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Vasse Diversion Drain



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1 INTRODUCTION

The Vasse Diversion Drain (VDD) is a 100-year-old infrastructure corridor, originally constructed in the 1920s to create more arable land. Now, its primary function is to prevent flooding of the Busselton township. The drain diverts flows from the catchments of the Vasse and Sabina rivers. The drain extends approximately 6.3 kilometres (km) from Geography Bay to the Busselton golf course, flowing through agricultural, light industrial, urban land uses and sensitive ecological environments.

The drain did not meet the flood mitigation requirement determined by the Busselton Flood Management Steering Committee and state cabinet; hence Water Corporation has upgraded the VDD to improve flood protection outcomes. The VDD upgrade works included:

- Construction of an overflow structure upstream of the Vasse River Diversion Dam (VRDD), identified as the Vasse River Overflow Structure (VROS)
- Widening and full reconstruction of the VDD levee banks
- Duplication of the existing culverts, increasing flow capacity into the Lower Vasse River (per Department of Water and Environmental Regulation (DWER) specifications)
- Installation of an improved gauging station (per DWER specification and requirements).

The VDD upgrade works were referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in May 2017. The Water Corporation received approval of EPBC 2017/7932 in September 2020 (Appendix A).

A clearing permit application for the VDD upgrade works was prepared in September 2018. Clearing permit (CPS 8191/1) was subsequently approved by DWER in July 2020 (Appendix B). CPS 8191/1 allowed for the clearing of up to 2.16 hectares (ha) of native vegetation within the approved clearing area. Section 40 Ministerial Authorisations for the taking and/or disturbing of Threatened fauna under the state *Biodiversity Conservation Act 2016* (BC Act) were also granted.

1.1 Scope of the report

This annual compliance report has been prepared by RPS on behalf of Water Corporation (the Permit Holder) to address the annual reporting requirements under the clearing permit (CPS 8191/1) and EPBC Act (EPBC 2017/7932) approvals.

The civil construction works for the VDD upgrade commenced in November 2020 and were completed by the end of June 2021. No native vegetation clearing was undertaken in 2021.

This annual compliance report addresses the required reporting period for the approved clearing permit (CPS 8191/1) from 1 January to 31 December 2021. In March 2022, Water Corporation requested approval from the DAWE to align the EPBC 2017/7932 compliance reporting dates with those of the approved clearing permit. Permission was granted to align EPBC 2017/7932 compliance reporting with the approved clearing permit on 8 April 2022 (Appendix C). Therefore, this annual compliance report addresses the EPBC Act (EPBC 2017/7932) approval compliance reporting requirements from 1 January to 31 December 2021.

A portion of this timeframe has already been reported on in the previous annual compliance report (RPS 2021). For completeness, this information has also been included in this annual compliance report.

Condition 19 (a) of the approved clearing permit (CPS 8191/1) states:

a. The Permit Holder must provide to the CEO on or before 30 June of each year, a written report:

    i. Of records required under condition 18 of this Permit; and
    j. Concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the proceeding calendar year.

Condition 16 of the EPBC Act (EPBC 2017/7932) approval states:

16. The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. The approval holder must:
    a. publish each compliance report on the website within 60 business days following the relevant 12 month period;
    b. notify the Department by email that a compliance report has been published on the website and provide the weblink for the compliance report within five business days of the date of publication;
    c. keep all compliance reports publicly available on the website until this approval expires;
    d. exclude or redact sensitive ecological data from compliance reports published on the website; and
    e. where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within 5 business days of publication.

1.2 Methodology

In preparing this annual compliance report, RPS:

- Reviewed the approved clearing permit (CPS 8191/1) and the EPBC Act (EPBC 2017/7932) approval to confirm the scope of the report
- Reviewed the record-keeping and reporting requirements for the approved clearing permit (CPS 8191/1) and the conditions of approval for the EPBC Act (EPBC 2017/7932) approval to assess environmental performance
- Verified the environmental performance using the available evidence
- Assigned a compliance rating for each record-keeping and reporting requirement of approved clearing permit (CPS 8191/1); and the conditions of approval for the EPBC Act (EPBC 2017/7932) approval.

1.3 Structure of report

This annual compliance report has been structured in the following order to specifically address the reporting requirements of the approved clearing permit (CPS 8191/1) and the conditions of approval for EPBC Act (EPBC 2017/7932):

- CPS 8191/1: Condition 18: Record Keeping
  - Condition 18a (i), (ii), (iii), (iv), (v) and (vi) is presented in Table 2
  - Condition 18a (v) specific to flora management under conditions 9 and 10 is detailed in Table 3
  - Condition 18 (vi) specific to fauna management – Carter's freshwater mussel under conditions 11 and 12 is detailed in Table 4
  - Condition 18 (vi) specific to fauna management – Western ringtail possum under conditions 13, 14 and 15 is detailed in Table 5
  - Conditions 18b is presented in Table 6
- EPBC 2017/7932: Condition 16: Annual Compliance Reporting
  - Part A: Conditions specific to the action (Conditions 1 – 10) are presented in Table 7
  - Part B: Standard administrative conditions (Conditions 11 – 22) are presented in Table 8.

1.4 Compliance assessment framework

The environmental performance against the reporting requirements of the approved clearing permit (CPS 8191/1) and the conditions of approval for the EPBC Act (EPBC 2017/7932) approval has been assessed using the available evidence to determine a compliance rating.

1.4.1 Compliance information sources

This compliance report has been underpinned by various information sources (available evidence) prepared to support the planning and implementation of the VDD upgrade works, including:

- 2021 site audits of the contractor's Construction Environment Management Plan (CEMP, VJV 2020)
- Subject matter specific information sources
- Regulator liaison.

1.4.1.1 Site audits

Site audits were completed by Water Corporation and RPS against the general commitments, management, monitoring and reporting requirements identified within the contractor CEMP (Table 1).

Table 1: CEMP field audits schedule

Date	Auditors	Activities completed
17–18 February 2021	RPS	Review of environmental record-keeping and environmental practices on site, site photographs
22–23 April 2021	RPS	

The contractor CEMP was developed by VJV to ensure that the VDD upgrade works complied with the overarching Water Corporation Construction Environmental Management Framework (CEMF) and all state and Commonwealth statutory environmental protection requirements. The field observations and site photographs, along with tacit information gained during the site audits through consultation with VJV and Water Corporation, provided the necessary context to inform the site audits.

The RPS site audits are provided in Appendix D.

1.4.1.2 Subject matter specific information

Subject matter specific information has been generated for the VDD upgrade works to specifically address fauna management (western ringtail possum) and revegetation and rehabilitation requirements identified in the approved clearing permit (CPS 8191/1) and EPBC Act (EPBC 2017/7932) approval. These subject matter specific information sources have been collated in respect to the particular matters as follows:

- Western ringtail possum information is provided in Appendix E.
- Revegetation and rehabilitation information is provided in Appendix F.

1.4.1.3 Regulator liaison

Liaison from Water Corporation with DWER and DAWE reporting information or results required to be provided to the regulator under the clearing permit (CPS 8191/1) and EPBC Act (EPBC 2017/7932) approvals include:

- Email: CPS 8191/1, 2017/7932, CDD 00116 – Vasse Diversion Drain Upgrade – Western Ringtail Possum Report (5 February 2021)
- Email: 2017/7932, CPS 8191/1, CD00116 – Vasse Diversion Drain Upgrade – Annual Environmental Compliance Report (30 June 2021).

A copy of this correspondence is provided in Appendix G.

1.4.2 Compliance rating determination

Compliance ratings have been allocated to each condition according to the following set of measures:

- Achieved: Available evidence identities the condition has been met
- Partially achieved: Available evidence demonstrates the condition has been partially met
- Not achieved: Available evidence shows that the condition has not been met
- Not applicable: Available evidence shows the condition is no longer applicable
- Implementation ongoing: Available evidence shows that the implementation of the condition remains ongoing.

2 CLEARING PERMIT: CPS 8191/1

2.1 Condition 18a: Recording-keeping

Table 2: Environmental performance against record-keeping and reporting requirements for CPS 8191/1 condition 18a

Condition no.	Condition	Evidence	Discussion	Compliance rating
8191/1: 18 (a) (i)	The boundaries of clearing undertaken on each date, recorded using a Global Positioning System GPS unit set to GDA94, expressing the geographical coordinates in eastings and northings or decimal degrees	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 18 (a) (ii)	The size of the area cleared (in hectares)	Previous annual compliance report (RPS 2021)		Not applicable
8191/1: 18 (a) (iii)	Actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 7 of this Permit			
8191/1: 18 (a) (iv)	Actions taken to minimise the risk of the introduction and spread of weeds and dieback in accordance with condition 8 of this Permit	Previous annual compliance report (RPS 2021)		Not applicable
8191/1: 18 (a) (v)	Details required in accordance with flora management conditions 9 and 10 of this Permit	Refer to Table 3		Condition 9 – Not applicable Condition 10 – Not applicable
8191/1: 18 (a) (vi)	Details required in accordance with fauna management conditions 11, 12, 13, 14 and 15 of this Permit	• Refer to Table 4 for conditions 11 and 12 • Refer to Refer to Table 5 for conditions 13, 14 and 15		Condition 11 (a) – Not applicable Condition 11 (b) – Not applicable Condition 12 – Not applicable Condition 13 – Not applicable Condition 14 – Implementation ongoing Condition 15 – Implementation ongoing

2.2 Condition 18a (v): Flora management – conditions 9 and 10

Table 3: Environmental performance against record-keeping and reporting requirements for CPS 8191/1 condition 18a (v): conditions 9 and 10

Condition no.	Condition	Evidence	Discussion	Compliance rating
8191/1: 9 (a)	Prior to undertaking any clearing, the Permit Holder must engage a botanist to conduct a targeted flora survey within suitable habitat(a) within the areas cross-hatched yellow on attached Plan 8191/1a for the presence of *Caladenia procera*	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 9 (b)	The Permit Holder shall ensure no clearing of any *Caladenia procera* individuals identified through the surveys required by condition 9(a)	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 9 (c)	The Permit Holder shall ensure that no clearing occurs within ten metres of *Caladenia procera* individuals identified through the surveys required by condition 9(a), unless the clearing is done in accordance with condition 9(d) of this Permit	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 9 (d)	Where clearing within ten metres of individuals of *Caladenia procera* is unavoidable, the Permit Holder must: (i) Install clearly demarked temporary fencing around the individuals of *Caladenia procera* prior to undertaking any clearing and maintain the fencing until the project activities have ceased (ii) Adhere to the Flora Management Plan required under condition 10 which has been approved by the CEO	Previous annual compliance report (RPS 2021)		
8191/1: 9 (e)	Within two months of undertaking any clearing authorised under this Permit within the areas cross-hatched yellow on Plan 8191/1a, the Permit Holder must provide the results of the targeted flora survey, as required by condition 9(a), in a report to the CEO	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 9 (f)	If *Caladenia procera* are identified within ten metres of the areas cross-hatched yellow on Plan 8191/1a, the targeted flora survey report must include the following: (i) The location of each *Caladenia procera* identified under condition 9(a), either as the location of individual plants, or where this is not practical, the areal extent of the population and an estimate of the number of plants, recorded using a global positioning system (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in eastings and northings or decimal degrees (ii) Map/s showing the location of any identified population of *Caladenia procera* cleared and the remaining population (iii) The methodology used to survey the Permit area	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 10	Where clearing within ten metres of individuals of *Caladenia procera* is unavoidable, the Permit Holder must submit a Flora Management Plan to the CEO for approval, prior to clearing commencing. The management plan must contain the following: (i) Details of the Permit Holder's attempts to avoid and minimise impacts to *Caladenia procera* (ii) Proposed methods of minimising and mitigating any indirect impacts to *Caladenia procera*	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable

2.3 Condition 18a (vi): Fauna management conditions 11, 12, 13, 14 and 15

2.3.1 Conditions 11 – other approvals and 12 – Carter's freshwater mussel

Table 4: Environmental performance against record-keeping and reporting requirements for CPS 8191/1 condition 18a (vi): conditions 11 and 12

Condition no.	Condition	Evidence	Discussion	Compliance rating
8191/1: 11 (a)	Prior to clearing, the Permit Holder must provide to the CEO a copy of the fauna licence(s) obtained under the *Biodiversity Conservation Act 2016* for the relocation and/or translocation of Carter's freshwater mussel (*Westralunio carteri*) and the dispersion of western ringtail possum *(Pseudocheirus occidentalis*) individuals	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 11 (b)	Prior to clearing, the Permit Holder must provide to the CEO a copy of the approved exemption from the Department of Primary Industries and Regional Development under the *Fish Resources Management Act 1994* and Fish Resources Management Regulations 1995 for the collection of Carter's freshwater mussel for translocation.	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 12 (a)	Prior to commencement of any clearing activities authorised under this Permit, the Permit Holder must submit a Carter's freshwater mussel (*Westralunio carteri*) Management Plan to the CEO for approval. The management plan must contain the following: (i) Removal, transportation and relocation method, and where required, temporary storage method (ii) Location of the relocation site, including a field assessment confirming the suitability of the relocation site (iii) Stocking densities (iv) The success rate monitoring plan	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable

2.3.2 Condition 13, 14 and 15 – western ringtail possum

Table 5: Environmental performance against record-keeping and reporting requirements for CPS 8191/1 condition 18a (vi): conditions 13, 14 and 15

Condition no.	Condition	Evidence	Discussion	Compliance rating
8191/1: 13 (a)	In relation to the area cross-hatched yellow on attached Plans 8191/1a and 8191/1b, the Permit Holder must engage a fauna specialist to inspect that area, including all trees and tree hollows present, within 24 hours prior to, and for the duration of clearing, for the presence of western ringtail possum(s) (*Pseudocheirus occidentalis*)	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
8191/1: 13 (b)	Clearing must cease in any area where fauna referred to in condition 13(a) above are identified until the western ringtail possum(s) has moved out of the development area to adjoining suitable habitat(b)			
8191/1: 13 (c)	Where fauna is identified under condition 13(a) of this Permit, the Permit Holder must provide the following records to the CEO as soon as practicable: (i) The number of individuals identified (ii) The date each individual was identified (iii) The location where each individual was identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in eastings and northings or decimal degrees (iv) The number of individuals displaced (v) the relevant qualifications of the fauna specialist undertaking the displacement (vi) The date each individual was displaced (vii) The method of dispersal (viii) The date each individual was dispersed (ix) The location where each individual dispersed to, recorded using a GPS unit set toGDA94, expressing the geographical coordinates in eastings and northings or decimal degrees (x) Details pertaining to the circumstances of any death of, or injury sustained by, an individual	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable

Condition no.	Condition	Evidence	Discussion	Compliance rating
8191/1: 14	Prior to commencement of any clearing activities authorised under this Permit, the Permit Holder must at a minimum install six rope bridges within the area cross-hatched red on the attached Plan 8191/1c, in accordance with the following requirements: (i) The end of each rope bridge must be connected to at least two mature trees, or two different locations in the canopy of a single mature tree, at a height of at least three metres above ground level (ii) The rope bridges must be placed in areas that provide canopy connectivity for western ringtail possum movement across the local area, i.e. across roadways and other gaps in the canopy (iii) Be monitored annually and maintained for a period of at least ten years (iv) Within two months of undertaking any clearing authorised under this Permit within the combined areas cross-hatched yellow on Plan 8191/1a and 8191/1b, the Permit Holder must provide to the CEO, the locations where each rope bridge was placed using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in eastings and northings or decimal degrees	• Subject matter specific information – Western ringtail possum information (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020- January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022).	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021) • Bamford Consulting Ecologists have been commissioned to conduct ongoing monitoring of the rope bridges for ten years: (Bamford Consulting Ecologists 2021 and 2022): – Bamford Consulting Ecologists undertook possum monitoring for Year One in January, March, April / May, August, and September 2021. Motion sensitive cameras were positioned to monitor rope bridge usage on three sessions of three nights during Year One. In addition, observations and opportunistic searches for scat underneath the rope bridges were undertaken during other monitoring events to search for evidence of use – Scats from western ringtail possums were observed under the rope bridge adjacent to Cook St industrial area in September 2021 – Both brushtail and Western ringtail possums were recorded using the rope bridges, indicating the design is successful and are suitable to keep possums off the ground and improve connectivity	Implementation ongoing
8191/1: 15	Prior to commencement of any clearing activities authorised under this Permit, the Permit Holder must, at a minimum, install 12 nest boxes within the area cross-hatched red on the attached Plan 8191/1c, in accordance with the following requirements: (i) Be designed and placed in accordance with the specifications detailed in the Project Revegetation Plan required by condition 17(a) (ii) Be placed at least three metres above ground level in a mature tree facing the shadiest side of the tree (iii) Be monitored annually and maintained for a period of at least ten years (iv) Within two months of undertaking any clearing authorised under this Permit within the combined areas cross-hatched yellow on Plan 8191/1a, the Permit Holder must provide to the CEO, the locations where each nest box was placed using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees	• Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022) • Regulator liaison (Appendix G) – Email: CPS 8191/1, 2017/7932, CDD 00116 – Vasse Diversion Drain Upgrade – Western Ringtail Possum Report (5 February 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021) • Location, date installed and photograph of each relocated drey and artificial shelter is detailed in Appendix 4 of the Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020- January 2021 report (Bamford Consulting Ecologists 2021) • The Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020- January 2021 (Bamford Consulting Ecologists 2021) report was provided to DWER on 5 February 2021 • Bamford Consulting Ecologists have been commissioned to conduct ongoing monitoring of the installed shelters for ten years (Bamford Consulting Ecologists 2021 and 2022): – All 87 artificial shelters were checked by Bamford Consulting Ecologists on five occasions throughout 2021 in January, March, April / May, August, and September 2021 for Year One. These included 24 relocated natural dreys. A number of new natural dreys were observed in the study area, largely during March 2021, which have been added to future monitoring events. – Bamford Consulting Ecologists (2022) found that the overall numbers of possums have remained stable throughout 2021 – The relocated natural dreys were considered important initially, however became disused as possums built new dreys or adopted artificial dreys. Two relocated natural dreys were in use in September 2021 – The artificial shelters were quickly adopted and used consistently during Year One, and 12% – 18% of possums located during monitoring events were using artificial shelters. The availability of additional shelter is likely to have supported the population of possums following displacement	Implementation ongoing

2.4 Condition 18b: Record-keeping

Table 6: Environmental performance against record-keeping and reporting requirements for CPS 8191/1 condition 18b

Condition no.	Condition	Evidence	Discussion	Compliance rating
8191/1 18 (b) "The Permit Holder must maintain the following records in relation to revegetation activities undertaken pursuant to conditions 16 and 17 of this Permit:"				
8191/1: 18 (b) (i)	The date(s) each area was revegetated	• Subject matter specific information – Revegetation and rehabilitation information (Appendix F) ○ Vasse Diversion Drain Upgrade Revegetation – Water Corporation Post Activity Reports #3 to #11	• Revegetation works were undertaken by Tranen on the following dates: – 5–19 July 2021: Installed 21,543 seedlings in the Quindalup Dune and VDD Embankments zones – 13–19 August 2021: Installed 214 mature trees along pathway in the Central PEC zone. Included root barrier, soil conditioner, Terracottem, mulching, stakes and ties. – 23 August 2021: Commencement of planting along Central PEC zone including tree guards and fertiliser tablets – 25 August–10 September 2021: Installed the remaining plants and guards in the Central PEC and Western PEC zones. A total of 14,617 plants and 11,261 guards were installed – 30 August–13 September 2021: Installed plants and guards in the Western PEC zone. A total of 3,149 plants and 2,539 guards installed – 13–21 September 2021: Installed plants and guards in Central PEC zone. A total of 6,000 plants were installed – 23 September 2021: Planted remaining mature trees in Quindalup Dune zone and installed signage – 25 to 26 October 2021: Completed planting of lower VDD Embankments (3,500 plants total)	Implementation ongoing
8191/1: 18 (b) (ii)	The location of each area revegetated recorded using a GPS unit set to GDA94, expressing the geographical coordinates in eastings and northings or decimal degrees	• Subject matter specific information – Revegetation and rehabilitation information (Appendix F) ○ Revegetation Plan (Tranen 2020) ○ Vasse Diversion Drain Upgrade Revegetation – Water Corporation Post Activity Reports #3 to #11	Areas within the Quindalup Dune, VDD Embankments, Central PEC and Western PEC zones were revegetated between 5 July to 26 October 2021. The revegetation zones are illustrated in Appendix 2 of the Revegetation Plan (Tranen 2020). Shapefiles for these revegetation zones can be provided to DWER in GDA94 format (if required)	Implementation ongoing
8191/1: 18 (b) (iii)	At least two photographs of each area revegetated taken on an annual basis at the same location each year	• Subject matter specific information – Revegetation and rehabilitation information (Appendix F) ○ Vasse Diversion Drain Upgrade Revegetation – Water Corporation Post Activity Reports #8 to #11 ○ Vasse Diversion Drain Upgrade Revegetation Spring 2021 Vegetation Monitoring Report (Tranen 2022)	Photo monitoring was undertaken by Tranen on 16–17 November 2021 at 34 quadrats across the revegetation zones, as shown in Appendix 5 of the Spring 2021 Vegetation Monitoring Report. At least two photo monitoring quadrats for each zone revegetated have been established. A photo was captured for each quadrat as follows: • Zone 1 – Quindalup Dune (Q1–Q4) • Zone 2 – VDD Embankments (Q5–Q8) • Zone 4 – Upland PEC • Zone 4.2 – Western PEC (Q12–Q14) • Zone 4.3 – Central PEC (Q18–Q20)	Implementation ongoing
8191/1: 18 (b) (iv)	A description of the revegetation activities undertaken each year for each area revegetated	• Subject matter specific information – Revegetation and rehabilitation information (Appendix F) ○ Vasse Diversion Drain Upgrade Revegetation – Water Corporation Post Activity Reports #3 to #11	After activity reports have been prepared by Tranen identifying the rehabilitation actions undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021). Activities undertaken for the whole project and at specific revegetation zones are summarised in the table below	Implementation ongoing

Location	Rehabilitation activities in 2021
Whole of project	• Weed control along a number of revegetation areas • Local provenance material collections • Baseline monitoring report • Mulch procurement and site preparation planning • Aboriginal engagement – Roelands Village, Undalup Association and Wadandi Rangers • Green waste and woody weeds removal • Procurement of corflute tree guards, stakes and root barrier • Plant deliveries and batching • *Caladenia procera* monitoring • Setting up quadrats and monitoring of all revegetation areas • Plant orders for 2022
Zone 1 - Quindalup Dune	• Weed control • Relocation and respreading topsoil • Soil ripping • Procurement of seedlings • Planting seedlings • Fencing • Mulch spreading • Mature trees and signage installation • Palisade construction
Zone 2 - VDD Embankments	• Weed control • Brush wall installation • Embankment regrading • Embankment palisade construction • Matting installation • Procurement of seedlings • Planting seedlings • Fencing • Slashing VDD levees • Planting

Condition no.	Condition	Evidence	Discussion		Compliance rating
			Location	**Rehabilitation activities in 2021**	
			Zone 4 – Upland PEC	• Weed control • Soil ripping • Mulch spreading • Mature trees installation • Plants and guard installation • Aboriginal engagement • Green waste removal • Fencing • Tree guard maintenance • Watering mature trees • *Caladenia procera* monitoring	
8191/1: 18 (b) (v)	A description of the tree density and native understorey vegetation cover for each area revegetated recorded on an annual basis	• Subject matter specific information – Revegetation and rehabilitation information (Appendix F) ○ Revegetation Plan (Tranen 2020) ○ Vasse Diversion Drain Upgrade Revegetation Spring 2021 Vegetation Monitoring Report (Tranen 2022)	Condition 17 of the clearing permit approval (CPS 8191/1) requires that Water Corporation achieve established completion criteria for revegetation and rehabilitation within the ten year monitoring period. These completion criteria were incorporated into the Revegetation Plan (Tranen 2020), assessed in spring 2020 (baseline) and in spring 2021 when the ten year monitoring program commenced (Tranen 2022) Tranen (2022) visited 34 quadrats across all key revegetation zones on 16–17 November 2021. A summary of the results against each completion criterion is provided below: • Native vegetation cover – The average native vegetation cover across all quadrats was 6%, which is down from 8% cover in spring 2020. For the quadrats where revegetation works have commenced (Q1–Q8, Q12, Q14, Q18–Q20, Q32), all showed an increase in cover since spring 2020, from 1% to 7%. Key factors behind the changes in vegetation cover was the vegetation clearing works between October and November 2020 and the revegetation works undertaken between July and October 2021 – The results did not include existing mature canopy cover, as this can provide a skewed representation of rehabilitation success in the early stages of establishment • Weeds – Average weed cover across all quadrats was 15%, which is down from 73% in spring 2020. The reduction in weed cover is a result of regular and targeted weed control works taken across the project – The declared weed arum lily (*Zantedeschia aethiopica*) was recorded in two quadrats (Q15 and Q27) and a moderate abundance of the declared weed bridal creeper (*Asparagus asparagoides*) was recorded in the Possum Corridor PEC zone • Bare ground cover – Bare ground cover varies significantly across the quadrats, averaging at 25%, which is up from 16% in spring 2020. The increased bare ground is a result of the significant reduction in weed cover (via clearing works and weed control), partially offset by spreading mulch and installing matting in a number of the revegetation zones • Species richness – Overall species richness is 47 species, which is up from 26 species in spring 2020. This was primarily a result of the revegetation works increasing the species diversity. The quadrats which showed a reduction in species richness were cleared during construction works • Vegetation condition – Overall 59% of the total area was assessed in good condition or better, which is up from 48% in spring 2020 – The Quindalup Dune and Western PEC zones showed the most improvement in vegetation condition, where intensive site preparation, planting and weed control works have been undertaken. The Southern Swale PEC zone changed from 100% in good condition or better to 100% degraded due to being cleared during construction works The completion criterion for *Conospermum caeruleum* var. *Busselton* was not assessed in spring 2021, as the species was in production at nurseries and was not ready to be planted in 2021 (Tranen 2022). Once the species is planted, this criterion will be assessed in future monitoring reports	Implementation ongoing

3 EPBC ACT 2017/7932

3.1 Condition 16: Annual compliance reporting

3.1.1 EPBC 2017/7932: Part A – conditions specific to the action

Table 7: Summary of environmental performance of Vasse Diversion Drain upgrade works with EPBC 2017/7932: Part A – Conditions specific to the action

Condition no.	Condition	Evidence	Discussion	Compliance rating
1.	To minimise impacts to EPBC Act listed species, the approval holder must:			
a.	Clear no more than 2.16 hectares (ha) of western ringtail possum habitat within the project area (hatched yellow in Attachment A and Attachment B)	Previous annual compliance report (RPS 2021)	• No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021) • Clearing works were completed between October and November 2020 and reported on as part of the previous annual compliance report (RPS 2021)	Not applicable
b.	Comply with and implement the conditions of the clearing permit CPS 8191/1 or as varied from time to time	This annual compliance report	Refer to Table 2, Table 3, Table 4, Table 5 and Table 6	Implementation ongoing
c.	Notify the Department in writing of any variations of the conditions of clearing permit CPS 8191/1 within ten business days of such a change being approved by the state government	No variation to the conditions of clearing permit (CPS 819/1) occurred		Not applicable
2.	To avoid and mitigate impacts to the Western Ringtail Possum, the approval holder must:			
a.	Implement condition 14 of the clearing permit CPS 8191/1 by installing a minimum of six rope bridges. The installation of the rope bridges must be in accordance with advice from a suitably qualified ecologist	• Subject matter specific information – Western ringtail possum information (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022) – Revegetation and rehabilitation information (Appendix F) ○ Vasse Diversion Drain Upgrade Revegetation – Water Corporation Post Activity Reports #3 and #9	Refer to Table 5, 8191/1: 14	Implementation ongoing
b.	Implement condition 15 of the clearing permit CPS 8191/1 by installing a minimum of 12 nest boxes suitable for western ringtail possum. If the action results in the removal of more than six dreys, the approval holder must install two nest boxes for each additional drey being removed. Installation of the nest boxes must be in accordance with advice from a suitably qualified ecologist	• Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022)	• Refer to Table 5, 8191/1: 15 • 87 shelters comprised relocated dreys and artificial shelters have been installed and are currently being monitored by Bamford Consulting Ecologists (Bamford Consulting Ecologists 2022). The ratio of artificial shelters installed to relocated dreys exceeds the 2:1 requirement	Implementation ongoing
c.	Reposition rope bridges and nest boxes in accordance with advice from a suitably qualified ecologist if they are not being utilised by western ringtail possum within six months of installation	• Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022)	• Bamford Consulting Ecologists conducted a survey in January 2021 to make a preliminary assessment of the shelters and the possum population following displacement. They also conducted the first event of a ten year monitoring program during January, March, April / May, August, and September 2021 – No recommendations were made to reposition the rope bridges in either report (Bamford Consulting Ecologists 2021 and 2022) – No recommendations were made to reposition the shelters (Bamford Consulting Ecologists 2021 and 2022)	Not applicable
3.	The approval holder must maintain the following records and provide them to the Department within two months of the installation or repositioning of rope bridges and nesting boxes:			
a.	The date(s) and the location where the rope bridges and nest boxes for western ringtail possum (conditioned under 2 and the clearing permit CPS 8191/1) were installed or repositioned	• Previous annual compliance report (RPS 2021) • Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022)	• Refer to Table 7, 2.b and c • Location, date installed, and photographs of rope bridges confirmed part of the previous annual compliance report (RPS 2021) • Location, date installed and photograph of each relocated drey and artificial shelter is detailed in Appendix 4 of Bamford Consulting Ecologists' (2021) report	Achieved

Condition no.	Condition	Evidence	Discussion	Compliance rating
b.	An in-situ photograph of each rope bridge and nest box installed or repositioned	• Previous annual compliance report (RPS 2021) • Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020-January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021–January 2022 (Bamford Consulting Ecologists 2022)	• Refer to Table 7, 3.a • No repositioning of ropes bridges or nest boxes was undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021)	Achieved
c.	Evidence that a suitably qualified ecologist has approved the design and placement of each rope bridge and nest box	• Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022)	• Eighty-seven shelters comprised of relocated dreys and artificial shelters have been installed and are currently being monitored by Bamford Consulting Ecologists (Bamford Consulting Ecologists 2022) • Bamford Consulting Ecologists conducted a survey in January 2021 to make a preliminary assessment of the shelters and the possum population following displacement. They also conducted the first event of a ten-year monitoring program during January, March, April / May, August, and September 2021 – No recommendations were made to reposition the rope bridges in either report (Bamford Consulting Ecologists 2021 and 2022) – No recommendations were made to reposition the shelters (Bamford Consulting Ecologists 2021 and 2022)	Implementation ongoing
d.	Provide the Department with an annual monitoring and maintenance report for the installed and repositioned rope bridges and nest boxes for at least ten years from the date of approval	• Subject matter specific information – Western ringtail possum (Appendix E) ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022)	The annual monitoring report by Bamford Consulting Ecologists (2022) is attached to this compliance report under Appendix E. It is anticipated that this annual compliance report will be sent to the DAWE, prior to being published on Water Corporation's project website	Implementation ongoing
4.	The approval holder must notify the Department within two business days if any western ringtail possum is killed as a result of the action	• Site audits (Appendix D) • Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021). ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022)	No western ringtail possum was killed as a result of the VDD upgrade works	Not applicable
5.	To minimise impacts to the Carbunup king spider orchid, the approval holder:			
a.	Must implement condition 9 of the clearing permit CPS 8191/1. The targeted flora survey as required by condition 9 (a) of the clearing permit CPS 8191/1, must be conducted between September and October 2020	Previous annual compliance report (RPS 2021)	Refer to Table 3, 8191/1: 9 (a-f)	Not applicable
b.	Must not clear any Carbunup king spider orchid individuals identified through the targeted flora survey required by condition 5a	Previous annual compliance report (RPS 2021)	Refer to Table 3, 8191/1: 9 (b)	Not applicable
c.	Develop and implement a translocation proposal for all Carbunup king spider orchid individuals identified through the targeted flora survey required under condition 5a located within the clearing area. This translocation proposal must be endorsed in writing by a suitably qualified biologist as appropriate to ensure the successful survival of the translocated individuals without posing a risk to the receiving area(s) prior to implementation of the proposal. The translocation proposal must be implemented once endorsed by a suitably qualified biologist as appropriate	Previous annual compliance report (RPS 2021)	Refer to Table 3, 8191/1: 9 (b)	Not applicable
d.	Documentary evidence of the endorsement of the translocation proposal and implementation of the translocation proposal must be provided to the Department within 14 business days of the endorsement	Previous annual compliance report (RPS 2021)	Refer to Table 3, 8191/1: 9 (b)	Not applicable

Condition no.	Condition	Evidence	Discussion	Compliance rating
6.	Within two months of conducting a targeted flora survey for Carbunup king spider orchid and as required by condition 5a, the approval holder must provide the Department the results of the targeted flora survey which must contain the following information	Previous annual compliance report (RPS 2021)	The Targeted *Caladenia procera* Flora Survey report was provided to DWER on 6 October 2020, prior to commencement of clearing on 28 October 2020	Not applicable
a.	The date(s) targeted flora survey was conducted and the methodology used	Previous annual compliance report (RPS 2021)	Refer Table 7, 6.	Not applicable
b.	A photograph of each individual of Carbunup king spider orchid identified during the targeted flora survey and map/s showing their location	Previous annual compliance report (RPS 2021)	Refer Table 7, 6.	Not applicable
7.	Prior to the commencement of the action, the approval holder must implement the weed management and soil hygiene management measures as mentioned in the Construction Environmental Management Framework provided to the Department on 2 July 2020	Site audits (Appendix D)	• Refer to Table 2, 8191/1: 18 (a) iv • CEMP was developed by VJV to ensure that the VDD upgrade works complied with the overarching CEMF – Site audits of CEMP demonstrate compliance with Weed and Soil Hygiene Management Requirements	Achieved
8.	The approval holder must implement the fauna management plan provided to the Department on 10 September 2020	• Site audits (Appendix D) • Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020-January 2021 (Bamford Consulting Ecologists 2021). ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022).	• Site audits of CEMP demonstrate compliance with the requirements specific to the Fauna Management Plan • Bamford Consulting Ecologists has been commissioned to conduct ongoing monitoring of the installed shelters for ten years (Bamford Consulting Ecologists 2021 and 2022) – All 87 artificial shelters were checked by Bamford Consulting Ecologists on five occasions throughout 2021 in January, March, April / May, August, and September 2021 for Year One. These included 24 relocated natural dreys. A number of new natural dreys were observed in the study area, largely during March 2021, which have been added to future monitoring events. – Bamford Consulting Ecologists (2022) found that the overall numbers of possums have remained stable throughout 2021 – The relocated natural dreys were considered important initially, however became disused as possums built new dreys or adopted artificial dreys. Two relocated natural dreys were in use in September 2021 – The artificial shelters were quickly adopted and used consistently during Year One, and 12%–18% of possums located during monitoring events were using artificial shelters. The availability of additional shelter is likely to have supported the population of possums following displacement	Implementation ongoing
9.	The approval holder must implement a flora management plan as required by condition 10 of the clearing permit CPS 8191/1	Site audits (Appendix D)	Site Audits of CEMP demonstrate compliance with the requirements specific to the Flora Management Plan	Achieved
10.	To compensate for the residual significant impacts on the Western Ringtail Possum, the approval holder must implement condition 17 of the clearing permit CPS 8191/1	• Subject matter specific information – Revegetation and rehabilitation information (Appendix F)	Refer to Table 6	Implementation ongoing

3.1.2 EPBC 2017/7932; Part B – standard administrative conditions

Table 8: Summary of environmental performance of Vasse Diversion Drain upgrade works with EPBC 2017/7932: Part B – Standard administrative conditions

Condition no.	Condition	Evidence	Discussion	Compliance rating
11.	The approval holder must notify the Department in writing of the date of commencement of the action within 10 business days after the date of commencement of the action	Previous annual compliance report (RPS 2021)	DAWE was advised in writing by Water Corporation of the intended commencement date (26 October 2020) on 6 October 2020	Not applicable
12.	The approval holder must maintain accurate and complete compliance records	This annual compliance report and previous annual compliance report (RPS 2021)	This annual compliance report and previous annual compliance report (RPS 2021) provides evidence that Water Corporation has maintained accurate and complete compliance records	Implementation ongoing
13.	If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request	Not applicable	DAWE has not requested in writing for the Water Corporation to provide electronic copes of compliance to the DAWE	Not applicable
14.	The approval holder must:			
a.	Submit plans electronically to the Department for approval by the Minister	Previous annual compliance report (RPS 2021)	All plans previously submitted to DAWE for approval. No new plans were prepared during the during the current reporting period (i.e. between 1 January 2021 and 31 December 2021)	Not applicable
b.	Publish each plan on the website within 20 business days of the date the plan is approved by the Minister or of the date a revised action management plan is submitted to the Minister or the Department, unless otherwise agreed to in writing by the Minister	Water Corporation VDD upgrade works project website: https://yoursay.watercorporation.com.au/VasseDrainUpgrade	The plans for the VDD upgrade works are available on Water Corporation's project website	Not applicable
c.	Exclude or sensitive ecological data from plans published on the website or provided to a member of the public	Water Corporation VDD upgrade works project website: https://yoursay.watercorporation.com.au/VasseDrainUpgrade	Sensitive ecological data within the VDD upgrade includes: • Confirmed locations of *Caladenia procera* – GPS locations of *Caladenia procera* provide in Dixon 2020 were blocked out in the report provided on the website • Identified locations of western ringtail possum and the location of fauna shelters – Figures and GPS locations showing fauna shelter or possum locations were blocked out in the Bamford Consulting Ecologists 2021 report provided on the website	Not applicable
d.	Keep plans published on the website until the end date of this approval	Water Corporation VDD upgrade works project website: https://yoursay.watercorporation.com.au/VasseDrainUpgrade	The plans for the VDD upgrade works are available on Water Corporation's project website	Implementation ongoing
15.	The approval holder must ensure that any monitoring data (including sensitive ecological data), surveys, maps, and other spatial and metadata required under condition 5 of this approval, is prepared in accordance with the Department's Guidelines for biological survey and mapped data (2018) and submitted electronically to the Department	• Previous annual compliance report (RPS 2021) • Subject matter specific information – Western ringtail possum (Appendix E) ○ Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020-January 2021 (Bamford Consulting Ecologists 2021). ○ Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021 – January 2022 (Bamford Consulting Ecologists 2022).	• All plans previously submitted to DAWE for approval and reported on as part of the previous annual compliance report (RPS 2021) • No new plans were prepared during the during the current reporting period (i.e. between 1 January 2021 and 31 December 2021 • The two reports, Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020- January 2021 (Bamford Consulting Ecologists 2021) and Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021–January 2022 (Bamford Consulting Ecologists 2022), are provided in Appendix E of this compliance report.	Achieved
16.	The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. The approval holder must:			
a.	Publish each compliance report on the website within 60 business days following the relevant 12 month period	Water Corporation VDD upgrade works project website: https://yoursay.watercorporation.com.au/VasseDrainUpgrade	• The previous annual compliance report (RPS 2021) is available on Water Corporation's project website • This annual compliance report addresses the required reporting period from 1 January 2021 to 31 December 2021 for the approved clearing permit (CPS 8191/1) and EPBC Act (EPBC 2017/7932) It is anticipated this annual compliance report will be published on the Water Corporation's VDD Upgrade website https://yoursay.watercorporation.com.au/VasseDrainUpgrade	Implementation ongoing
b.	Notify the Department by email that a compliance report has been published on the website and provide the weblink for the compliance report within five business days of the date of publication	Not applicable	This annual compliance report is pending website publication	Not applicable
c.	Keep all compliance reports publicly available on the website until this approval expires	Water Corporation VDD upgrade works project website: https://yoursay.watercorporation.com.au/VasseDrainUpgrade	See Table 8,16a	Implementation ongoing

Condition no.	Condition	Evidence	Discussion	Compliance rating
d.	Exclude or redact sensitive ecological data from compliance reports published on the website	Water Corporation VDD upgrade works project website: https://yoursay.watercorporation.com.au/VasseDrainUpgrade	• The 2020 Annual Compliance Report (RPS 2021) that is available on the Water Corporation's project website has redacted sensitive ecological data within the VDD upgrade – GPS locations of *Caladenia procera* provided in the Targeted *Caladenia procera* survey (Dixon 2020) report have been blocked out in Appendix F of the 2020 Annual Compliance Report (RPS 2021) – Figures and GPS locations showing fauna shelter or possum locations provided in the Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020-January 2021 (Bamford Consulting Ecologists 2021) report have been redacted from Appendix H of the 2020 Annual Compliance Report (RPS 2021) • Prior to publication of this compliance report on the Water Corporation's project website, it is anticipated that sensitive ecological information will be redacted from the Bamford Consulting Ecologists (2021 and 2022) reports in Appendix E.	Achieved
e.	Where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within five business days of publication	• Regulator liaison (Appendix G) – Email: CPS 8191/1, 2017/7932, CDD 00116 – Vasse Diversion Drain Upgrade – Western Ringtail Possum Report (5 February 2021) – Email: 2017/7932, CPS 8191/1, CD00116 – Vasse Diversion Drain Upgrade – Annual Environmental Compliance Report (30 June 2021)	• The full 2020 Annual Compliance Report (RPS 2021) was sent to the DAWE on 30 June 2021. Water Corporation advised that the compliance report would be available on the project website within 60 days • This annual compliance report is pending website publication	Achieved
17.	The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify:			
a.	Any condition which is or may be in breach	Site audits (Appendix D)	Site audits of CEMP demonstrate compliance with the requirements specific to the EPBC Act (2017/7932) approval. These are: • Fauna Management • Threatened or Specially Protected Flora Management • Weed and Soil Hygiene Management	Not applicable
b.	A short description of the incident and/or non-compliance			
c.	The location (including co-ordinates), date, and time of the incident and/or non-compliance. In the event the exact information cannot be provided, provide the best information available			
18.	The approval holder must provide to the Department the details of any incident or non-compliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:			
a.	Any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future	Site audits (Appendix D)	Site audits of CEMP demonstrate compliance with the requirements specific to the EPBC Act (2017/7932) approval. These are: • Fauna management • Threatened or specially protected flora management • Weed and soil hygiene management	Not applicable
b.	The potential impacts of the incident or non-compliance			
c.	The method and timing of any remedial action that will be undertaken by the approval holder			
19.	The approval holder must ensure that independent audits of compliance with the conditions are conducted as requested in writing by the Minister	Not applicable	No independent audits of compliance with the conditions have been requested in writing by the Minister	Not applicable
20.	For each independent audit, the approval holder must:			
a.	Provide the name and qualifications of the independent auditor and the draft audit criteria to the Department	Not applicable	Refer Table 8, 19	Not applicable
b.	Only commence the independent audit once the audit criteria have been approved in writing by the Department			
c.	Submit an audit report to the Department within the time frame specified in the approved audit criteria			
21.	The approval holder must publish the audit report on the website within ten business days of receiving the Department's approval of the audit report and keep the audit report published on the website until the end date of this approval	Not applicable	Refer Table 8, 19	Not applicable
22.	Within 30 days after the completion of the action, the approval holder must notify the Department in writing and provide completion data	Not applicable	Completion of the action means all specified activities associated with the action have permanently ceased. The VDD upgrade works were completed on schedule in July 2021, however management and monitoring activities associated with the action are ongoing	Not applicable

4 DISCUSSION

The environmental performance assessment against the record-keeping and reporting requirements for CPS 8191/1 (Condition 19(a)) (i.e. Tables 2–6) found:

- No clearing works were undertaken during the current reporting period (i.e. between 1 January 2021 and 31 December 2021), hence Conditions 9, 10, 11, 12 (a), 13, 18 (a) (i) – (v) were not applicable.
- Bamford Consulting Ecologists undertook the first event of the ten-year monitoring program of the rope bridges and artificial shelters for Year One in January, March, April / May, August, and September 2021, which found that:
  - The overall numbers of possums have remained stable throughout 2021
  - All 87 artificial shelters were checked on five occasions throughout 2021, which included 24 relocated natural dreys. A number of new natural dreys were observed in the study area, largely during March 2021, which have been added to future monitoring events.
  - The relocated natural dreys were considered important initially, however became disused as possums built new dreys or adopted artificial dreys. Two relocated natural dreys were in use in September 2021.
  - The artificial shelters were quickly adopted and used consistently during Year One, and 12%–18% of possums located during monitoring events were using artificial shelters. The availability of additional shelter is likely to have supported the population of possums following displacement.
- Revegetation works were undertaken by Tranen from 5 July to 26 October 2021 within the Quindalup Dune, VDD Embankments, Central PEC and Western PEC zones. Up to 27 October 2021, 48,945 plants (seedlings and mature trees), 38,186 fertiliser tablets and 11,261 guards have been installed.
- Tranen (2022) visited 34 quadrats across all key revegetation zones on 16–17 November 2021 for the first assessment since the ten-year program commenced. They captured photos at each quadrat, and assessed the native vegetation cover, weed cover, presence of declared weeds, bare ground cover, species richness and vegetation condition. They did not address the completion criterion for *Conospermum caeruleum* var. *Busselton* as it was not ready to be planted yet.
- Water Corporation's environmental performance addressed the requirements of all of the clearing permit conditions, with implementation ongoing to address Conditions 14 and 15.

