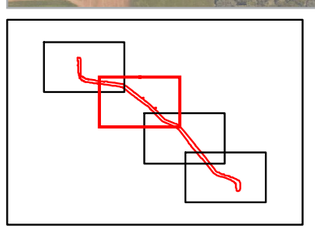
Vegetation Type

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 2

G:\61\36801\GIS\Maps\Deliverables\61\36801_002_Fig2VegTypes_Rev0.mxd
Print date: 30 May 2018 - 14:49

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Type - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

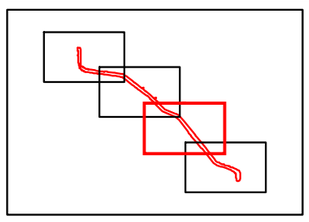
Vegetation Type

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 2

G:\61\36801\GIS\Maps\Deliverables\6136801_002_Fig2VegTypes_Rev0.mxd
Print date: 30 May 2018 - 14:49

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Type - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

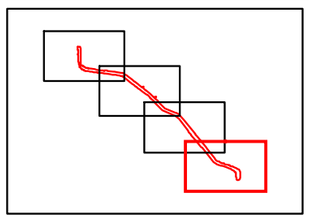
Vegetation Type

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 2

G:\61\36801\GIS\Maps\Deliverables\6136801_002_Fig2VegTypes_Rev0.mxd
Print date: 30 May 2018 - 14:50

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Type - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

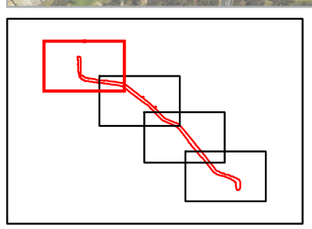
Vegetation Type

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 2

G:\61\36801\GIS\Maps\Deliverables\6136801_002_Fig2VegTypes_Rev0.mxd
Print date: 30 May 2018 - 14:50

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Type - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

Water Corporation
Vasse Diversion Drain Upgrade

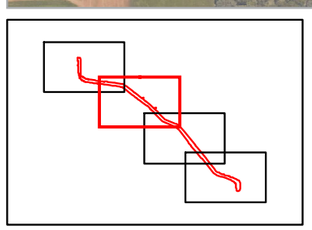
Vegetation Condition

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 3

G:\61\36801\GIS\Maps\Deliverables\6136801_003_Fig3VegCondition_Rev0.mxd
Print date: 30 May 2018 - 14:52

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Condition - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

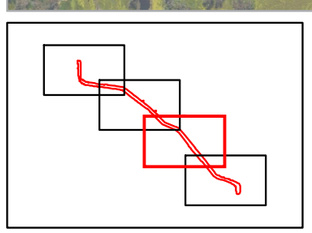
Vegetation Condition

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 3

G:\61\36801\GIS\Maps\Deliverables\6136801_003_Fig3VegCondition_Rev0.mxd
Print date: 30 May 2018 - 14:53

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Condition - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

Water Corporation
Vasse Diversion Drain Upgrade

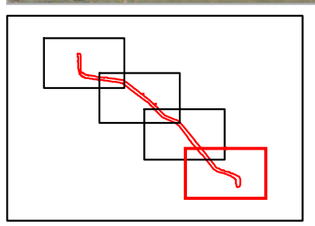
Vegetation Condition

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 3

G:\61\36801\GIS\Maps\Deliverables\6136801_003_Fig3VegCondition_Rev0.mxd
Print date: 30 May 2018 - 14:53

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Condition - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

Vegetation Condition

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 3

G:\61\36801\GIS\Maps\Deliverables\6136801_003_Fig3VegCondition_Rev0.mxd
Print date: 30 May 2018 - 14:54

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Vegetation Condition - 20180426. Created by: krawlinson

Bussell Hwy

LEGEND

- Black Cockatoo Tree (GHD 2016, 2017)

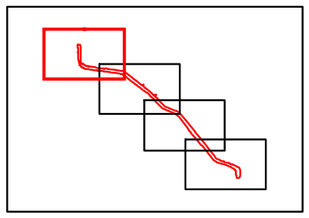
Ringtail Possum Observations (GHD 2016, 2017)

- Drey
- Drey and Scat
- Scat
- Major Road
- Minor Road
- Project Footprint

Fauna Habitat

- Marri and Flooded Gum Woodland
- Peppermint Woodland
- Tall Melaleuca Shrubland
- Watercourse
- Highly Disturbed

SLIP



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

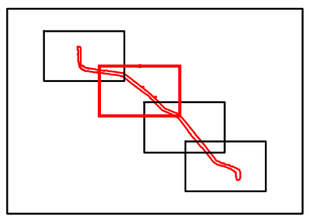
Fauna Habitats

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 4

G:\61\36801\GIS\Maps\Deliverables\61368801_004_Fig4FaunaHabitats_Rev0.mxd
Print date: 30 May 2018 - 15:00

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Black Cockatoo Trees, Ringtail Possum Observations, Fauna Habitat - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

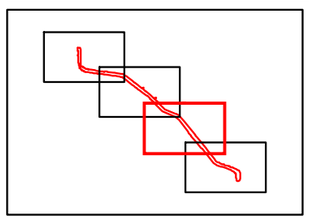
Fauna Habitats

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 4

G:\61\36801\GIS\Maps\Deliverables\61136801_004_Fig4FaunaHabitats_Rev0.mxd
Print date: 30 May 2018 - 15:00

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Black Cockatoo Trees, Ringtail Possum Observations, Fauna Habitat - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

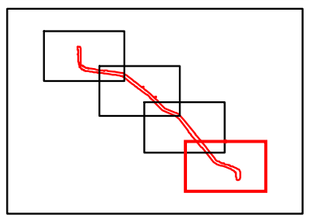
Fauna Habitats

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 4

G:\61\36801\GIS\Maps\Deliverables\61\36801_004_Fig4FaunaHabitats_Rev0.mxd
Print date: 30 May 2018 - 15:01

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Black Cockatoo Trees, Ringtail Possum Observations, Fauna Habitat - 20180426. Created by: krawlinson



Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Water Corporation
Vasse Diversion Drain Upgrade

Fauna Habitats

Project No. **61-36801**
Revision No. **0**
Date **30/04/2018**

FIGURE 4

G:\61\36801\GIS\Maps\Deliverables\6136801_004_Fig4FaunaHabitats_Rev0.mxd
Print date: 30 May 2018 - 15:01

Data source: Landgate: Imagery, Roads - 20180430; WaterCorp: Project Footprint - 20180405; GHD: Black Cockatoo Trees, Ringtail Possum Observations, Fauna Habitat - 20180426. Created by: krawlinson

GHD

Level 10
999 Hay Street
T: 61 8 6222 8222 F: 61 8 6222 8555 E: permail@ghd.com

6136801-44901/https://projects.ghd.com/oc/WesternAustralia/environmentalapprova3/Delivery/Documents/6136801-REP-0_Vasse Variation Summary Report.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	E Lynch	D Farrar		D Farrar		30/05/2018

www.ghd.com