The environmental performance assessment against conditions of approval for the EPBC Act (EPBC 2017/ 7932) approval (Condition 16) (i.e. Tables 7–8) found:

- Bamford Consulting Ecologists undertook a survey in January 2021 and the first event of the ten-year monitoring program of the rope bridges and artificial shelters for Year One in January, March, April / May, August, and September 2021.These reports did not make any recommendations to reposition the rope bridges or nest boxes.
- The Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021 (Bamford Consulting Ecologists 2021) report was provided to DWER on 5 February 2021.
- The annual monitoring report by Bamford Consulting Ecologists (2022) is attached to this compliance report under Appendix E. It is anticipated that this annual compliance report will be sent to the DAWE, prior to being published on Water Corporation's project website.
- No western ringtail possum was killed as a result of the VDD upgrade works.
- Water Corporation's environmental performance addressed the requirements of all of the EPBC Act approval conditions that were applicable to the reporting period, with implementation ongoing to address Conditions 1. b. 2. a. and b. 3. c. and d. 8. 10. 12. 14. d. 16. a. and c.
  - Prior to publication of this compliance report on the Water Corporation's project website, it is anticipated that sensitive ecological information will be redacted from the Bamford Consulting Ecologists (2021 and 2022) reports in Appendix E.

5 REFERENCES

Bamford Consulting Ecologists. 2021. Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton: October 2020–January 2021. Report prepared for the Water Corporation.

Bamford Consulting Ecologists. 2022. Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton: Year One, January 2021–January 2022. Draft report prepared for the Water Corporation.

RPS. 2021. Annual compliance report, Vasse Diversion Drain. Report prepared for Water Corporation.

Tranen. 2020. Vasse Diversion Drain Upgrade Revegetation Plan. Report prepared for Water Corporation.

Tranen. 2022. Vasse Diversion Drain Upgrade Revegetation Spring 2021 Vegetation Monitoring Report. Report prepared for Water Corporation.

Vasse Joint Venture. 2020. Construction Environmental Management Plan. Report prepared for Water Corporation.

Appendix A
EPBC Act (2017/7932) approval



Australian Government
Department of Agriculture, Water and the Environment

APPROVAL

Vasse Diversion Drain Upgrade, Busselton, Western Australia (EPBC 2017/7932)

This decision is made under sections 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999 (Cth).* Note that section 134(1A) of the **EPBC Act** applies to this approval, which provides in general terms that if the approval holder authorises another person to undertake any part of the action, the approval holder must take all reasonable steps to ensure that the other person is informed of any conditions attached to this approval, and that the other person complies with any such condition.

Details

Person to whom the approval is granted (approval holder)	Water Corporation WA
ACN or ABN of approval holder	ABN: 28003434917
Action	To upgrade the Vasse diversion drain within the City of Busselton approximately 220 km south of Perth, WA (EPBC 2017/7932) subject to the variation of the action accepted by the Minister under section 156B of the EPBC Act on Wednesday, 18 July 2018.

Approval decision

My decision on whether or not to approve the taking of the action for the purposes of the controlling provision for the action is as follows.

Controlling Provisions

Listed Threatened Species and Communities	
Section 18	Approve
Section 18A	Approve

Period for which the approval has effect

This approval has effect until 28 July 2035

Decision-maker

Name and position	Kylie Calhoun Assistant Secretary Environment Assessments West (WA, SA, NT) Branch Department of Agriculture, Water and the Environment
Signature	
Date of decision	**24 September 2020**

Conditions of approval

This approval is subject to the conditions under the EPBC Act as set out in ANNEXURE A.

ANNEXURE A – CONDITIONS OF APPROVAL

Part A – Conditions specific to the action

1. To minimise impacts to **EPBC Act listed species**, the approval holder must:
   a. **clear** no more than 2.16 hectares (ha) of **Western Ringtail Possum habitat** within the **project area** (hatched yellow in Attachment A and Attachment B);
   b. comply with and implement the conditions of the **clearing permit CPS 8191/1** or as varied from time to time; and
   c. notify the **Department** in writing of any variations of the conditions of **clearing permit CPS 8191/1** within 10 business days of such a change being approved by the **State Government**.
2. To avoid and mitigate impacts to the **Western Ringtail Possum**, the approval holder must:
   a. implement condition 14 of the **clearing permit CPS 8191/1** by installing a minimum of six rope bridges. The installation of the rope bridges must be in accordance with advice from a **suitably qualified ecologist**;
   b. implement condition 15 of the **clearing permit CPS 8191/1** by installing a minimum of 12 nest boxes suitable for **Western Ringtail Possum**. If the **action** results in the removal of more than six **dreys**, the **approval holder** must install two nest boxes for each additional **drey** being removed. Installation of the nest boxes must be in accordance with advice from a **suitably qualified ecologist**; and
   c. reposition rope bridges and nest boxes in accordance with advice from a **suitably qualified ecologist** if they are not being utilised by **Western Ringtail Possum** within six months of installation.
3. The approval holder must maintain the following records and provide them to the **Department** within two months of the installation or repositioning of rope bridges and nesting boxes:
   a. the date(s) and the **location** where the rope bridges and nest boxes for **Western Ringtail Possum** (conditioned under 2 and the **clearing permit CPS 8191/1**) were installed or repositioned;
   b. an in-situ photograph of each rope bridge and nest box installed or repositioned;
   c. evidence that a **suitably qualified ecologist** has approved the design and placement of each rope bridge and nest box; and
   d. provide the **Department** with an annual monitoring and maintenance report for the installed and repositioned rope bridges and nest boxes for at least ten years from the date of approval.
4. The approval holder must notify the **Department** within two **business days** if any **Western Ringtail Possum** is killed as a result of the **action**.
5. To minimise impacts to the **Carbunup King Spider Orchid,** the approval holder:
   a. must implement condition 9 of the **clearing permit CPS 8191/1**. The **targeted flora survey** as required by condition 9 (a) of the **clearing permit CPS 8191/1,** must be conducted between September and October 2020;
   b. must not **clear** any **Carbunup King Spider Orchid** individuals identified through the **targeted flora survey** required by condition 5a; and
   c. develop and implement a **translocation proposal** for all **Carbunup King Spider Orchid** individuals identified through the **targeted flora survey** required under condition 5a located within the **clearing area**. This **translocation proposal** must be endorsed in writing by a **suitably qualified biologist** as appropriate to ensure the successful survival of the translocated individuals without posing a risk to the receiving area(s) prior to implementation

of the proposal. The **translocation proposal** must be implemented once endorsed by a **suitably qualified biologist** as appropriate.

d. documentary evidence of the endorsement of the **translocation proposal** and implementation of the **translocation proposal** must be provided to the **Department** within 14 business days of the endorsement.

6. Within two months of conducting a **targeted flora survey** for **Carbunup King Spider Orchid** and as required by condition 5a, the approval holder must provide the **Department** the results of the **targeted flora survey** which must contain the following information:
   a. the date(s) **targeted flora survey** was conducted and the methodology used; and
   b. a photograph of each individual of **Carbunup King Spider Orchid** identified during the **targeted flora survey** and map/s showing their **location**.

7. Prior to the **commencement of the action**, the approval holder must implement the weed management and soil hygiene management measures as mentioned in the **Construction Environmental Management Framework** provided to the **Department** on 2 July 2020.

8. The approval holder must implement the **fauna management plan** provided to the **Department** on 10 September 2020.

9. The approval holder must implement a **flora management plan** as required by condition 10 of the **clearing permit CPS 8191/1.**

10. To compensate for the **residual significant impacts** on the **Western Ringtail Possum**, the approval holder must implement condition 17 of the **clearing permit CPS 8191/1**.

Part B – Standard administrative conditions

Notification of date of commencement of the action

11. The approval holder must notify the **Department** in writing of the date of **commencement of the action** within 10 **business days** after the date of **commencement of the action.**

Compliance records

12. The approval holder must maintain accurate and complete **compliance records**.

13. If the **Department** makes a request in writing, the approval holder must provide electronic copies of **compliance records** to the **Department** within the timeframe specified in the request.

Note: **Compliance records** may be subject to audit by the **Department** or an independent auditor in accordance with section 458 of the **EPBC Act**, and or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the **Department**'s website or through the general media.

Preparation and publication of plans

14. The approval holder must:
    a. submit **plans** electronically to the **Department** for approval by the **Minister**;
    b. publish each **plan** on the **website** within 20 **business days** of the date the **plan** is approved by the **Minister** or of the date a revised action management plan is submitted to the **Minister** or the **Department**, unless otherwise agreed to in writing by the **Minister**;
    c. exclude or redact **sensitive ecological data** from **plans** published on the **website** or provided to a member of the public; and
    d. keep **plans** published on the **website** until the end date of this approval.

15. The approval holder must ensure that any **monitoring data** (including **sensitive ecological data**), surveys, maps, and other spatial and metadata required under condition 5 of this approval, is prepared in accordance with the **Department's** *Guidelines for biological survey and mapped data* (2018) and submitted electronically to the **Department**.

Annual compliance reporting

16. The approval holder must prepare a **compliance report** for each 12 month period following the date of **commencement of the action**, or otherwise in accordance with an annual date that has been agreed to in writing by the **Minister**. The approval holder must:

    a. publish each **compliance report** on the **website** within 60 **business days** following the relevant 12 month period;

    b. notify the **Department** by email that a **compliance report** has been published on the **website** and provide the weblink for the **compliance report** within five **business days** of the date of publication;

    c. keep all **compliance reports** publicly available on the **website** until this approval expires;

    d. exclude or redact **sensitive ecological data** from **compliance reports** published on the **website**; and

    e. where any **sensitive ecological data** has been excluded from the version published, submit the full **compliance report** to the **Department** within 5 **business days** of publication.

Note: **Compliance reports** may be published on the **Department**'s website.

Reporting non-compliance

17. The approval holder must notify the **Department** in writing of any: **incident;** non-compliance with the conditions; or non-compliance with the commitments made in **plans**. The notification must be given as soon as practicable, and no later than two **business days** after becoming aware of the **incident** or non-compliance. The notification must specify:

    a. any condition which is or may be in breach;

    b. a short description of the **incident** and/or non-compliance; and

    c. the location (including co-ordinates), date, and time of the **incident** and/or non-compliance. In the event the exact information cannot be provided, provide the best information available.

18. The approval holder must provide to the **Department** the details of any **incident** or non-compliance with the conditions or commitments made in **plans** as soon as practicable and no later than 10 **business days** after becoming aware of the **incident** or non-compliance, specifying:

    a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;

    b. the potential impacts of the **incident** or non-compliance; and

    c. the method and timing of any remedial action that will be undertaken by the approval holder.

Independent audit

19. The approval holder must ensure that **independent audits** of compliance with the conditions are conducted as requested in writing by the **Minister**.

20. For each **independent audit**, the approval holder must:

    a. provide the name and qualifications of the independent auditor and the draft audit criteria to the **Department**;

b. only commence the **independent audit** once the audit criteria have been approved in writing by the **Department**; and

c. submit an audit report to the **Department** within the timeframe specified in the approved audit criteria.

21. The approval holder must publish the audit report on the **website** within 10 **business days** of receiving the **Department's** approval of the audit report and keep the audit report published on the **website** until the end date of this approval.

Completion of the action

22. Within 30 days after the **completion of the action**, the approval holder must notify the **Department** in writing and provide **completion data**.

Part C - Definitions

In these conditions, except where contrary intention is expressed, the following definitions are used:

Approval holder means Western Australian Water Corporation.

Business day means a day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.

Carbunup King Spider Orchid means the **EPBC Act** listed critically endangered *Caladenia procera.*

Clear/Clearing means the cutting down, felling, thinning, logging, removing, killing, destroying, poisoning, ringbarking, uprooting or burning of vegetation (but not including weeds – see the *Australian weeds strategy 2017 to 2027* for further guidance, or for the purpose of translocation under condition 5c).

Cleared area/s means an area/s (in hectares) within the **project area** where loss or long-term modification of habitat has occurred.

Clearing area means the area (in hectares) where loss or long term modification of habitat will occur within the **project area**.

Clearing permit CPS 8191/1 means the clearing permit granted on 3 July 2020 under section 51E of the *Environmental Protection Act 1986* (WA), and any subsequent versions.

Commencement of the action means the first instance of any specified activity associated with the action including clearing of vegetation and **construction** of any infrastructure. **Commencement of the action** does not include minor physical disturbance necessary to:

i. undertake pre-clearance surveys or monitoring programs;

ii. install signage and /or temporary fencing to prevent unapproved use of the project area;

iii. protect environmental and property assets from fire, weeds and pests, including **construction** of fencing, and maintenance of existing surface access tracks;

iv. install temporary site facilities for persons undertaking pre-commencement activities so long as these are located where they have no impact on the **protected matters**.

Completion data means an environmental report and spatial data clearly detailing how the conditions of this approval have been met. The **Department**'s preferred spatial data format is **shapefile**. **Completion data** should include, but not be limited to, information detailing the date and location of **clearing**; the actual total **cleared area/s** within the **project area** (in hectares); the total area and type of **Western Ringtail Possum** habitat **cleared** within the **project area** (in hectares); and the total area and type of **Western Ringtail Possum** habitat within **retention area/s** (in hectares). **Completion data** must also include information on the location of rope bridges and nest hollows installed under the conditions of this approval.

Completion of the action means all specified activities associated with the action have permanently ceased.

Compliance records means all documentation or other material in whatever form required to demonstrate compliance with the conditions of approval in the approval holder's possession or that are within the approval holder's power to obtain lawfully.

Compliance reports means written reports:

i. providing accurate and complete details of compliance, **incidents**, and non-compliance with the conditions and the **plans**;

ii. consistent with the **Department's** *Annual Compliance Report Guidelines* (2014);

iii. include a **shapefile** of any clearance of any **protected matters**, or their habitat, undertaken within the relevant 12 month period; and

iv. annexing a schedule of all **plans** prepared and in existence in relation to the conditions during the relevant 12 month period.

Construction means the erection of a building or structure that is or is to be fixed to the ground and wholly or partially fabricated on-site; the alteration, maintenance, repair or demolition of any building or structure; preliminary site preparation work which involves breaking of the ground (including pile driving); the laying of pipes and other prefabricated materials in the ground, and any associated excavation work; but excluding the installation of temporary fences and signage.

Construction Environmental Management Framework means the document provided by Western Australian Water Corporation to the **Department** on 2 July 2020.

Department means the Australian Government agency responsible for administering the **EPBC Act**.

Drey means a nest for the **Western Ringtail Possum** typically formed from a mass of twigs.

Dieback and weed management methods mean various methodologies applied to control dieback of Western Australian native vegetation from *Phytophthora* species and multiple **weeds.**

EPBC Act means the *Environment Protection and Biodiversity Conservation Act 1999* (Cth).

EPBC Act listed species Threatened fauna and flora listed under Section 178 of the **EPBC Act**.

Fauna management plan means a management **plan** for fauna species including **Western Ringtail Possum** occurring within the **project area** prepared by Western Australian Water Corporation.

Flora management plan means a management **plan** for flora species including **Carbunup King Spider Orchid** occurring within the **project area** prepared by Western Australian Water Corporation.

Incident means any event which has the potential to, or does, impact on one or more **protected matter(s)**.

Independent audit: means an audit conducted by an independent and **suitably qualified person** as detailed in the *Environment Protection and Biodiversity Conservation Act 1999 Independent Audit and Audit Report Guidelines* (2019).

Life of the approval means the period for which this approval has effect.

Location means the exact position recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA 1994), expressing the geographical co-ordinates in decimal degrees.

Monitoring data means the data required to be recorded under the conditions of this approval.

Minister means the Australian Government Minister administering the **EPBC Act** including any delegate thereof.

Plan(s) means any of the documents required to be prepared, approved by the **Minister**, and/or implemented by the approval holder and published on the **website** in accordance with these conditions (includes action management plans and/or strategies).

Project area means all of the areas approved to clear overlain with yellow in Attachment A and Attachment B and areas subject to conditions overlain with yellow and blue in Attachment C.

Protected matter means a matter protected under a controlling provision in Part 3 of the **EPBC Act** for which this approval has effect.

Residual significant impacts mean the residual impacts on the protected matters that are still likely to occur after the proposed activities to avoid and mitigate all impacts are taken into account.

Sensitive ecological data means data as defined in the Australian Government Department of the Environment (2016) *Sensitive Ecological Data – Access and Management Policy V1.0.*

Shapefile means location and attribute information of the action provided in an Esri shapefile format. Shapefiles must contain '.shp', '.shx' , '.dbf' files and a '.prj' file that specifies the projection/geographic co-ordinate system used. Shapefiles must also include an '.xml' metadata file that describes the shapefile for discovery and identification purposes**.**

State Government means the Government of Western Australia.

Suitably qualified biologist means a person who has professional qualifications and at least three years of work experience surveying for **Carbunup King Spider Orchid** and can give authoritative assessment, advice and analysis on performance relative to the subject matter using relevant protocols, standards, methods and/or literature. If the person does not have appropriate professional qualifications, the person must have at least five years of work experience related to the subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using relevant protocols, standards, methods and/or literature.

Suitably qualified ecologist means a person who has professional qualifications and at least three years of work experience surveying for **Western Ringtail Possum** and can give authoritative assessment, advice and analysis on performance relative to the subject matter using relevant protocols, standards, methods and/or literature. If the person does not have appropriate professional qualifications, the person must have at least five years of work experience related to the subject matter and can give authoritative assessment, advice and analysis on performance relative to the subject matter using relevant protocols, standards, methods and/or literature.

Suitably qualified person means a person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.

Targeted flora survey means a field-based investigation, including a review of established literature, of the biodiversity of flora and vegetation of the permit area, focusing on habitat suitable for **Carbunup King Spider Orchid** and carried out during the optimal time to identify the species, which is during the flowering period between September and October. Where target flora are identified in the or in close proximity to the permit area, the survey must also include a minimum of a 10 metre radius of the surrounding areas to place the permit area into a local context.

Translocation proposal means a written plan that details the deliberate, human-mediated movement of **Carbunup King Spider Orchid** from one area, with a release in another for the purpose of establishing, re-establishing or augmenting a population.

Website means a set of related web pages located under a single domain name attributed to the approval holder and available to the public.

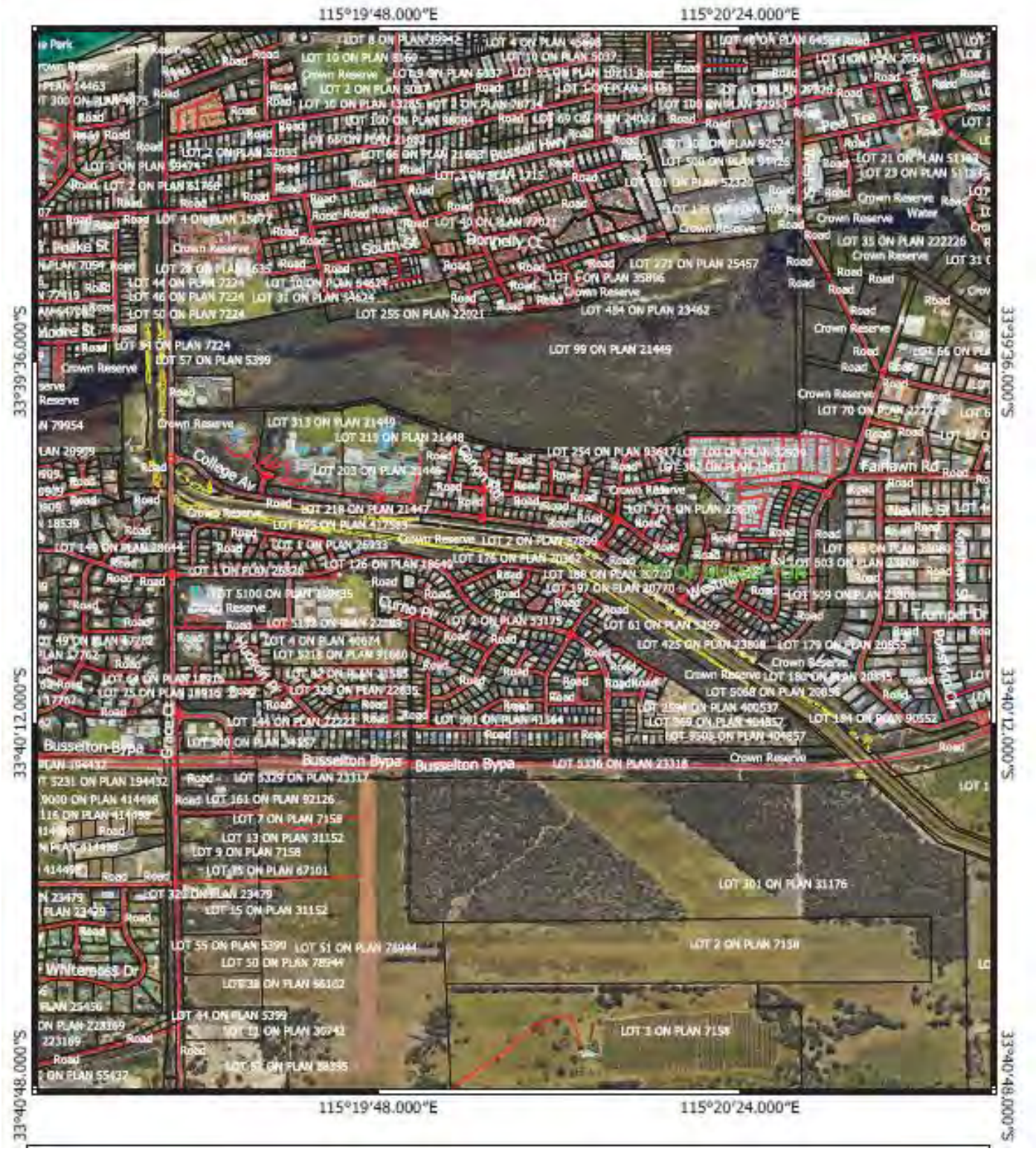
Weed/s means any plant species included in the Australian Government Weeds of National Significance or any other species defined as a weed in **clearing permit CPS 8191/1**.

Western Ringtail Possum means the **EPBC Act** listed critically endangered species *Pseudocheirus occidentalis.*

Western Ringtail Possum habitat means any areas where **Western Ringtail Possum** occurs naturally.

ATTACHMENTS

Attachment A



Attachment B



Attachment C



Appendix B
Approved Clearing Permit (CPS 8191/1)



GOVERNMENT OF WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	CPS 8191/1
Permit Holder:	Water Corporation
Duration of Permit:	From 28 July 2020 to 28 July 2035

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

1. **Purpose for which clearing may be done**
   Clearing for the purpose of upgrading the Vasse Diversion Drain, including the reconstruction of the Vasse Diversion Dam and duplication of the culverts.

2. **Land on which clearing is to be done**
   Lot 866 on Diagram 4170 (Crown reserve 16061), West Busselton
   Lot 80 on Deposited Plan 70429, Bovell
   Lot 61 on Plan 5399, West Busselton
   Lot 59 on Plan 5399, West Busselton
   Lot 58 on Plan 5399, Bovell
   Lot 57 on Plan 5399 (Crown reserve 16061), West Busselton
   Lot 56 on Plan 9868, Bovell
   Lot 56 on Plan 9868, West Busselton
   Lot 56 on Plan 5399, Bovell
   Lot 55 on Plan 9868, West Busselton
   Lot 553 on Plan 23463 (Crown reserve 48018), West Busselton
   Lot 5337 on Plan 23318, Bovell
   Lot 5210 on Plan 22191 (Crown reserve 45170), West Busselton
   Lot 5209 on Plan 22630 (Crown reserve 45170), West Busselton
   Lot 5190 on Deposited Plan 220139 (Crown reserve 41460), West Busselton
   Lot 5136 on Diagram 42478 (Crown reserve 45588), Bovell
   Lot 5068 on Plan 20855 (Crown reserve 44380), Busselton
   Lot 5067 on Plan 20770 (Crown reserve 43250), West Busselton
   Lot 5067 on Plan 20362 (Crown reserve 43250), West Busselton
   Lot 505 on Deposited Plan 417589, West Busselton
   Lot 501 on Deposited Plan 417589, West Busselton
   Lot 4989 on Plan 18644 (Crown reserve 43250), West Busselton
   Lot 4607 on Diagram 40995, West Busselton
   Lot 4348 on Diagram 27395 (Crown reserve 26555), West Busselton
   Lot 2594 on Deposited Plan 400537 (Crown Reserve 52132), West Busselton
   Lot 2593 on Deposited Plan 400537 (Crown Reserve 52132), West Busselton
   Lot 1 on Diagram 39001, West Busselton

Lot 100 on Diagram 9165, Bovell
Unallocated Crown Land (PIN 11993547), Bovell
Water Feature (PIN 11725451), Bovell
Road Reserve - 1172836, West Busselton
Road Reserve - 11440716, West Busselton
Road Reserve - 1183896, West Busselton
Deposited Plan 37514 - Easement J140752 (5067)
Deposited Plan 37514 - Easement J140752 (5209)
Deposited Plan 37514 - Easement J140752 (5210)

3. **Area of clearing**
The Permit Holder must not clear more than 2.16 hectares of native vegetation within the area hatched yellow on attached Plan 8191/1a and 8191/1b.

4. **Period in which clearing is authorised**
The Permit Holder shall not clear any native vegetation after 28 July 2025.

5. **Application**
This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

6. **Type of clearing authorised**
This Permit authorises the Permit Holder to clear native vegetation for the *project activities* described in condition 1 of this Permit to the extent that the Permit Holder has the power to carry out works involving clearing for those *project activities* under the *Water Corporation Act 1995* or any other written law.

7. **Avoid, minimise and reduce the impacts and extent of clearing**
In determining the amount of native vegetation to be cleared authorised under this Permit, the Permit Holder must have regard to the following principles, set out in order of preference:
   (a) avoid the clearing of native vegetation;
   (b) minimise the amount of native vegetation to be cleared; and
   (c) reduce the impact of clearing on any environmental value.

8. **Dieback and weed management**
When undertaking any clearing authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds* and *dieback*:
   (a) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
   (b) ensure that no known *dieback* or *weed*-affected soil, *mulch, fill* or other material is brought into the area to be cleared; and
   (c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

9. **Flora management – *Caladenia procera***
   (a) Prior to undertaking any clearing, the Permit Holder must engage a *botanist* to conduct a *targeted flora survey* within *suitable habitat(a)* within the areas cross-hatched yellow on attached Plan 8191/1a for the presence of *Caladenia procera*;
   (b) The Permit Holder shall ensure no clearing of any *Caladenia procera* individuals identified through the surveys required by condition 9(a);
   (c) The Permit Holder shall ensure that no clearing occurs within 10 metres of *Caladenia procera* individuals identified through the surveys required by condition 9(a), unless the clearing is done in accordance with condition 9(d) of this Permit;
   (d) Where clearing within 10 metres of individuals of *Caladenia procera* is unavoidable, the Permit Holder must:

(i) install clearly demarked temporary fencing around the individuals of *Caladenia procera* prior to undertaking any clearing and maintain the fencing until the *project activities* have ceased; and

(ii) Adhere to the Flora Management Plan required under condition 10 which has been approved by the *CEO*.

(e) Within two months of undertaking any clearing authorised under this Permit within the areas cross-hatched yellow on Plan 8191/1a, the Permit Holder must provide the results of the *targeted flora survey*, as required by condition 9(a), in a report to the *CEO;* and

(f) If *Caladenia procera* are identified within 10 metres of the areas cross-hatched yellow on Plan 8191/1a, the *targeted flora survey* report must include the following:

(i) the location of each *Caladenia procera* identified under condition 9(a), either as the location of individual plants, or where this is not practical, the areal extent of the population and an estimate of the number of plants, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;

(ii) map/s showing the location of any identified population of *Caladenia procera* cleared and the remaining population; and

(iii) the methodology used to survey the Permit area.

10. Flora Management Plan

Where clearing within 10 metres of individuals of *Caladenia procera* is unavoidable, the Permit Holder must submit a Flora Management Plan to the *CEO* for approval, prior to clearing commencing. The management plan must contain the following:

(i) Details of the Permit Holder's attempts to avoid and minimise impacts to *Caladenia procera*; and

(ii) Proposed methods of minimising and mitigating any indirect impacts to *Caladenia procera*.

11. Fauna management – other approvals

Prior to clearing, the Permit Holder must provide to the *CEO:*

(a) a copy of the fauna licence(s) obtained under the *Biodiversity Conservation Act 2016* for the *relocation* and/or *translocation* of Carter's freshwater mussel (*Westralunio carteri*) and the dispersion of western ringtail possum (*Pseudocheirus occidentalis*) individuals; and

(b) a copy of the approved exemption from the Department of Primary Industries and Regional Development under the *Fish Resources Management Act 1994 and Fish Resources Management Regulations 1995* for the collection of Carter's freshwater mussel for translocation.

12. Fauna management – Carter's freshwater mussel

(a) Prior to commencement of any clearing activities authorised under this Permit, the Permit Holder must submit a Carter's freshwater mussel (*Westralunio carteri*) Management Plan to the *CEO* for approval. The management plan must contain the following:

(i) Removal, transportation and *relocation* method, and where required, temporary storage method;

(ii) Location of the *relocation* site, including a field assessment confirming the suitability of the *relocation* site;

(iii) Stocking densities; and

(iv) The success rate monitoring plan.

13. Fauna management – western ringtail possum

(a) In relation to the area cross-hatched yellow on attached Plans 8191/1a and 8191/1b, the Permit Holder must engage a *fauna specialist* to inspect that area, including all trees and tree hollows present, within 24 hours prior to, and for the duration of clearing, for the presence of western ringtail possum(s) (*Pseudocheirus occidentalis*).

(b) Clearing must cease in any area where fauna referred to in condition 13(a) above are identified until the western ringtail possum(s) has moved out of the development area to adjoining *suitable habitat(b)*.

(c) Where fauna is identified under condition 13(a) of this Permit, the Permit Holder must provide the following records to the *CEO* as soon as practicable:

(i) the number of individuals identified;
(ii) the date each individual was identified;
(iii) the location where each individual was identified recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
(iv) the number of individuals displaced;
(v) the relevant qualifications of the *fauna specialist* undertaking the displacement;
(vi) the date each individual was displaced;
(vii) the method of dispersal;
(viii) the date each individual was dispersed;
(ix) the location where each individual dispersed to, recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees; and
(x) details pertaining to the circumstances of any death of, or injury sustained by, an individual.

14. Fauna management – western ringtail possum rope bridges

Prior to commencement of any clearing activities authorised under this Permit, the Permit Holder must at a minimum install six rope bridges within the area cross-hatched red on the attached Plan 8191/1c, in accordance with the following requirements:

(i) the end of each rope bridge must be connected to at least two mature trees, or two different locations in the canopy of a single mature tree, at a height of at least three metres above ground level;
(ii) the rope bridges must be placed in areas that provide canopy connectivity for western ringtail possum movement across the local area, i.e. across roadways and other gaps in the canopy;
(iii) be monitored annually and maintained for a period of at least ten years; and
(iv) Within two months of undertaking any clearing authorised under this Permit within the combined areas cross-hatched yellow on Plan 8191/1a and 8191/1b, the Permit Holder must provide to the *CEO*, the locations where each rope bridge was placed using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees.

15. Fauna management – western ringtail possum nest boxes

Prior to commencement of any clearing activities authorised under this Permit, the Permit Holder must, at a minimum, install 12 nest boxes within the area cross-hatched red on the attached Plan 8191/1c, in accordance with the following requirements:

(i) be designed and placed in accordance with the specifications detailed in the Project Revegetation Plan required by condition 17(a);
(ii) be placed at least three metres above ground level in a mature tree facing the shadiest side of the tree;
(iii) be monitored annually and maintained for a period of at least ten years; and
(iv) within two months of undertaking any clearing authorised under this Permit within the combined areas cross-hatched yellow on Plan 8191/1a, the Permit Holder must provide to the *CEO*, the locations where each nest box was placed using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees.

16. Revegetation and rehabilitation – mitigation

(a) Within 12 months of the commencement of clearing, the Permit Holder must undertake revegetation within 0.55 hectares of the area hatched red on attached Plan 8191/1d in accordance with condition 17 of this permit.

17. **Offset – revegetation and rehabilitation**
    (a) Within 3 months of clearing commencing, the Permit Holder must submit a Project Revegetation Plan to the *CEO* for approval for the *revegetation* of 10.34 hectares of land within the areas cross-hatched red on Plan 8191/1e, which shall be developed in accordance with *A Guide to Preparing Revegetation Plans for Clearing Permits* (Department of Water and Environmental Regulation (DWER) 2018).
    (b) The Project Revegetation Plan must be prepared by an *environmental specialist*.
    (c) The Project Revegetation Plan must include the following:
        (i) *site preparation*;
        (ii) deliberate planting of native vegetation that will provide *suitable habitat(b)* for western ringtail possum;
        (iii) deliberate planting of species associated with the *Eucalyptus rudis* (flooded gum), *Corymbia calophylla*, *Agonis flexuosa* Closed Low Forest (near Busselton)' priority ecological community (PEC) in areas as outlined in the Project Revegetation Plan;
        (iv) deliberate planting of up to 300 seedlings of *Conospermum caeruleum var.* Busselton;
        (v) planting of *local provenance* native understorey species at an *optimal time* so as to achieve the *completion criteria* specified in condition 17(a)(xii) below;
        (vi) a biannual weed control program within the area hatched red on Plan 8191/1e to achieve the *completion criteria* outline under condition 17(a)(xii), criterion 2;
        (vii) establishment of a total of 34, 5 x 5 metre monitoring *quadrats* within the area hatched red on Plan 8191/1e;
        (viii) maintenance of sufficient fencing to protect revegetation areas adjacent to areas most impacted by public access as outlined in the Project Revegetation Plan;
        (ix) implementation of hygiene protocols by cleaning earth-moving machinery of soil and vegetation prior to entering and leaving the site;
        (x) installation of signage to educate reserve users of the revegetation activities being undertaken;
        (xi) achieve the below *completion criteria* within the ten year monitoring period for the area hatched red on Plan 8191/1e;

Criterion	Aspect	Scale	Completion criteria description	Monitoring frequency
1	Per cent *weed* cover	Average of *quadrat* data and site traverse	<15 per cent weed cover across all sites	Bi-annually in the first 2 years, and annually for the next 8 years
2	Declared *weeds*	Site traverse	Absence of declared weeds	Bi-annually in the first 2 years, and annually for the next 8 years
3	Per cent bare ground	Average of *quadrat* data and site traverse	Per cent of bare ground to be no greater than that recorded in the *pre clearing surveys*.	Bi-annually in the first 2 years, and annually for the next 8 years
4	Vegetation condition	Site traverse	The condition of the vegetation to be in a good to very good condition on average across the revegetation area (Keighery 1994).	Bi-annually in the first 2 years, and annually for the next 8 years
5	Native vegetation cover/density	Average of *quadrat* data and site traverse	>70 per cent native cover	Bi-annually in the first 2 years, and annually for the next 8 years
6	Species richness	Average of *quadrat* data	>70 per cent of species planted represented across all sites respectively (PEC sites, Geographe coastal wetland	Bi-annually in the first 2 years, and annually for the next 8 years

			system sites and Quindalup dune sites) as outlined in the species list provided in the Project Revegetation Plan	
7	*Conospermum caeruleum var.* Busselton	Site traverse and direct survival observation	>50 per cent survival rate to be achieved	Bi-annually in the first 2 years, and annually for the next 8 years

(xii) remedial actions to be undertaken if *completion criteria* are not met; and
(xiii) management commitments that will be achieved.

(d) The Permit Holder shall implement the Project Revegetation Plan as approved by the *CEO*.

18. Record keeping

The Permit Holder must maintain the following records:

(a) In relation to the clearing of native vegetation authorised under this Permit:
  (i) the boundaries of clearing undertaken on each date, recorded using a Global Positioning System GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  (ii) the size of the area cleared (in hectares);
  (iii) actions taken to avoid, minimise and reduce the impacts and extent of clearing in accordance with condition 7 of this Permit;
  (iv) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 8 of this Permit;
  (v) details required in accordance with flora management conditions 9and 10 of this Permit; and
  (vi) details required in accordance with fauna management conditions 11, 12, 13, 14 and 15 of this Permit.

(b) In relation to revegetation activities undertaken pursuant to conditions 16 and 17 of this Permit:
  (i) the date(s) each area was revegetated;
  (ii) the location of each area revegetated recorded using a GPS unit set to GDA94, expressing the geographical coordinates in Eastings and Northings or decimal degrees;
  (iii) at least two photographs of each area revegetated taken on an annual basis at the same location each year;
  (iv) a description of the revegetation activities undertaken each year for each area revegetated; and
  (v) a description of the tree density and native understorey vegetation cover for each area revegetated recorded on an annual basis.

19. Reporting

(a) The Permit Holder must provide to the *CEO* on or before 30 June of each year, a written report:
  (i) of records required under condition 18 of this Permit; and
  (ii) concerning activities done by the Permit Holder under this Permit between 1 January to 31 December of the preceding calendar year.

(b) If no clearing authorised under this Permit has been undertaken, a written report confirming that no clearing under this Permit has been undertaken, must be provided to the *CEO* on or before 30 June of each year.

(c) Prior to 30 March 2030, the Permit Holder must provide to the *CEO* a written report of records required under condition 18 of this Permit where these records have not already been provided under condition 19(a) of this Permit.

Definitions

The following meanings are given to terms used in this Permit:

botanist means a person who holds a tertiary qualification specialising in environmental science or equivalent, and has a minimum of two (2) years work experience in Western Australian flora identification and undertaking flora surveys native to the bioregion being inspected or surveyed, or who is approved by the CEO as a suitable environmental specialist for the bioregion, and who holds a valid flora licence issued under the *Biodiversity Conservation Act 2016*;

CEO means the Chief Executive Officer of the Department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*;

completion criteria (quantitative) means a measurable outcome based on a suitable reference site, used to determine revegetation/rehabilitation success;

dieback means the effect of *Phytophthora* species on native vegetation;

environmental specialist means a person who holds a tertiary qualification in environmental science or equivalent, and has a minimum of 2 years work experience relevant to the type of environmental advice that an environmental specialist is required to provide under this permit, or who is approved by the CEO as a suitable environmental specialist;

fill means material used to increase the ground level, or fill a hollow;

local provenance means native vegetation seeds and propagating material from natural sources within 100 kilometres where practical, based on a species specific assessment and availability of sufficient propagation material and the same Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the area cleared.

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

optimal time means the most suitable period for undertaking direct seeding and planting based on species availability, as set out in the Project Revegetation Plan;

pre clearing surveys means those surveys undertaken by the applicant prior to the permit being granted, which informed the assessment of the clearing permit application;

quadrat means a sample plot established for the purpose of data collection and monitoring vegetation characteristics, for example species composition, structure, density and condition;

rehabilitate/ed/ion/ing means actively managing an area containing native vegetation in order to improve the ecological function of that area;

relocation means moving an individual animal (or family group) from one location within its home range to another location within the same home range for the purpose of resolving a human-wildlife conflict;

revegetate/ed/ion/ing means the re-establishment of a cover of local provenance native vegetation in an area using methods such as natural regeneration, direct seeding and/or planting, so that the species composition, structure and density is similar to pre-clearing vegetation types in that area;

reference site means a site used to provide baseline data for planning a revegetation project. Measurements from fixed reference points or plots where biodiversity components are measured are used to set measurable completion criteria for revegetation projects. Reference sites are to be in at least very good condition (Keighery 1994);

revegetation plan means a plan prepared by the Permit Holder, or an appropriate *environmental specialist* delegated by the Permit Holder, for the *revegetation* of a site in accordance with a Permit condition;

site preparation means management of existing site topsoil and preparation of the finished soil surface, for example by ripping or tilling the soil surface and respreading site topsoil and chipped native vegetation.

suitable habitat(a) means habitat known to support Carbunup king spider orchid (*Caladenia procera*) within the known current distribution of the species, typically characterised by jarrah (*Eucalyptus marginata*), marri (*Corymbia calophylla*) and peppermint (*Agonis flexuosa*) woodland on alluvial sandy-clay loam flats, with Mangles kangaroo paw (*Anigozanthos manglesii*) amongst dense heath and sedges or low dense shrubs. Other associated species include *Acacia stenoptera* and *Pimelea sylvestris*.

suitable habitat(b) means habitat known to support western ringtail possums (*Pseudocheirus occidentalis*) within the known current distribution of the species, typically characterised by abundant foliage, presence of suitable nesting structures such as tree hollows, as well as high canopy cover and continuity. Known habitat includes peppermint (*Agonis flexuosa*) dominated woodlands, jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) forests, riparian vegetation with a canopy of Bullich (*Eucalyptus megacarpa*) or flooded gum (*Eucalyptus rudis*), karri (*Eucalyptus diversicolor*) forests, sheoak (*Allocasuarina fraseriana*) dominated woodlands, and other stands of myrtaceous trees growing near swamps, watercourses or floodplains;

targeted flora survey means a field-based investigation, including a review of established literature, of the biodiversity of flora and vegetation of the permit area, focusing on habitat suitable for *Caladenia procera* and carried out during the optimal time to identify the species, which is during the flowering period between September and October. Where target flora are identified in the or in close proximity to the permit area, the survey must also include a minimum of a 10 metre radius of the surrounding areas to place the permit area into local context;

translocation means deliberate, human-mediated movement of living organisms from one area, with release in another for the purpose of establishing, re-establishing or augmenting a population. Movement includes between wild locations and populations, from a captive facility or ex situ population to a wild location, and/or from the wild to a captive facility for population growth, with an intention to return the individuals or their progeny to the wild;

vegetation condition means the rating given to native vegetation which refers to the impact of disturbance on each of the layers and the ability of the community to regenerate (Keighery 1994);

weed/s means any plant -

(a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or

(b) published in a Department of Biodiversity, Conservation and Attractions species-led ecological impact and invasiveness ranking summary, regardless of ranking; or

(c) not indigenous to the area concerned.

fauna specialist means a person who holds a tertiary qualification specialising in environmental science or equivalent, and has a minimum of 2 years work experience in fauna identification and surveys of fauna native to the region being inspected or surveyed, or who is approved by the CEO as a suitable fauna specialist for the bioregion, and who holds a valid fauna licence issued under the Biodiversity Conservation Act 2016.

Digitally signed
by Adrian Wiley
Date: 2020.07.03
16:06:17 +08'00'

Adrian Wiley
SENIOR MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

3 July 2020

Appendix C
Compliance reporting time frame approval



Australian Government
Department of Agriculture, Water and the Environment

Ref: 2017/7932

Mr Sean Nicholson
Senior Environment Advisor
Assets Planning and Delivery
Water Corporation
Locked Mail Bag 2
Osborne Park Delivery Centre
OSBORNE PARK WA 6916

RE: EPBC 2017/7932 - Request to change compliance reporting

Dear Mr Nicholson

Thank you for your correspondence to the Department requesting changes to the compliance reporting for EPBC 2017/7932.

Officers of this Department have reviewed these requests and briefed me. As delegate of the Minister, I agree for the EPBC 2017/7932 compliance reporting dates to be aligned with the state clearing permit. Please note that in accordance with the relevant Annual compliance reporting condition, the Department must be notified by email that a compliance report has been published on the website and provide the weblink for the compliance report within five business days of the date of publication.

As you are aware, the Department has an active monitoring program which includes monitoring inspections, desk top document reviews and audits. Please ensure that you maintain accurate records of all activities associated with, or relevant to, the conditions of approval so that they can be made available to the Department on request.

Should you require any further information please contact Bayley Costin, Project Officer, Post Approvals Section, on 02 6274 1118 or by email: post.approval@awe.gov.au.

Yours sincerely

Kim Farrant
Assistant Secretary
Environment Assessments (Vic, Tas) and Post Approvals Branch
Environment Approvals Division

8 April 2022

Appendix D
Site audits



Audit Process
The Contractor will be provided the audit table (this document) two weeks prior to the audit
The Contractor will have the opportunity to provide evidence of compliance in preparation for the audit.
Evidence of compliance can include photos, documentation, forms, visual inspection during the audit and personal communciations with project staff
Audit Outcomes
The Contractor will have one week after the audit to provide additional evidence, or action any quick fix hazards or Area's for improvement
All other outcomes will be recorded as major- or minor- non-compliance within the Corporation Sentinel system

Environmental Compliance Audit Report	
Asset/Project Details	
Audit Type	Environmental
Project Number	CD00116
Audit Document	CD00116-PLN-011-Cnostruction Environmental Management Plan Rev 5 (VJV, 2020)
Audit Folder	**https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/111439856**
Project Approvals	**https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/73772539**
Current risk rating	Moderate
Phase	Construction
Asset Details	Vasse Diversion Drain, Busselton
Audit Details	
Audit Team	Giles Glasson, Shenae Blakiston
Reviewer	Klara Allsopp, Bree Atkinson
Auditee	Vasse Joint Venture and Western Environmental
Audit Date	16-Feb-21
Audit Objective	This audit reviews contractor requirements as outlined in CD00116-PLN-011 Construction Environmental management Plan (VJV, 2020) CD00116 – Vasse Diversion Drain Upgrade Project. **https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/103879081** The CEMP is a live document that works as an adaptive management plan. The version of this document live at the date and time of audit will be saved in PDF format with the finalised Audit Compliance Report (this document).
Project Description	Project Scope - Refurbishment of levees including repair of concrete walls along the lower sections of the Vasse Diversion Drain along Queen Elizabeth Avenue - Deconstruction, widening and reconstruction of the levees - Construction of the Vasse Diversion Dam - Installation or replacement of culverts - Dredging/scouring of the Vasse Diversion Drain channel - Construction and deconstruction of temporary coffer dams.

General commitments								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
Section 1.5, pg. 6	GC1	WEM-POL-001 Environmental Policy and WEM-POL-002 Sustainability Policy posted in site office.	Vasse Joint Venture (VJV)	• WEM-POL-001 Environmental Policy posted in main site office and four counstruction site offices • WEM-POL-002 Sustainability Policy not observed posted	• Visual observation • Site photographs	WEM-POL-002 Sustainability Policy to be posted in site offices	Partially Compliant	Policy placed in crib rooms. Evidence provided. Closed out
Section 2, pg. 6	GC2	The risk register will be maintained on site and will be communicated to project personnel. VRV will review the register on the following basis: • Reviews will be undertaken on a minimum quarterly basis; • When a CEMP non-conformance has been reported; • An environmental incident has occurred; and/or • Changes to the environmental approval compliance obligations and/or the scope of works is communicated by Water Corporation.	VJV	Project risk register observed in hard copy and provided in electronic (CD00116-REG-003-5-Risk Register) format	• Visual observation • Site photographs • VJV advised that risk register is communicated: - on a weekly basis via JSA's - on a daily basis via Take 5's • Risk register has been subject to five reviews between November 2020 and January 2021		Compliant	
Section 2, pg. 7	GC3	Project team to ensure that potential environmental aspects and impacts are considered and incorporated into other risk management activities for the project e.g. SWMS, JSA, Take 5 etc.	VJV	• See GC2 • Risk register includes environmental risks			Compliant	
Section 3.3, pg. 7-8	GC4	VJV to adhere to: • Australian Government, 'Controlled Action' approved under the Environment Protection and Biodiversity Conservation Act 1999 (Cth); all activities to be undertaken in compliance with conditions set in the EPBC 2017/7932 Approval Conditions (September 2020 to July 2035) • Government of Western Australia, Clearing Permit (Purpose Permit) granted under Part V (Section 51E) of the Environmental Protection Act 1986 Purpose Permit number 8191/1 (June 2020 to June 2035) • Dewatering Licence (5C Licence to Take Water -GWL204992(1) and 26D Licence to Construct or Alter Well - CAW204993(1) • Traffic Management Plan: Busselton Vasse Diversion Drain Upgrade (Adjacent to Queen Elizabeth Ave, College Ave and Chapman Hill Road) Vasse, WA (Edge Transport Solutions, 2020) • Acid Sulfate Soil and Dewatering Management Plan: CD00116 – Vasse Diversion Drain EEC19269.001-3 (RPS, 2020) • Vasse Diversion Drain Upgrade, Westralunio carteri (Carter's Freshwater Mussel) Relocation Management Plan (IndoPacific, 2020a) • Vasse Diversion Drain Upgrade: Water Quality Monitoring and Management Plan (IndoPacific, 2020b) • Fauna management Plan for the Vasse Diversion Drain Upgrade (Bamford Consulting Ecologists, 2020) • Vasse Diversion Drain Upgrade: Revegetation Management Plan (Tranen Revegetation Southwest, 2020).	VJV	Demonstrated through implementation of the approved CEMP (CD00116-PLN-011-5)			N/A	
Section 3.3, pg. 8	GC5	VJV to obtained and adhered City of Busselton Construction Work Regulation 13 Permit (if noise generation is required outside of 7am – 6pm Monday – Saturday).	VJV	City of Busselton Construction Work Regulation 13 Permit (ECM_4499680_v2_Regulation 13 Approval - VDDU) obtained for Dewatering Pumps	Regulation 13 Permit (ECM_4499680_v2_Regulation 13 Approval - VDDU) provided in electronic format		Compliant	
Misc.	GC6	Copies of the CEMP and relevant ITPs kept at all four site crib rooms.	VJV	• Copies CEMP, Quality Management Plan, Occupational Safety and Health Management Plan & Risk Register visually observed in hard copy in main site office • Copies of the CEMP, Quality Management Plan, Occupational Safety and Health Management Plan & Risk Register available to site personnel in electronic format	Visual observation		Compliant	

General commitments								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
Section 5.1, pg. 9-10	GC7	Site Access Plan identifying: •Approved development area footprint (DAF); •Approved clearing areas; •Fences for the protection of Environmentally Sensitive Areas (ESAs) •Approved construction laydown area(s); •Plant and vehicle access and egress points; •Hygiene management points; •Site offices and amenities; •Material stockpiles, soil/spoil windrows; •Location of stormwater runoff control measures; •Acid Sulfate Soil (ASS) treatment locations; •Bypass pipes; •Infiltration areas. Copies of these should be kept at each Site Office.	VJV	• Site access plan prepared and visually observed at main site office • Copies of the site access plan available to site personnel in electronic format	Visual observation		Compliant	
Section 5.1, pg. 10	GC8	DAF and Approved Clearing Areas will be set out by a qualified surveyor and subject to joint inspection and signoff prior to clearing, with specified hold points captured in VJV inspection and test plans	VJV				Compliant complete 16/12/2020	
Section 5.1, pg. 10	GC9	Principal will identify and fence off ESA's and VJV will stay out of these areas and monitor the integrity of these fences throughout the works.	WC / VJV	• ESA fence with shade cloth observed • No evidence of unauthorised access to the fenced ESA observed • Various instances of sand accumulation against fence and minor holes in the shade cloth observed • Open trench directly adjacent to ESA fence observed within the DAF has potential for fauna entrapment	• Visual observation • Site photographs	• Sand accumulation against the fence and shade cloth integrity to be regularly monitored with regular remedial actions implemented to remove sand and fix shade cloth • Open trench to be filled in to eliminate fauna entrapment risk. Suggest using excess sand which has accumulated against the fence to fill in the trench	• WC-Compliant • VJV-Not Compliant	Sand removed immediately. Evidence of inspections daily. Closed out
Section 6, pg. 11	GC10	The Project Manager or delegate will maintain records of training for the project including successful completion of the project induction.	VJV	Training Matrix (C2261-VJV-WHS-REG-0002) contains details training records for project staff	Training Matrix (C2261-VJV-WHS-REG-0002) provided		Compliant	
Section 6, pg. 11	GC11	Relevant environmental topics will be incorporated within daily prestart meetings or toolbox meetings for presentation to the project personnel.	VJV	• Pre-start meeting attended at Site 1 - VROS / VRDD. • Environmental issues addressed included use of existing access tracks for vehicle movements.	• Aural observation • Minutes from one daily prestart meeting provided (20210213 - Prestart (aaron)) which detail consideration of environmental issues	• One set of minutes from one daily prestart meeting provided only. • There are four construction site offices each of which hold a daily prestart meeting. VJV to ensure that environmental considerations are incorporated to daily prestarts at each construction site office	Partially Compliant	Additional Evidence provided listed as 'Other' Closed out
Section 6, pg. 11	GC12	Additional specialist environmental skills training (e.g. fauna handling) will be provided for project staff as determined by operational requirements.	VJV	See GC10	• VJV advised that additional targeted snake handling training had been undertaken by environmental staff. • Ad hoc task specific training was also conducted by Bamford Consulting Ecologists and Indopacific		Compliant	
Section 7.1, pg. 11	GC13	The Project Manager or delegate will actively promote considerations of environmental issues at prestart meetings and toolbox meetings, with relevant environmental topics incorporated into the meetings for presentation to the project personnel.	VJV	See GC11			Partially Compliant	Additional Evidence provided listed as 'Other' Closed out
Section 7.1, pg. 11	GC14	Poster and other promotional materials will be placed in crib room and site office to reinforce environmental awareness with the project personnel.	VJV	WC Environmental Matters poster sighted at main site office and four construction site offices	• Visual observation • Site photographs		Compliant	
Section 7.1, pg. 11	GC15	Discussion of project environmental matters will also be incorporated into the fortnightly project meeting agenda including review of Contractor compliance with the CEMP and to encourage continual improvement of environmental management during the execution of the project. Meeting agenda and minutes will be recorded, maintained and be made available when required.	VJV	• Minutes from internal progress meetings 8 and 9 only provided • Environmental context addressed	Minutes from internal progress meetings 8 and 9	Agendas and minutes from all fortnightly meetings to be maintained	Partially Compliant	Additional Evidence provided listed as 'Other' Closed out
Section 7.3, pg. 11	GC16	• The Project manager or delegate will manage all complaints received by VJV and ensure they are communicated to the Water Corporation's Community Engagement Advisor in accordance with the community engagement plan • All complaints will be recorded • The complaint will be investigated promptly to determine the cause and any corrective action required.	VJV	Community Interaction Register (CD00116-REG-011-0) contains description of the interaction, actions required and status	Community Interaction Register (CD00116-REG-011 0) provided	Complaints to be communicated to WC Community Engagement Advisor	Compliant	

General commitments								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
Section 8.1, pg. 12	GC17	Any environmental incidents shall be investigated and reported to Water Corporation as soon as practicable after the incident is identified. Reports shall include details of the incident and any corrective actions taken.	VJV	Hazard Incident Report Register (WHS-REG-021) details environmental incidents.	• Hazard Incident Report Register (WHS-REG-021) provided • VJV advised that minor spills are no longer recorded and that tickets for minor spills are prepared		Compliant	
Section 8.2, pg. 13	GC18	• The Project Manager or delegate is responsible for reporting and investigating environmental incidents that occur within the worksite; • The Project Team are responsible for reporting any member of staff, either by refusal or neglect fails to observe requirements; • Any incident that directly impacts on any of the above environmental issues is to be reported immediately to the HSE Manager/ HSE Advisor who will then inform the Project Manager who will notify Water Corporation in accordance with the identified timeframes.	VJV	See GC17			Compliant	
Section 8.2, pg. 13	GC19	Environmental incidents are reported on WEM-FM-001 Environmental Incident Notification.	VJV	See GC17			Compliant	
Section 9.1, pg. 13	Vasse Joint Venture and Western Environmental	Formal inspections of clearing boundaries and ESA fencing will be undertaken prior to the commencement of any clearing activities and daily during clearing activities	VJV				Compliant complete 16/12/2020	
Section 9.1, pg. 13	16-Feb-21	Daily and weekly inspections will be recorded on WEM-FM-002 Weekly Environmental Inspection Checklist.	VJV	Daily and weekly inspections are undertaken on Site Environmental Inspection Checklist	• Daily and weekly inspections provided • VJV advised that weekly inspections have been replaced by daily inspections and that daily inspections are provided to WC on a weekly basis		Compliant	

General commitments								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
Section 9.1, pg. 13	GC22	Issues arising from site inspections shall be addressed as soon as possible, in some cases non-conformance reports may be raised. Issues identified shall also be discussed at toolbox or site prestart meetings together with any improvement measures that have been implemented.	VJV	See GC21	• VJV advised that issues detected by daily site inspections are communicated verbally for resolution • Issue resolution checked as part of daily site inspections	Identified issues to be discussed at toolbox or site prestart meetings together with any improvement measures that have been implemented.	Partially Compliant	Register has been provided and will be maintained. Closed out
Section 9.1, pg. 13	GC23	Internal environmental audits will be undertaken by the Contractor approximately 1 month after mobilisation, 3 monthly thereafter and as directed by Water Corporation.	VJV	• WC undertook site audit in December • Site audit completed by VJV in January using the same WC template	VJV January site audit provided		Compliant	
Section 9.2, pg. 13	GC24	Laboratory Testing – personnel and sampling logs, evidence of NATA accredited laboratory, Chain of Custody	VJV	• WE project scientist undertook field measures • Field logs for ASS, dewatering effluent, groundwater, surface water and soil profile provided • Laboratory results, CoC and QA/QC documentation provided	• Field logs for ASS, dewatering effluent, groundwater, surface water and soil profile • NATA accredited laboratories (Eurofins, ARL) have been used to process the field samples • Laboratory results, CoC and QA/QC documentation provided		Compliant	
Section 9.3, pg. 14	GC25	Non-Conformances – records, evidence of inspection, review, reporting, and implementation of appropriate remedial action.	VJV	See GC22	No evidence of review, reporting, and implementation of appropriate remedial actions to address issues identified by daily inspections provided	Review, reporting, and implementation of appropriate remedial actions to address issues identified by daily inspections to be documented	Not Compliant	See GC22 Closed out
Section 10.1, pg. 14	GC26	The CEMP will be reviewed and may be revised as a result of: • An Environmental Incident; • Changes to Company procedures or processes; • Changes to key personnel or resources; • Changes in legal and other obligations • Findings from an audit or inspection; • Findings from a significant incident or near miss; • Significant changes to site conditions and/or work methods • Instructions from Water Corporation	VJV	No review or revisions to the CEMP have been made			Compliant	
Section 10.1, pg. 14	GC27	• Within 2 working days of the start of each month during the progress of the project, monthly HSE performance reporting to Water Corporation will be carried out via http://eprocurement.watercorporation.com.au. • In addition to the above, the Contractor will provide on request all daily/weekly site inspections and provide an update to project team on environmental performance at each fortnightly site meeting. • The Contractor will review the HSE management performance for and lessons learnt during the project for the purpose of continually improving the Environmental Management System for VJV.	VJV	Risk Register Review and HSE information (RE_ Vasse Diversion Drain - VJV CEMP Site Audit) for January only sighted	• Records of HSE performance reporting to WC provided only for January • See GC21 & GC15	HSE performance reporting to be provided to WC on a monthly basis	Partially Compliant	Closed out - Issue was a Water Corporation IT issue. Resolved in Jan 2021.

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.1 Native Vegetation and Clearing Management Sub-Plan								
App 12.1, pg. 17	12.1 MGa	Inspection and clearing procedure developed for clearing activities identifying hold points from Water Corporation Vasse Diversion Drain Upgrade Construction Environment Management Framework (CEMF) and specification	Vasse Joint Venture (VJV)	Clearing lot maps, Clearing ITPs (001-004), Clearing records, Clearing photos and Survey record provided	• Clearing lot maps • Clearing ITPs (001-004) • Clearing records • Clearing photos • Survey record		Compliant completed	
App 12.1, pg. 17	12.1 MGb	DAF and approved clearing areas to be established by qualified surveyor and clearly demarcate. Review demarcated areas to identify areas of vegetation that can be retained and amend clearing areas if applicable.	VJV	• Clearing ITPs (001-004) identify that DAF and approved clearing areas established by a qualified surveyor • Trees demarcated with pink flagging have been retained within DAF	• Clearing ITPs (001-004) • Visual observation • Site photographs		Compliant completed	
App 12.1, pg. 17	12.1 MGc	Clearing only to commence after inspection of demarcated and barricaded areas and hold points signed off by WC and VJV. WC Environmental specialist to complete inspection 5d prior to clearing.	VJV	Clearing ITPs (001-004) provided	Clearing ITPs (001-004)		Compliant completed	
App 12.1, pg. 17	12.1 MGd	Site Access Plan to be developed to delineate laydown areas and access tracks	VJV	See GC7			Compliant completed	
App 12.1, pg. 17	12.1 MGe	Facilitate access for the Principal's Flora SME	VJV		• VJV advised Principal's SMEs subject to standard site induction procedures • No access complaints received from Principal's SMEs		Compliant	
App 12.1, pg. 17	12.1 MGf	Include vegetation management requirements within project specific induction, including but not limited to: • All project activities and access to be limited to within the demarcated DAF and public roads • The location of Environmentally Sensitive Areas (ESA's) and sensitive receptors (which will be identified and fenced by the Principal) to which access is forbidden • All hot works require signed hot work permit with controls identified on the permit in place prior to commencement of any hot work	VJV		VJV advised vegetation management requirements identified in project specific induction	Project specific induction to be provided for review	Compliant	
12.2 Fauna Management Sub-Plan								
Ap 12.2, pg. 20	12.2 MGa	All injured/killed fauna to be reported to site management immediately and handled only by trained handler. We intend to utilize the services of FAWNA Busselton (0438 526 660 [primary contact], 0417 937 184 [FAWNA Manager Suze Strap, secondary contact]) if required to handle and care for injured animals.	VJV	N/A - No injured/killed fauna to be reported on site	Fauna interaction register (CD00116-REG-019)		N/A	
Ap 12.2, pg. 20	12.2 MGb	FAWNA to conduct first responder training with VJV management team members	VJV to facilitate	See GC12			Compliant	
Ap 12.2, pg. 20	12.2 MGc	Register to be created for all fauna removals, deaths or injuries. The register must identify: • Date/time and location. • Type and number of fauna. • Status (E.g. dead/alive/injured). • Method of removal. • Location of removal • Details of person (Name, Contact Registration/Licence details)	VJV	Fauna interaction register (CD00116-REG-019) provided	Fauna interaction register (CD00116-REG-019)		Compliant	
Ap 12.2, pg. 20	12.2 MGd	Inspection and test plans to identify hold points from CEMF and specification	VJV	• Fauna interaction register (CD00116-REG-019) provided • BCE tab in Fauna interaction register identifies that clearing was undertaken under the supervision of BCE	Fauna interaction register (CD00116-REG-019)		Compliant	
Ap 12.2, pg. 20	12.2 MGe	Clearing debris to be removed from cleared area on the day of clearing	VJV	• Clearing Records provided • No obvious signs of clearing debris with DAF during site audit	• Clearing Record • Visual observation • Site photographs		Compliant	
Ap 12.2, pg. 20	12.2 MGf	Install silt curtains downstream of the works in the VDD and downstream of the works in the lower Vasse river	VJV	Silt curtains observed in place during site audit	• Visual observation • Site photographs		Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
Ap 12.2, pg. 20	12.2 MGg	Facilitate access for all the Principal's Fauna SME's (eg mussel relocation, Possum drey removal, inspections/trapping for Quenda & Rakali, daily wildlife inspections during clearing	VJV	See 12.1 MGe			Compliant	
Ap 12.2, pg. 20	12.2 MGh	Confirm that Water Corporation has executed their responsible actions and attain WC approval prior to commencement of clearing.	VJV	See 12.1 MGc			Compliant complete	
Ap 12.2, pg. 20	12.2 MGi	Native vegetation clearing will be undertaken under the supervision of the Principal's Fauna SME's. The contractor will work collaboratively with the SME's to establish and document the agreed clearing methodology for each individual tree identified as containing possums prior to felling those trees.	VJV under the supervision of the Water Corporation Fauna SME's (Bamford Consulting Ecologists)	See 12.2 MGd			Compliant	
Ap 12.2, pg. 20	12.2 MGj	Include fauna management requirements within project specific induction, including but not limited to: • Education on threatened and specially protected species and required actions if encountered • Methods for avoiding damage to fauna • Incident response if fauna is injured / killed inc phone #'s • Maintain clean work environment to avoid attracting fauna • No feeding disturbance, harassing or hunting of fauna, or the presence of firearms or pets on site. • Daily inspection of open excavations and pipes for fauna	VJV		VJV advised fauna management requirements identified in project specific induction	Project specific induction to be provided for review	Compliant	
12.3 Threatened or Specially Protected Flora Management Sub-Plan								
App 12.3, pg. 22	12.3 MGa	Inspection and test plan developed for clearing activities identifying hold points from CEMF and specification	VJV	See 12.1 MGa			Compliant	
App 12.3, pg. 22	12.3 MGb	Access to be provided to Principal's SME's as required	VJV	See 12.1 MGe			Compliant	
App 12.3, pg. 22	12.3 MGc	Principal to identify and fence off Environmentally Sensitive Areas (ESA's)	Water Corporation (WC)	See GC09			Compliant complete	
App 12.3, pg. 22	12.3 MGd	ESA's to be identified in site maps and discussed in prestart meetings when working in proximity to these areas	VJV	• WC Environmental Matters poster sighted four site offices • ESA identified in WC Environmental Matters poster	• Visual observation • Site photographs		Compliant	
App 12.3, pg. 22	12.3 MGe	Clearing only to commence after inspection of demarcated areas and hold points signed off by WC and VJV. Contractor to provide notice 5d prior clearing on southern side of drain between ch 1700 and 1900.	VJV	N/A - VJV advised that WC contractor undertook clearing adjacent to ESA prior to site handover			N/A	
App 12.3, pg. 22	12.3 MGf	Water Corporation Personnel will be present on site to monitor clearing works in the immediate vicinity of the ESA on the southern side of the drain between CH 1700 to CH 1900	WC	See 12.3 MGf			N/A	
App 12.3, pg. 22	12.3 MGg	Include Flora management requirements within project specific induction, including but not limited to: • The location of Environmentally Sensitive Areas (ESA's) and sensitive receptors (which will be identified and fenced by the Principal) to which access is forbidden • The requirement to remain on designated access areas within the Development Area Footprint (DAF)	VJV	See 12.1 MGf			Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.4 ASS and Dewatering Management Sub-Plan – VROS/VRDD								
App 12.4, pg. 23-25	12.4 MGa	Inspection and test plan developed for acid sulfate soil and dewatering activities identifying hold points and testing requirements from CEMF, ASSDMP and specification	VJV	Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided	Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP)		Compliant	
App 12.4, pg. 23-25	12.4 MGb	Appoint appropriately qualified Environmental Scientist to complete groundwater, surface water and ASS sampling and provide details to Principal for approval. Environmental Scientist to be on site whilst excavation, infiltration and/or dewatering activities are occurring.	VJV	• WE project scientist undertook field measures for groundwater, surface water and ASS • WE project scientist is on site every day	Field logs for groundwater, surface water and ASS		Compliant	
App 12.4, pg. 23-25	12.4 MGc	Include testing instruments / equipment used for groundwater, surface water and ASS sampling in the site testing equipment register, calibrate prior to use and monthly (minimum) thereafter. Calibration certification provided to Principal.	VJV	Calibration logs in hard copy visually sighted	Visual observation	Calibration logs to be provided to WC	Compliant	
App 12.4, pg. 23-25	12.4 MGd	Alleviate vegetation stress (if identified) in consultation with Water Corporation (i.e. supplementary watering of vegetation during dewatering if directed).	VJV in consultation with WC	• Daily inspection reports provided • No obvious signs vegetation stress in vegetated areas adjacent to the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.4, pg. 23-25	12.4 MGe	Include ASS disturbance risks and the soil, sediment, water and dewatering management requirements within project specific induction, including but not limited to: • Identification and notification protocols for ASS and PASS • The expected location of ASS including MBO	VJV		VJV advised ASS disturbance risks and the soil, sediment, water and dewatering management requirements identified in project specific induction	Project specific induction to be provided for review	Compliant	
App 12.4, pg. 23-25	12.4 MGf	Dewatering management requirements: • Treat (i.e. increase pH to ≥6.0 and<8.5, decrease acidity to ≤40 mg/L with calcium based agent, increase alkalinity to ≥30 mg/L) prior to discharge to ground (aquifer recharge via sediment and infiltration basin or use for dust suppression) • Volume of water taken to be metered and not to exceed 260,000kL per calendar year for 2020 and 2021 • Depth of dewatering spears to be limited to the superficial aquifer	VJV	• Dosing unit observed in VROS/VRDD site • Treated effluent used for on site dust suppression • Dewatering volumes metred and monitored • Dewatering spears are up to ~ 5 metres in depth	• Visual observation • Site photographs		Compliant	
App 12.4, pg. 23-25	12.4 MGg	Do not discharge effluent (directly or indirectly) to surface water without DWER/DBCA/WC approval or use sodium based agents	VJV	N/A - Treated effluent used for on site dust suppression			N/A	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
App 12.4, pg. 23-25	12.4 MGh	Groundwater management requirements: • Monitoring of existing network during dewatering as following locations: - VRDD box culvert – GW01, GW02, GW03, GW04, BH-VDD/07/01 - VROS – GW03, GW04, BH-VDD/07/01 • Replace bores if necessary in accordance with ASSDMP • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals), field blank (metals)	VJV	• GW01, GW02, GW03 bores have been destroyed during construction. • Replacement bores have been installed by VJV • Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided • Groundwater field sheets and lab analysis provided - Groundwater field sheets not completely filled out (eg. Recovery depth, general observations, sample colour, turbidity, etc) - QA/QC data not provided	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • Groundwater field sheets and lab analysis	• All fields in data sheets to be addressed • QA/QC data to be provided to WC	Partially Compliant	Records are being improved and QA/QC data has been provided to the Corporation. Closed out
App 12.4, pg. 23-25	12.5 MGi	Surface water management requirements (Sampling and testing by Principals SME): • To be undertaken during the construction of the VROS/VRDD structure • Establish silt curtains downstream of works and discharge point, remove in accordance with the ASSDMP (coffer dams finished, no plumes, same quality up and down stream of curtain • Monitoring at up and down stream locations (SW01-SW04) as per the ASSDMP • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals+turbidity), field blank (metals+turbidity)	Water Corporation Water Quality SME (IndoPacific) / VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided • Surface water field sheets provided - Surface water field sheets not completely filled out (eg. Recovery depth, general observations, sample colour, turbidity, etc) - QA/QC data not provided • Silt curtains observed in place • SW01 - SW04 monitoring locations observed	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • Surface water field sheets • Visual observation • Site photographs	• All fields in data sheets to be addressed • QA/QC data to be provided to WC	Partially Compliant	See 12.4 MGh Closed out
App 12.4, pg. 23-25	12.5 MGj	Soil/sediment management requirements: • Soils from 0.5 mbgl at the VROS/VRDD and from 3 mbgl within the existing VRDD, as well as sediments, are ASS and should be treated if excavated. MBOs have not been observed at VROS/VRDD. • ASS treatment and reuse options: - Treat and reuse onsite - Treat and reuse offsite - Dispose offsite for treatment • Treatment onsite can be done immediately adjacent to the open trench or in stockpiles (recommended within 18 hours but up to 14 days is ok) on a 300 mm thick limestone pad with bunds • Liming rates (based on 50% ENV, adjust if necessary) as follows: - VROS/VRDD – All soils below 0.5 mbgl (0.05%S): 8 kg/m^3 - VROS/VRDD – All soils below 1.5 mbgl (0.1%S): 15 kg/m^3 - Dark grey/black soils > 2.7 mbgl (0.6%S): 90 kg/m^3 - Blue/grey clays > 4.5 mbgl (0.37%S): 56 kg/m^3 - All sediments (0.14%S): 21 kg/m^3 • There is to be no uncontained stockpile runoff	VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided • ASS field sheets and lab analysis provided • Treated ASS stockpiles observed in adjacent paddocks • No uncontained stockpile runoff observed • 300 mm thick limestone pad with bund visually observed	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis	Suggest consistent reporting of soil description of the ASS stockpile, volume of the stockpile, reaction vigour and description of where material came from on site in ASS field sheets is undertaken	Compliant	
App 12.4, pg. 23-25	12.4 MGk	Contingencies: • Refer to S2.7 of the VROS/VRDD ASSDMP	VJV		VJV advised that there has been an increase in field monitoring frequency, laboratory samples have been retested and additional sheet piling installed to minimise dewatering duration		Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.5 ASS and Dewatering Management Sub-Plan – Levee Reconstruction								
App 12.5, pg. 28-30	12.5 MGa	Inspection and test plan developed for acid sulfate soil and dewatering activities identifying hold points and testing requirements from CEMF, ASSDMP and specification	VJV	See 12.4 MGa			Compliant	
App 12.5, pg. 28-30	12.5 MGb	Appoint appropriately qualified Environmental Scientist to complete groundwater, surface water and ASS sampling and provide details to Principal for approval. Environmental Scientist to be on site whilst excavation, infiltration and/or dewatering activities are occurring.	VJV	See 12.4 MGb			Compliant	
App 12.5, pg. 28-30	12.5 MGc	Include testing instruments / equipment used for groundwater, surface water and ASS sampling in the site testing equipment register, calibrate prior to use and monthly (minimum) thereafter. Calibration certification provided to Principal.	VJV	See12.4 MGc			Compliant	
App 12.5, pg. 28-30	12.5 MGd	Include ASS disturbance risks and the soil, sediment, water and dewatering management requirements within project specific induction, including but not limited to: • Identification and notification protocols for ASS and PASS • The expected location of ASS including MBO	VJV	See 12.1 MGf			Compliant	
App 12.5, pg. 28-30	12.5 MGe	Dewatering is not expected; however, management of effluent requirements include: • Treat (i.e. increase pH to ≥6.0 and<8.5, decrease acidity to ≤40 mg/L with calcium based agent, increase alkalinity to ≥30 mg/L) prior to discharge to ground (aquifer recharge via sediment and infiltration basin or use for dust suppression) • Volume of water taken to be metered and not to exceed 260,000kL per calendar year for 2020 and 2021 • Depth of dewatering spears to be limited to the superficial aquifer	VJV	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 28-30	12.5 MGf	Do not discharge effluent (if any, directly or indirectly) to surface water without DWER/DBCA/WC approval or use sodium based agents	VJV	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 28-30	12.5 MGg	Groundwater management requirements: • Monitoring of three wells during dewatering (if any); one up and two down gradient of works. There is existing network of 6 wells; however, additional complimentary wells may be required. • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals), field blank (metals)	VJV	N/A - No dewatering being undertaken			N/A	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
App 12.5, pg. 28-30	12.5 MGh	Surface water management requirements: • To be undertaken during any dewatering in the area • Establish silt curtains down and upstream of works and discharge point, remove in accordance with the ASSDMP (coffer dams finished, no plumes, same quality up and down stream of curtain) • Monitoring at up and down stream locations from silt curtains and New River estuary • Saturate work zone between CH0800-1500 for 5 days with seawater prior to dam removal	VJV	• N/A - No dewatering being undertaken • Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided • Surface water field sheets provided • Silt curtains observed in place • SW05 - SW06 monitoring locations observed • N/A - coffer dam not proposed for removal	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • Surface water field sheets • Visual observation • Site photographs		N/A-Compliant	
App 12.5, pg. 28-30	12.5 MGi	Soil/sediment management requirements: • ASS includes: - Soils > 2.5 mbgl @ CH5600-5980 (northern side) - Dark grey black sediment/potential MBO @ CH800-5600 - New River estuary sediments @ CH800-1000 - VDD sediments @ CH5600-6000 - Ironstone “Ferricrete” gravels/boulders @ CH2350-6300 – reuse untreated above the water table • ASS treatment and reuse options: - Treat and reuse onsite - Treat and reuse offsite - Dispose soils offsite for treatment - Treat MBO and dispose offsite • Soil treatment can be done onsite immediately adjacent to the open trench or in stockpiles (recommended within 18 hours but up to 14 days is ok if covered with 10 mm lime layer) on a 300 mm thick limestone pad with bunds • Inspect CH800-5600, CH5600-6000 and New River estuary sediments upon on site possession and assess MBO extent and risk. Cover any MBO and surrounds with 20 mm/m^2 aglime; mix and remove material onto limestone pad validation. If not MBO excavate onto pad for treatment. • Liming rates (based on 50% ENV, adjust if necessary) as follows: - Soils > 2.5 mbgl @ CH5600-5980 (0.08%S): 12 kg/m^3 - Dark grey black sediment/potential MBO @ CH800-5600: 20 mm/m^2 - New River estuary sediments @ CH800-1000: (0.34%S): 51 kg/m^3 - VDD sediments @ CH5600-6000: (0.27%S): 41 kg/m^3 • There is to be no uncontained stockpile runoff	VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided • ASS field sheets and lab analysis provided	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis		Compliant	
App 12.5, pg. 28-30	12.5 MGj	Contingencies: • Refer to S3.8 of the Levee Reconstruction ASSDMP	VJV	N/A - VJV advised that no contingencies have been required to be implemented			N/A	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.6 ASS and Dewatering Management Sub-Plan – Gauging Station								
App 12.6, pg 33-34	12.6 MGa	Inspection and test plan developed for ASS and dewatering ac	VJV	See 12.4 MGa			Compliant	
App 12.6, pg 33-34	12.6 MGb	Appoint appropriately qualified Environmental Scientist to comp	VJV	See 12.4 MGb			Compliant	
App 12.6, pg 33-34	12.6 MGc	Include testing instruments / equipment used for groundwater, surface water and ASS sampling in the site testing equipment register, calibrate prior to use and monthly (minimum) thereafter. Calibration certification provided to Principal.	VJV	See12.4 MGc			Compliant	
App 12.6, pg 33-34	12.6 MGd	Include ASS disturbance risks and the soil, sediment, water and dewatering management requirements within project specific induction, including but not limited to: • Identification and notification protocols for ASS and PASS • The expected location of ASS including MBO	VJV	See 12.1 MGf			Compliant	
App 12.6, pg 33-34	12.6 MGe	Dewatering may be required; management of effluent will include: • Treat (i.e. increase pH to ≥6.0 and<8.5, decrease acidity to ≤40 mg/L with calcium based agent, increase alkalinity to ≥30 mg/L) prior to discharge to ground (aquifer recharge via sediment and infiltration basin or use for dust suppression) • Volume of water taken to be metered and not to exceed 260,000kL per calendar year for 2020 and 2021 • Depth of dewatering spears to be limited to the superficial aquifer	VJV	N/A - No dewatering being undertaken			N/A	
App 12.6, pg 33-34	12.6 MGf	Do not discharge effluent (if any, directly or indirectly) to surface water without DWER/DBCA/WC approval or use sodium based agents	VJV	N/A - No dewatering being undertaken			N/A	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
App 12.6, pg 33-34	12.6 MGg	Groundwater management requirements: • Install additional three wells (GW07/19, GW08/19, GW09/19) prior to and monitor four wells (incl BH-VDD/07/06) during dewatering. • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals), field blank (metals)	VJV	N/A - No dewatering being undertaken	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • Groundwater field sheets and lab analysis • VJV advised that two wells have been installed, as agreed to by WC, and baseline conditions sampled		N/A	
App 12.6, pg 33-34	12.6 MGh	Soil/sediment management requirements: • ASS includes: - Dark grey black silty sediment/potential MBO and soils - Ironstone “Ferricrete” gravels/boulders @ CH2350-6300 – reuse untreated above the water table • ASS treatment and reuse options: - Treat and reuse onsite - Treat and reuse offsite - Dispose soils offsite for treatment - Treat MBO and dispose offsite • Inspect CH5300-5350 sediments upon on site possession and assess MBO extent and risk. Cover any MBO and surrounds with 20 mm/m^2 aglime; mix and remove material onto limestone pad validation. If not MBO excavate onto pad for treatment. • Liming rates (based on 50% ENV, adjust if necessary) as follows: - All material (0.34%S): 52 kg/m^3 or 20 mm/m^2 • There is to be no uncontained stockpile runoff • Accumulated sediments from dewatering will be tested for metals to determine reuse potential	VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) provided • ASS field sheets and lab analysis provided	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis		Compliant	
App 12.6, pg 33-34	12.6 MGi	Contingencies: • Refer to S2.9 of the Gauging Station ASSDMP	VJV	N/A - VJV advised that no contingencies have been required to be implemented			N/A	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.7 Weed and Soil Hygiene Management Sub-Plan								
App12.7, pg. 37	12.7 MGa	Inspection and test plan developed for construction activities identifying hold points from CEMF and specification	VJV		VJV advised that all new vehicles on site are either inspected by the hire company prior to mobilisation or inspected onsite		Compliant	
App12.7, pg. 37	12.7 MGb	All plant and equipment will be inspected to ensure they are free from soil and plant debris prior to commencement of work on site.	VJV	• Vehicle inspection sheet sighted in hard copy • New scrapper observed to be free of vegetative material	• Visual observation • Site photographs • VJV advised that all new vehicles on site are either inspected by the hire company prior to mobilisation or inspected onsite		Compliant	
App12.7, pg. 37	12.7 MGc	Restrict access of machines and vehicles to areas of cleared native vegetation.	VJV	Machines and vehicles sighted in cleared areas only.	• Visual observation • Site photographs		Compliant	
App12.7, pg. 37	12.7 MGd	No mulch or topsoil is to be imported to site without approval from the Superintendent.	VJV	N/A - VJV advised that no mulch or topsoil has been imported to site			N/A	
App12.7, pg. 37	12.7 MGe	No known dieback or weed-affected soil, mulch, fill or other material is to be imported to site.	VJV	See 12.7 MGd			Compliant	
App12.7, pg. 37	12.7 MGf	Inspection of site for declared weed infestations.	VJV	• Daily inspection reports provided • No obvious signs of weeds establishment post clearing evident within the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App12.7, pg. 37	12.7 MGg	Facilitate access for the Principal's Revegetation SME	VJV	See 12.1 MGe			Compliant	
App12.7, pg. 37	12.7 MGh	Include weed and soil hygiene management requirements within project specific induction, including but not limited to: • Protocols to ensure all personnel and sub-contractors minimise the spread or introduction of weeds or dieback via movement of soil & vegetation and mobile plant	VJV	See 12.1 MGf			Compliant	
12.8 Land Degradation Management Sub-Plan								
App 12.8, pg. 39	12.8 MGa	Inspection and test plan developed for ground disturbance and clearing activities identifying hold points from CEMF and specification	VJV	See 12.1 MGa			Compliant	
App 12.8, pg. 39	12.8 MGb	Install silt curtains downstream of the culvert in the Lower Vasse River and downstream of coffer dam at ch 800 to manage turbidity	VJV	See 12.2 MGf			Compliant	
App 12.8, pg. 39	12.8 MGc	Considering site conditions (soil type, slope, and vegetation cover) and proximity to sensitive environments when determining stockpile locations	VJV	• Stockpiles have primarily been located in cleared paddocks not proximate to native vegetation. • Sand has been piled proximate to the ESA fence in Site 3	• Visual observation • Site photographs	Sand piling proximate to ESA to be avoided	Partially Compliant	Sand was removed immediately. Daily inpsection reports are now providing more comprehensive evidence. Closed out
App 12.8, pg. 39	12.8 MGd	Facilitate access for the Principal's Water Quality Monitoring SME	VJV	See 12.1 MGe			Compliant	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
App 12.8, pg. 39	12.8 MGe	Remove sedimentation/or erosion management structures when water quality has returned to baselines levels.	VJV	N/A - Silt curtains remain in place during construction			N/A	
App 12.8, pg. 39	12.8 MGf	Plan construction to minimise the time period between clear and grade and backfill and restoration to reduce the potential for erosion of exposed soils.	VJV	Construction works staged concurrently across four active work fronts to minimise the time period between clear and grade and backfill and restoration			Compliant	
App 12.8, pg. 39	12.8 MGg	All vehicles to use the constructed and/or existing access tracks and designated turning circles to prevent erosion of adjacent farmland or vegetation.	VJV	• Daily inspection reports provided • No obvious signs of windrows being driven over or vehicle tracks outside of existing trafficable areas • Flagging and fencing observed to demarcate the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.8, pg. 39	12.8 MGh	Ground disturbance and vegetation clearing shall be restricted to defined areas within the project DAF	VJV	See 12.1 MGb			Compliant	
App 12.8, pg. 39	12.8 MGi	Strip topsoil from the laydown area and any stockpile areas	VJV	Topsoil stripping observed at Site 2 (Chapman Hill Road) stockpiles	• Visual observation • Site photographs		Compliant	
App 12.8, pg. 39	12.8 MGj	Stockpiled soils shall be stabilised and contained to avoid wind and water erosion and maximise future viability	VJV	• Daily inspection reports provided • No obvious signs of loss of stockpile integrity or erosion • Water carts observed onsite watering stockpiles	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.8, pg. 39	12.8 MGk	Construct a hardstand with imported material (typically natural gravel, crushed limestone, or road base)	VJV		VJV advised that compacted crushed limestone is used for hardstand areas		Compliant	
App 12.8, pg. 39	12.8 MGl	Install bunding for all machine servicing areas to capture any oil / fuel spills. Install an impermeable membrane under the pad location where servicing vehicles, plant and equipment is proposed	VJV	• Earthen bund established around fuel storage and machinery parking area in Site 2 (Chapman Hill Road) • Refuelling area has bunded tray underlying truck refuelling site	• Visual observation • Site photographs • VJV advised that vehicles are serviced offsite from the VROS / VRDD site and onsite at Site 2 (Chapman Hill Road). Mobile drip trays are used is vehicles are required to be serviced in situ		Compliant	
App 12.8, pg. 39	12.8 MGm	Include land degradation management requirements within project specific induction, including but not limited to identification and communication of erosion risks	VJV	See 12.1 MGf			Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.9 Waste Management Sub-Plan								
App 12.9, pg. 41	12.9 MGa	Inspection and test plan developed for clearing activities identifying hold points from CEMF and specification	VJV	N/A - This line item is a typo and was incorrectly copied and pasted from the clearing sub-plan (T. Malseed [VJV Project Manager], personal communication, February 25, 2021)			N/A	
App 12.9, pg. 41	12.9 MGb	Identify all major waste streams associated with the works and identify any controlled or recyclable wastes.	VJV	• Waste and recycling bins observed at each site office • Oil waste segregated and stored at Site 2 (Chapman Hill Road)	• Visual observation • Site photographs • VJV advised that the site participates in the containers for change program		Compliant	
App 12.9, pg. 41	12.9 MGc	Refer to RPS (2020) waste characterisation report regarding soil /sediment waste disposal	VJV	N/A - VJV advised that no soil / sediment waste has been disposed offsite			N/A	
App 12.9, pg. 41	12.9 MGd	Include waste management requirements within project specific induction, including but not limited to identification and management protocols	VJV	See 12.1 MGf			Compliant	
App 12.9, pg. 41	12.9 MGe	Identify waste disposal locations on site maps including within the site office	VJV	See 12.9 MGb			Compliant	
App 12.9, pg. 41	12.9 MGf	Remove all waste from site at the completion of works	VJV	N/A - Construction works remain ongoing			N/A	
12.10 Chemical Use Management Sub-Plan								
Ap 12.10, pg. 42	12.10 MGa	Inspection and test plan developed for clearing activities identifying hold points from CEMF and specification	VJV	N/A - This line item is a typo and was incorrectly copied and pasted from the clearing sub-plan (T. Malseed [VJV Project Manager], personal communication, February 25, 2021)			N/A	
Ap 12.10, pg. 42	12.10 MGb	List fuels, oils or chemicals that will be utilized on site (MSDS register)	VJV	Chemical store at Site 2 (Chapman Hill Road) visually inspected and SDS register observed	• Visual observation • Site photographs		Compliant	
Ap 12.10, pg. 42	12.10 MGc	Include chemical management and safe storage requirements within project specific induction, including but not limited to identification of spills and reporting procedures	VJV	See 12.1 MGf			Compliant	
Ap 12.10, pg. 42	12.10 MGd	Combustible, flammable and/or corrosive liquids are to be stored in accordance with relevant Australian standards, including: • AS1940: The Storage and Handling of Flammable and Combustible Liquids • AS3780: The storage and handling of corrosive substances • AS1940: The aggregate quantity stored on site shall not exceed 1,000 L for each chemical other than diesel.	VJV	• See 12.10 MGb • No obvious signs of integrity breaches of storage containers • Small quantities only of stored chemicals located within the Chemical store	• Visual observation • Site photographs		Compliant	
Ap 12.10, pg. 42	12.10 MGe	Flammable gases in cylinders are to be stored in accordance with their relevant Australian Standards: • AS 4332 and AS 1596. • The aggregate quantity on site shall not exceed 500 L.	VJV	N/A - No gas cylinders stored onsite			N/A	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
Ap 12.10, pg. 42	12.10 MGf	Oil and fuel are to be stored in designated, bunded areas, capable of handling 120% of stored capacity and shall only be located in cleared areas.	VJV	See 12.8 MGl			Compliant	
Ap 12.10, pg. 42	12.10 MGg	Spill kits are to be readily available at chemical storage locations and during maintenance, refuelling or transfer of chemicals.	VJV	• Spill kits observed at site offices and appeared to be complete when inspected • Spare spill kit material observed in chemical store	• Visual observation • Site photographs		Compliant	
Ap 12.10, pg. 42	12.10 MGh	All refuelling and servicing of plant, vehicles and equipment is to occur on a bunded area or utilize leak proof tray as far as practicable from any active waterway or wetland.	VJV	• See 12.8 MGl • Refuelling area at Site (Chapman Hill Road) is not located proximate to an active waterway or wetland	• Visual observation • Site photographs		Compliant	
Ap 12.10, pg. 42	12.10 Mgi	Fuel is to be delivered around site via service trucks. Drum storage on site is not permitted.	VJV	Refuelling truck, used to distribute fuel to machinery and mobile plant, observed refuelling at Site 2 (Chapman Hill Road)	• Visual observation • Site photographs		Compliant	
Ap 12.10, pg. 42	12.10 MGj	All vehicles, storage and handling equipment (including transfer hoses, etc.) shall be well maintained.	VJV		VJV advised that machinery / equipment hire company (Edge Equipment Australia) and primary civil contractor (Leeuwin Civil) are responsible for machinery / equipment maintenance		Compliant	
Ap 12.10, pg. 42	12.10 MGk	No chemical storage, transfer or handling to occur in areas within 50 m of surface water features, including wetlands, damplands and active drainage lines, where practicable.	VJV	• Chemicals / fuel are generally stored away from surface water features within the DAF • Fuel and chemical containers observed stored within the mapped area of Conservation Category Wetland (UFI 223) at Site 4 (Town site)	• Visual observation • Site photographs	Investigate alternative locations for the fuel and chemical containers to be stored outside of the mapped area of Conservation Category Wetland (UFI 223)	Not Compliant	Chemicals removed, Evidence provided. Closed out
Ap 12.10, pg. 42	12.10 MGl	The storage, handling or use of aqueous film forming foams, which may contain per- and poly-fluoroalkyl substances (PFAS), is strictly prohibited.	VJV		No PFAS foams are located on site (T. Malseed [VJV Project Manager], personal communication, February 25, 2021).		Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.11 Water Management Sub-Plan								
App 12.11, pg. 44	12.11 MGa	Facilitate access for the Principal's Water Quality Monitoring SME	VJV	See 12.1 MGe			Compliant	
App 12.11, pg. 44	12.11 MGb	Install a silt curtain downstream of the coffer dam at approx. CH800 at location specified by the SME; the dam and silt curtain will remain in place until confirmatory water quality results confirm water quality criteria have been met. The Principal will provide approval to remove	VJV	Silt curtains observed in place during site audit	• Visual observation • Site photographs		Compliant	
App 12.11, pg. 44	12.11 MGc	Install silt curtain downstream of the VRDD works and water diversion point in the Lower Vasse River	VJV	See 12.2 MGf			Compliant	
App 12.11, pg. 44	12.11 MGd	Surface water quality triggers include: • Salinity of greater than 1.3 ppt recorded at WQM1 • A variation by ±20% in the value of any monitored parameter at WQM1 or WQM2 in comparison to the corresponding value at WQR1 for a period of greater than two weeks • Refer to RPS (2020) ASSDMPs • See VRDD surface water management Flow chart	Principal's Water Quality Monitoring SME (IndoPacific)	N/A - IndoPacific responsible for monitoring WQM1, WQM2 and WQR1			N/A	
App 12.11, pg. 44	12.11 MGe	Refer to Appendix 12.4 – 12.6 for ASS water (effluent, groundwater and surface water) management controls	VJV	See 12.4 to 12.6			As per sections 12.4 to 12.6	
App 12.11, pg. 44	12.11 MGf	Execute contingencies if criteria exceeded: • Refer to IndoPacific (2020) and RPS (2020) ASDMPs.	VJV	N/A - No contingency actions undertaken by VJV			N/A	
App 12.11, pg. 44	12.11 MGg	Design of coffer dams and water diversion and contingency planning in accordance with specification CIVIL1.3.1 (refer to coffer dam and pumping design report)	VJV	Coffer Dam Design Report (CD00116-REP-003) provided	Coffer Dam Design Report (CD00116-REP-003)		Compliant	
App 12.11, pg. 44	12.11 MGh	Ensure all construction activities are undertaken so that any spillages, runoff and sedimentation are entirely contained within the development area footprint.	VJV	• No obvious signs of spillages, runoff and sedimentation observed in areas adjacent to the DAF • Earthen bund established around fuel storage and machinery parking area in Site 2 (Chapman Hill Road) • Refuelling area has bunded tray underlying truck refuelling site • Small quantities only of stored chemicals located within the Chemical store	• Visual observation • Site photographs		Compliant	
App 12.11, pg. 44	12.11 MGi	Include water quality management requirements within project specific induction, including but not limited to: • Water quality management risks and the adaptive management plan flowchart from IndoPacific (2020) • Identification of deteriorating water quality and reporting procedures.	VJV	See 12.1 MGf			Compliant	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.12 Dust Management Sub-Plan								
App 12.12, pg. 46	12.12 MGa	Plan construction to minimise the potential for dust to be generated; identify site access, laydown areas and stockpile locations as well as sensitive receptors	VJV	Community Interaction Register (CD00116-REG-011-0) identifies no dust complaints received	• VJV advised the following actions had been undertaken to minimise the potential for dust generation: - Water carts used for dust suppression - Daily monitoring of weather conditions - Surface roller employed - Traffic management • Community Interaction Register (CD00116-REG-011-0)		Compliant	
App 12.12, pg. 46	12.12 MGb	Implement dust control measures that include are but not limited to the following: • Maintain and implement a suitable method of dust suppression on site at all times (ie water carts) • Stabilisation and management of soil stockpiles to minimise dust generation of longterm stockpiles • Vehicle movement with the site will be limited to designated tracks which will be maintained with water carts in order to minimise the amount of dust generated within the construction area • Restrict high risk activities during extreme weather events (strong winds, hot dry weather) to dry/calm conditions • Suspend dust producing activities immediately if dust suppression control measures prove ineffective • Cover loads when transporting material off site	VJV	• See 12.2 MGa • Water carts observed during site audit • Stockpile watering observed in Site 4 (Town) • No vehicle tracks observed outside of existing tracks • No significant dust generation observed during site audit • No sand is exported off site	• Visual observation • Site photographs • VJV advised that stockpiles are compressed to reduce dust generation and weather is monitored for unfavourable conditions		Compliant	
App 12.12, pg. 46	12.12 MGc	Maintain fencing and shade cloth downstream of Busselton bypass (by contractor) inc surrounding the ESA (by Principal)	VJV	GC9			Not Compliant	See 12.8 MGc Closed out
App 12.12, pg. 46	12.12 MGd	Include dust management requirements within project specific induction including but not limited to identification of any deterioration in air quality and reporting procedures	VJV	See 12.1 MGf			Compliant	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.13 Noise and Vibration Management Sub-Plan								
App 12.13, pg. 49-50	12.13 MGa	Site working hours to be limited to 7am – 6pm Monday to Saturday (exc public holidays)	VJV	No machinery operated prior to 7am at Site 1 (VROS/VRDD)	• Aural observation • VJV advised that construction works undertaken during nominated site working hours		Compliant	
App 12.13, pg. 49-51	12.13 MGb	The following mitigation controls will be implemented during the project (in line with AS 2436-2010): • Select well maintained plant and equipment that generates low noise and vibration • Plant will be fitted with appropriate noise emission/vibration control equipment (i.e. machinery has appropriate mufflers, silencers and/or enclosures fitted) • Enclose, where practical, stationary constant noise sources such as pumps, generators etc to reduce noise levels, particularly those required to operate outside site working hours. • Plant should be switched off when not in use, wherever practicable • All plant, equipment and vehicles are to be regularly monitored and maintained and records kept of maintenance • Any abnormalities in expected noise or vibration emissions will be recorded in the plant's prestart form, reported to the Project Manager so the abnormality can be assessed and addressed in a timely manner • Maximise distance between activities likely to generate noise and vibration and sensitive receptors • Undertake noisy fabrication work off-site where possible, or at a location on site that is away from sensitive receptors; • The use of temporary site building and material stockpiles as noise barriers (associated with earthworks) • In the event that out of hours work are scheduled then restricting the number of nights that after hour work is conducted near residences and provide ample notice to residents.	VJV	• All plant machinery and equipment observed to be relatively recent models and appeared to be in service • No unreasonably loud noise detected from construction machinery or processes	• Visual observation • Aural observation • VJV advised: - Silence pumps and generators are used - Plant machinery and equipment are maintained in regular service by hire company / civil contractors - Distances between construction works and sensitive receptors maximised where practicable		Compliant	
App 12.13, pg. 49-52	12.13 MGc	Include noise and vibration management requirements within project specific induction including but not limited to the project operating hours and the correct use of PPE	VJV	See 12.1 MGf			Compliant	
App 12.13, pg. 49-53	12.13 MGd	Work will be limited to between 0700 and 1800 Monday to Saturday excluding public holidays, unless approved by the Superintendent. If after hours work is proposed the following actions and controls are required: • Submit the Noise Management Plan to the Superintendent > 30 days prior to the proposed activity • Submit an application for Approval of Construction Work (Regulation 13 Permit) including the Noise Management Plan, must be provided to the City of Busselton at least three weeks prior to the Commencement of Works • Notify nearby residents/landowners if any project activities proposed outside of normal construction times	VJV	See GC5			Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.14 Bushfire Management Sub-Plan								
App 12.14, pg. 52-53	12.14 MGa	All works will be conducted in compliance with bushfire management strategies included in the VJV OSH Management Plan and Emergency Response Plan	VJV	• Fire units observed at site offices • Fire extinguishers observed on plant machinery and light vehicles	• Visual observation • Site photographs • VJV advised that works are suspended during City of Busselton Harvest and Vehicle Movement Bans		Compliant	
App 12.14, pg. 52-53	12.14 MGb	Include bushfire management requirements within project specific induction including but not limited to bushfire risk management protocols and emergency evacuation points	VJV	See 12.1 MGf			Compliant	
App 12.14, pg. 52-53	12.14 MGc	Maintain primary vehicular routes in a condition that facilitates ready access by the appropriate Health and Safety Authorities and site based firefighting equipment	VJV	Primary vehicle movement tracks observed to be in trafficable condition	• Visual observation • Site photographs		Compliant	
App 12.14, pg. 52-53	12.14 MGd	Advance notice of all proposed road and route closures and traffic deviations will be communicated to the appropriate Health and Safety Authorities in accordance with the TMP	VJV		VJV haven't closed or deviated any public or fire access roads (T. Malseed [VJV Project Manager], personal communication, February 25, 2021).		Compliant	
App 12.14, pg. 52-53	12.14 MGe	Water Trucks and equipment with the capacity to cut firebreaks will be on site at all times of high fire risk	VJV	Water trucks and heavy machinery capable of cutting firebreaks observed on site	• Visual observation • Site photographs		Compliant	
App 12.14, pg. 52-53	12.14 MGf	Plan work accordingly based on ongoing (daily and weekly) risk assessments; the ongoing risk assessment will be based on: • A designated on-site employee will monitor and record daily weather forecasts and bushfire risk warnings (i.e. danger rating) for the following day and the following week to assess risk. Monitoring sources shall include, but not be limited to BoM, dfes.wa.gov.au, local ABC radio station, emergency service Facebook and Twitter feed updates for any warnings and/or incidents • A designated on-site employee will monitor and record daily weather observations twice daily	VJV	Daily inspection reports provided show weather is monitored twice daily	Daily inspection reports		Compliant	
App 12.14, pg. 52-53	12.14 MGg	If a total fire ban and/or a vehicle movement ban is expected/predicted, advise the Superintendent as soon as practicable to discuss impacts to the work schedule including reprioritization of work tasks.	VJV	See 12.14 MGa			Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
App 12.14, pg. 52-53	12.14 MGh	No activities that could generate sparks (e.g. cutting and grinding) will be permissible on 'very high' or 'extreme' fire risk days as defined by the appropriate Authority.	VJV		VJV advised that grinders are banned from site and hot works procedures apply for high risk activities		Compliant	
App 12.14, pg. 52-53	12.14 MGi	Appropriate fire extinguishers will be located in designated areas through the project area, including the site office, chemical/fuel storage areas and in close proximity to all cutting, grinding or welding (and any other spark generating activities) (dry chemical or carbon dioxide fire extinguishers).	VJV	See 12.14 MGa			Compliant	
App 12.14, pg. 52-53	12.14 MGj	All construction vehicles will be fitted with dry chemical or carbon dioxide fire extinguishers.	VJV	See 12.14 MGa			Compliant	
App 12.14, pg. 52-53	12.14 MGk	The Superintendent may suspend the works where the occurrence of bush fires is likely to deplete available fire-fighting resources in the locality of the site. The Principal will provide relevant information relating to construction activities on a regular periodic basis to the appropriate Health and Safety Authorities (DBCA, City of Busselton, DFES).	VJV	See 12.14 MGa			Compliant	
App 12.14, pg. 52-53	12.14 MGl	Smoking will be prohibited except in designated smoking areas, outside of site buildings. These areas will have clear signage.	VJV	Designated smoking areas observed outside of site offices	• Visual observation • Site photographs		Compliant	
App 12.14, pg. 52-53	12.14 MGm	Appropriate containers for cigarette disposal will be located in designated smoking areas	VJV	See 12.14 MGl			Compliant	
App 12.14, pg. 52-53	12.14 MGn	The Contractor will ensure that a shroud will be installed if cutting, grinding or welding (or any other spark generating) activity occurs within 5 m of any vegetation (including dry grass/weeds). The shroud will be installed between the activity and the vegetation to capture sparks.	VJV	N/A - VJV advised that no high risk activities are undertaken proximate to vegetation.			N/A	
App 12.14, pg. 52-53	12.14 MGo	All vehicles and construction plant intended for use on site will be regularly checked, serviced and repaired as necessary to prevent oil and fuel leaks.	VJV	See 12.10 MGj			Compliant	
App 12.14, pg. 52-53	12.14 MGp	Plant operators are designated the responsibility to monitor and report any vehicles and construction plant defects promptly and regular maintenance of equipment including the removal of combustible materials from tracks, guards and the undercarriage of all vehicles and construction plant.	VJV		VJC advised that daily plant prestart inspection is undertaken by operators		Compliant	

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.15 Public Safety and Traffic Management Sub-Plan								
App 12.15, pg. 54	12.15 MGa	Preparation of a TMP that includes but is not limited to: • Management of access to the project area by construction vehicles • Identification of designated site access locations • Establishment of traffic guidance schemes that conform to AS 1742.3 – 2009 and MRWA Traffic Management for Works on Roads Code of Practice • Identification and management of potential conflicts between users of local roads and construction vehicles • Identification and management of potential conflicts between the public and construction activities Refer to CD00116-PLN-012 Traffic Management Plan for additional details	VJV	Traffic Management Plan (CD00116-PLN-012) provided	Traffic Management Plan (CD00116-PLN-012)		Compliant complete	
App 12.15, pg. 54	12.15 MGb	Install temporary public exclusion gates, fencing and appropriate signposts, at all access points to the project site in accordance with the TMP to warn and deter the public	VJV	Appropriate gates, fencing and signposts installed at construction sites	Visual observation		Compliant	
App 12.15, pg. 54	12.15 MGc	Include public safety and traffic management requirements within project specific induction	VJV	See 12.1 MGf			Compliant	
App 12.15, pg. 54	12.15 MGd	Principal will provide updates to the impacted community as appropriate, prior to the commencement of work.	WC	N/A - WC to control community updates			N/A	
App 12.15, pg. 54	12.15 MGe	Ensure all light vehicles, construction vehicles, plant and machinery access the project site via designated construction access areas.	VJV	No obvious signs of alternative access provided to construction sites	• Visual observation • Site photographs		Compliant	
12.16 Communication and Stakeholder Engagement Management Sub-Plan								
App 12.16, pg. 56	12.16 MGa	Contractor will provide training to all personnel during an initial safety and environment induction course, which will include Stakeholder engagement protocols	VJV	See GC10			Compliant	
App 12.16, pg. 56	12.16 MGb	ALL VJV project management team (supervisors and above) to undergo communications training provided by the Principal	VJV	See GC10			Compliant	
App 12.16, pg. 56	12.16 MGc	All other project staff will receive training for community communication protocols via the VJV project induction and/or communications training provided by the Principal	VJV and/or WC	See GC10	Provided by Sarah Bennett (WC)		Compliant	
App 12.16, pg. 56	12.16 MGd	All community complaints will be recorded and conveyed in writing to the Water Corporation Senior Communications Advisor within 24 hours of the complaint occurring.	VJV	See GC16		No evidence provided detailing conveyance of community complaints to WC within 24 hours of the complaint occurring	Partially Compliant	Confirmed with WC Comms Offcer that the register is a live document on OneDrive. Changed to 'other'

Management requirements								
CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
App 12.17, pg. 57	12.7 MGa	Complete sections of the work progressively and facilitate access for the Principal's Reinstatement and Revegetation SME to facilitate progressive weed suppression and management and revegetation activities	VJV	N/A - Construction works remain ongoing			N/A	
App 12.17, pg. 57	12.7 MGb	Implement soil and sediment control measures in areas prone to erosion by wind or water	VJV	N/A - Construction works remain ongoing			N/A	
App 12.17, pg. 57	12.7 MGc	Remove and dispose of hardstand material from old depot site and replace with sand fill sourced between ch 1250 and ch 3300	VJV	N/A - Construction works remain ongoing			N/A	
App 12.17, pg. 57	12.7 MGd	Remove the hardstand at the completion of the works	VJV	N/A - Construction works remain ongoing			N/A	
App 12.17, pg. 57	12.7 MGe	Tyne the ground surface of compacted ground (ie under the temp hardstands, access roads, ramps, stockpiles etc) in areas external to the proposed revegetation areas with a grader on completion to a depth of 50-100mm; note that ripping in revegetation areas to ~300mm to be undertaken by WC SME (Tranen)	VJV	N/A - Construction works remain ongoing			N/A	
App 12.17, pg. 57	12.7 MGf	Respread the topsoil as soon as practical once earthworks completed for sections of work (excluding the revegetation areas which are not to have topsoil respread by VJV to avoid the risk of weed spread)	VJV	N/A - Construction works remain ongoing			N/A	
App 12.17, pg. 57	12.7 MGg	Remove all stockpiles to the original surface level; scarify the surface to a depth of ~150mm; break up any compacted surface materials; spread topsoil; and grade the surface consistent with the pre-lease condition	VJV	N/A - Construction works remain ongoing			N/A	

Management requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.18 Asbestos Management Sub-Plan								
App 12.18, pg. 58	12.8 MGa	Asbestos has been identified on-site including redundant DN150 AC and DN300 AC pipework within the embankment.	VJV		VJV advised that most of the pipework has been removed by licenced asbestos contractor, Anstee Earthmoving, however one pipe remains in place		Compliant	
App 12.18, pg. 58	12.8 MGb	Careful positive identification, removal and disposal of asbestos based products shall comply with the Principal's procedure "HSEAA-P-131 Working with Asbestos".	VJV		Licenced asbestos contractor Anstee Earthmoving used to undertake asbestos removal		Compliant	
App 12.18, pg. 58	12.8 MGc	Evidence of licensed disposal site and provision of specified resources (qualified people, materials/PPE) will be provided to Water Corporation before commencing planned asbestos removal	VJV		Licenced asbestos contractor Anstee Earthmoving used to undertake asbestos removal		Compliant	
App 12.18, pg. 58	12.8 MGd	In the event that unexpected and/or damaged asbestos is identified on site: • The Supervisor will be contacted immediately and the area quarantined, including from the public. • Communicated to all persons working on the site. • The Project Manager or delegate will consult/engage an appropriately licensed asbestos removalist to remove the asbestos from site in a lawful manner in accordance with an Asbestos Removal Control Plan (ARCP) or Site Management Plan (SMP). • An asbestos register will be maintained in the Master HSE Register and be readily accessible to all personnel who carry out or intend to carry out work	VJV		VJV advised that unexpected finds protocol implemented for the item logged on the Asbestos Register (CD00116-REG-017-0)		Compliant	
App 12.18, pg. 58	12.8 MGe	This Asbestos Register will record: • Details of identified (or assumed) asbestos in the workplace including detection date • The location, type and condition of the asbestos • Remediation details.	VJV	Asbestos Register (CD00116-REG-017-0) provided	Asbestos Register (CD00116-REG-017-0)	Asbestos register to be updated with pipework context from 12.8 MGa	Partially Compliant	Updated register provided. Disposal receipt provided. Closed out
App 12.18, pg. 58	12.8 MGf	Only workers with an appropriate asbestos licence may carry out asbestos removal. The two types of licence are: 1) Unrestricted: Allows people to remove all forms of asbestos (friable and non-friable). 2) Restricted: Allows people to remove amounts exceeding 10 square metres of bonded (non-friable) asbestos.	VJV	• See 12.8 MGc • Licence not required for unexpected find logged on the Asbestos Register (CD00116-REG-017-0)	Asbestos Register (CD00116-REG-017-0)		Compliant	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.1 Native Vegetation and Clearing Management Sub-Plan									
App 12.1, pg. 17- 18	12.1 MNa	Contractor must confirm with the Super's Representative once demarcation of the DAF is complete	Vasse Joint Venture	At least 5 days prior to the commencement of clearing	See 12.1 MGb & 12.1 MGc			Compliant complete	
App 12.1, pg. 17- 18	12.1 MNb	Visual inspection of all demarcated boundaries for damage or signs of encroachment into adjacent unauthorised areas	VJV	Daily during clearing operations via clearing record, then weekly via site environmental checklist post clearing	• Clearing records provided • Daily inspection reports provide limited/no evidence to support the finding that all clearing boundaries are being inspected	• Clearing records • Daily inspection reports	Daily inspection reports to provide evidence (e.g. field notes, photographs etc) to demonstrate that clearing boundaries are being inspected	Partially Compliant	See 12.8 MGc Closed out
App 12.1, pg. 17- 18	12.1 MNc	Completion of a clearing record.	VJV	Daily when undertaking clearing activities	Clearing records provided	Clearing records		Compliant complete	
12.2 Fauna Management Sub-Plan									
App 12.2, pg. 20	12.2 MNa	Maintain register of fauna removals, deaths or injuries	VJV	Updated by the end of shift in which incident occurs	See 12.2 MGc			Compliant	
App 12.2, pg. 20	12.2 MNb	Visual inspection of any open excavations and pipes for the presence of fauna. Observations to be recorded on daily site environmental checklists (to be developed by the Contractor).	VJV	Daily during clearing operations via clearing record, then weekly via site environmental checklist post clearing	• Fauna interaction register (CD00116-REG-019) provided • Daily inspection reports provide limited/no evidence to support the finding that fauna inspections are being undertaken	Daily inspection reports	Daily inspection reports to provide evidence (e.g. field notes, photographs etc) to demonstrate that fauna inspections are being undertaken	Partially Compliant	See 12.8 MGc Closed out
12.3 Threatened or Specially Protected Flora Management Sub-Plan									
App 12.3, pg. 22	12.3 MNa	Visual inspection of all demarcated boundaries for damage or signs of encroachment into adjacent unauthorized areas	VJV	Daily during clearing operations via clearing record, then weekly via site environmental checklist post clearing	See 12.1 MNb			Partially Compliant	See 12.8 MGc Closed out
12.4 ASS and Dewatering Management Sub-Plan – VROS/VRDD									
App 12.4, pg. 25- 26	12.4 MNa	Effluent (pre and post treatment): • field analysis (pH, EC, TTA, total alkalinity) • lab analysis (pH, total acidity and alkalinity) • lab analysis (full suite)	VJV	• Daily during dewatering • Weekly during dewatering • Fortnightly	• Effluent field sheets and lab analysis provided - Field sheets not completely filled out	Effluent field sheets and lab analysis	All fields in data sheets to be addressed	Compliant	
App 12.4, pg. 25- 26	12.4 MNb	Groundwater: • baseline (level, field quality and lab analysis (full suite) • level, field quality • lab analysis (full suite)	VJV	• Prior to dewatering • Thrice weekly during dewatering, all sampling events • Fortnightly, immediately after dewatering cessation, every 2 months post dewatering for 6 months (3 events)	• Groundwater field sheets and lab analysis provided - All fields in data sheets to be addressed	Groundwater field sheets and lab analysis	All fields in data sheets to be addressed	Compliant	
App 12.4, pg. 25- 26	12.4 MNc	Surface water (Testing by Principals SME): • baseline (level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • level, field quality including DO and Redox, silt curtain inspection • level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • Inspect silt curtains and water down stream of curtains for any plumes	Water Corporation Water Quality SME (IndoPacific) / VJV	• Surface water testing by Principals SME • Daily when in use (VJV)	• Surface water field sheets provided - All fields in data sheets to be addressed • Daily inspection reports provide limited/no evidence to support the finding that silt curtains and any surface water plumes are being inspected • Silt curtains observed in place during site audit	• Surface water field sheets • Daily inspection reports • Visual observation • Site photographs	• All fields in data sheets to be addressed • Daily inspection reports to provide evidence (e.g. field notes, photographs etc) to demonstrate that silt curtains and any surface water plumes are being inspected	Not Compliant	Daily inpsections are being completed with more comprehensive evidence. Field sheets are being completed and will be reviewed again in Audit 3 Closed out
App 12.4, pg. 25- 26	12.4 MNd	Treated PASS: • Collect validation samples; total number will be dependent on stockpile size (refer to sampling density table) • All samples tested for pH_F and pH_{FOX} • SPOCAS undertaken on 25% of samples that pass pH_F and pH_{FOX} criteria • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Ad-hoc when treated ASS is well mixed and ready for validation	• ASS field sheets and lab analysis provided - Data provided in P20.087_Vasse ASS field and lab validation data as of 20210215 does not include QAQC complying to 1 duplicate for every 20 primary validation samples.	ASS field sheets and lab analysis	QA/QC data to be provided to WC	Partially Compliant	QA/QC data has been provided. WC following up with concerns about %RPD failure. To be revieved in the April Audit Closed out

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
App 12.4, pg. 25- 26	12.4 Mne	• Accumulated sediments from dewatering will be tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Following cessation of dewatering	N/A - Dewatering is ongoing			N/A	
App 12.4, pg. 25- 26	12.4 MNf	Visual inspection of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches	VJV	Daily during dewatering operations	• Daily inspection reports provided • No obvious signs loss of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches within the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.4, pg. 25- 26	12.4 MNg	Visual inspection of vegetation condition nearby dewatering activities including surrounding the Vasse Diversion Dam construction site.	VJV	Baseline inspection and weekly ongoing visual monitoring of vegetation.	• Daily inspection reports provided • No obvious signs vegetation stress in vegetated areas adjacent to the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.5 ASS and Dewatering Management Sub-Plan – Levee Reconstruction									
App 12.5, pg. 30- 31	12.5 MNa	Effluent (pre and post treatment): • field analysis (pH, EC, TTA, total alkalinity) • lab analysis (pH, total acidity and alkalinity) • lab analysis (full suite)	VJV	• Daily during dewatering • Weekly during dewatering • Fortnightly	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNb	Groundwater: • baseline (level, field quality and lab analysis (full suite) • level, field quality • lab analysis (full suite)	VJV	• Prior to dewatering • Thrice weekly during dewatering, all sampling events • Fortnightly, immediately after dewatering cessation, every 2 months post dewatering for 6 months (3 events)	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNc	Surface water (Testing by Principals SME): • baseline (level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • level, field quality including DO and Redox, silt curtain inspection • level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • Inspect silt curtains and water down stream of curtains for any plumes	Water Corporation Water Quality SME (IndoPacific) / VJV	• Surface water testing by Principals SME • Daily when in use (VJV)	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNd	Treated PASS: • Collect validation samples; total number will be dependent on stockpile size (refer to sampling density table) • All samples tested for pH_F and pH_{FOX} • SPOCAS undertaken on 25% of samples that pass pH_F and pH_{FOX} criteria • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Ad-hoc when treated ASS is well mixed and ready for validation	N/A - No ASS encountered			N/A	
App 12.5, pg. 30- 31	12.5 Mne	• Accumulated sediments from dewatering will be tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Following cessation of dewatering	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNf	Visual inspection of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches	VJV	Daily during dewatering operations	N/A - No dewatering being undertaken			N/A	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.6 ASS and Dewatering Management Sub-Plan – Gauging Station									
App 12.6, pg. 35	12.6 MNa	Effluent (pre and post treatment): • field analysis (pH, EC, TTA, total alkalinity) • lab analysis (pH, total acidity and alkalinity) • lab analysis (full suite)	VJV	• Daily during dewatering • Weekly during dewatering • Fortnightly	N/A - No dewatering being undertaken			N/A	
App 12.6, pg. 35	12.6 MNb	Groundwater: • baseline (level, field quality and lab analysis (full suite) • level, field quality • lab analysis (full suite)	VJV	• Prior to dewatering • Thrice weekly during dewatering, all sampling events • Fortnightly, immediately after dewatering cessation, every 2 months post dewatering for 6 months (3 events)	N/A - No dewatering being undertaken			N/A	
App 12.6, pg. 35	12.6 MNc	Surface water (Testing by Principals SME): • baseline (level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • level, field quality including DO and Redox, silt curtain inspection • level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • Inspect silt curtains and water down stream of curtains for any plumes	Water Corporation Water Quality SME (IndoPacific) / VJV	• Surface water testing by Principals SME • Daily when in use (VJV)	N/A - No dewatering being undertaken			N/A	
App 12.6, pg. 35	12.6 MNd	Treated PASS: • Collect validation samples; total number will be dependent on stockpile size (refer to sampling density table) • All samples tested for pH_F and pH_{FOX} • SPOCAS undertaken on 25% of samples that pass pH_F and pH_{FOX} criteria • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Ad-hoc when treated ASS is well mixed and ready for validation	ASS field and lab validation data sheet provided	ASS field and lab validation data sheet		Compliant	
App 12.6, pg. 35	12.6 MNe	• Accumulated sediments from dewatering will be tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Following cessation of dewatering	N/A - No dewatering being undertaken			N/A	
App 12.6, pg. 35	12.6 MNf	Visual inspection of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches	VJV	Daily during dewatering operations	N/A - No dewatering being undertaken			N/A	
12.7 Weed and Soil Hygiene Management Sub-Plan									
App 12.7, pg. 37	12.7 MNa	Visual inspection for weed infestations	VJV	Daily	• Daily inspection reports provided • No obvious signs of weeds establishment post clearing evident within the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.7, pg. 37	12.7 MNb	Record and log weed and seed inspections of mobile plant	VJV	Prior to mobilisation	Vehicle inspection sheet sighted in hard copy	• Visual observation • VJV advised that all new vehicles on site are either inspected by the hire company prior to mobilisation or inspected onsite		Compliant	
12.8 Land Degradation Management Sub-Plan									
App 12.8, pg 39 - 40	12.8 MNa	Visual inspection of efficacy of erosion and sediment control measures.	VJV	Daily observations to be recorded on site environmental checklist	• Daily inspection reports provided • No obvious signs of erosion or sedimentation evident within the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.8, pg 39 - 40	12.8 MNb	Ongoing turbidity monitoring of the Lower Vasse River to be undertaken by Principal SME during works between CH5940-6200 and any works relating to the culvert upgrade, spillway and reconstruction of the diversion dam in this area.	Water Corporation Water Quality SME (IndoPacific)	N/A	N/A - 12.8 MNb implemented by IndoPacific			N/A	

Monitoring requirements									
CEMP Ref #	Audit Ref #	Required action	Responsibility	Frequency	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.9 Waste Management Sub-Plan									
App 12.9, pg 41	12.9 MNa	Visual inspection of all waste management areas	VJV	Daily during the project via site environmental checklist	• Daily inspection reports provided • Waste and recycling bins observed at each site office. • No obvious signs (i.e. rubbish) of in effective waste management practices within the works areas.	• Daily inspection reports • Visual observation • Site photographs		Compliant	

Monitoring requirements									
CEMP Ref #	Audit Ref #	Required action	Responsibility	Frequency	Auditor observations	Evidence	Recommendations	Compliance rating	Review 18/03/21
12.10 Chemical Use Management Sub-Plan									
App 12.10, pg 43	12.10 MNa	Visual inspection of all chemical storage and bunded areas	VJV	Daily during the project via site environmental checklist	• Daily inspection reports provided • Chemical storage area and bunded plant inspected during site audit. No obvious signs of leaks or in effective management observed.	• Daily inspection reports • Visual observation • Site photographs		Compliant	
12.11 Water Management Sub-Plan									
App 12.11, pg. 45	12.11 MNa	Monitor and record weather observations and forecast to determine risk of flood event each work day using BoM tools	VJV	Daily via site environmental checklist	Daily inspection reports provided	Daily inspection records		Compliant	
App 12.11, pg. 45	12.11 MNb	Visual inspection of coffer dams reviewing for leaks, structural integrity, water levels, water transfer pipes and equipment operating correctly.	VJV	Daily via site environmental checklist	• Daily inspection reports provided • No obvious signs loss of leaks, structural integrity loss, water level decline or water transfer pipes and equipment operating incorrectly	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.11, pg. 45	12.11 MNc	Inspect, photographs and record any visible plumes generated by works upstream and/or downstream of all silt curtains	VJV	Daily during dewatering and/or surface water disturbance	• Daily inspection reports provided • No sediment plumes observed	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.11, pg. 45	12.11 MNd	Surface water quality monitoring will be undertaken by the Principal's Water Quality SME in accordance with IndoPacific (2020)	Water Corporation Water Quality SME (IndoPacific)	As specified in IndoPacific (2020)	N/A - 12.11 MNd implemented by IndoPacific			N/A	
12.12 Dust Management Sub-Plan									
App 12.12, pg. 46- 47	12.12 MNa	Monitor and record weather observations and forecast to determine daily dust generation risk at start of each work day using BoM tools (i.e. wind strength and prevailing wind directions at 0900 and 1500) and observation data (Busselton Aero Station #009603)	VJV	Daily during the project via site environmental checklist	Daily inspection reports provided	Daily inspection reports		Compliant	
App 12.12, pg. 46- 48	12.12 MNb	Visual inspection of work areas for dust generation travelling 10m beyond the DAF	VJV	Daily by supervisors	• Daily inspection reports provided • No obvious signs of significant dust generation from construction works	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.12, pg. 46- 49	12.12 MNc	Visual inspection of stockpile stability and erosion risk	VJV	Daily during the project via site environmental checklist	• Daily inspection reports provided • No obvious signs of loss of stockpile integrity or erosion • Water carts observed onsite	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.12, pg. 46- 50	12.12 MNd	Visual inspection of shade cloth and fencing along the ESA	VJV	Daily during the project via site environmental checklist	See GC9			Not Compliant	See 12.8 MGc Closed out
12.13 Noise and Vibration Management Sub-Plan									
App 12.13, pg. 50	12.13 MNa	Supervision to monitor noise emissions	VJV	daily	• Daily inspection reports provided • No unreasonably loud noise detected from construction machinery or processes	• Daily inspection reports • Aural observation • Site photographs		Compliant	
App 12.13, pg. 50	12.13 MNb	Complete dilapidation surveys for the 100 nearby properties	VJV	Prior to commencement of compaction works in vicinity of properties	N/A - Dilapidation surveys undertaken by WC			N/A	
App 12.13, pg. 50	12.13 MNc	Monitor and record weather observations and forecast each work day using BoM tools (i.e. wind strength and prevailing wind directions at 0900 and 1500) and observation data (Busselton Aero Station #009603)	VJV	Daily during the project via site environmental checklist	See 12.12 MNa			Compliant	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 18/03/21**
12.14 Bushfire Management Sub-Plan									
App 12.14, pg. 53	12.14 MNa	Assess and monitor ongoing fire risk prior to and during construction activities including twice (minimum) daily review (i.e. 0900 and 1500) of weather and fire risk forecast and weather observations for the purposes of assessing risk for the following day and week: • Maximum temperature • Relative humidity • Wind speeds and direction • Fire danger risk	VJV	Daily during construction via site environmental checklist	Daily inspection reports provided	Daily inspection reports		Compliant	
App 12.14, pg. 53	12.14 MNb	Daily inspections of vehicles and plant for defects and/or trapped combustible vegetation/material that presents a fire risk should be removed.	VJV	Daily plant prestart inspection checklist	See 12.14 MGp			Compliant	
12.15 Public Safety and Traffic Management Sub-Plan									
App 12.15, pg. 54	12.15 MNa	Maintain register of public complaints and actions taken	VJV	As required	See GC16			Compliant	
App 12.15, pg. 54	12.15 MNb	Assess if vehicles etc are complying to the TMP including speed and use of designated construction access areas/tracks	VJV	Daily during the project via site environmental checklist	• Daily inspection reports provided • No obvious signs of speeding, wheel marks off track or windrow damage observed	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.15, pg. 54	12.5 MNc	Monitor implementation of TMP in traffic management diary	VJV	As per TMP	White boards outside site offices have daily vehicle movements identified in high traffic areas.	• Visual observation • Site photographs		Compliant	
12.16 Communication and Stakeholder Engagement Management Sub-Plan									
App 12.16, pg. 56	12.16 MNa	Maintain register of community enquiries and complaints		As required	See GC16			Compliant	
12.17 Reinstatement and Revegetation Management Sub-Plan									
App 12.17, pg. 57	12.17 MNa	Principal to provide confirmation that the site is returned to pre-disturbance or otherwise acceptable condition	Water Corporation	Prior to Handover	N/A - Construction works remain ongoing			N/A	
12.18 Asbestos Management Sub-Plan									
App 12.18, pg. 58- 59	12.18 MNa	Visual inspections during the work to look for evidence of asbestos	VJV	Ad-hoc, daily	• Daily inspection reports provided • Asbestos Register (CD00116-REG-017-0) provided	• Daily inspection reports • Asbestos Register (CD00116-REG-017-0)		Compliant	
App 12.18, pg. 58- 59	12.18 MNb	Visual inspections during the work to demonstrate compliance with ARCP/SMP	VJV	Daily during asbestos removal/remediation	Hazard Identification Report (20201127 - Hazard) provided	Hazard Identification Report (20201127 - Hazard)		Compliant	
App 12.18, pg. 58- 59	12.18 MNc	Air fibre monitoring (if required in accordance with the approved ARCP/SMP)	VJV	As specified in the approved ARCP/SMP	N/A - Air fibre monitoring not required			N/A	
App 12.18, pg. 58- 59	12.18 MNd	Visual inspection of all remediated areas to validate asbestos risk has been removed.	VJV	Following completion of the remediation actions by the asbestos sub-contractor	• Asbestos Register (CD00116-REG-017-0) • Hazard Identification Report (20201127 - Hazard) provided • Waste Acceptance Docket (WEPL 20201217) for Asbestos bags	No evidence of visual inspection of areas remediated by Anstee Earthmoving provided	Evidence of visual inspection of areas remediated to be provided	Not Compliant	Evidence provided Closed out

Reporting requirements									
CEMP Ref #	Audit Ref #	Required action	Responsibility	Frequency	Auditor observations	Evidence	Recommendations	Compliance ra	Review 18/03/2021
12.1 Native Vegetation and Clearing Management Sub-Plan									
App 12.1, pg. 18	12.1 Ra	Site environmental inspection checklist provided to the Principal	Vasse Joint Venture (VJV)	Weekly	See GC21			Compliant	
App 12.1, pg. 18	12.1 Rb	Completion of clearing records complying with Condition 19 of CPS 8191/1 and including Georeferenced spatial data indicating the actual extent of clearing undertaken in .DXF or .SHP file format.	VJV	Completed daily during clearing operations and submitted within 2 weeks of completion of the project or prior to end of the calendar year (whichever is sooner).				Compliant complete 16/12/2020	
12.2 Fauna Management Sub-Plan									
App 12.2, pg. 21	12.2 Ra	Any fauna deaths are considered an environmental incident and are to be reported to the Principal	VJV	Within 24 hrs of incident identification	See 12.2 MGa			N/A	
App 12.2, pg. 21	12.2 Rb	Register of project site Safety and Environmental Inductions	VJV	Register maintained daily when inductions completed, provided on request	See GC10			Compliant	
App 12.2, pg. 21	12.2 Rc	Fauna register is to be reported to the Principal	VJV	On request; at project completion	See 12.2 MGc			N/A	
App 12.2, pg. 21	12.2 Rd	Unauthorised discharges into the Lower Vasse River shall be reported to the Principal	VJV	Within 30 minutes	N/A - VJV advised that no unauthorised discharges into the Lower Vasse River have occurred			N/A	
App 12.2, pg. 21	12.2 Re	Site environmental inspection checklist provided to the Principal	VJV	Weekly	See GC21			Compliant	
12.3 Threatened or Specially Protected Flora Management Sub-Plan									
App 12.3, pg. 22	12.3 Ra	Site environmental inspection checklist provided to the Principal, including inspection and maintenance of ESA fences	VJV	Weekly	See GC21			Compliant	
12.4 ASS and Dewatering Management Sub-Plan – VROS/VRDD									
App 12.4, pg. 27	12.4 Ra	Provide Principal evidence of vegetation stress, silt curtain and plume inspections during works as part of environmental checklist, i.e. photos	VJV	Weekly	See GC21			Compliant	
App 12.4, pg. 27	12.4 Rb	Any exceedance of limits or trigger values specified within the ASSDMP and/or the Principal's 5C licence is to be considered an incident and must be reported	VJV	Within 24 hrs	ASS field and lab validation data sheet provided	• ASS field and lab validation data sheet • VJV advised that field and laboratory results are provided to WC with any exceedances directly attributed to the project identified		Compliant	
App 12.4, pg. 27	12.4 Rc	Groundwater, effluent, surface water and soil sampling (for ASS or PASS) results, dewatering volumes and calibration certificates for sampling instruments are to be reported to the Superintendent and Principal's Environmental Scientist.	VJV	Weekly	See 12.4 Rb			Compliant	
App 12.4, pg. 27	12.4 Rd	Reporting in accordance ASSDMP and Dewatering License GWL204992(1) conditions	VJV	Initial Closure Report – following cessation of construction works Post Dewatering Monitoring Closure Report - following cessation of construction works and post construction monitoring	N/A - Construction works remain ongoing			N/A	

Reporting requirements									
CEMP Ref #	Audit Ref #	Required action	Responsibility	Frequency	Auditor observations	Evidence	Recommendations	Compliance ra	Review 18/03/2021
12.5 ASS and Dewatering Management Sub-Plan – Levee Reconstruction									
App 12.5, pg. 31- 32	12.5 Ra	Provide Principal evidence of vegetation stress, silt curtain and plume inspections during works as part of environmental checklist i.e. photos	VJV	Weekly	See GC21			Compliant	
App 12.5, pg. 31- 32	12.5 Rb	Any exceedance of limits or trigger values specified within the ASSDMP and/or the Principal's 5C licence is to be considered an incident and must be reported	VJV	Within 24 hrs	N/A - No ASS encountered or dewatering being undertaken			N/A	
App 12.5, pg. 31- 32	12.5 Rc	Groundwater, effluent, surface water and soil sampling (for ASS or PASS) results, dewatering volumes and calibration certificates for sampling instruments are to be reported to the Superintendent and Principal's Environmental Scientist.	VJV	Weekly	N/A - No ASS encountered or dewatering being undertaken			N/A	
App 12.5, pg. 31- 32	12.5 Rd	Reporting in accordance ASSDMP and Dewatering License GWL204992(1) conditions	VJV	Initial Closure Report – following cessation of construction works Post Dewatering Monitoring Closure Report - following cessation of construction works and post construction monitoring	N/A - No ASS encountered or dewatering being undertaken			N/A	
12.6 ASS and Dewatering Management Sub-Plan – Gauging Station									
App 12.6, pg. 36	12.6 Ra	Provide Principal evidence of vegetation stress, silt curtain and plume inspections during works as part of environmental checklist, i.e. photos	VJV	Weekly	See GC21			Compliant	
App 12.6, pg. 36	12.6 Rb	Any exceedance of limits or trigger values specified within the ASSDMP and/or the Principal's 5C licence is to be considered an incident and must be reported	VJV	Within 24 hrs	ASS field and lab validation data sheet provided	ASS field and lab validation data sheet		Compliant	
App 12.6, pg. 36	12.6 Rc	Groundwater, effluent, surface water and soil sampling (for ASS or PASS) results, dewatering volumes and calibration certificates for sampling instruments are to be reported to the Superintendent and Principal's Environmental Scientist.	VJV	Weekly	See 12.6 Rb			Compliant	
App 12.6, pg. 36	12.6 Rd	Reporting in accordance ASSDMP and Dewatering License GWL204992(1) conditions	VJV	Initial Closure Report – following cessation of construction works Post Dewatering Monitoring Closure Report - following cessation of construction works and post construction monitoring	See 12.6 Rb			Compliant	
12.7 Weed and Soil Hygiene Management Sub-Plan									
App 12.7, pg. 37	12.7 Ra	Site environmental inspection checklist provided to the Principal. Notify Water Corporation of any weed infestations.	VJV	Weekly	See GC21			Compliant	
App 12.7, pg. 37	12.7 Rb	Provision of site induction register	VJV	When requested by Water Corporation and at the end of the project	See GC10			Compliant	
12.8 Land Degradation Management Sub-Plan									
App 12.8, pg. 40	12.8 Ra	Site environmental inspection checklist provided to the Principal	VJV	Weekly	See GC21			Compliant	
App 12.8, pg. 40	12.8 Rb	Any exceedance of surface water triggers are considered an environmental incident and are to be reported to the Principal	VJV	Within 24 hrs of incident identification	See 12.4 Rb			Compliant	

Reporting requirements									
CEMP Ref #	Audit Ref #	Required action	Responsibility	Frequency	Auditor observations	Evidence	Recommendations	Compliance ra	Review 18/03/2021
12.9 Waste Management Sub-Plan									
App 12.9, pg	12.9 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant	
App 12.9, pg	12.9 Rb	Provision of following records: Waste classification (if required) and disposal Quantity of soil and sediments reused on site	VJV	When requested by Water Corporation and at the end of the project	N/A - VJV advised that no soil or sediment has been disposed of offsite			Compliant	
12.10 Chemical Use Management Sub-Plan									
App 12.10, pg.43	12.10 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant	
App 12.10, pg. 43	12.10 Rb	Any chemical spills or leaks are considered an environmental incident and are to be reported to the Principal	VJV	Within 24 hrs of incident identification (or within 30 min if spill effects lower vasse river)	See GC17			Compliant	
12.11 Water Management Sub-Plan									
App 12.11, pg. 45	12.11 Ra	Any exceedance of water quality criteria are considered an environmental incident and is to be reported to the Principal and Contractor	VJV	Within 24 hrs of incident identification, or within 30 minutes if into lower Vasse river	See 12.4 Rb			Compliant	
12.12 Dust Management Sub-Plan									
App 12.12, pg. 47	12.12 Ra	Report complaints to the Principal	VJV	As required	See GC16			Compliant	
App 12.12, pg. 47	12.12 Rb	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See 12.1 Ra			Compliant	
12.13 Noise and Vibration Management Sub-Plan									
App 12.13, pg. 50	12.13 Ra	Report complaints to the Principal	VJV	Within 24hrs of notification	See GC16			Compliant	
App 12.13, pg. 50	12.13 Rb	Site environmental inspection checklist.	VJV	Weekly	See GC21			Compliant	
12.14 Bushfire Management Sub-Plan									
App 12.14, pg. 53	12.14 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant	
App 12.14, pg. 53	12.14 Rb	Plant inspection checklist provided to the Principal	VJV	On request	See 12.7 MNb			Compliant	
App 12.14, pg. 53	12.14 Rc	Provision of project Safety and Environmental Inductions Register to Principal	VJV	On request	See GC10			Compliant	
App 12.14, pg. 53	12.14 Rd	Report incidents to the Principal	VJV	Within 30 minutes of becoming aware of incident	See GC17			Compliant	
12.15 Public Safety and Traffic Management Sub-Plan									
12.15, pg. 54	12.15 Ra	Report complaints to the Principal	VJV	As required and within 24 hours of receiving compliant	See GC16			Compliant	
12.15, pg. 54	12.15 Rb	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant	
12.16 Communication and Stakeholder Engagement Management Sub-Plan									
App 12.16, pg. 56	12.16 Ra	Report community complaints to the Principal	VJV	As required and within 24 hours of receiving compliant	See GC16			Compliant	
App 12.16, pg. 56	12.16 Rb	Provision of the community enquiries and complaint register to the Principal	VJV	Weekly	See GC16			Compliant	
12.17 Reinstatement and Revegetation Management Sub-Plan									
App 12.17, pg. 57	12.17 Ra	Notify the Principal when areas are available for Principals SME	VJV	As available	N/A - No areas within DAF suitable for revegetation			N/A	
12.18 Asbestos Management Sub-Plan									
App 12.18, pg. 59	12.18 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant	
App 12.18, pg. 59	12.18 Rb	Remediation and validation report including a clearance certificate following removal.	VJV	Following each remediation event	See 12.18 MNd			Not Compliant	Evidence provided Closed out

Audit Process
The Contractor will be provided the audit table (this document) two weeks prior to the audit
The Contractor will have the opportunity to provide evidence of compliance in preparation for the audit.
Evidence of compliance can include photos, documentation, forms, visual inspection during the audit and personal communciations with project staff
Audit Outcomes
The Contractor will have one week after the audit to provide additional evidence, or action any quick fix hazards or Area's for improvement
All other outcomes will be recorded as major- or minor- non-compliance within the Corporation Sentinel system

Environmental Compliance Audit Report	
Asset/Project Details	
Audit Type	Environmental
Project Number	CD00116
Audit Document	CD00116-PLN-011-Cnostruction Environmental Management Plan Rev 5 (VJV, 2020)
Audit Folder	**https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/111439856**
Project Approvals	**https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/73772539**
Current risk rating	Moderate
Phase	Construction
Asset Details	Vasse Diversion Drain, Busselton
Audit Details	
Audit Team	Giles Glasson, Shenae Blakiston
Reviewer	Klara Allsopp, Bree Atkinson
Auditee	Vasse Joint Venture and Western Environmental
Audit Date	22-Apr 21 & 23 Apr 23
Audit Objective	This audit reviews contractor requirements as outlined in CD00116-PLN-011 Construction Environmental management Plan (VJV, 2020) CD00116 – Vasse Diversion Drain Upgrade Project. **https://nexus.watercorporation.com.au/otcs/cs.exe/app/nodes/103879081** The CEMP is a live document that works as an adaptive management plan. The version of this document live at the date and time of audit will be saved in PDF format with the finalised Audit Compliance Report (this document).
Project Description	Project Scope - Refurbishment of levees including repair of concrete walls along the lower sections of the Vasse Diversion Drain along Queen Elizabeth Avenue - Deconstruction, widening and reconstruction of the levees - Construction of the Vasse Diversion Dam - Installation or replacement of culverts - Dredging/scouring of the Vasse Diversion Drain channel - Construction and deconstruction of temporary coffer dams.

General commitments							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
Section 1.5, pg. 6	GC1	WEM-POL-001 Environmental Policy and WEM-POL-002 Sustainability Policy posted in site office.	Vasse Joint Venture (VJV)	WEM-POL-001 Environmental and WEM-POL-002 Sustainability Policy posted in main site office and three construction site offices	• Visual observation • Site photographs		Compliant
Section 2, pg. 6	GC2	The risk register will be maintained on site and will be communicated to project personnel. VJV will review the register on the following basis: • Reviews will be undertaken on a minimum quarterly basis; • When a CEMP non-conformance has been reported; • An environmental incident has occurred; and/or • Changes to the environmental approval compliance obligations and/or the scope of works is communicated by Water Corporation.	VJV	Project risk register (CD00116-REG-003-5-Risk Register)	• Visual observation • Site photographs • VJV advised: - that risk register is communicated on a daily via Take 5s and 'What happened on last shift' pre-start call outs; and weekly via JSAs - Take 5s provide feedback for safety improvement - that the risk register is subject to ongoing review and update		Compliant
Section 2, pg. 7	GC3	Project team to ensure that potential environmental aspects and impacts are considered and incorporated into other risk management activities for the project e.g. SWMS, JSA, Take 5 etc.	VJV	• See GC2 • Risk register includes environmental risks			Compliant
Section 3.3, pg. 7-8	GC4	VJV to adhere to: • Australian Government, 'Controlled Action' approved under the Environment Protection and Biodiversity Conservation Act 1999 (Cth); all activities to be undertaken in compliance with conditions set in the EPBC 2017/7932 Approval Conditions (September 2020 to July 2035) • Government of Western Australia, Clearing Permit (Purpose Permit) granted under Part V (Section 51E) of the Environmental Protection Act 1986 Purpose Permit number 8191/1 (June 2020 to June 2035) • Dewatering Licence (5C Licence to Take Water -GWL204992(1) and 26D Licence to Construct or Alter Well - CAW204993(1) • Traffic Management Plan: Busselton Vasse Diversion Drain Upgrade (Adjacent to Queen Elizabeth Ave, College Ave and Chapman Hill Road) Vasse, WA (Edge Transport Solutions, 2020) • Acid Sulfate Soil and Dewatering Management Plan: CD00116 – Vasse Diversion Drain EEC19269.001-3 (RPS, 2020) • Vasse Diversion Drain Upgrade, Westralunio carteri (Carter's Freshwater Mussel) Relocation Management Plan (IndoPacific, 2020a) • Vasse Diversion Drain Upgrade: Water Quality Monitoring and Management Plan (IndoPacific, 2020b) • Fauna management Plan for the Vasse Diversion Drain Upgrade (Bamford Consulting Ecologists, 2020) • Vasse Diversion Drain Upgrade: Revegetation Management Plan (Tranen Revegetation Southwest, 2020).	VJV	Demonstrated through implementation of the approved CEMP (CD00116-PLN-011-5)			N/A
Section 3.3, pg. 8	GC5	VJV to obtained and adhered City of Busselton Construction Work Regulation 13 Permit (if noise generation is required outside of 7am – 6pm Monday – Saturday).	VJV	City of Busselton Construction Work Regulation 13 Permit (ECM_4499680_v2_Regulation 13 Approval - VDDU) obtained for Dewatering Pumps	Regulation 13 Permit (ECM_4499680_v2_Regulation 13 Approval - VDDU)		Compliant
Misc.	GC6	Copies of the CEMP and relevant ITPs kept at all four site crib rooms.	VJV	• Copies CEMP, Quality Management Plan, Occupational Safety and Health Management Plan & Risk Register visually observed in hard copy in main site office • Copies of the CEMP, Quality Management Plan, Occupational Safety and Health Management Plan & Risk Register available to site personnel in electronic format	Visual observation		Compliant
Section 5.1, pg. 9-10	GC7	Site Access Plan identifying: •Approved development area footprint (DAF); •Approved clearing areas; •Fences for the protection of Environmentally Sensitive Areas (ESAs) •Approved construction laydown area(s); •Plant and vehicle access and egress points; •Hygiene management points; •Site offices and amenities; •Material stockpiles, soil/spoil windrows; •Location of stormwater runoff control measures; •Acid Sulfate Soil (ASS) treatment locations; •Bypass pipes; •Infiltration areas. Copies of these should be kept at each Site Office.	VJV	• Site access plan prepared and visually observed at main site office • Copies of the site access plan available to site personnel in electronic format	Visual observation		Compliant

General commitments							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
Section 5.1, pg. 10	GC8	DAF and Approved Clearing Areas will be set out by a qualified surveyor and subject to joint inspection and signoff prior to clearing, with specified hold points captured in VJV inspection and test plans	VJV				Compliant complete 16/12/2020
Section 5.1, pg. 10	GC9	Principal will identify and fence off ESA's and VJV will stay out of these areas and monitor the integrity of these fences throughout the works.	WC / VJV	• ESA fence subject to detailed inspection with new signage and shade cloth fixes observed • No evidence of unauthorised access to the fenced ESA observed • No evidence of sand accumulation against the ESA fence observed	• Visual observation • Site photographs		Compliant
Section 6, pg. 11	GC10	The Project Manager or delegate will maintain records of training for the project including successful completion of the project induction.	VJV	Training Matrix (C2261-VJV-WHS-REG-0002) contains details training records for project staff	Training Matrix (C2261-VJV-WHS-REG-0002)		Compliant
Section 6, pg. 11	GC11	Relevant environmental topics will be incorporated within daily prestart meetings or toolbox meetings for presentation to the project personnel.	VJV	• Pre-start meeting attended at Site 2 - Chapman Hill Road (22/04) and Site 4 - Town (23/04). • Environmental issues addressed at Site 1 included checking of pipes and culverts for fauna. • Environmental issues address at Site 4 included dust, litter in drain and washouts	• Aural observation • Minutes from all daily pre-starts provided for 22/4 & 23/4 • VJV advised that minutes from daily prestarts are maintained and stored electronically		Compliant
Section 6, pg. 11	GC12	Additional specialist environmental skills training (e.g. fauna handling) will be provided for project staff as determined by operational requirements.	VJV	See GC10	• VJV previously advised that additional targeted snake handling training had been undertaken by environmental staff. • Ad hoc task specific training was also previously conducted by Bamford Consulting Ecologists and Indopacific. • No additional training has been undertaken since the previous audit • Snake handling training was used to remove a tiger snake from work site		Compliant
Section 7.1, pg. 11	GC13	The Project Manager or delegate will actively promote considerations of environmental issues at prestart meetings and too box meetings, with relevant environmental topics incorporated into the meetings for presentation to the project personnel.	VJV	See GC11			Compliant
Section 7.1, pg. 11	GC14	Poster and other promotional materials will be placed in cr b room and site office to reinforce environmental awareness with the project personnel.	VJV	WC Environmental Matters poster sighted at main site office and three construction site offices	• Visual observation • Site photographs		Compliant
Section 7.1, pg. 11	GC15	Discussion of project environmental matters will also be incorporated into the fortnightly project meeting agenda including review of Contractor compliance with the CEMP and to encourage continual improvement of environmental management during the execution of the project. Meeting agenda and minutes will be recorded, maintained and be made available when required.	VJV	• Minutes from 1-20 internal progress meetings maintained and stored electronically • Minutes from 1-6 monthly meetings maintained and stored electronically • Environmental context included	Minutes from internal progress meetings and monthly meetings visually observed in electronic format		Compliant
Section 7.3, pg. 11	GC16	• The Project manager or delegate will manage all complaints received by VJV and ensure they are communicated to the Water Corporation's Community Engagement Advisor in accordance with the community engagement plan • All complaints will be recorded • The complaint will be investigated promptly to determine the cause and any corrective action required.	VJV	Community Interaction Register (CD00116-REG-011-0) contains description of the interaction, actions required and status	• Community Interaction Register (CD00116-REG-011-0) sighted • VJV advised Community Interaction Register is now stored on a Water Corporation (WC) server facilitating dual access		Compliant
Section 8.1, pg. 12	GC17	Any environmental incidents shall be investigated and reported to Water Corporation as soon as practicable after the incident is identified. Reports shall include details of the incident and any corrective actions taken.	VJV	Hazard Incident Report Register (WHS-REG-021) details environmental incidents.	• Hazard Incident Report Register (WHS-REG-021) • VJV advised that minor spills are no longer recorded and that tickets for minor spills are prepared • Incident review and response procedures observed during site audit		Compliant
Section 8.2, pg. 13	GC18	• The Project Manager or delegate is responsible for reporting and investigating environmental incidents that occur within the worksite; • The Project Team are responsible for reporting any member of staff, either by refusal or neglect fails to observe requirements; • Any incident that directly impacts on any of the above environmental issues is to be reported immediately to the HSE Manager/ HSE Advisor who will then inform the Project Manager who will notify Water Corporation in accordance with the identified timeframes.	VJV	See GC17			Compliant

General commitments							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
Section 8.2, pg. 13	GC19	Environmental incidents are reported on WEM-FM-001 Environmental Incident Notification.	VJV	See GC17			Compliant
Section 9.1, pg. 13	Vasse Joint Venture and Western Environmental	Formal inspections of clearing boundaries and ESA fencing will be undertaken prior to the commencement of any clearing activities and daily during clearing activities	VJV				Compliant complete 16/12/2020
Section 9.1, pg. 13	GC21	Daily and weekly inspections will be recorded on WEM-FM-002 Weekly Environmental Inspection Checklist.	VJV	Daily inspections are undertaken on Site Environmental Inspection Checklist	Daily inspections provided to WC on a weekly basis		Compliant
Section 9.1, pg. 13	GC22	Issues arising from site inspections shall be addressed as soon as possible, in some cases non-conformance reports may be raised. Issues identified shall also be discussed at toolbox or site prestart meetings together with any improvement measures that have been implemented.	VJV	See GC21	• VJV advised that issues detected by daily site inspections are recorded in the Environmental Inspection Corrective Action Register • Environmental Inspection Corrective Action Register sighted • Environmental Inspection Corrective Action Register is maintained and stored electronically • Issues are entered and resolved using the register • Additional flagging observed being put in place during site audit to clearly demarcated the DAF and adjacent wetland environments at Site 4 (Town)		Compliant
Section 9.1, pg. 13	GC23	Internal environmental audits will be undertaken by the Contractor approximately 1 month after mobilisation, 3 monthly thereafter and as directed by Water Corporation.	VJV	• WC undertook site audit in December • Site audit completed by VJV in January using the same WC template • RPS undertook site audit in February	Previous site audits		Compliant
Section 9.2, pg. 13	GC24	Laboratory Testing – personnel and sampling logs, evidence of NATA accredited laboratory, Chain of Custody	VJV	• WE project scientist undertook field measures • Field logs for ASS, dewatering effluent, groundwater, surface water and soil profile • Laboratory results, CoC and QA/QC documentation	• Field logs for ASS, dewatering effluent, groundwater, surface water and soil profile • NATA accredited laboratories (Eurofins, ARL) have been used to process the field samples • Laboratory results, CoC and QA/QC documentation		Compliant
Section 9.3, pg. 14	GC25	Non-Conformances – records, evidence of inspection, review, reporting, and implementation of appropriate remedial action.	VJV	See GC22			Compliant
Section 10.1, pg. 14	GC26	The CEMP will be reviewed and may be revised as a result of: • An Environmental Incident; • Changes to Company procedures or processes; • Changes to key personnel or resources; • Changes in legal and other obligations • Findings from an audit or inspection; • Findings from a significant incident or near miss; • Significant changes to site conditions and/or work methods • Instructions from Water Corporation.	VJV	No review or revisions to the CEMP have been made			Compliant
Section 10.1, pg. 14	GC27	• Within 2 working days of the start of each month during the progress of the project, monthly HSE performance reporting to Water Corporation will be carried out via http://eprocurement.watercorporation.com.au. • In addition to the above, the Contractor will provide on request all daily/weekly site inspections and provide an update to project team on environmental performance at each fortnightly site meeting. • The Contractor will review the HSE management performance for and lessons learnt during the project for the purpose of continually improving the Environmental Management System for VJV.	VJV	• HSE performance is reported to WC on a monthly basis • See GC21 & GC15	• HSE performance is reported to WC on a monthly basis • See GC21 & GC16		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.1 Native Vegetation and Clearing Management Sub-Plan							
App 12.1, pg. 17	12.1 MGa	Inspection and clearing procedure developed for clearing activities identifying hold points from Water Corporation Vasse Diversion Drain Upgrade Construction Environment Management Framework (CEMF) and specification	Vasse Joint Venture (VJV)	Clearing lot maps, Clearing ITPs (001-004), Clearing records, Clearing photos and Survey record provided	• Clearing lot maps • Clearing ITPs (001-004) • Clearing records • Clearing photos • Survey record		Compliant completed
App 12.1, pg. 17	12.1 MGb	DAF and approved clearing areas to be established by qualified surveyor and clearly demarcate. Review demarcated areas to identify areas of vegetation that can be retained and amend clearing areas if applicable.	VJV	• Clearing ITPs (001-004) identify that DAF and approved clearing areas established by a qualified surveyor • Trees demarcated with pink flagging have been retained within DAF	• Clearing ITPs (001-004) • Visual observation • Site photographs		Compliant completed
App 12.1, pg. 17	12.1 MGc	Clearing only to commence after inspection of demarcated and barricaded areas and hold points signed off by WC and VJV. WC Environmental specialist to complete inspection 5d prior to clearing.	VJV	Clearing ITPs (001-004) provided	Clearing ITPs (001-004)		Compliant completed
App 12.1, pg. 17	12.1 MGd	Site Access Plan to be developed to delineate laydown areas and access tracks	VJV	See GC7			Compliant completed
App 12.1, pg. 17	12.1 MGe	Facilitate access for the Principal's Flora SME	VJV		• VJV advised Principal's SMEs subject to standard site induction procedures • No access complaints received from Principal's SMEs		Compliant
App 12.1, pg. 17	12.1 MGf	Include vegetation management requirements within project specific induction, including but not limited to: • All project activities and access to be limited to within the demarcated DAF and public roads • The location of Environmentally Sensitive Areas (ESA's) and sensitive receptors (which will be identified and fenced by the Principal) to which access is forbidden • All hot works require signed hot work permit with controls identified on the permit in place prior to commencement of any hot work.	VJV	Vegetation management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
12.2 Fauna Management Sub-Plan							
Ap 12.2, pg. 20	12.2 MGa	All injured/killed fauna to be reported to site management immediately and handled only by trained handler. We intend to utilize the services of FAWNA Busselton (0438 526 660 [primary contact], 0417 937 184 [FAWNA Manager Suze Strap, secondary contact]) if required to handle and care for injured animals.	VJV	N/A - No injured/killed fauna to be reported on site	Fauna interaction register (CD00116-REG-019)		N/A
Ap 12.2, pg. 20	12.2 MGb	FAWNA to conduct first responder training with VJV management team members	VJV to facilitate	See GC12			Compliant
Ap 12.2, pg. 20	12.2 MGc	Register to be created for all fauna removals, deaths or injuries. The register must identify: • Date/time and location. • Type and number of fauna. • Status (E.g. dead/alive/injured). • Method of removal. • Location of removal • Details of person (Name, Contact Registration/Licence details)	VJV	Fauna interaction register (CD00116-REG-019) provided	Fauna interaction register (CD00116-REG-019)		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
Ap 12.2, pg. 20	12.2 MGd	Inspection and test plans to identify hold points from CEMF and specification	VJV	• Fauna interaction register (CD00116-REG-019) • BCE tab in Fauna interaction register identifies that clearing was undertaken under the supervision of BCE	Fauna interaction register (CD00116-REG-019)		Compliant
Ap 12.2, pg. 20	12.2 MGe	Clearing debris to be removed from cleared area on the day of clearing	VJV	• Clearing Records provided • No obvious signs of clearing debris with DAF during site audit	• Clearing records • Visual observation • Site photographs		Compliant
Ap 12.2, pg. 20	12.2 MGf	Install silt curtains downstream of the works in the VDD and downstream of the works in the lower Vasse river	VJV	• Silt curtains observed in place during site audit • Additional silt curtain (three in total) observed in place at Site 4 (Town)	• Visual observation • Site photographs		Compliant
Ap 12.2, pg. 20	12.2 MGg	Facilitate access for all the Principal's Fauna SME's (eg mussel relocation, Possum drey removal, inspections/trapping for Quenda & Rakali, daily wildlife inspections during clearing	VJV	See 12.1 MGe			Compliant
Ap 12.2, pg. 20	12.2 MGh	Confirm that Water Corporation has executed their responsible actions and attain WC approval prior to commencement of clearing.	VJV	See 12.1 MGc			Compliant complete
Ap 12.2, pg. 20	12.2 MGi	Native vegetation clearing will be undertaken under the supervision of the Principal's Fauna SME's. The contractor will work collaboratively with the SME's to establish and document the agreed clearing methodology for each individual tree identified as containing possums prior to felling those trees.	VJV under the supervision of the Water Corporation Fauna SME's (Bamford Consulting Ecologists)	See 12.2 MGd			Compliant complete
Ap 12.2, pg. 20	12.2 MGj	Include fauna management requirements within project specific induction, including but not limited to: • Education on threatened and specially protected species and required actions if encountered • Methods for avoiding damage to fauna • Incident response if fauna is injured / killed inc phone #'s • Maintain clean work environment to avoid attracting fauna • No feeding disturbance, harassing or hunting of fauna, or the presence of firearms or pets on site. • Daily inspection of open excavations and pipes for fauna	VJV	Fauna management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
12.3 Threatened or Specially Protected Flora Management Sub-Plan							
App 12.3, pg. 22	12.3 MGa	Inspection and test plan developed for clearing activities identifying hold points from CEMF and specification	VJV	See 12.1 MGa			Compliant
App 12.3, pg. 22	12.3 MGb	Access to be provided to Principal's SME's as required	VJV	See 12.1 MGe			Compliant
App 12.3, pg. 22	12.3 MGc	Principal to identify and fence off Environmentally Sensitive Areas (ESA's)	Water Corporation (WC)	See GC09			Compliant complete
App 12.3, pg. 22	12.3 MGd	ESA's to be identified in site maps and discussed in prestart meetings when working in proximity to these areas	VJV	• WC Environmental Matters poster sighted four site offices • ESA identified in WC Environmental Matters poster	• Visual observation • Site photographs		Compliant
App 12.3, pg. 22	12.3 MGe	Clearing only to commence after inspection of demarcated areas and hold points signed off by WC and VJV. Contractor to provide notice 5d prior clearing on southern side of drain between ch 1700 and 1900.	VJV	N/A - VJV advised that WC contractor undertook clearing adjacent to ESA prior to site handover			N/A
App 12.3, pg. 22	12.3 MGf	Water Corporation Personnel will be present on site to monitor clearing works in the immediate vicinity of the ESA on the southern side of the drain between CH 1700 to CH 1900	WC	See 12.3 MGf			N/A
App 12.3, pg. 22	12.3 MGg	Include Flora management requirements within project specific induction, including but not limited to: • The location of Environmentally Sensitive Areas (ESA's) and sensitive receptors (which will be identified and fenced by the Principal) to which access is forbidden • The requirement to remain on designated access areas within the Development Area Footprint (DAF)	VJV	See 12.1 MGf			Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.4 ASS and Dewatering Management Sub-Plan – VROS/VRDD							
App 12.4, pg. 23-25	12.4 MGa	Inspection and test plan developed for acid sulfate soil and dewatering activities identifying hold points and testing requirements from CEMF, ASSDMP and specification	VJV	Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP)	Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP)		Compliant
App 12.4, pg. 23-25	12.4 MGb	Appoint appropriately qualified Environmental Scientist to complete groundwater, surface water and ASS sampling and provide details to Principal for approval. Environmental Scientist to be on site whilst excavation, infiltration and/or dewatering activities are occurring.	VJV	• WE project scientist undertook field measures for groundwater, surface water and ASS • WE project scientist is on site every day	Field logs for groundwater, surface water and ASS		Compliant
App 12.4, pg. 23-25	12.4 MGc	Include testing instruments / equipment used for groundwater, surface water and ASS sampling in the site testing equipment register, calibrate prior to use and monthly (minimum) thereafter. Calibration certification provided to Principal.	VJV	• Calibration logs in hard copy visually sighted • VJV advised that testing instruments / equipment calibrated on a daily basis	Visual observation		Compliant
App 12.4, pg. 23-25	12.4 MGd	Alleviate vegetation stress (if identified) in consultation with Water Corporation (i.e. supplementary watering of vegetation during dewatering if directed).	VJV in consultation with WC	• Daily inspection reports • No obvious signs vegetation stress in vegetated areas adjacent to the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant
App 12.4, pg. 23-25	12.4 MGe	Include ASS disturbance risks and the soil, sediment, water and dewatering management requirements within project specific induction, including but not limited to: • Identification and notification protocols for ASS and PASS • The expected location of ASS including MBO	VJV	ASS disturbance risks and the soil, sediment, water and dewatering management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
App 12.4, pg. 23-25	12.4 MGf	Dewatering management requirements: • Treat (i.e. increase pH to ≥6.0 and<8.5, decrease acidity to ≤40 mg/L with calcium based agent, increase alkalinity to ≥30 mg/L) prior to discharge to ground (aquifer recharge via sediment and infiltration basin or use for dust suppression) • Volume of water taken to be metered and not to exceed 260,000kL per calendar year for 2020 and 2021 • Depth of dewatering spears to be limited to the superficial aquifer	VJV	VJV advised that dewatering ceased from 09 April 21			N/A

CEMP Ref #	Audit Ref #	Required action	Responsibility	Auditor observations	Evidence	Recommendations	Compliance rating
Management requirements							
App 12.4, pg. 23-25	12.4 MGg	Do not discharge effluent (directly or indirectly) to surface water without DWER/DBCA/WC approval or use sodium based agents	VJV	N/A - See 12.4 MGf			N/A
App 12.4, pg. 23-25	12.4 MGh	Groundwater management requirements: • Monitoring of existing network during dewatering as following locations: - VRDD box culvert – GW01, GW02, GW03, GW04, BH-VDD/07/01 - VROS – GW03, GW04, BH-VDD/07/01 • Replace bores if necessary in accordance with ASSDMP • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals), field blank (metals)	VJV	VJV advised that dewatering ceased from 09 April 21	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • Groundwater field sheets and lab analysis		Compliant
App 12.4, pg. 23-25	12.5 MGi	Surface water management requirements (Sampling and testing by Principals SME): • To be undertaken during the construction of the VROS/VRDD structure • Establish silt curtains downstream of works and discharge point, remove in accordance with the ASSDMP (coffer dams finished, no plumes, same quality up and down stream of curtain • Monitoring at up and down stream locations (SW01-SW04) as per the ASSDMP • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals+turbidity), field blank (metals+turbidity)	Water Corporation Water Quality SME (IndoPacific) / VJV	• VJV advised that surface water monitoring ceased from 09 April 21 coinciding with the cessation of dewatering • Silt curtains observed in place	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • Surface water field sheets and lab analysis • Visual observation • Site photographs		Compliant
App 12.4, pg. 23-25	12.5 MGj	Soil/sediment management requirements: • Soils from 0.5 mbgl at the VROS/VRDD and from 3 mbgl within the existing VRDD, as well as sediments, are ASS and should be treated if excavated. MBOs have not been observed at VROS/VRDD. • ASS treatment and reuse options: - Treat and reuse onsite - Treat and reuse offsite - Dispose offsite for treatment • Treatment onsite can be done immediately adjacent to the open trench or in stockpiles (recommended within 18 hours but up to 14 days is ok) on a 300 mm thick limestone pad with bunds • Liming rates (based on 50% ENV, adjust if necessary) as follows: - VROS/VRDD – All soils below 0.5 mbgl (0.05%S): 8 kg/m^3 - VROS/VRDD – All soils below 1.5 mbgl (0.1%S): 15 kg/m^3 - Dark grey/black soils > 2.7 mbgl (0.6%S): 90 kg/m^3 - Blue/grey clays > 4.5 mbgl (0.37%S): 56 kg/m^3 - All sediments (0.14%S): 21 kg/m^3 • There is to be no uncontained stockpile runoff	VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis • Treated ASS stockpiles observed in adjacent paddocks • No uncontained stockpile runoff observed • Repurposed limestone pad with bund visually observed • VJV advised that last validation of treated material occurred on 15 April 21	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis • Visual observation • Site photographs		Compliant
App 12.4, pg. 23-25	12.4 MGk	Contingencies: • Refer to S2.7 of the VROS/VRDD ASSDMP	VJV		Discussions regarding liming of exposed ASS in the based of drain ongoing during site audit		Compliant
12.5 ASS and Dewatering Management Sub-Plan – Levee Reconstruction							
App 12.5, pg. 28-30	12.5 MGa	Inspection and test plan developed for acid sulfate soil and dewatering activities identifying hold points and testing requirements from CEMF, ASSDMP and specification	VJV	See 12.4 MGa			Compliant
App 12.5, pg. 28-30	12.5 MGb	Appoint appropriately qualified Environmental Scientist to complete groundwater, surface water and ASS sampling and provide details to Principal for approval. Environmental Scientist to be on site whilst excavation, infiltration and/or dewatering activities are occurring.	VJV	See 12.4 MGb			Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.5, pg. 28-30	12.5 MGc	Include testing instruments / equipment used for groundwater, surface water and ASS sampling in the site testing equipment register, calibrate prior to use and monthly (minimum) thereafter. Calibration certification provided to Principal.	VJV	See12.4 MGc			Compliant
App 12.5, pg. 28-30	12.5 MGd	Include ASS disturbance risks and the soil, sediment, water and dewatering management requirements within project specific induction, including but not limited to: • Identification and notification protocols for ASS and PASS • The expected location of ASS including MBO	VJV	See 12.1 MGf			Compliant
App 12.5, pg. 28-30	12.5 MGe	Dewatering is not expected; however, management of effluent requirements include: • Treat (i.e. increase pH to ≥6.0 and<8.5, decrease acidity to ≤40 mg/L with calcium based agent, increase alkalinity to ≥30 mg/L) prior to discharge to ground (aquifer recharge via sediment and infiltration basin or use for dust suppression) • Volume of water taken to be metered and not to exceed 260,000kL per calendar year for 2020 and 2021 • Depth of dewatering spears to be limited to the superficial aquifer	VJV	N/A - No dewatering being undertaken			N/A
App 12.5, pg. 28-30	12.5 MGf	Do not discharge effluent (if any, directly or indirectly) to surface water without DWER/DBCA/WC approval or use sodium based agents	VJV	N/A - No dewatering being undertaken			N/A
App 12.5, pg. 28-30	12.5 MGg	Groundwater management requirements: • Monitoring of three wells during dewatering (if any); one up and two down gradient of works. There is existing network of 6 wells; however, additional complimentary wells may be required. • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals), field blank (metals)	VJV	N/A - No dewatering being undertaken			N/A
App 12.5, pg. 28-30	12.5 MGh	Surface water management requirements: • To be undertaken during any dewatering in the area • Establish silt curtains down and upstream of works and discharge point, remove in accordance with the ASSDMP (coffer dams finished, no plumes, same quality up and down stream of curtain) • Monitoring at up and down stream locations from silt curtains and New River estuary • Saturate work zone between CH0800-1500 for 5 days with seawater prior to dam removal	VJV	• N/A - No dewatering being undertaken • Silt curtains observed in place • N/A - coffer dam not proposed for removal	• Visual observation • Site photographs		N/A-Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.5, pg. 28-30	12.5 MGi	Soil/sediment management requirements: • ASS includes: - Soils > 2.5 mbgl @ CH5600-5980 (northern side) - Dark grey black sediment/potential MBO @ CH800-5600 - New River estuary sediments @ CH800-1000 - VDD sediments @ CH5600-6000 - Ironstone "Ferricrete" gravels/boulders @ CH2350-6300 – reuse untreated above the water table • ASS treatment and reuse options: - Treat and reuse onsite - Treat and reuse offsite - Dispose soils offsite for treatment - Treat MBO and dispose offsite • Soil treatment can be done onsite immediately adjacent to the open trench or in stockpiles (recommended within 18 hours but up to 14 days is ok if covered with 10 mm lime layer) on a 300 mm thick limestone pad with bunds • Inspect CH800-5600, CH5600-6000 and New River estuary sediments upon on site possession and assess MBO extent and risk. Cover any MBO and surrounds with 20 mm/m^2 aglime; mix and remove material onto limestone pad validation. If not MBO excavate onto pad for treatment. • Liming rates (based on 50% ENV, adjust if necessary) as follows: - Soils > 2.5 mbgl @ CH5600-5980 (0.08%S): 12 kg/m^3 - Dark grey black sediment/potential MBO @ CH800-5600: 20 mm/m^2 - New River estuary sediments @ CH800-1000: (0.34%S): 51 kg/m^3 - VDD sediments @ CH5600-6000: (0.27%S): 41 kg/m^3 • There is to be no uncontained stockpile runoff	VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis • Top soil stockpiles observed in adjacent paddocks • No uncontained stockpile runoff observed	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis • Visual observation • Site photographs		Compliant
App 12.5, pg. 28-30	12.5 MGj	Contingencies: • Refer to S3.8 of the Levee Reconstruction ASSDMP	VJV	N/A - VJV advised that no contingencies have been required to be implemented			N/A
12.6 ASS and Dewatering Management Sub-Plan – Gauging Station							
App 12.6, pg 33-34	12.6 MGa	Inspection and test plan developed for ASS and dewatering act	VJV	See 12.4 MGa			Compliant
App 12.6, pg 33-34	12.6 MGb	Appoint appropriately qualified Environmental Scientist to comp	VJV	See 12.4 MGb			Compliant
App 12.6, pg 33-34	12.6 MGc	Include testing instruments / equipment used for groundwater, surface water and ASS sampling in the site testing equipment register, calibrate prior to use and monthly (minimum) thereafter. Calibration certification provided to Principal.	VJV	See12.4 MGc			Compliant
App 12.6, pg 33-34	12.6 MGd	Include ASS disturbance risks and the soil, sediment, water and dewatering management requirements within project specific induction, including but not limited to: • Identification and notification protocols for ASS and PASS • The expected location of ASS including MBO	VJV	See 12.1 MGf			Compliant
App 12.6, pg 33-34	12.6 MGe	Dewatering may be required; management of effluent will include: • Treat (i.e. increase pH to ≥6.0 and<8.5, decrease acidity to ≤40 mg/L with calcium based agent, increase alkalinity to ≥30 mg/L) prior to discharge to ground (aquifer recharge via sediment and infiltration basin or use for dust suppression) • Volume of water taken to be metered and not to exceed 260,000kL per calendar year for 2020 and 2021 • Depth of dewatering spears to be limited to the superficial aquifer	VJV	N/A - No dewatering being undertaken			N/A
App 12.6, pg 33-34	12.6 MGf	Do not discharge effluent (if any, directly or indirectly) to surface water without DWER/DBCA/WC approval or use sodium based agents	VJV	N/A - No dewatering being undertaken			N/A

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.6, pg 33-34	12.6 MGg	Groundwater management requirements: • Install additional three wells (GW07/19, GW08/19, GW09/19) prior to and monitor four wells (incl BH-VDD/07/06) during dewatering. • Collect QA/QC samples at each event (duplicate (full suite), rinsate (metals), field blank (metals)	VJV	N/A - No dewatering being undertaken			N/A
App 12.6, pg 33-34	12.6 MGh	Soil/sediment management requirements: • ASS includes: - Dark grey black silty sediment/potential MBO and soils - Ironstone "Ferricrete" gravels/boulders @ CH2350-6300 – reuse untreated above the water table • ASS treatment and reuse options: - Treat and reuse onsite - Treat and reuse offsite - Dispose soils offsite for treatment - Treat MBO and dispose offsite • Inspect CH5300-5350 sediments upon on site possession and assess MBO extent and risk. Cover any MBO and surrounds with 20 mm/m^2 aglime; mix and remove material onto limestone pad validation. If not MBO excavate onto pad for treatment. • Liming rates (based on 50% ENV, adjust if necessary) as follows: - All material (0.34%S): 52 kg/m^3 or 20 mm/m^2 • There is to be no uncontained stockpile runoff • Accumulated sediments from dewatering will be tested for metals to determine reuse potential	VJV	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis	• Master sheet for ASSDMP management (Worksheet in CD00116-PLN-011-5-CEMP) • ASS field sheets and lab analysis		Compliant
App 12.6, pg 33-34	12.6 MGi	Contingencies: • Refer to S2.9 of the Gauging Station ASSDMP	VJV	N/A - VJV advised that no contingencies have been required to be implemented			N/A
12.7 Weed and Soil Hygiene Management Sub-Plan							
App12.7, pg. 37	12.7 MGa	Inspection and test plan developed for construction activities identifying hold points from CEMF and specification	VJV		VJV advised that all new vehicles on site are either inspected by the hire company prior to mobilisation or inspected onsite		Compliant
App12.7, pg. 37	12.7 MGb	All plant and equipment will be inspected to ensure they are free from soil and plant debris prior to commencement of work on site.	VJV	VJV advised that vehicle inspection sheets are maintained in hard copy at main site office	• Visual observation • Site photographs • VJV advised that all new vehicles on site are either inspected by the hire company prior to mobilisation or inspected onsite		Compliant
App12.7, pg. 37	12.7 MGc	Restrict access of machines and vehicles to areas of cleared native vegetation.	VJV	Machines and vehicles sighted in cleared areas only.	• Visual observation • Site photographs		Compliant
App12.7, pg. 37	12.7 MGd	No mulch or topsoil is to be imported to site without approval from the Superintendent.	VJV	N/A - VJV advised that no mulch or topsoil has been imported to site			N/A
App12.7, pg. 37	12.7 MGe	No known dieback or weed-affected soil, mulch, fill or other material is to be imported to site.	VJV	See 12.7 MGd			Compliant
App12.7, pg. 37	12.7 MGf	Inspection of site for declared weed infestations.	VJV	• Daily inspection reports • No obvious signs of significant weed establishment post clearing evident within the DAF • One emergent Arum Lily (Declared pest under the BAM Act) plant observed at Site 4 (Town) on the banks of the drain proximate to the eastern bridge. Presence of this species also noted in the adjacent landholdings	• Daily inspection reports • Visual observation • Site photographs	• Emergent Arum Lily plants within the DAF are controlled on an 'as required' basis • Suggested method of management and control is provided on Florabase https://florabase.dpaw.wa.gov.au/browse/profile/1049	Compliant
App12.7, pg. 37	12.7 MGg	Facilitate access for the Principal's Revegetation SME	VJV	See 12.1 MGe			Compliant
App12.7, pg. 37	12.7 MGh	Include weed and soil hygiene management requirements within project specific induction, including but not limited to: • Protocols to ensure all personnel and sub-contractors minimise the spread or introduction of weeds or dieback via movement of soil & vegetation and mobile plant.	VJV	Weed and soil hygiene management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.8 Land Degradation Management Sub-Plan							
App 12.8, pg. 39	12.8 MGa	Inspection and test plan developed for ground disturbance and clearing activities identifying hold points from CEMF and specification	VJV	See 12.1 MGa			Compliant
App 12.8, pg. 39	12.8 MGb	Install silt curtains downstream of the culvert in the Lower Vasse River and downstream of coffer dam at ch 800 to manage turbidity	VJV	See 12.2 MGf			Compliant
App 12.8, pg. 39	12.8 MGc	Considering site conditions (soil type, slope, and vegetation cover) and proximity to sensitive environments when determining stockpile locations	VJV	• Stockpiles have primarily been located in cleared paddocks not proximate to native vegetation. • Sand has been piled proximate to one large Jarrah tree outside of the DAF at Site 2 (Chapman Hill Road), with tyre tracks observed immediately adjacent to the tree's trunk (i.e. within a nominal root protection zone)	• Visual observation • Site photographs (DSC00723-25)	• Demarcation of the stockpile location, similar to the other stockpile site at Site 2 (i.e. perimeter flagging), would assist with sand placement and establishing vehicle movement patterns • VJV to provide landholder confirmation of land acess and stockpiling arrangements	Partially Compliant/Area for improvement
App 12.8, pg. 39	12.8 MGd	Facilitate access for the Principal's Water Quality Monitoring SME	VJV	See 12.1 MGe			Compliant
App 12.8, pg. 39	12.8 MGe	Remove sedimentation/or erosion management structures when water quality has returned to baselines levels.	VJV	N/A - Silt curtains remain in place during construction			N/A
App 12.8, pg. 39	12.8 MGf	Plan construction to minimise the time period between clear and grade and backfill and restoration to reduce the potential for erosion of exposed soils.	VJV	• Construction works staged concurrently across four active work fronts to minimise the time period between clear and grade and backfill and restoration • Installation of hydromulch has commenced on finished drain batters			Compliant
App 12.8, pg. 39	12.8 MGg	All vehicles to use the constructed and/or existing access tracks and designated turning circles to prevent erosion of adjacent farmland or vegetation.	VJV	• Daily inspection reports provided • No obvious signs of vehicle tracks outside of existing trafficable areas	• Daily inspection reports • Visual observation • Site photographs		Compliant
App 12.8, pg. 39	12.8 MGh	Ground disturbance and vegetation clearing shall be restricted to defined areas within the project DAF	VJV	See 12.1 MGb			Compliant
App 12.8, pg. 39	12.8 MGi	Strip topsoil from the laydown area and any stockpile areas	VJV	Topsoil respreading currently being undertaken at Site 2 (Chapman Hill Road) stockpiles	• Visual observation • Site photographs		Compliant
App 12.8, pg. 39	12.8 MGj	Stockpiled soils shall be stabilised and contained to avoid wind and water erosion and maximise future viability	VJV	• Daily inspection reports provided • No obvious signs of loss of stockpile integrity or erosion • Water carts observed onsite • Installation of hydromulch has commenced on finished drain batters • Anecdotal evidence to suggest that recent rains and cooler mornings have also assisted with dust suppression	• Daily inspection reports • Visual observation • Site photographs		Compliant
App 12.8, pg. 39	12.8 MGk	Construct a hardstand with imported material (typically natural gravel, crushed limestone, or road base)	VJV		VJV previously advised that compacted crushed limestone is used for hardstand areas		Compliant
App 12.8, pg. 39	12.8 MGl	Install bunding for all machine servicing areas to capture any oil / fuel spills. Install an impermeable membrane under the pad location where servicing vehicles, plant and equipment is proposed	VJV	• Earthen bund established around fuel storage and machinery parking area in Site 2 (Chapman Hill Road) • Refuelling area has bunded tray underlying truck refuelling site • No obvious signs of fuel spills proximate to the refuelling area	• Visual observation • Site photographs • VJV advised that vehicles are serviced offsite from the VROS / VRDD site and onsite at Site 2 (Chapman Hill Road). Mobile drip trays are used is vehicles are required to be serviced in situ		Compliant
App 12.8, pg. 39	12.8 MGm	Include land degradation management requirements within project specific induction, including but not limited to identification and communication of erosion risks	VJV	Land degradation management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
12.9 Waste Management Sub-Plan							
App 12.9, pg. 41	12.9 MGa	Inspection and test plan developed for clearing activities identifying hold points from CEMF and specification	VJV	N/A - This line item is a typo and was incorrectly copied and pasted from the clearing sub-plan (T. Malseed [VJV Project Manager], personal communication, February 25, 2021)			N/A
App 12.9, pg. 41	12.9 MGb	Identify all major waste streams associated with the works and identify any controlled or recyclable wastes.	VJV	• Waste and recycling bins observed at each site office • Oil waste segregated and stored at Site 2 (Chapman Hill Road)	• Visual observation • Site photographs		Compliant
App 12.9, pg. 41	12.9 MGc	Refer to RPS (2020) waste characterisation report regarding soil /sediment waste disposal	VJV	N/A - VJV advised that no soil / sediment waste has been disposed offsite.			N/A

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.9, pg. 41	12.9 MGd	Include waste management requirements within project specific induction, including but not limited to identification and management protocols	VJV	Waste management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
App 12.9, pg. 41	12.9 MGe	Identify waste disposal locations on site maps including within the site office	VJV	See 12.9 MGb			Compliant
App 12.9, pg. 41	12.9 MGf	Remove all waste from site at the completion of works	VJV	N/A - Construction works remain ongoing			N/A
12.10 Chemical Use Management Sub-Plan							
Ap 12.10, pg. 42	12.10 MGa	Inspection and test plan developed for clearing activities identifying hold points from CEMF and specification	VJV	N/A - This line item is a typo and was incorrectly copied and pasted from the clearing sub-plan (T. Malseed [VJV Project Manager], personal communication, February 25, 2021)			N/A
Ap 12.10, pg. 42	12.10 MGb	List fuels, oils or chemicals that will be utilized on site (MSDS register)	VJV	• Chemical store at Site 2 (Chapman Hill Road) visually inspected and SDS register observed • VJV advised that the SDS register is also maintained electronically	• Visual observation • Site photographs		Compliant
Ap 12.10, pg. 42	12.10 MGc	Include chemical management and safe storage requirements within project specific induction, including but not limited to identification of spills and reporting procedures	VJV	Chemical use requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
Ap 12.10, pg. 42	12.10 MGd	Combustible, flammable and/or corrosive liquids are to be stored in accordance with relevant Australian standards, including: • AS1940: The Storage and Handling of Flammable and Combustible Liquids • AS3780: The storage and handling of corrosive substances • AS1940: The aggregate quantity stored on site shall not exceed 1,000 L for each chemical other than diesel.	VJV	• See 12.10 MGb • No obvious signs of integrity breaches of storage containers • Small quantities only of stored chemicals located within the Chemical store	• Visual observation • Site photographs		Compliant
Ap 12.10, pg. 42	12.10 MGe	Flammable gases in cylinders are to be stored in accordance with their relevant Australian Standards: • AS 4332 and AS 1596. • The aggregate quantity on site shall not exceed 500 L.	VJV	N/A - No gas cylinders stored onsite			N/A
Ap 12.10, pg. 42	12.10 MGf	Oil and fuel are to be stored in designated, bunded areas, capable of handling 120% of stored capacity and shall only be located in cleared areas.	VJV	See 12.8 MGl			Compliant
Ap 12.10, pg. 42	12.10 MGg	Spill kits are to be readily available at chemical storage locations and during maintenance, refuelling or transfer of chemicals.	VJV	• Spill kits observed at site offices and appeared to be complete when inspected • Spare spill kit material observed in chemical store	• Visual observation • Site photographs		Compliant
Ap 12.10, pg. 42	12.10 MGh	All refuelling and servicing of plant, vehicles and equipment is to occur on a bunded area or utilize leak proof tray as far as practicable from any active waterway or wetland.	VJV	• See 12.8 MGl • Refuelling area at Site (Chapman Hill Road) is not located proximate to an active waterway or wetland	• Visual observation • Site photographs		Compliant
Ap 12.10, pg. 42	12.10 Mgi	Fuel is to be delivered around site via service trucks. Drum storage on site is not permitted.	VJV	Refuelling truck used to distribute fuel to machinery and mobile plant	• Visual observation • Site photographs		Compliant
Ap 12.10, pg. 42	12.10 MGj	All vehicles, storage and handling equipment (including transfer hoses, etc.) shall be well maintained.	VJV		VJV advised that machinery / equipment hire company (Edge Equipment Australia) and primary civil contractor (Leeuwin Civil) are responsible for machinery / equipment maintenance		Compliant
Ap 12.10, pg. 42	12.10 MGk	No chemical storage, transfer or handling to occur in areas within 50 m of surface water features, including wetlands, damplands and active drainage lines, where practicable.	VJV	• Chemicals / fuel are generally stored away from surface water features within the DAF • Fuel and chemical containers previously observed stored within the mapped area of Conservation Category Wetland (UFI 223) at Site 4 (Town) have been moved to the main site office	• Visual observation • Site photographs		Compliant
Ap 12.10, pg. 42	12.10 MGl	The storage, handling or use of aqueous film forming foams, which may contain per- and poly-fluoroalkyl substances (PFAS), is strictly prohibited.	VJV		No PFAS foams are located on site (T. Malseed [VJV Project Manager], personal communication, February 25, 2021).		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.11 Water Management Sub-Plan							
App 12.11, pg. 44	12.11 MGa	Facilitate access for the Principal's Water Quality Monitoring SME	VJV	See 12.1 MGe			Compliant
App 12.11, pg. 44	12.11 MGb	Install a silt curtain downstream of the coffer dam at approx. CH800 at location specified by the SME; the dam and silt curtain will remain in place until confirmatory water quality results confirm water quality criteria have been met. The Principal will provide approval to remove	VJV	Silt curtains observed in place during site audit	• Visual observation • Site photographs		Compliant
App 12.11, pg. 44	12.11 MGc	Install silt curtain downstream of the VRDD works and water diversion point in the Lower Vasse River	VJV	See 12.2 MGf			Compliant
App 12.11, pg. 44	12.11 MGd	Surface water quality triggers include: • Salinity of greater than 1.3 ppt recorded at WQM1 • A variation by ±20% in the value of any monitored parameter at WQM1 or WQM2 in comparison to the corresponding value at WQR1 for a period of greater than two weeks • Refer to RPS (2020) ASSDMPs • See VRDD surface water management Flow chart	Principal's Water Quality Monitoring SME (IndoPacific)	N/A - IndoPacific responsible for monitoring WQM1, WQM2 and WQR1			N/A
App 12.11, pg. 44	12.11 MGe	Refer to Appendix 12.4 – 12.6 for ASS water (effluent, groundwater and surface water) management controls	VJV	See 12.4 to 12.6			As per sections 12.4 to 12.6
App 12.11, pg. 44	12.11 MGf	Execute contingencies if criteria exceeded: • Refer to IndoPacific (2020) and RPS (2020) ASDMPs.	VJV	N/A - No contingency actions undertaken by VJV			N/A
App 12.11, pg. 44	12.11 MGg	Design of coffer dams and water diversion and contingency planning in accordance with specification CIVIL1.3.1 (refer to coffer dam and pumping design report)	VJV	Coffer Dam Design Report (CD00116-REP-003) provided	Coffer Dam Design Report (CD00116-REP-003)		Compliant
App 12.11, pg. 44	12.11 MGh	Ensure all construction activities are undertaken so that any spillages, runoff and sedimentation are entirely contained within the development area footprint.	VJV	• No obvious signs of spillages, runoff and sedimentation observed in areas adjacent to the DAF • Earthen bund established around fuel storage and machinery parking area in Site 2 (Chapman Hill Road) • Refuelling area has bunded tray underlying truck refuelling site • Small quantities only of stored chemicals located within the Chemical store	• Visual observation • Site photographs		Compliant
App 12.11, pg. 44	12.11 MGi	Include water quality management requirements within project specific induction, including but not limited to: • Water quality management risks and the adaptive management plan flowchart from IndoPacific (2020) • Identification of deteriorating water quality and reporting procedures.	VJV	Water management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.12 Dust Management Sub-Plan							
App 12.12, pg. 46	12.12 MGa	Plan construction to minimise the potential for dust to be generated; identify site access, laydown areas and stockpile locations as well as sensitive receptors	VJV	• VJV advised the following actions are undertaken to minimise the potential for dust generation: - Water carts used for dust suppression - Daily monitoring of weather conditions - Surface roller employed - Traffic management - Stockpiles are compressed to reduce dust generation - Cessation of top soil carting during high winds • No significant dust generation observed during site audit	• Visual observation • Site photographs		Compliant
App 12.12, pg. 46	12.12 MGb	Implement dust control measures that include are but not limited to the following: • Maintain and implement a suitable method of dust suppression on site at all times (ie water carts) • Stabilisation and management of soil stockpiles to minimise dust generation of longterm stockpiles • Vehicle movement with the site will be limited to designated tracks which will be maintained with water carts in order to minimise the amount of dust generated within the construction area • Restrict high risk activities during extreme weather events (strong winds, hot dry weather) to dry/calm conditions • Suspend dust producing activities immediately if dust suppression control measures prove ineffective • Cover loads when transporting material off site	VJV	• See 12.2 MGa • Vehicle observed using existing tracks • Street sweepers used to address dust/sand on local roads (as needed)	• Visual observation • Site photographs		Compliant
App 12.12, pg. 46	12.12 MGc	Maintain fencing and shade cloth downstream of Busselton bypass (by contractor) inc surrounding the ESA (by Principal)	VJV	GC9			Compliant
App 12.12, pg. 46	12.12 MGd	Include dust management requirements within project specific induction including but not limited to identification of any deterioration in air quality and reporting procedures	VJV	Dust management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
12.13 Noise and Vibration Management Sub-Plan							
App 12.13, pg. 49-50	12.13 MGa	Site working hours to be limited to 7am – 6pm Monday to Saturday (exc public holidays)	VJV	No machinery observed in operation prior to 7am at Site 2 and 4	• Aural observation • VJV advised that construction works undertaken during nominated site working hours		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.13, pg. 49-51	12.13 MGb	The following mitigation controls will be implemented during the project (in line with AS 2436-2010): • Select well maintained plant and equipment that generates low noise and vibration • Plant will be fitted with appropriate noise emission/vibration control equipment (i.e. machinery has appropriate mufflers, silencers and/or enclosures fitted) • Enclose, where practical, stationary constant noise sources such as pumps, generators etc to reduce noise levels, particularly those required to operate outside site working hours. • Plant should be switched off when not in use, wherever practicable • All plant, equipment and vehicles are to be regularly monitored and maintained and records kept of maintenance • Any abnormalities in expected noise or vibration emissions will be recorded in the plant's prestart form, reported to the Project Manager so the abnormality can be assessed and addressed in a timely manner • Maximise distance between activities likely to generate noise and vibration and sensitive receptors • Undertake noisy fabrication work off-site where possible, or at a location on site that is away from sensitive receptors; • The use of temporary site building and material stockpiles as noise barriers (associated with earthworks) • In the event that out of hours work are scheduled then restricting the number of nights that after hour work is conducted near residences and provide ample notice to residents.	VJV	• All plant machinery and equipment observed to be relatively recent models and appeared to be in service • No unreasonably loud noise detected from construction machinery or processes • Dewatering gensets/pumps at Site 1 (VROS) have now been switched off	• Visual observation • Aural observation • VJV advised: - Silence pumps and generators are used - Plant machinery and equipment are maintained in regular service by hire company / civil contractors - Distances between construction works and sensitive receptors maximised where practicable		Compliant
App 12.13, pg. 49-52	12.13 MGc	Include noise and vibration management requirements within project specific induction including but not limited to the project operating hours and the correct use of PPE	VJV	Noise and vibration management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
App 12.13, pg. 49-53	12.13 MGd	Work will be limited to between 0700 and 1800 Monday to Saturday excluding public holidays, unless approved by the Superintendent. If after hours work is proposed the following actions and controls are required: • Submit the Noise Management Plan to the Superintendent > 30 days prior to the proposed activity • Submit an application for Approval of Construction Work (Regulation 13 Permit) including the Noise Management Plan, must be provided to the City of Busselton at least three weeks prior to the Commencement of Works • Notify nearby residents/landowners if any project activities proposed outside of normal construction times	VJV	See GC5			Compliant
12.14 Bushfire Management Sub-Plan							
App 12.14, pg. 52-53	12.14 MGa	All works will be conducted in compliance with bushfire management strategies included in the VJV OSH Management Plan and Emergency Response Plan	VJV	• Fire units observed at site offices • Fire extinguishers observed on plant machinery and light vehicles	• Visual observation • Site photographs • VJV advised that works are suspended during City of Busselton Harvest and Vehicle Movement Bans		Compliant
App 12.14, pg. 52-53	12.14 MGb	Include bushfire management requirements within project specific induction including but not limited to bushfire risk management protocols and emergency evacuation points	VJV	Bushfire management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
App 12.14, pg. 52-53	12.14 MGc	Maintain primary vehicular routes in a condition that facilitates ready access by the appropriate Health and Safety Authorities and site based firefighting equipment	VJV	Primary vehicle movement tracks observed to be in trafficable condition	• Visual observation • Site photographs		Compliant
App 12.14, pg. 52-53	12.14 MGd	Advance notice of all proposed road and route closures and traffic deviations will be communicated to the appropriate Health and Safety Authorities in accordance with the TMP	VJV		VJV haven't closed or deviated any public or fire access roads (B. Fleay [Western Environmenta], personal communication, April 30, 2021).		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.14, pg. 52-53	12.14 MGe	Water Trucks and equipment with the capacity to cut firebreaks will be on site at all times of high fire risk	VJV	Water trucks and heavy machinery capable of cutting firebreaks observed on site	• Visual observation • Site photographs		Compliant
App 12.14, pg. 52-53	12.14 MGf	Plan work accordingly based on ongoing (daily and weekly) risk assessments; the ongoing risk assessment will be based on: • A designated on-site employee will monitor and record daily weather forecasts and bushfire risk warnings (i.e. danger rating) for the following day and the following week to assess risk. Monitoring sources shall include, but not be limited to BoM, dfes.wa.gov.au, local ABC radio station, emergency service Facebook and Twitter feed updates for any warnings and/or incidents • A designated on-site employee will monitor and record daily weather observations twice daily	VJV	Daily inspection reports provided show weather is monitored twice daily	Daily inspection reports		Compliant
App 12.14, pg. 52-53	12.14 MGg	If a total fire ban and/or a vehicle movement ban is expected/predicted, advise the Superintendent as soon as practicable to discuss impacts to the work schedule including reprioritization of work tasks.	VJV	See 12.14 MGa			Compliant
App 12.14, pg. 52-53	12.14 MGh	No activities that could generate sparks (e.g. cutting and grinding) will be permissible on 'very high' or 'extreme' fire risk days as defined by the appropriate Authority.	VJV		VJV advised that grinders are banned from site and hot works procedures apply for high risk activities		Compliant
App 12.14, pg. 52-53	12.14 MGi	Appropriate fire extinguishers will be located in designated areas through the project area, including the site office, chemical/fuel storage areas and in close proximity to all cutting, grinding or welding (and any other spark generating activities) (dry chemical or carbon dioxide fire extinguishers).	VJV	See 12.14 MGa			Compliant
App 12.14, pg. 52-53	12.14 MGj	All construction vehicles will be fitted with dry chemical or carbon dioxide fire extinguishers.	VJV	See 12.14 MGa			Compliant
App 12.14, pg. 52-53	12.14 MGk	The Superintendent may suspend the works where the occurrence of bush fires is likely to deplete available fire-fighting resources in the locality of the site. The Principal will provide relevant information relating to construction activities on a regular periodic basis to the appropriate Health and Safety Authorities (DBCA, City of Busselton, DFES).	VJV	See 12.14 MGa			Compliant
App 12.14, pg. 52-53	12.14 MGl	Smoking will be prohibited except in designated smoking areas, outside of site buildings. These areas will have clear signage.	VJV	Designated smoking areas observed outside of site offices	• Visual observation • Site photographs		Compliant
App 12.14, pg. 52-53	12.14 MGm	Appropriate containers for cigarette disposal will be located in designated smoking areas	VJV	See 12.14 MGl			Compliant
App 12.14, pg. 52-53	12.14 MGn	The Contractor will ensure that a shroud will be installed if cutting, grinding or welding (or any other spark generating) activity occurs within 5 m of any vegetation (including dry grass/weeds). The shroud will be installed between the activity and the vegetation to capture sparks.	VJV	N/A - VJV advised that no high risk activities are undertaken proximate to vegetation.			N/A
App 12.14, pg. 52-53	12.14 MGo	All vehicles and construction plant intended for use on site will be regularly checked, serviced and repaired as necessary to prevent oil and fuel leaks.	VJV	See 12.10 MGj			Compliant
App 12.14, pg. 52-53	12.14 MGp	Plant operators are designated the responsibility to monitor and report any vehicles and construction plant defects promptly and regular maintenance of equipment including the removal of combustible materials from tracks, guards and the undercarriage of all vehicles and construction plant.	VJV		VJV advised that daily plant prestart inspection is undertaken by operators		Compliant

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.15 Public Safety and Traffic Management Sub-Plan							
App 12.15, pg. 54	12.15 MGa	Preparation of a TMP that includes but is not limited to: • Management of access to the project area by construction vehicles • Identification of designated site access locations • Establishment of traffic guidance schemes that conform to AS 1742.3 – 2009 and MRWA Traffic Management for Works on Roads Code of Practice • Identification and management of potential conflicts between users of local roads and construction vehicles • Identification and management of potential conflicts between the public and construction activities Refer to CD00116-PLN-012 Traffic Management Plan for additional details.	VJV	Traffic Management Plan (CD00116-PLN-012)	Traffic Management Plan (CD00116-PLN-012)		Compliant complete
App 12.15, pg. 54	12.15 MGb	Install temporary public exclusion gates, fencing and appropriate signposts, at all access points to the project site in accordance with the TMP to warn and deter the public	VJV	Appropriate gates, fencing and signposts installed at construction sites	Visual observation		Compliant
App 12.15, pg. 54	12.15 MGc	Include public safety and traffic management requirements within project specific induction	VJV	Public Safety and Traffic management requirements identified in project specific induction	Site induction slides (CD00116-IND-001-5-Site Induction Powerpoint_VJV) provided		Compliant
App 12.15, pg. 54	12.15 MGd	Principal will provide updates to the impacted community as appropriate, prior to the commencement of work.	WC	N/A - WC to control community updates			N/A
App 12.15, pg. 54	12.15 MGe	Ensure all light vehicles, construction vehicles, plant and machinery access the project site via designated construction access areas.	VJV	No obvious signs of alternative access provided to construction sites	• Visual observation • Site photographs		Compliant
12.16 Communication and Stakeholder Engagement Management Sub-Plan							
App 12.16, pg. 56	12.16 MGa	Contractor will provide training to all personnel during an initial safety and environment induction course, which will include Stakeholder engagement protocols	VJV	See GC10			Compliant
App 12.16, pg. 56	12.16 MGb	ALL VJV project management team (supervisors and above) to undergo communications training provided by the Principal	VJV	See GC10			Compliant
App 12.16, pg. 56	12.16 MGc	All other project staff will receive training for community communication protocols via the VJV project induction and/or communications training provided by the Principal	VJV and/or WC	See GC10	Provided by Sarah Bennett (WC)		Compliant
App 12.16, pg. 56	12.16 MGd	All community complaints will be recorded and conveyed in writing to the Water Corporation Senior Communications Advisor within 24 hours of the complaint occurring.	VJV	See GC16			Compliant
12.17 Reinstatement and Revegetation Management Sub-Plan							
App 12.17, pg. 57	12.7 MGa	Complete sections of the work progressively and facilitate access for the Principal's Reinstatement and Revegetation SME to facilitate progressive weed suppression and management and revegetation activities	VJV	N/A - Construction works remain ongoing			N/A
App 12.17, pg. 57	12.7 MGb	Implement soil and sediment control measures in areas prone to erosion by wind or water	VJV	N/A - Construction works remain ongoing			N/A
App 12.17, pg. 57	12.7 MGc	Remove and dispose of hardstand material from old depot site and replace with sand fill sourced between ch 1250 and ch 3300	VJV	N/A - Construction works remain ongoing			N/A
App 12.17, pg. 57	12.7 MGd	Remove the hardstand at the completion of the works	VJV	N/A - Construction works remain ongoing			N/A
App 12.17, pg. 57	12.7 MGe	Tyne the ground surface of compacted ground (ie under the temp hardstands, access roads, ramps, stockpiles etc) in areas external to the proposed revegetation areas with a grader on completion to a depth of 50-100mm; note that ripping in revegetation areas to ~300mm to be undertaken by WC SME (Tranen)	VJV	N/A - Construction works remain ongoing			N/A
App 12.17, pg. 57	12.7 MGf	Respread the topsoil as soon as practical once earthworks completed for sections of work (excluding the revegetation areas which are not to have topsoil respread by VJV to avoid the risk of weed spread)	VJV	N/A - Construction works remain ongoing			N/A

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
App 12.17, pg. 57	12.7 MGg	Remove all stockpiles to the original surface level; scarify the surface to a depth of ~150mm; break up any compacted surface materials; spread topsoil; and grade the surface consistent with the pre-lease condition	VJV	N/A - Construction works remain ongoing			N/A

Management requirements							
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.18 Asbestos Management Sub-Plan							
App 12.18, pg. 58	12.8 MGa	Asbestos has been identified on-site including redundant DN150 AC and DN300 AC pipework within the embankment.	VJV		VJV advised that all of the pipework has been removed by licenced asbestos contractor, Anstee Earthmoving		Compliant
App 12.18, pg. 58	12.8 MGb	Careful positive identification, removal and disposal of asbestos based products shall comply with the Principal's procedure "HSEAA-P-131 Working with Asbestos".	VJV		Licenced asbestos contractor Anstee Earthmoving used to undertake asbestos removal		Compliant
App 12.18, pg. 58	12.8 MGc	Evidence of licensed disposal site and provision of specified resources (qualified people, materials/PPE) will be provided to Water Corporation before commencing planned asbestos removal	VJV		Licenced asbestos contractor Anstee Earthmoving used to undertake asbestos removal		Compliant
App 12.18, pg. 58	12.8 MGd	In the event that unexpected and/or damaged asbestos is identified on site: • The Supervisor will be contacted immediately and the area quarantined, including from the public. • Communicated to all persons working on the site. • The Project Manager or delegate will consult/engage an appropriately licensed asbestos removalist to remove the asbestos from site in a lawful manner in accordance with an Asbestos Removal Control Plan (ARCP) or Site Management Plan (SMP). • An asbestos register will be maintained in the Master HSE Register and be readily accessible to all personnel who carry out or intend to carry out work.	VJV		VJV advised that unexpected finds protocol implemented for the item logged on the Asbestos Register (CD00116-REG-017-0)		Compliant
App 12.18, pg. 58	12.8 MGe	This Asbestos Register will record: • Details of identified (or assumed) asbestos in the workplace including detection date • The location, type and condition of the asbestos • Remediation details.	VJV	Asbestos Register (CD00116-REG-017-0) observed with updated pipework context from 12.8 MGa	Asbestos Register (CD00116-REG-017-0)		Compliant
App 12.18, pg. 58	12.8 MGf	Only workers with an appropriate asbestos licence may carry out asbestos removal. The two types of licence are: 1) Unrestricted: Allows people to remove all forms of asbestos (friable and non-friable). 2) Restricted: Allows people to remove amounts exceeding 10 square metres of bonded (non-friable) asbestos.	VJV	• See 12.8 MGc • Licence not required for unexpected finds logged on the Asbestos Register (CD00116-REG-017-0)	Asbestos Register (CD00116-REG-017-0)		Compliant

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 30/04/21**
12.1 Native Vegetation and Clearing Management Sub-Plan									
App 12.1, pg. 17- 18	12.1 MNa	Contractor must confirm with the Super's Representative once demarcation of the DAF is complete	Vasse Joint Venture	At least 5 days prior to the commencement of clearing	See 12.1 MGb & 12.1 MGc			Compliant complete	
App 12.1, pg. 17- 18	12.1 MNb	Visual inspection of all demarcated boundaries for damage or signs of encroachment into adjacent unauthorised areas	VJV	Daily during clearing operations via clearing record, then weekly via site environmental checklist post clearing	• Clearing records • Daily inspection reports • DAF observed to be demarcated with no signs of encroachment at Sites 1, 2 and 3 • Earthen mound separating the works area from adjacent wetland environment observed breached at Site 4 (Town). Works remained within the DAF, however there was inadequate boundary demarcation to easily make this determination	• Clearing records • Daily inspection reports • Visual observation • Site photographs (DSC00806-12)	Reinstate / provide a visual barrier between the DAF and the adjacent wetland environment to ensure works do not encroach outside the DAF	Partially Compliant/Area for improvement	• Initial site pegging advanced during site audit (DCS00863-68) • Photos of flagging to provide a visual barrier between the DAF and the adjacent wetland environment provided on 30/04. Partially Compliant/Area for improvement rating resolved
App 12.1, pg. 17- 18	12.1 MNc	Completion of a clearing record.	VJV	Daily when undertaking clearing activities	Clearing records	Clearing records		Compliant complete	
12.2 Fauna Management Sub-Plan									
App 12.2, pg. 20	12.2 MNa	Maintain register of fauna removals, deaths or injuries	VJV	Updated by the end of shift in which incident occurs	See 12.2 MGc			Compliant	
App 12.2, pg. 20	12.2 MNb	Visual inspection of any open excavations and pipes for the presence of fauna. Observations to be recorded on daily site environmental checklists (to be developed by the Contractor).	VJV	Daily during clearing operations via clearing record, then weekly via site environmental checklist post clearing	• Fauna interaction register (CD00116-REG-019) • Daily inspection reports • Item discussed at Site 1 (VROS) pre-start on 22/3	Daily inspection reports		Compliant	
12.3 Threatened or Specially Protected Flora Management Sub-Plan									
App 12.3, pg. 22	12.3 MNa	Visual inspection of all demarcated boundaries for damage or signs of encroachment into adjacent unauthorized areas	VJV	Daily during clearing operations via clearing record, then weekly via site environmental checklist post clearing	See 12.1 MNb			Partially Compliant/Area for improvement	• Initial site pegging advanced during site audit (DCS00863-68) • Photos of flagging to provide a visual barrier between the DAF and the adjacent wetland environment provided on 30/04. Partially Compliant/Area for improvement rating resolved
12.4 ASS and Dewatering Management Sub-Plan – VROS/VRDD									
App 12.4, pg. 25- 26	12.4 MNa	Effluent (pre and post treatment): • field analysis (pH, EC, TTA, total alkalinity) • lab analysis (pH, total acidity and alkalinity) • lab analysis (full suite)	VJV	• Daily during dewatering • Weekly during dewatering • Fortnightly	• Effluent field sheets and lab analysis • VJV advised that dewatering ceased from 09 April 21	Effluent field sheets and lab analysis		Compliant	
App 12.4, pg. 25- 26	12.4 MNb	Groundwater: • baseline (level, field quality and lab analysis (full suite) • level, field quality • lab analysis (full suite)	VJV	• Prior to dewatering • Thrice weekly during dewatering, all sampling events • Fortnightly, immediately after dewatering cessation, every 2 months post dewatering for 6 months (3 events)	• Groundwater field sheets and lab analysis • VJV advised that the first initial fortnightly monitoring had been undertaken	Groundwater field sheets and lab analysis		Compliant	
App 12.4, pg. 25- 26	12.4 MNc	Surface water (Testing by Principals SME): • baseline (level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • level, field quality including DO and Redox, silt curtain inspection • level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • Inspect silt curtains and water down stream of curtains for any plumes	Water Corporation Water Quality SME (IndoPacific) / VJV	• Surface water testing by Principals SME • Daily when in use (VJV)	• Surface water field sheets • Daily inspection reports • Surface water monitoring ceased from 09 April 21 coinciding with the cessation of dewatering (VJV) • Silt curtains observed in place during site audit • No plumes observed downstream of the silt curtains	• Surface water field sheets • Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.4, pg. 25- 26	12.4 MNd	Treated PASS: • Collect validation samples; total number will be dependent on stockpile size (refer to sampling density table) • All samples tested for pH_F and pH_{FOX} • SPOCAS undertaken on 25% of samples that pass pH_F and pH_{FOX} criteria • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Ad-hoc when treated ASS is well mixed and ready for validation	ASS field sheets and lab analysis	ASS field sheets and lab analysis		Compliant	
App 12.4, pg. 25- 26	12.4 Mne	• Accumulated sediments from dewatering will be tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Following cessation of dewatering	VJV advised that the accumulated sediments from dewatering have been tested with the results pending with the lab			Compliant	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 30/04/21**
App 12.4, pg. 25- 26	12.4 MNf	Visual inspection of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches	VJV	Daily during dewatering operations	• Daily inspection reports • VJV advised that dewatering ceased from 09 April 21	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.4, pg. 25- 26	12.4 MNg	Visual inspection of vegetation condition nearby dewatering activities including surrounding the Vasse Diversion Dam construction site.	VJV	Baseline inspection and weekly ongoing visual monitoring of vegetation.	• Daily inspection reports • No obvious signs vegetation stress in vegetated areas adjacent to the DAF • VJV advised that dewatering ceased from 09 April 21	• Daily inspection reports • Visual observation • Site photographs		Compliant	
12.5 ASS and Dewatering Management Sub-Plan – Levee Reconstruction									
App 12.5, pg. 30- 31	12.5 MNa	Effluent (pre and post treatment): • field analysis (pH, EC, TTA, total alkalinity) • lab analysis (pH, total acidity and alkalinity) • lab analysis (full suite)	VJV	• Daily during dewatering • Weekly during dewatering • Fortnightly	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNb	Groundwater: • baseline (level, field quality and lab analysis (full suite) • level, field quality • lab analysis (full suite)	VJV	• Prior to dewatering • Thrice weekly during dewatering, all sampling events • Fortnightly, immediately after dewatering cessation, every 2 months post dewatering for 6 months (3 events)	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNc	Surface water (Testing by Principals SME): • baseline (level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • level, field quality including DO and Redox, silt curtain inspection • level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • Inspect silt curtains and water down stream of curtains for any plumes	Water Corporation Water Quality SME (IndoPacific) / VJV	• Surface water testing by Principals SME • Daily when in use (VJV)	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNd	Treated PASS: • Collect validation samples; total number will be dependent on stockpile size (refer to sampling density table) • All samples tested for pH_F and pH_{FOX} • SPOCAS undertaken on 25% of samples that pass pH_F and pH_{FOX} criteria • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Ad-hoc when treated ASS is well mixed and ready for validation	N/A - No ASS encountered			N/A	
App 12.5, pg. 30- 31	12.5 Mne	• Accumulated sediments from dewatering will be tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Following cessation of dewatering	N/A - No dewatering being undertaken			N/A	
App 12.5, pg. 30- 31	12.5 MNf	Visual inspection of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches	VJV	Daily during dewatering operations	N/A - No dewatering being undertaken			N/A	
12.6 ASS and Dewatering Management Sub-Plan – Gauging Station									
App 12.6, pg. 35	12.6 MNa	Effluent (pre and post treatment): • field analysis (pH, EC, TTA, total alkalinity) • lab analysis (pH, total acidity and alkalinity) • lab analysis (full suite)	VJV	• Daily during dewatering • Weekly during dewatering • Fortnightly	N/A - No dewatering being undertaken			N/A	
App 12.6, pg. 35	12.6 MNb	Groundwater: • baseline (level, field quality and lab analysis (full suite) • level, field quality • lab analysis (full suite)	VJV	• Prior to dewatering • Thrice weekly during dewatering, all sampling events • Fortnightly, immediately after dewatering cessation, every 2 months post dewatering for 6 months (3 events)	N/A - No dewatering being undertaken			N/A	
App 12.6, pg. 35	12.6 MNc	Surface water (Testing by Principals SME): • baseline (level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • level, field quality including DO and Redox, silt curtain inspection • level, field quality including DO and Redox, and lab analysis (full suite + turbidity) • Inspect silt curtains and water down stream of curtains for any plumes	Water Corporation Water Quality SME (IndoPacific) / VJV	• Surface water testing by Principals SME • Daily when in use (VJV)	N/A - No dewatering being undertaken			N/A	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 30/04/21**
App 12.6, pg. 35	12.6 MNd	Treated PASS: • Collect validation samples; total number will be dependent on stockpile size (refer to sampling density table) • All samples tested for pH_F and pH_{FOX} • SPOCAS undertaken on 25% of samples that pass pH_F and pH_{FOX} criteria • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Ad-hoc when treated ASS is well mixed and ready for validation	ASS field and lab validation data sheet	ASS field and lab validation data sheet		Compliant	
App 12.6, pg. 35	12.6 MNe	• Accumulated sediments from dewatering will be tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) • Collect 1 QA/QC duplicate sample for every 20 primary validation samples	VJV	Following cessation of dewatering	N/A - No dewatering being undertaken			N/A	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 30/04/21**
App 12.6, pg. 35	12.6 MNf	Visual inspection of integrity of dewatering treatment units, bunds, infiltration ponds and pipeline trenches	VJV	Daily during dewatering operations	N/A - No dewatering being undertaken			N/A	
12.7 Weed and Soil Hygiene Management Sub-Plan									
App 12.7, pg. 37	12.7 MNa	Visual inspection for weed infestations	VJV	Daily	• Daily inspection reports • No obvious signs of significant weed establishment post clearing evident within the DAF • One emergent Arum Lily (Declared pest under the BAM Act) plant observed at Site 4 (Town) on the banks of the drain proximate to the eastern bridge. Presence of this species also noted in the adjacent landholdings	• Daily inspection reports • Visual observation • Site photographs	• Emergent Arum Lily plants within the DAF are controlled on an 'as required' basis • Suggested method of management and control is provided on Florabase https://florabase.dpaw.wa.gov.au/browse/profile/1049	Compliant	
App 12.7, pg. 37	12.7 MNb	Record and log weed and seed inspections of mobile plant	VJV	Prior to mobilisation	Vehicle inspection sheet sighted in hard copy	• Visual observation • VJV advised that all new vehicles on site are either inspected by the hire company prior to mobilisation or inspected onsite		Compliant	
12.8 Land Degradation Management Sub-Plan									
App 12.8, pg 39 - 40	12.8 MNa	Visual inspection of efficacy of erosion and sediment control measures.	VJV	Daily observations to be recorded on site environmental checklist	• Daily inspection reports • No obvious signs of erosion or sedimentation evident within the DAF	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.8, pg 39 - 40	12.8 MNb	Ongoing turbidity monitoring of the Lower Vasse River to be undertaken by Principal SME during works between CH5940-6200 and any works relating to the culvert upgrade, spillway and reconstruction of the diversion dam in this area.	Water Corporation Water Quality SME (IndoPacific)	N/A	N/A - 12.8 MNb implemented by IndoPacific			N/A	
12.9 Waste Management Sub-Plan									
App 12.9, pg 41	12.9 MNa	Visual inspection of all waste management areas	VJV	Daily during the project via site environmental checklist	• Daily inspection reports • Waste and recycling bins observed at each site office • No obvious signs (i.e. rubbish) of in effective waste management practices within the works areas at Sites 1, 2 and 3 • Evidence of ineffective waste management practices (i.e. loose litter/ general construction waste scattered at low levels through works area) at Site 4 (Town) • Loose materials stored on earthen mound have the potential to make their way into adjacent wetland environment at Site 4 (Town) • Evidence of uncontained concrete washouts observed at Site 4 (Town) • One small engine was also observed unbunded at Site 4 (Town) • One subcontractor only was noted to be operating within the site at the time of the audit	• Daily inspection reports • Visual observation • Site photographs	Improvements in waste management practices required including general house keeping, containing concrete washouts and bunding all small engines	Non-compliant	
12.10 Chemical Use Management Sub-Plan									
App 12.10, pg 43	12.10 MNa	Visual inspection of all chemical storage and bunded areas	VJV	Daily during the project via site environmental checklist	• Daily inspection reports • Chemical storage area and bunded plant inspected during site audit. • No obvious signs of leaks observed • Small plant either self bunded or placed upon bunds.	• Daily inspection reports • Visual observation • Site photographs		Compliant	
12.11 Water Management Sub-Plan									
App 12.11, pg. 45	12.11 MNa	Monitor and record weather observations and forecast to determine risk of flood event each work day using BoM tools	VJV	Daily via site environmental checklist	Daily inspection reports	Daily inspection records		Compliant	
App 12.11, pg. 45	12.11 MNb	Visual inspection of coffer dams reviewing for leaks, structural integrity, water levels, water transfer pipes and equipment operating correctly.	VJV	Daily via site environmental checklist	• Daily inspection reports • No obvious signs loss of leaks, structural integrity loss, water level decline or water transfer pipes and equipment operating incorrectly	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.11, pg. 45	12.11 MNc	Inspect, photographs and record any visible plumes generated by works upstream and/or downstream of all silt curtains	VJV	Daily during dewatering and/or surface water disturbance	• Daily inspection reports • No sediment plumes observed	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.11, pg. 45	12.11 MNd	Surface water quality monitoring will be undertaken by the Principal's Water Quality SME in accordance with IndoPacific (2020)	Water Corporation Water Quality SME (IndoPacific)	As specified in IndoPacific (2020)	N/A - 12.11 MNd implemented by IndoPacific			N/A	
12.12 Dust Management Sub-Plan									
App 12.12, pg. 46- 47	12.12 MNa	Monitor and record weather observations and forecast to determine daily dust generation risk at start of each work day using BoM tools (i.e. wind strength and prevailing wind directions at 0900 and 1500) and observation data (Busselton Aero Station #009603)	VJV	Daily during the project via site environmental checklist	Daily inspection reports	Daily inspection reports		Compliant	
App 12.12, pg. 46- 48	12.12 MNb	Visual inspection of work areas for dust generation travelling 10m beyond the DAF	VJV	Daily by supervisors	• Daily inspection reports • No obvious signs of significant dust generation from construction works	• Daily inspection reports • Visual observation • Site photographs		Compliant	

Monitoring requirements									
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**	**Review 30/04/21**
App 12.12, pg. 46- 49	12.12 MNc	Visual inspection of stockpile stability and erosion risk	VJV	Daily during the project via site environmental checklist	• Daily inspection reports • No obvious signs of loss of stockpile integrity or erosion • Water carts observed onsite	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.12, pg. 46- 50	12.12 MNd	Visual inspection of shade cloth and fencing along the ESA	VJV	Daily during the project via site environmental checklist	See GC9			Compliant	
12.13 Noise and Vibration Management Sub-Plan									
App 12.13, pg. 50	12.13 MNa	Supervision to monitor noise emissions	VJV	daily	• Daily inspection reports • No unreasonably loud noise detected from construction machinery or processes	• Daily inspection reports • Aural observation • Site photographs		Compliant	
App 12.13, pg. 50	12.13 MNb	Complete dilapidation surveys for the 100 nearby properties	VJV	Prior to commencement of compaction works in vicinity of properties	N/A - Dilapidation surveys undertaken by WC			N/A	
App 12.13, pg. 50	12.13 MNc	Monitor and record weather observations and forecast each work day using BoM tools (i.e. wind strength and prevailing wind directions at 0900 and 1500) and observation data (Busselton Aero Station #009603)	VJV	Daily during the project via site environmental checklist	See 12.12 MNa			Compliant	
12.14 Bushfire Management Sub-Plan									
App 12.14, pg. 53	12.14 MNa	Assess and monitor ongoing fire risk prior to and during construction activities including twice (minimum) daily review (i.e. 0900 and 1500) of weather and fire risk forecast and weather observations for the purposes of assessing risk for the following day and week: • Maximum temperature • Relative humidity • Wind speeds and direction • Fire danger risk	VJV	Daily during construction via site environmental checklist	Daily inspection reports	Daily inspection reports		Compliant	
App 12.14, pg. 53	12.14 MNb	Daily inspections of vehicles and plant for defects and/or trapped combustible vegetation/material that presents a fire risk should be removed.	VJV	Daily plant prestart inspection checklist	See 12.14 MGp			Compliant	
12.15 Public Safety and Traffic Management Sub-Plan									
App 12.15, pg. 54	12.15 MNa	Maintain register of public complaints and actions taken	VJV	As required	See GC16			Compliant	
App 12.15, pg. 54	12.15 MNb	Assess if vehicles etc are complying to the TMP including speed and use of designated construction access areas/tracks	VJV	Daily during the project via site environmental checklist	• Daily inspection reports • No obvious signs of speeding, wheel marks off track etc	• Daily inspection reports • Visual observation • Site photographs		Compliant	
App 12.15, pg. 54	12.5 MNc	Monitor implementation of TMP in traffic management diary	VJV	As per TMP	White boards outside site offices have daily vehicle movements identified in high traffic areas.	• Visual observation • Site photographs		Compliant	
12.16 Communication and Stakeholder Engagement Management Sub-Plan									
App 12.16, pg. 56	12.16 MNa	Maintain register of community enquiries and complaints		As required	See GC16			Compliant	
12.17 Reinstatement and Revegetation Management Sub-Plan									
App 12.17, pg. 57	12.17 MNa	Principal to provide confirmation that the site is returned to pre-disturbance or otherwise acceptable condition	Water Corporation	Prior to Handover	N/A - Construction works remain ongoing			N/A	
12.18 Asbestos Management Sub-Plan									
App 12.18, pg. 58- 59	12.18 MNa	Visual inspections during the work to look for evidence of asbestos	VJV	Ad-hoc, daily	• Daily inspection reports • Asbestos Register (CD00116-REG-017-0)	• Daily inspection reports • Asbestos Register (CD00116-REG-017-0)		Compliant	
App 12.18, pg. 58- 59	12.18 MNb	Visual inspections during the work to demonstrate compliance with ARCP/SMP	VJV	Daily during asbestos removal/remediation	Hazard Identification Report (20201127 - Hazard)	Hazard Identification Report (20201127 - Hazard)		Compliant	
App 12.18, pg. 58- 59	12.18 MNc	Air fibre monitoring (if required in accordance with the approved ARCP/SMP)	VJV	As specified in the approved ARCP/SMP	N/A - Air fibre monitoring not required			N/A	
App 12.18, pg. 58- 59	12.18 MNd	Visual inspection of all remediated areas to validate asbestos risk has been removed.	VJV	Following completion of the remediation actions by the asbestos sub-contractor	• Asbestos Register (CD00116-REG-017-0) • Hazard Identification Report (20201127 - Hazard) • All dockets visually observed for Asbestos Register entries • Asbestos Register has been updated with outcomes of visual inspections and inspection dates			Compliant	

Reporting requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.1 Native Vegetation and Clearing Management Sub-Plan								
App 12.1, pg. 18	12.1 Ra	Site environmental inspection checklist provided to the Principal	Vasse Joint Venture (VJV)	Weekly	See GC21			Compliant
App 12.1, pg. 18	12.1 Rb	Completion of clearing records complying with Condition 19 of CPS 8191/1 and including Georeferenced spatial data indicating the actual extent of clearing undertaken in .DXF or .SHP file format.	VJV	Completed daily during clearing operations and submitted within 2 weeks of completion of the project or prior to end of the calendar year (whichever is sooner).				Compliant complete 16/12/2020
12.2 Fauna Management Sub-Plan								
App 12.2, pg. 21	12.2 Ra	Any fauna deaths are considered an environmental incident and are to be reported to the Principal	VJV	Within 24 hrs of incident identification	See 12.2 MGa			N/A
App 12.2, pg. 21	12.2 Rb	Register of project site Safety and Environmental Inductions	VJV	Register maintained daily when inductions completed, provided on request	See GC10			Compliant
App 12.2, pg. 21	12.2 Rc	Fauna register is to be reported to the Principal	VJV	On request; at project completion	See 12.2 MGc			N/A
App 12.2, pg. 21	12.2 Rd	Unauthorised discharges into the Lower Vasse River shall be reported to the Principal	VJV	Within 30 minutes	• Incident review and response procedures observed during site audit • Phone call from Tim Malseed (VJV) to Joel McLure (WC) on 21/3 determined to have occurred within 30 minutes of the identification of the incident	Visual and aural observation		Compliant
App 12.2, pg. 21	12.2 Re	Site environmental inspection checklist provided to the Principal	VJV	Weekly	See GC21			Compliant
12.3 Threatened or Specially Protected Flora Management Sub-Plan								
App 12.3, pg. 22	12.3 Ra	Site environmental inspection checklist provided to the Principal, including inspection and maintenance of ESA fences	VJV	Weekly	See GC21			Compliant
12.4 ASS and Dewatering Management Sub-Plan – VROS/VRDD								
App 12.4, pg. 27	12.4 Ra	Provide Principal evidence of vegetation stress, silt curtain and plume inspections during works as part of environmental checklist, i.e. photos	VJV	Weekly	See GC21			Compliant
App 12.4, pg. 27	12.4 Rb	Any exceedance of limits or trigger values specified within the ASSDMP and/or the Principal's 5C licence is to be considered an incident and must be reported	VJV	Within 24 hrs	ASS field and lab validation data sheet	• ASS field and lab validation data sheet • VJV advised that field and laboratory results are provided to WC with any exceedances directly attributed to the project identified		Compliant
App 12.4, pg. 27	12.4 Rc	Groundwater, effluent, surface water and soil sampling (for ASS or PASS) results, dewatering volumes and calibration certificates for sampling instruments are to be reported to the Superintendent and Principal's Environmental Scientist.	VJV	Weekly	See 12.4 Rb			Compliant
App 12.4, pg. 27	12.4 Rd	Reporting in accordance ASSDMP and Dewatering License GWL204992(1) conditions	VJV	Initial Closure Report – following cessation of construction works Post Dewatering Monitoring Closure Report - following cessation of construction works and post construction monitoring	Initial closure report is current under preparation by WE			Compliant
12.5 ASS and Dewatering Management Sub-Plan – Levee Reconstruction								
App 12.5, pg. 31- 32	12.5 Ra	Provide Principal evidence of vegetation stress, silt curtain and plume inspections during works as part of environmental checklist, i.e. photos	VJV	Weekly	See GC21			Compliant
App 12.5, pg. 31- 32	12.5 Rb	Any exceedance of limits or trigger values specified within the ASSDMP and/or the Principal's 5C licence is to be considered an incident and must be reported	VJV	Within 24 hrs	N/A - No ASS encountered or dewatering being undertaken			N/A
App 12.5, pg. 31- 32	12.5 Rc	Groundwater, effluent, surface water and soil sampling (for ASS or PASS) results, dewatering volumes and calibration certificates for sampling instruments are to be reported to the Superintendent and Principal's Environmental Scientist.	VJV	Weekly	See 12.5 Rb			N/A
App 12.5, pg. 31- 32	12.5 Rd	Reporting in accordance ASSDMP and Dewatering License GWL204992(1) conditions	VJV	Initial Closure Report – following cessation of construction works Post Dewatering Monitoring Closure Report - following cessation of construction works and post construction monitoring	See 12.4 Rd			N/A

Reporting requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.6 ASS and Dewatering Management Sub-Plan – Gauging Station								
App 12.6, pg. 36	12.6 Ra	Provide Principal evidence of vegetation stress, silt curtain and plume inspections during works as part of environmental checklist, i.e. photos	VJV	Weekly	See GC21			Compliant
App 12.6, pg. 36	12.6 Rb	Any exceedance of limits or trigger values specified within the ASSDMP and/or the Principal's 5C licence is to be considered an incident and must be reported	VJV	Within 24 hrs	N/A - VJV advised that no ASS has been encountered since the February audit			Compliant
App 12.6, pg. 36	12.6 Rc	Groundwater, effluent, surface water and soil sampling (for ASS or PASS) results, dewatering volumes and calibration certificates for sampling instruments are to be reported to the Superintendent and Principal's Environmental Scientist.	VJV	Weekly	See 12.6 Rb			Compliant
App 12.6, pg. 36	12.6 Rd	Reporting in accordance ASSDMP and Dewatering License GWL204992(1) conditions	VJV	Initial Closure Report – following cessation of construction works Post Dewatering Monitoring Closure Report - following cessation of construction works and post construction monitoring	See 12.4 Rd			Compliant
12.7 Weed and Soil Hygiene Management Sub-Plan								
App 12.7, pg. 37	12.7 Ra	Site environmental inspection checklist provided to the Principal. Notify Water Corporation of any weed infestations.	VJV	Weekly	See GC21			Compliant
App 12.7, pg. 37	12.7 Rb	Provision of site induction register	VJV	When requested by Water Corporation and at the end of the project	See GC10			Compliant
12.8 Land Degradation Management Sub-Plan								
App 12.8, pg. 40	12.8 Ra	Site environmental inspection checklist provided to the Principal	VJV	Weekly	See GC21			Compliant
App 12.8, pg. 40	12.8 Rb	Any exceedance of surface water triggers are considered an environmental incident and are to be reported to the Principal	VJV	Within 24 hrs of incident identification	See 12.4 Rb			Compliant
12.9 Waste Management Sub-Plan								
App 12.9, pg 41	12.9 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant
App 12.9, pg 41	12.9 Rb	Provision of following records: Waste classification (if required) and disposal Quantity of soil and sediments reused on site	VJV	When requested by Water Corporation and at the end of the project	• See 12.9 MGc • VJV advised that records of soil and sediment reuse are maintained			Compliant
12.10 Chemical Use Management Sub-Plan								
App 12.10, pg.43	12.10 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant
App 12.10, pg. 43	12.10 Rb	Any chemical spills or leaks are considered an environmental incident and are to be reported to the Principal	VJV	Within 24 hrs of incident identification (or within 30 min if spill effects lower vasse river)	See GC17			Compliant
12.11 Water Management Sub-Plan								
App 12.11, pg. 45	12.11 Ra	Any exceedance of water quality criteria are considered an environmental incident and is to be reported to the Principal and Contractor	VJV	Within 24 hrs of incident identification, or within 30 minutes if into lower Vasse river	See 12.4 Rb			Compliant
12.12 Dust Management Sub-Plan								
App 12.12, pg. 47	12.12 Ra	Report complaints to the Principal	VJV	As required	See GC16			Compliant
App 12.12, pg. 47	12.12 Rb	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See 12.1 Ra			Compliant
12.13 Noise and Vibration Management Sub-Plan								
App 12.13, pg. 50	12.13 Ra	Report complaints to the Principal	VJV	Within 24hrs of notification	See GC16			Compliant
App 12.13, pg. 50	12.13 Rb	Site environmental inspection checklist.	VJV	Weekly	See GC21			Compliant

Reporting requirements								
CEMP Ref #	**Audit Ref #**	**Required action**	**Responsibility**	**Frequency**	**Auditor observations**	**Evidence**	**Recommendations**	**Compliance rating**
12.14 Bushfire Management Sub-Plan								
App 12.14, pg. 53	12.14 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant
App 12.14, pg. 53	12.14 Rb	Plant inspection checklist provided to the Principal	VJV	On request	See 12.7 MNb			Compliant
App 12.14, pg. 53	12.14 Rc	Provision of project Safety and Environmental Inductions Register to Principal	VJV	On request	See GC10			Compliant
App 12.14, pg. 53	12.14 Rd	Report incidents to the Principal	VJV	Within 30 minutes of becoming aware of incident	See GC17			Compliant
12.15 Public Safety and Traffic Management Sub-Plan								
12.15, pg. 54-54	12.15 Ra	Report complaints to the Principal	VJV	As required and within 24 hours of receiving compliant	See GC16			Compliant
12.15, pg. 54-55	12.15 Rb	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant
12.16 Communication and Stakeholder Engagement Management Sub-Plan								
App 12.16, pg. 56	12.16 Ra	Report community complaints to the Principal	VJV	As required and within 24 hours of receiving compliant	See GC16			Compliant
App 12.16, pg. 56	12.16 Rb	Provision of the community enquiries and complaint register to the Principal	VJV	Weekly	See GC16			Compliant
12.17 Reinstatement and Revegetation Management Sub-Plan								
App 12.17, pg. 57	12.17 Ra	Notify the Principal when areas are available for Principals SME	VJV	As available	N/A - No areas within DAF suitable for revegetation			N/A
12.18 Asbestos Management Sub-Plan								
App 12.18, pg. 59	12.18 Ra	Site environmental inspection checklist provided to the Principal.	VJV	Weekly	See GC21			Compliant
App 12.18, pg. 59	12.18 Rb	Remediation and validation report including a clearance certificate following removal.	VJV	Following each remediation event	• See 12.18 MNd • All dockets visually observed for Asbestos Register entries			Compliant

Appendix E
Western ringtail possum



Management of the Western Ringtail Possum and other Vertebrates during Clearing along the Vasse Diversion Drain, Busselton

October 2020 – January 2021



Images 1 – 4. Possums using relocated and artificial shelters (J & J Bamford)

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4th February 2021

Executive Summary

The Water Corporation is widening the Vasse Diversion Drain in Busselton for flood mitigation, and preliminary environmental impact assessments found that the conservation significant Western Ringtail Possum occurs in remnant vegetation adjacent to the existing drain. Some of this vegetation was to be impacted by drain widening, so following assessment of the population in 2019, Bamford Consulting Ecologists was commissioned to undertake the displacement of possums prior to clearing along the drain in two areas: a northern area between [redacted] and the [redacted], and a southern area near the [redacted]. BCE was also commissioned to conduct ongoing monitoring of the population and their use of installed shelters and rope bridges over a ten-year period.

Of the 43ha project area surveyed in 2019, where 206 dreys and at least 66 possums were recorded, only 1.9ha was cleared in 2020. Forty-one dreys and hollows and 36 possums were identified in the impact area prior to clearing. Prior to and during clearing in November 2020, all possums were successfully relocated into adjacent vegetation without mortality or injury. Of the 41 dreys found, 23 were able to be relocated, and a further 64 artificial shelters (dreys and hollows) were installed, making a total of 87 new shelter locations.

Handling of possums was avoided where possible to minimise stress. In most cases, animals could be displaced into adjacent vegetation without handling them. Trees were checked and animals displaced immediately prior to clearing, to avoid them returning to the clearing area. Eleven possums had to be hand-captured and moved; four were moved without touching them, while contained within or holding onto the top of an artificial or natural drey; two were moved while within hollows; and two were moved by encouraging them to climb onto the net and carrying them to safety while perched on top of the net. The remaining 17 were displaced by gently disturbing them from their dreys and herding them to adjacent, safe trees.

In addition to displacement of possums, one Quenda, eighteen reptiles, five frogs and two birds (a nest of Silvereyes) were successfully relocated from the clearing area. Four reptiles were found killed in clearing operations, an inevitable consequence of any clearing activity using vehicles.

In a preliminary check of artificial shelters conducted in January 2021, six of 86 located shelters were occupied by possums, one contained a Black Rat and one had a Bronzewing Pigeon egg in it. A further 10 shelters appeared to have been used by possums since being installed but were not occupied when checked.

Eighteen possums were recorded in natural dreys or on branches in the vicinity of the artificial shelters during the January surveys, so including the six in artificial shelters, a total of 24 possums was recorded using the strip of vegetation immediately adjacent to the drain works, suggesting that the animals are tolerating the disturbance. It seems likely that many of these animals are those who were displaced from the impact area but have stayed within their remaining home ranges.

Ongoing monitoring will better assess the population adjoining the drain and help to detect any fluctuations in numbers.

Artificial shelters appear to be assisting in providing shelter for possums, although some appear to be building new natural dreys instead.

Relocated natural dreys performed an important function immediately following displacement of the possums but will need replacement as they deteriorate to maintain the numbers of additional dreys provided, as committed to as part of approvals for the project. While this is a requirement, the possums are now constructing their own dreys, so it will be interesting to see if increasing the numbers of artificial dreys increases usage of them.

Revegetation should proceed as quickly as practical to ensure the animals continue to have sufficient food resources to support them during lean times. The increased connectivity provided by plantings will also allow possums to move between the population along the drain and the rest of Busselton, improving the species' long-term viability in the area.

INTRODUCTION

The Water Corporation manages a network of drains in the vicinity of Busselton and is widening the Vasse Diversion Drain for flood mitigation. This widening will affect some vegetation alongside the drain, but not the full width of this vegetation. An Environmental Impact Assessment conducted by GHD (2017) found that the Western Ringtail Possum *Pseudocheirus occidentalis*, which is a listed conservation significant species (Critically Endangered under both the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Western Australian Biodiversity Conservation Act 2016*) occurred in vegetation adjacent to the drain. Widening of the drain could affect >0.5ha of what might be primary corridor habitat for the species (*sensu* DEWHA 2009) and based on EPBC Act Policy Statement 3.10 (DEWHA 2009), this would be a significant impact. Therefore, the Department of Biodiversity, Conservation and Attractions requested the Water Corporation provide more information on the distribution and abundance of this species along the drain. Bamford Consulting Ecologists was commissioned to undertake this work in 2019.

The Vasse Drain Diversion Upgrade project was assessed Bilaterally by the DWER Native Vegetation branch under Part V of the EP Act [WA] and by AWE under the EPBC Act 1999 [Cwth] and the project was referred under the *EPBC Act* (Cwth). The project is a '*Controlled Action*,' all activities must be undertaken in compliance with conditions set in the EPBC 2017/7932 Approval Conditions.

Following surveys of the 43ha project area in March 2019, where 206 dreys and at least 66 possums were recorded, areas were revised and only 2.16ha was identified as the impact area to be cleared in 2020.

A Fauna Management Plan for the Vasse Diversion Drain Upgrade was developed by Bamford Consulting Ecologists as part of the Approvals process and provides a detailed description of commitments and approach, as well a summary of current research on Western Ringtail Possums and their requirements (Bamford et al., 2020). Implementation of the plan commenced in October 2020, prior to works commencing.

The Water Corporation has committed to revegetation to re-establish and improve connectivity of vegetation, and the installation of rope bridges and fauna shelters, including ten years of maintenance and monitoring with the aim that any long-term effect of the works will be a positive one.

Clearing works were carried out from October to December 2020 and construction is underway, with a notional completion time frame of April 2021. Artificial shelters were installed, Western Ringtail Possums and other fauna were displaced from the clearing areas in October and November 2020, and a survey was carried out in January 2021 to make a preliminary assessment of the shelters and the possum population following displacement. This interim report includes a summary of relocation activities, installation of artificial shelters and a preliminary assessment of their use by possums.

METHODS

Description of Project Area

The project area consists of land along two parts of the Vasse Diversion Drain (Figure 1). The northern area lies between the Busselton Bypass Road in the south and Bussell Highway in the north and includes some extra land in small reserves to the south of the drain. Much of the vegetation consists of Peppermint *Agonis flexuosa* forest and woodland, with varying proportions of Marri *Corymbia calophylla*, Flooded Gum *Eucalyptus rudis*, Jarrah *Eucalyptus marginata,* Coojong *Acacia saligna,* Swamp Banksia *Banksia littoralis*, Modong *Melaleuca priessiana* (Saltwater Paperbark *Melaleuca cuticularis* where the drain crosses The Broadwater), Spearwood *Kunzea* sp., and occasional other tree and tall shrub species. The understorey is generally in poor condition. Vegetation is in best condition on the south side of the drain, between Queen Elizabeth Avenue and the Busselton Bypass Road. Open areas of weedy grasses are present.

The southern area lies adjacent to the Busselton Golf Course, east of Chapman Hill Rd and includes land on the eastern side of the drain, as well as encompassing a section of the Vasse River. This will be the site of the Vasse River Overflow Structure (VROS). The vegetation is generally degraded and in places parkland cleared and grazed, with an open woodland of Peppermint and Flooded Gum, some planted, non-native eucalypts and some riparian woodland along the Vasse River. (See Image 14 in Appendix 1).

The total area cleared was 1.9ha (see Figure 1 a, b and c), however the project area for this study also includes sites in adjacent bushland into which artificial shelters and relocated dreys have been installed.

(a)


LEGEND
Approved Clearing Area
1:5,000 at A4
0 40 80 120
Metres
Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD
N
WATER
CD00116
Vasse Diversion Drain
Equivalent to part of Plan 8191/1 a

(b)


LEGEND
Approved Clearing Area
1:5,500 at A4
0 50 100 150
Metres
Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD
N
WATER
CD00116
Vasse Diversion Drain
Equivalent to part of Plan 8191/1 a

(c)



Figure 1 (a,b,c). *The project areas. The northern site (a and b) stretches from Busselton Bypass Road in the south to Queen Elizabeth Avenue in the north. Figure 1(c)shows the Vasse River Overflow Structure (VROS) site. Clearing areas are hatched yellow.*

Approach

All work was carried out in accordance with the Fauna Management Plan for the Vasse Diversion Drain Upgrade (Bamford et al., 2020). The aim was to displace animals as little as possible, ideally within their existing home ranges, while moving them from the impact area.

Since possums sleep during the day, they are often slow moving if roused, allowing a gentle approach to moving them with minimal handling and reduced stress to the animal. Since they only needed to move a short distance, this approach was particularly suitable.

Prior to animals being displaced, artificial shelters were installed in adjacent safe areas. Once animals had been moved, their natural drey was also relocated nearby, if it was salvageable.

All artificial shelters and relocated natural dreys were then surveyed in January 2021, to assess their status and check for possums. During this survey, natural dreys, and possums sighted out of dreys adjacent to the cleared area were also recorded opportunistically.

Survey methods

In the week prior to clearing the project area was visited by Mike Bamford (B.Sc. Hons. Ph.D. Biol.), Mandy Bamford (B.Sc. Hons. Zool.) and Andrew McCreery (B.Sc. Cons. & Wildl. Biol.). Mike, Mandy and Andrew have many years of experience in management of the Western Ringtail Possum (hereafter referred to as possum). The work was carried out under DBCA Permit numbers TFA 2020-0149 and FR28000164, and undertaken with reference to the Fauna Management Plan for the Vasse Diversion Drain Upgrade (Bamford et al, 2020). Personnel considered information and locations identified in the previous survey (Bamford, 2019) while focussing on the reduced footprint of the project (Figure 1 a, b, & c). Field assistance was provided by Jake Bamford (B.C.I.) and Joshua Bamford (B. Sc. B.Mus. Hons. M.A.), and Data Management was undertaken by Joshua Bamford.

The entire project area (Figure 1) and some adjacent bushland was visited on foot, between 19th October and 27th November 2020, prior to clearing of each section, and trees were examined closely for possum dreys. These are clumps of twigs and leaves that are generally quite conspicuous and placed in the mid canopy of trees (See Images 7 & 8 in Appendix 1). A possum may have five to eight dreys across a home range of 0.5 – 1.5ha, and home ranges overlap (Jones, 2000). By examining dreys through binoculars, it is sometimes possible to tell if a possum is present, and this was noted if observed. All dreys found in the impact area were recorded, whether they were occupied or not. In some cases, possums were found asleep but not in a drey and these were also noted. Possums will also shelter in tree hollows and thus dreys are not always a reliable indicator of possum presence. Attendance by BCE personnel at all clearing of trees ensured that possums in hollows would be detected and could be relocated.

Targetted spotlighting was carried out in areas where possums were thought to be sheltering in hollows, to inform likely locations to be targeted before and during clearing. The [redacted] area in particular had been found in previous surveys to support a possum that was sheltering in a hollow rather than a drey in the impact area. Spotlighting was carried out by two personnel each with a headlamp, and all trees were scoured thoroughly for possums. Possum eyeshine is very distinct.

All possum locations (dreys, trees containing possums and logs suspected of containing possums) were marked with flagging tape prior to clearing so that workers on site were aware of them (Appendix 1, Image 15). BCE personnel met with the clearing contractors at their pre-start meeting each day to clarify works to be carried out that day and develop a plan to undertake the safe displacement of possums and other fauna. The contractors understood the importance of protecting and safely relocating the possums and assisted in skilfully lowering vegetation slowly to avoid unnecessary stress to the animals and allowing BCE personnel to access possums and dreys efficiently, minimising risk to the animals.

If a possum went to ground and could not be accessed, work would stop at that location until the possum had emerged and could be located and moved safely. This sometimes required delaying clearing in an area until the following day when the animal could be located.

Handling of Fauna

Fauna handling was kept to a minimum to minimise stress to the animals during displacement. The location and behaviour of each possum was assessed prior to displacement and a plan devised. Management was adapted in response to the animal's behaviour.

Cage traps were not used for displacement of the possums in this project as they were considered unnecessary and stressful. Many of the possums were females with dependent joeys, which might have become separated if either the mother or joey were trapped. Enclosing an animal in a cage trap is inherently stressful and a more prolonged procedure than gently displacing the animal. Where an animal is only to be moved a few metres within its existing home range, capturing the animal is often unnecessary, particularly if the animals can be moved during the day when they are sleepy and less active.

In many cases possums could be displaced by gently tapping the drey. When the animals emerged from the drey, they were then herded to a safe tree adjacent to the tree to be cleared. If a drey remained in the tree, the tree was lowered slowly by the machinery operator, so that the drey could be checked. In some cases an animal (often a joey) remained in the drey. If this occurred, the animal was either transported in its drey to the tree containing the mother and the drey attached to the tree, or if required the joey was gently captured and transferred to the tree containing the mother. The drey was then installed in the tree. The animals' behaviour was then observed to ensure that the pair stayed together and stayed in a safe area.

In cases where an animal was not in a drey or was otherwise difficult to move, an artificial drey was installed in the tree to encourage the animals to shelter within it overnight. If the possum was found inside the drey the following morning, the entrance to the drey could then be blocked to keep the animal inside while the drey was moved to a tree outside the impact area.

If possums needed to be captured, they were either captured by hand, or by using a large, soft rubber, landing net. Both these methods were safe and effective and on two occasions the net was mistaken for a branch by a sleepy possum, who climbed onto it and could then be carried across to a safe tree, without being captured.

Management of Fauna other than Possums

As part of the project, species other than possums were searched for and relocated if possible.

Trapping and opportunistic searching were used to locate animals other than Possums. Following discovery of Quenda diggings, cage traps were installed. Elliott traps were deployed in areas likely to shelter King's Skinks and Bobtail Skinks. Hand-searching was undertaken for small reptiles.

Clearing debris was mulched and removed from site by the contractor immediately following clearing to minimise the attractiveness of the impact area for animals, in line with the Fauna Management Plan (Bamford et al., 2020).

Relocated and Artificial Dreys

As outlined in the Fauna Management Plan (Bamford et al., 2020), a range of shelter types was installed in the project area in a variety of locations to augment the shelters available in relocation areas and trial the attractiveness to possums of the different designs. The types included:

Relocated Natural Drey – a drey cut out from a tree to be cleared and wired up into a tree outside the clearing zone.

Relocated Long Hollow – a long hollow cut from a tree in the clearing zone. There were only two of these so results are lumped with Short Hollows in this report.

Short Hollow – a short hollow log, capped at one end and chained with plastic coated chain to a tree, to minimise damage to the tree branch. Short hollows were chosen to trial as they may prove less attractive to European Honeybees *Apis mellifera* than long hollows and possums will shelter in short natural hollows.

Dome – a wire dome made from two hanging baskets wired together, with a quarter cut out for the entrance and lined with *Agonis flexuosa* leaves and twigs.*

Dome with Coconut Dome – a wire dome with matching coconut fibre liner and entrance hole.*

Dome with Coconut Cup – a wire dome with the lower half lined with coconut fibre.*

Cup – a single hanging basket installed as a wire cup.*

Cup with Coconut – a single hanging basket lined with coconut.*

Plastic bucket – a plastic filter bucket.*

*In all cases, WA Peppermint *Agonis flexuosa* sprigs from the possum's nearest tree were added to each artificial drey to try to mimic as closely as possible the natural smell of the animal's home range. In some instances where an animal's natural drey could not be salvaged, material from the natural drey was added to an artificial drey to make the drey smell more familiar to the animal and perhaps make it more likely to be used.

Artificial shelters were installed throughout the project area, outside the impact area. Eighteen dreys and hollows were installed by Tree Surgeons WA, while they were installing the rope bridges. The remaining 68 relocated and artificial dreys were installed by Bamford Consulting Ecologists' personnel. Details of all dreys relocated and all installed shelters are given in Figures 4 & 5 and Appendix 4. Examples of shelter designs are provided in Appendix 1, Image 9.

Monitoring of Artificial Shelters

A check of all artificial shelters was carried out from the 20th - 25th January 2021. All locations were checked, shelters were photographed and the state of the shelters recorded, noting any that needed repair or replacement. A pole camera was used to determine if the shelters were occupied by possums or had been used since they were installed (see Appendix 1, Image 18).

RESULTS

Possum Displacement

A detailed description of all possums moved prior to clearing is given in Appendix 3.

Thirty-six possums were displaced from the clearing area during operations. All animals were relocated successfully without injury or mortality. In most cases, the animals were moved no more than 20 metres and in some cases as little as five metres. The longest distances moved were three possums in a hollow tree in [redacted] who were relocated with their hollows approximately 650m west to the southern edge of the [redacted] as there was no connected, adjacent remnant vegetation into which they could be displaced.

Eleven possums had to be hand-captured and moved, four were moved without touching them, while contained within an artificial drey or holding onto the top of their drey, two were moved while within hollows, and two were moved by encouraging them to climb onto the net and carrying them to safety while perched on top of the net. The remaining 17 were displaced by gently disturbing them from their dreys and herding them to adjacent, safe trees.

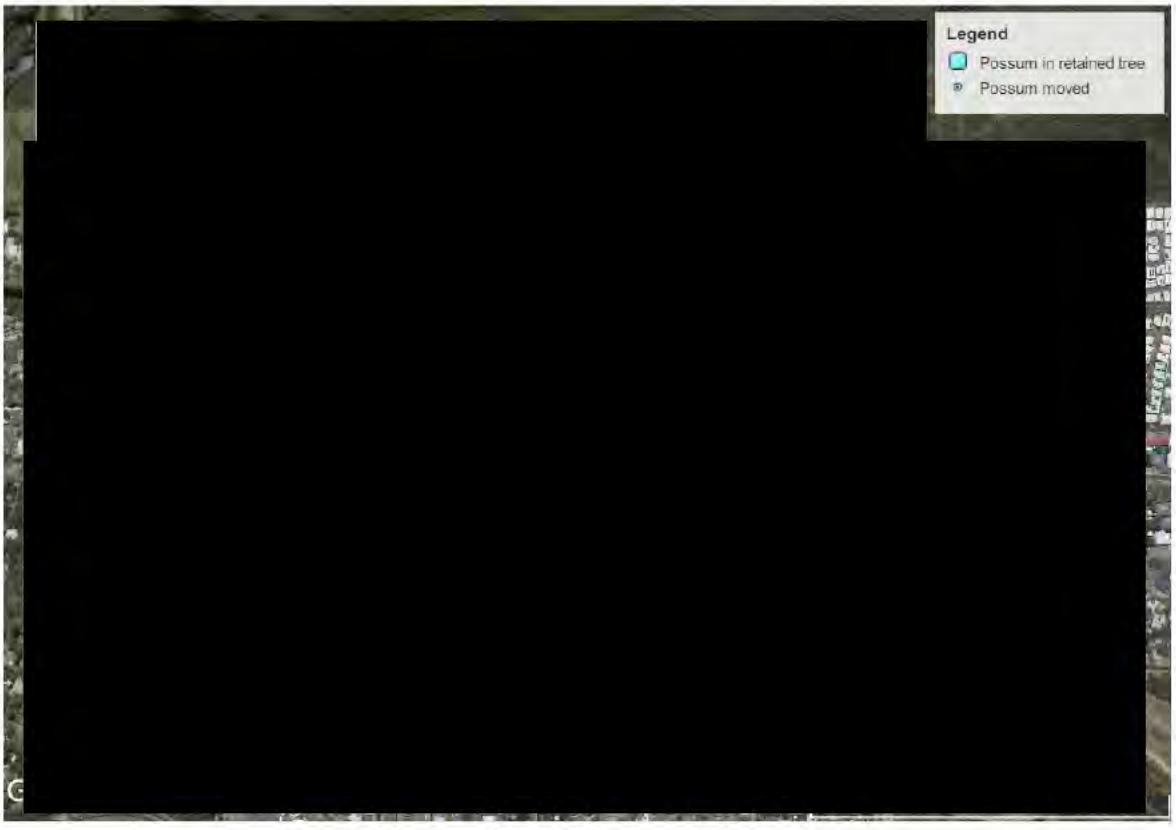


Figure 2. *Locations of Western Ringtail Possums along the Vasse Drain in Busselton in October and November 2020, prior to displacement. White dots denote possums +/- joeys which were displaced, blue points indicate possums which were on the border of clearing works and were not moved as their trees were retained. Two of these retained trees contained possums in January 2021, despite being immediately adjacent to construction work.*



***Figure 3**. Locations of Western Ringtail Possums in the southern (VROS) site prior to displacement in November 2020.*

Relocation of Species other than Possums

Records for species other than possums are presented in Appendix 2. Photographs are provided in Appendix 1.

Quenda: One Quenda was trapped and relocated to adjacent bushland immediately before clearing.

Reptiles: eighteen individuals of seven species were successfully captured and relocated, although four individuals of four species were crushed during clearing and were deceased when found, an inevitable consequence of any clearing activity involving vehicles.

Frogs: Five individuals of two species were captured and relocated.

Birds: two Silvereye chicks in their nest were successfully relocated. The parents returned to the relocated nest within a few minutes and fed the chicks. One nest of two Red-capped Parrot eggs was found abandoned in a hollow.

January 2021 Shelter Check and Monitoring

Results of the January check are presented in Appendix 4.

Six relocated or artificial shelters out of the 87 that were installed were occupied when checked; a 7% occupancy rate. A further ten shelters contained green leaves of varying ages and appeared to have been used at some stage since they were installed.

Table 1. *Numbers and designs of artificial shelters installed along the Vasse Diversion Drain and their use by possums in January 2021.*

Shelter type	Number installed	Number Occupied	Evidence of past use	Total used
Relocated Natural Drey (NAT)	23***	1	1	2 (1%)
Dome with Coconut (DoCo)	17* 7 available	2	3	5 (29%) (70%)
Cup without Coconut (Cup)	14	0	1	1 (7%)
Cup with Coconut (CuCo)	11	0	4	4 (36%)
Installed or relocated Hollow (Hol)	10	3	1**	4 (40%)
Dome without Coconut (Dom)	5	0	0	0 (0%)
Plastic Filter Bucket (Buc)	6	0	0	0 (0%)
Totals	**86*** **	**6**	**10**	**16 (18%)**

*Note that in 10 of these dreys the coconut had collapsed and requires repair, so only 7 were available to the Possums.

** This may be an underestimate since evidence of past use of hollows is more difficult to detect than past use of dreys.

*** This number is one less than the number of shelters installed, as one relocated natural drey was not located in January.

Eighteen possums were observed opportunistically in natural dreys or on branches in the areas immediately adjacent to the clearing area in January while checking the artificial shelters. Eight of these animals were pairs of mothers and large joeys. One joey was out of the drey but in the same tree as the mother, suggesting that it was becoming independent. An additional six possums were in artificial shelters, making a total of 24 animals observed in January. These were opportunistic records along a narrow corridor and not an exhaustive survey.



Figure 4. *Locations of shelters for Western Ringtail Possums installed along the Vasse Drain in Busselton in October and November 2020.*



Figure 5. *The southern project area (VROS) off* [redacted] *along the Vasse Diversion Drain and extending north along a natural drainage line, showing installed artificial shelters in red. DEUCP1, marked in green, was the location of a large Eucalyptus rudis from which a possum was displaced during clearing. It ran to a hollow (marked in white), behaving as if it knew the location. When the site was checked in January, there was a possum occupying the hollow - possibly the same animal. The hollow is now immediately adjacent to works (see Figure xx), however the possum appears to be tolerating the disturbance.*



Image 5. *Retained Natural hollow on the edge of the* [redacted] *which contained a possum in January despite the proximity to works. This may be the animal which sheltered in the hollow after being displaced from the Eucalyptus rudis at DEUCP1 in November (see Figure 5). A decision was made to retain this tree although it was on the edge of the clearing zone, Its continued use by a possum in January illustrates the importance of decisions to retain individual trees.*

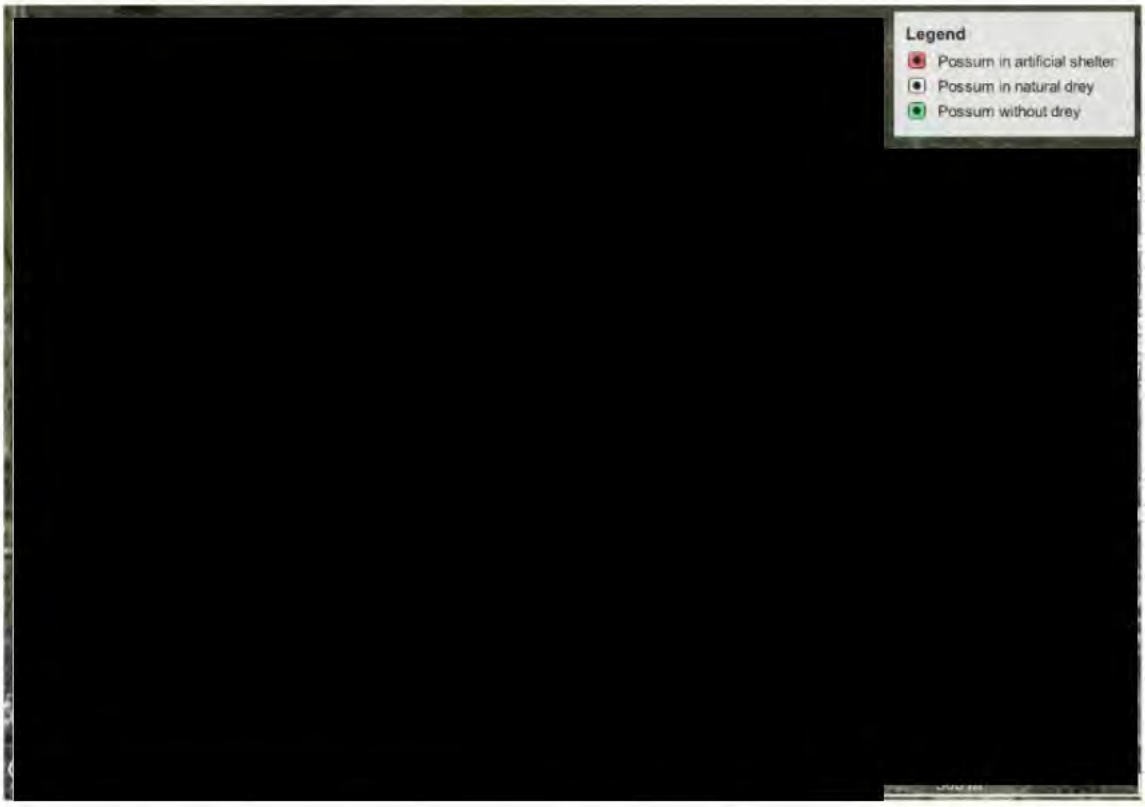


Figure 6. *Opportunistic records of Western Ringtail Possums along the* [redacted] *in Busselton during January 2021. Three of the natural dreys (white points) contained two possums. Raw data is given in Appendices 4 and 5.*

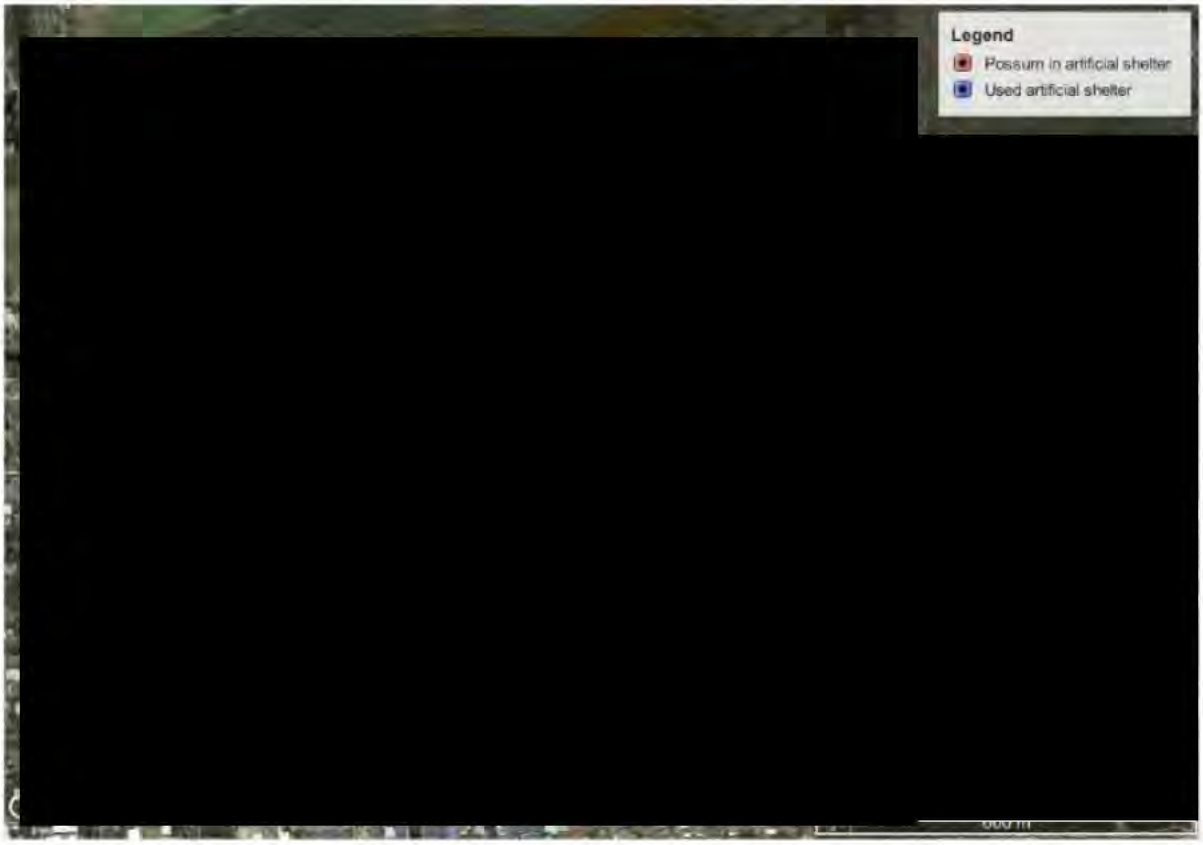


Figure 7. *Use of artificial shelters by Western Ringtail Possums along the Vasse Drain in Busselton during January 2021. Red points indicate shelters which contained possums when surveyed, blue points indicate shelters which contained green Agonis leaves or where coconut fibre had been rearranged.*



Image 6. *A recently constructed natural drey containing a Western Ringtail Possum mother and large joey on January 22nd, 2021 – possibly a displaced pair from the clearing area who had constructed a new drey.*

DISCUSSION

The use of the displacement technique outlined in the Fauna Management Plan for the Vasse Diversion Drain Upgrade (Bamford et al., 2020) to move possums from the clearing area appears to have been successful. All 36 possums were displaced from the clearing area without injury, many needing to be moved by less than 20 m. Most would only have been moved within their existing home ranges. By avoiding or minimising handling, personnel were able to keep stress to the animals to a minimum. Cowan et al. (2020), links the poor survival of relocated animals to the stress associated with their capture, handling and transport. Studies of Western Ringtail Possums report high mortality of relocated animals (Clarke, 2011, Thompson & Thompson, 2009) however preliminary observations from the present study suggest that animals remained in the area following displacement. Ongoing surveys will better inform these preliminary observations.

Relocated natural dreys were used by several possums immediately following relocation but some had deteriorated and only two appeared to still be in use by January 2021. The relocated dreys probably perform an important function temporarily but ultimately may best be replaced with artificial shelters, to fulfil commitments made as part of project approvals to install double the number of artificial shelters as were removed and maintaining them for ten years (DWER Clearing permit CPS 8191/1). By January, it appeared that some displaced possums may have chosen a new location within their home range and built a new drey. New, natural dreys have been constructed in areas adjacent to the clearing area, suggesting that this might be the case. It will be interesting to see if increasing the numbers of artificial dreys increases usage of them in the long term, or if some animals prefer to build their own.

Artificial shelters are being used by the possums and once readjustments are made to the coconut fibre of some of the dome shelters to ensure that animals can enter the shelters, their use may increase further. At this stage, short hollows, wire domes with coconut fibre and cups with coconut fibre appear to be the most used by possums however more data is required, and repairs need to be made, before conclusions can be drawn.

Although the January data are preliminary and opportunistic, the recording of 24 possums alongside the clearing area in January is a good result and suggests that many of the relocated possums are likely still in the area. Eight of the animals recorded were mothers and large joeys which all appeared in good condition, suggesting that resources are not limiting. More systematic future surveys will better define the population alongside the drain and help to determine if the numbers of possums in the area are stable or fluctuating.

Observations from January emphasised the importance of retaining individual trees where possible. A strip of vegetation immediately adjacent to the impact area and including several trees with dreys or hollows on the border were marked to be cleared in November 2020. After consideration, a decision was made by the client and contractor to retain them. Three of these trees contained possums in January, and most of them will have been used as food resources. Three of the 24 animals recorded in January were in dreys or hollows directly overlooking the

construction site but the animals had persisted in them, tolerating the disturbance. Decisions made to reduce clearing, even by a single tree, can improve the outcome for fauna.

In order to maintain the displaced animals at the site in the long term despite the reduction in habitat, it is essential that additional food resources are provided in the form of revegetation, as soon as is practical. Although food resources do not appear to be limiting at present and all animals appear in good condition, there is a risk that drought conditions or insufficient nitrogen in leaves will begin to affect the population. The wide range of plant species selected for revegetation to be implemented by Tranen (Tranen Revegetation SouthWest, 2020), including Coojong *Acacia saligna, Kunzea asp.* and Marri *Corymbia calophylla,* as well as WA Peppermint *Agonis flexuosa,* will provide a varied diet which Mathieson et al. (2020) found Western Ringtail Possums prefer. Some plants are already beginning to resprout along the fence line adjacent to the impact area, which is good to see.

Revegetation will also re-establish and enhance connectivity, supplemented by the rope bridges which were installed by Tree Surgeons WA. Increased connectivity will allow possums to move between the population along the drain and the rest of Busselton to access food resources, expand home ranges and find mates, improving the species' long-term viability in the area. Rope bridges and revegetation will also enable possums to travel without going to the ground, avoiding the risks of Foxes and cars, both identified as major threats to the viability of the Busselton population by (Yokochi *et al.,* (2015).

Although the Vasse Diversion Drain Widening Project has caused disruption to the Busselton population of Western Ringtail Possums in the short term, it has the potential to contribute to the possums' long term survival by improving the availability of high nutrient foliage for food, suitable structures for protection/nesting, and canopy continuity to escape predation and other threats, all issues identified as important by Department of Parks and Wildlife, (2017) and Bamford et al., (2019). Future monitoring as part of this project will help to show if this potential is realised.

RECOMMENDATIONS

- Artificial shelters where coconut fibre is collapsing should be repaired.
- Relocated Natural Dreys should gradually be replaced with artificial shelters as they deteriorate. Additional short hollows and wire domes / cups with coconut seem the best choice, given preliminary results.
- Revegetation should commence as soon as practical to increase food resources and connectivity.
- The location of the Fox den identified south of the drain in the Council reserve should be forwarded to the City of Busselton Environmental Officers for their information.
- Residents should be encouraged to plant appropriate food and shelter plants for possums to improve connectivity and support their continued occurrence in the suburbs of Busselton.
- The Busselton community should be provided with opportunities to learn more about the possums and promote their occurrence as an asset. This could include workshops to make artificial shelters, plant local plants and encourage a sense of custodianship of the possums.

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Appendix 1. Photographs





Image 7 (left). *A platform natural drey containing a Western Ringtail Possum mother and large joey taken in October 2020.*

Image 8 (right*). A dome-shaped natural drey containing one or two possums. Numbers of possums can be difficult to determine in dome-shaped dreys without disturbing the occupants.*



Image 9. *A selection of designs of Artificial Shelters: Dome – no coconut (Dom); Short Hollow (Hol); Cup with coconut (CuCo); Cup – no Coconut (Cup); Plastic Bucket (Buc); Dome with coconut (DoCo); Dome with coconut cup. (DoCoCu). DoCo and DoCoCu were lumped for the preliminary analysis undertaken for this report. More detailed analysis will be possible once more data has been collected.*



Image 10. *An example of a Relocated Natural Drey. Relocated Natural Dreys were probably an important interim measure in November 2020 for newly displaced possums. Two Relocated Dreys were still in use in January 2021 but others were disused, or had deteriorated.*



Image 11. *Installation of a rope bridge by Tree Surgeons WA at* [redacted]



Image 12. *Rope Bridge along* [redacted] *installed by Tree Surgeons WA. Project Approvals require six rope bridges to be maintained for 10 years to help improve connectivity for possums, so they do not need to come to the ground.*



Image 13. *Hollows were checked for possums and other wildlife such as geckoes, bats and birds, before and during clearing.*



Image 14. *The VROS area was mostly parkland cleared but had some large Eucalyptus rudis trees with hollows, several of which were used by possums. These possums required careful management to ensure that they were displaced rather than going to ground under logs or in hollows as they had several 'bolt holes' where they would retreat. When this happened, work would stop (sometimes overnight) until BCE personnel could confirm that the animal was not at risk.*



Image 15. *Trees with dreys were marked with flagging tape and branches lowered slowly using a small machine to allow BCE personnel to check each drey and move possums if necessary. All material was either carried away, or mulched on site immediately and removed, to avoid creating shelter for animals such as Quenda and Bobtails.*



Image 16. *A displaced Western Ringtail Possum making its way to cover. Animals often moved slowly through the vegetation and settled quickly once they reached the safe zone.*





Image 17 (left). *By January 2021, a number of the artificial shelters containing coconut had been rearranged. In this case, the possum obviously preferred to choose an alternate location to create its own shelter using coconut from the artificial drey!*

Image 18 (right). *Artificial Shelters were checked using a pole camera if necessary. Pole camera images may be seen on the cover of this report (Images 1 – 4) and also in Appendix 4.*



Image 19. *Nest with two Silvereye chicks (Zosterops australis), almost ready to fledge. This nest was in a Paperbark tree on the* [redacted] *and was relocated to the eastern side, in a similar Paperbark tree. The chicks began to call soon after the nest was installed and the parents returned to the nest in its new location and began to feed the chicks.*



Image 20. *Three Bobtail Skinks (Tiliqua rugosa) were relocated into the safe zone during clearing.*



Image 21. *Two Western Bearded Dragons (Pogona minor) were relocated into the safe zone.*



Image 22. *A Southern Blind Snake (Anilos australis) was hand-captured and released into the safe zone.*



Image 23. *Four King's Skinks (Egernia kingii) were captured and relocated to the safe zone.*



Image 24 *Two Motorbike Frogs (Litoria moorei) were hand-captured and moved to the safe zone.*

Appendix 2: Notes on Fauna other than Possums. Details of other fauna displaced during clearing, and the location of Fox Den.

Date	Location	Species	Description	Approach
11/10/2020	[redacted]	*Pogona minor*	Western Bearded Dragon found on Northern boundary along College Ave	moved across bike path
11/ /2020		*Cryptoblepharus buchananni x 4*	Four Fence Skinks on fallen branch with loose bark	Moved branch to outside the clearing area. Lizards remained under bark while carried outside.
11/10/2020		*Lialis burtonis*	Burton's Snake-Lizard Found on disturbed ground, moved from 34697e, 6273354N	Hand-captured and relocated south, of the clearing area, in the reserve.
11/12/2020		*Crinia glauerti x 3*	Three Clicking Frogs were exposed while clearing vegetation along the creekline.	captured by hand and relocated downstream along creek line.
11/12/2020		*Hemiergis peroni*	One Mulch Skink was found in the clearing area	crushed - deceased
11/12/2020		*Christinus marmoratus*	Marbled Gecko One found in the clearing area	crushed - deceased

Date	Location	Species	Description	Approach
11/12/2020	[redacted]	Possible bird hollow identified. Chew marks around entrance	Small - medium parrot, possibly Red-capped Parrot or Ringneck	No birds were observed attending the nest. Hollow checked as tree was felled on 13/11/2020. Hollow empty
11/13/2020		Red-capped Parrot eggs	Eggs were cold - presumed abandoned	Eggs were cold and one damaged. Dissection revealed dead, partially developed Red-capped Parrot embryo.
11/13/2020		*Christinus marmoratus* x 2	Two Marbled Geckoes Found under bark on felled trees	hand-captured and relocated downstream, to the east of the clearing area.
11/16/2020		*Litoria moorei* adult	Motorbike Frog Found in Melaleuca	hand-captured and relocated into the safe area.
11/17/2020		*Pogona minor*; adult	Western Bearded Dragon Seen by Matt (excavator driver) on the ground ahead of the excavator. Ran up the stem of a small *Agonis.*	Dragon grabbed by hand, bagged and later released into adjacent safe area.
11/19/2020		*Anilios australis*	Southern Blind Snake Sub-adult exposed in loose soil and seen by Matt.	Hand caught and released in safe area

Date	Location	Species	Description	Approach
11/19/2020	[redacted]	*Egernia kingii* adult	King's Skink exposed by large excavator moving rocks along drain	crushed by rock - deceased
11/19/2020		*Tiliqua rugosa* adult female	Bobtail Skink Found in half-buried pipe	Hand-caught and released in safe area
11/19/2020		*Tiliqua rugosa* adult female	Bobtail Skink Emerged from loose soil as an Agonis pushed over	Hand-caught and released in safe area
11/19/2020		*Litoria moorei* adult	Motorbike Frog Found in fork of large branches of Agonis	Hand-caught and released in drain
11/19/2020		*Egernia kingii* adult	King's Skink Emerged from loose soil as an Agonis pushed over	Hand-caught and released in safe area

Date	Location	Species	Description	Approach
11/20/2020	[redacted]	*Tiliqua rugosa* adult female	Bobtail Skink Caught in Elliott E17	Released in safe area within 50m . NB 23 Elliotts set (E01 to E23). All animals moved into safe zone.
11/20/2020		*Egernia kingii* adult	King's Skink Caught in Elliott E23	Released in safe area within 50m
11/24/2020		*Egernia kingii* adult x 2	King's Skink in fallen log of E. rudis	captured by hand and relocated downstream along creek line.
11/24/2020		*Tiliqua rugosa* adult	Bobtail Skink in fallen log of E. rudis	crushed by log - deceased
11/26/2020		Silvereye nest with two chicks -	In Melaleuca - Chicks almost ready to fledge	Carefully cut twig with nest and relocated across [redacted] Watched at a distance. Chicks made begging call, parents returned to nest in new location to feed them.
01/25/2021		*Vulpes vulpes*	Active Fox Den. Fox seen leaving the area.	UTM: [redacted]

Appendix 3. Notes on Displacement of Possums from the Vasse Diversion Drain Upgrade, October – November 2020. WRtP = Western Ringtail Possum

Date	Location	Event Code	UTM	No. Possums	Description	Approach	Artificial Shelter
10/28/2021	[redacted]	DE	[redacted]	2	Mother & joey (subadult)	Tree gently leant over onto ground, mother flees up nearby tree and juvenile starts to follow but heads in wrong direction. I pick up juvenile gently and place on trunk of same tree as mother. It climbs up and is reunited with mother. Drey cut out and relocated onto tree in the wider corridor to the south, adjacent to the possums.	S25
10/29/2020						Possums checked and still within narrow corridor they were relocated to	
10/30/2020						possums were not visible in area of narrow strip	
11/03/2020						checked S25 and nothing inside	
11/05/2020						one possum in tree where possums were relocated to on 28/10	
10/28/2020	[redacted]	DO11	[redacted]	2	Mother & joey (subadult)	Tree leaned over onto nearby tree gently, possums moved from drey along branches onto nearby tree, no handling necessary. Possums remain in tree outside clearing area.Drey	

						cut out and installed in adjacent corridor. Drey WP: DO11R.	
10/29/2020					possums checked and still in narrow corridor, persisting on branches.		
10/30/2020					possums checked and still in narrow corridor. It appears a rudimentary drey has been assembled. Joey is in drey and mother nearby.	A decision was made to relocate the original drey to the location of where possums are now at. So DO11R was removed and relocated onto tree next to where possums are persisting. New drey S22	
11/3/2020						Checked S22 and found mother and joey in same tree as 30/10, on branches, not in drey	S22
10/29/2020	[redacted]	DE1	5[redacted]	2	Mother & joey (subadult)	Tree leaned over onto nearby tree gently, possums hesitantly left drey and climbed on tree. Possums then climbed through the canopy back into the clearing areas. So had to be removed again using same method. Drey was	S18

						removed and relocated into larger corridor: S18	
10/30/2020					pair were not present along narrow corridor.		
10/29/2020	[redacted]	DE2 bound	[redacted]	1	Tree outside clearing area, retained. At least one possum in drey.		
11/3/2020					checked drey and no possums		
10/29/2020		DE3	[redacted]	2	mother and joey (about ½ grown).	Tree leant over gently, mother left drey freely and moved onto the next tree outside of the clearing area but young was reluctant to leave drey and had to be handled and placed on tree trunk. It climbed up to safety of canopy. The mother then moved across to the next tree canopy where it remained. Drey was cut out and relocated to same tree where the young was present. Drey S16	S16

10/30/2020					area checked for presence. No signs of possums along narrow corridor.		
11/3/2020					Checked S16 and at least one possum using drey		
10/30/2020	[redacted]	**DO out**	[redacted]	1	Drey outside clearing area, retained. Appears to have at least one possum.		
11/3/2020					looks like possum(s) are still in there but can't be certain.	Not investigated closely to avoid disturbance.	
10/30/2020	[redacted]	**DO4 bound**	[redacted]	1	tree on boundary and retained. At least one possum inside drey		
11/3/2020					at least one possum in drey.		

10/30/2020	[redacted]	DE4	[redacted]	0	Drey is small and flimsy and no possums were present. Drey was not salvageable.		
11/3/2020					drey falling apart after last rain.		
10/30/2020	[redacted]	DO5	[redacted]	2	mother and young (about 1/3 grown).	Tree leant over on side in direction of suitable tree. Possums were reluctant to move from the drey. Mother then bolted from drey into nearby thick sedges and could not be found after a thorough search of the sedges. Nearby trees were then searched in case the mother went up one but no presence was detected. The young remained in the drey. The drey was cut out gently with the young inside and attached to nearby tree. Upon installing the young got spooked and tried to escape, it was placed on the trunk of the tree but it didn't want to venture too far from the drey. Once the installation was complete and I moved down the ladder the joey felt safe	

						enough to climb back into the drey. Drey WP – DO5R	
11/2/2020					mother and joey reunited and located in a tree within the clearing area.	. It was decided to leave the tree for the time being. Possum WP: DO5poss	
11/3/2020			[redacted]		mother and young still in tree		
11/4/2020			[redacted]			artificial drey (2 hanging baskets assembled into a dome with a hole cut out, coconut husk left in) placed in tree.	
11/5/2020			[redacted]		Mother and young not sighted in tree, assumed in drey	Used a ladder to carefully reach drey without disturbance. Possums in artificial drey, a large bag was placed over the entire drey removed, lowered and reassembled in another tree, all the while being covered with the bag. The mother tried to push her way out but we gently coerced her back into the drey. Once attached, the bag was slowly removed and mother and young remained in the drey. WP of new drey – S54	S54

11/3/2020	[redacted]	DE17	[redacted]	0	drey degraded and not salvageable.		
11/3/2020	[redacted]	DE18		1	has possum but is outside of clearing area so retained.		
11/3/2020	[redacted]	DE5		0	No possum	drey cut out, relocated. Drey S10	S10
11/4/2020	[redacted]	DE6out		0	drey outside clearing area, retained.		
11/5/2020	[redacted]	DO7		2	Mother and joey	shaking of the tree disturbed the mother, she exited drey and climbed through canopy. While Drey was lowered with the machine, a juvenile came out and remained within branches surrounding the drey. Excavator gently lowered the tree to the ground and the juvenile was hand-captured and bagged. Drey was relocated to nearby area and juvenile was gently placed inside where it stayed. Drey S46.	S46

						Mother still remained in canopy within clearing area. We selected a path we wanted the possum to go so we cleared all of the other trees within the vicinity. Excavator leant on the tree with possum and initially the animal went the wrong way (toward the machine) . With gentle herding, the animal was moved away from the machine and it went in the right direction, through the canopy into safety.	
11/6/2020		**DO7**	50 H		Checked S46, possums not visible from ground and not visible in surrounding vegetation.		
11/5/2020	[redacted]	**DE8**	[redacted]	0	no possum.	Drey relocated to S47.	S47
11/5/2020	[redacted]	**DO9**	[redacted]	2	Mother and joey	possum fled drey when drey gently prodded but didn't go too far. It looked back and motioned the juvenile to follow, it did. It was quite small but furred. It climbed on	S45

						mother's back and they went as high as possible in the canopy. Similar to previously, we decided on a path for them to go and excavator cleared the way. Excavator gently leaned the large tree toward a smaller tree outside the clearing area. As the tree lowered the mother was reluctant to move, then jumped to the ground with baby still on her back. She slowly moved toward the nearest tree and climbed up to safety outside of the clearing area. The drey was partly disassembled when we took it down but it was salvageable. We put it up in a nearby peppermint tree. S45	
11/6/2020		**DO9**				Checked DO9R and doesn't appear to have possum(s) inside but can't be certain. Possums not visible in surrounding vegetation.	
11/6/2020	[redacted]	**DO20**	[redacted]			Drey found right on the edge, just inside of the clearing area, it looks occupied but was not disturbed. It may be able to be kept but a call by Client needs	

	[redacted]		[redacted]			to be made. – Drey was relocated, unoccupied	
11/6/2020		DE10			No possums, bit scraggly but can be salvaged.	Relocated to S42.	S42
11/6/2020		DE11			No possums, very degraded and not worth salvaging.		
11/6/2020		DE21			drey degraded, not worth salvaging.		
11/6/2020		DO19		2	female with pouch young	gave the tree a shake and a possum came out. Has settled in canopy on the edge of the clearing area for at least 30 mins. Without witnessing, the possum must have moved on into safe areas. Drey relocated to S41	S41
11/6/2020		DE12			no possum. Drey not salvageable.		

11/6/2020	[redacted]	DE13	[redacted]		No possum, drey salvageable.	relocated to S38.	S38
11/6/2020	[redacted]	DO14		1	Juvenile possum with no adult present.	Joey was furred but probably not independent. Tree bought down slowly and it stayed inside. Carefully cut out drey without disturbing the joey. In the process of relocating, it did escape the drey but remained within the branches above the drey. We then attached it, with joey inside, to another tree nearby. On the ladder the joey tried to escape the surrounding branches and it was hand-captured and placed on the tree trunk. Once the drey was secure the joey was placed in its drey. Its instant reaction was to climb inside, where it stayed. Drey WP: S39.	S39
11/10/2020		ARTSHEL1			Double basket with coconut fibre in base, drey material also.		S35

11/10/2020		**ARTSHEL2**	[redacted]		Double basket with *A flexuosa* from a natural drey		S33
11/10/2020		**MOVEDY**			A natural drey moved from *A saligna* to *A. flexuosa*		S37
11/10/2020		**DYP02MOVE**		2	Adult female and large juvenile	moved into next tree to south. Natural drey cut out and installed in next tree.	Relocated Drey in next tree
11/12/2020	[redacted]	**GPS271**			Old drey	old drey, not salvageable, 2 artificial dreys installed in trees to the east of the clearing zone	S1
		ARTDREYCOCO					
		ARTDREYYPEPONLY					S2
	[redacted]				drey in *Acacia saligna* - previously identified	Checked previous location of drey - drey gone, possum not present.	

11/13/2020	[redacted]	**ARTDREYCOCOCOVER**	[redacted]		artificial drey	installed outside the clearing area	S6
		ARTDREYPEPPONLY			artificial drey	installed outside the clearing area	S5
11/13/2020		**WGP0**			Dead *E. rudis* with hollows - possum previously observed	Decision made to leave dead *E. rudis* so hollows can be checked, cut and lowered to the ground rather than dropping the whole tree and risking injured animals. Clearing completed south of the creek pool. Limited vegetation adjacent to dead *E. rudis* – animal may choose to move over the weekend.	
11/15/2020		**DEUCP1**		3	Mother and large joey next to drey in large *E. rudis* along creek line. Also a third animal - possibly the one previously seen in dead *E. rudis* previously	Spotlighting, found mother and large joey next to drey in large *E. rudis*. Also a third animal – possibly the animal from the dead E. rudis. No animal was spotted in the dead E. rudis. This animal is likely to be the third animal seen in the large *E. rudis*.	
11/16/2020	[redacted]	**DEUCP1**		1	Single WRTP flushed while	Started to work along the line of FGs on the north side of the	

					clearing E. rudis along creekline	creek crossing and flushed a WRtP which sheltered amongst twigs over the water. Waded in but was unable to catch it. The animal initially began to climb up, appearing to be heading for the foliage of the E. rudis but then saw the excavator and headed down into a bolt hole under the large, recumbent trunk of the E. rudis. Decision made to wait until the animal reappeared as clearing the tree now would create a high risk of injuring a possum.	
11/16/2020	[redacted]	**DEUCP1**			Spotlighting: Three possums sighted in large *E. rudis*.	Spotlighting 16 11 20: Three possums sighted in large E. rudis, so the animal had emerged. Observed with night-vision binoculars to minimize disturbance.	
						Mother and joey finally able to be moved on 23/11/2020 (see description below). Third possum not present and presumably displaced and moved out of the impact area due to clearing in the vicinity.	
11/23/2020	[redacted]	**DEUCP1**		2 (Female & large joey)	One flooded gum contained a drey with a	Using a ladder, bag and net, two personnel attempted to catch the possums. Unfortunately, the mother	

					mother and joey.	was able to avoid capture and climbed down into the hollow log where it disappeared. The joey climbed out of the drey and higher into the canopy. At this point we could not take any further action due to the mother in the log. About 30 minutes later we witnessed what we assumed was the mother about 30 metres north climbing up a tree and into a hollow just outside of the clearing area. She had wet feet and tail and was clearly the same possum that escaped into the hollow but due to the joey still in the tree (and other concerns involving the operator) we did not remove the tree and logs that day. An artificial drey was installed into the tree below the joey, The original drey was removed to make it more appealing to use the artificial one. The trees around the joey tree were removed and we then left it alone.	
11/24/2020				1 -2 possums	In hollow where mother DEUCP1 had	Further inspection to see if 2 animals were in the hollow was not done to reduce the disturbance on the possums.	

					escaped to yesterday.		
					No possum observed in Flooded Gum	we carefully checked the artificial drey and nothing was inside. Presumably the joey felt exposed in the tree and abandoned the area. At least one possum was visible in the hollow that the mother had escaped into. Further inspection to see if 2 animals were in the hollow was not done to reduce the disturbance on the possums. The operators were given the go ahead to remove the tree and 2 logs. Upon removal of the logs, 2 King's Skinks were rescued and relocated and unfortunately one Bobtail was crushed in the process.	already installed artificial dreys and a third artificial drey installed
11/17/2020	[redacted]	**OLDDREY**	[redacted]		Old drey - empty, degraded		
11/17/2020	[redacted]	**OLDDREY1**	[redacted]		Old drey - empty, degraded		

11/17/2020	[redacted]		50 H			Noted that in the site on the east side of the drain, adjacent to Cook St one of the artificial dreys with coconut fibre had been raided for fibre which had been incorporated into a new drey in the next tree!	
11/17/2020	[redacted]	**POSSDECEP**	[redacted]	2 (female and large young)	Two WRtP in a drey in a large Agonis. A second old and shabby drey in same tree. No connection with safe areas.	Artificial drey (two hanging baskets) installed in tree; with coconut fibre lining. WRtP coerced from their drey by gently tapping it; they went to the top of the canopy. Branch and drey then cut out and the drey pushed into the artificial drey. The second natural drey was installed. This done after 5pm, leaving the two WRtP in the top of the tree. Hope is they will move into the artificial drey the following morning making for easy displacement.	
11/18/2020	[redacted]	**POSSDECEP**		2 (female and large young)	Two WRtP in large Agonis with artificial drey installed the previous afternoon. Despite rain, the two animals were	Trees around the Acacia were taken down but as this was done, the two WRtP moved into a small Agonis close to the fence. Plan was then to gently push this over which would put the canopy on the bike trail about 15m from safe trees. Personnel were spaced	S69

					curled up together on bare branch of an Acacia saligna beside the large Agonis.	to encourage the WRtP to go in the direction of the safe trees. The female leapt from the tree before it was fully descended. She ran along the base of the fence for 20m, then climbed the fence. There she was hand-captured and carried to a large safe Agonis where she was released. She ran up this and into a large Tuart alongside. The young animal remained in the small Agonis until this was at waist height and tree still restrained in the grabbing arm of the excavator. This animal was also hand-captured and carried to the same tree for release. It ran to the dead topmost branches of this tree and went as close as it could to the female in the next tree. After about 40 minutes, the young animal had disappeared and was cuddled up with female on bare branch of Tuart. The artificial drey, containing the WRtP's original drey, was installed in the safe Agonis at a height of about 5m.	

11/18/2020	[redacted]	POSSMOVE1	[redacted]	1 adult	Drey in top of Acacia saligna at height of about 10m. Animal remained in drey as all other trees removed. Branch bearing drey angled away from fence so difficult to push canopy containing drey into safe trees across the bike path	All surrounding trees and most lower branches of tall Acacia removed. Excavator succeeded in pushing canopy containing drey in the direction of the path, and then held it at about chest height with WRtP still in drey. Branch below drey then cut with handsaw and drey, with possum, carried to a safe tree approx. 10 m away. WRtP ran up safe tree and disappeared into canopy. Drey intalled at about 4m in a fork in safe tree.	S72
11/19/2020	[redacted]	POSSMOV2	[redacted]	2 Adult female and large joey	A large drey in the top of an Agonis. Drey looked fairly dense, so animals were suspected to be present, however animals did not appear until tree was felled.	All surrounding trees and lower branches removed. Tree then pushed over slowly on the basis that animals might be present, although none seen during the noisy clearing process and despite the tree swaying around; violently at times. The tree was felled through a gap created in the fence but the drey was well-buffered by the canopy. When examined	Drey installed in Kunzea S26

						closely, two WRtP present. One left quickly and ran up a *Kunzea*. The other remained in the drey as we cut the drey out and tried to drag it into the safe area, but *Hardenbergia* tangled everything. Second WRtP then left drey and climbed a *Kunzea*. Drey installed in a *Kunzea*. Both animals stayed in the Kunzeas.	
11/20/2020	[redacted]	**TWOPOSS (probably the same animals as POSSMOV2)**	[redacted]	2 Two adults - thought to be the same animals as POSSMOV2 from 19/11/2020	Two adults on bare branches of Agonis; only about 30m from where two animals moved the previous day. One was greyish; the other very brown (identical to the animals recorded as POSSMOV2), so almost certainly the same two animals had moved back	First animal came down in canopy as this was gently lowered, but refused to leave canopy and was 5m from a safe tree. The animal was netted, grasped through the net and carried to safe tree. Second animal remained in canopy when this was lowered, and climbed to the outmost dead twigs at head height. Net held out to it and it climbed onto the net and was carried to safe tree, where it climbed off slowly into the tree.	

					into the clearing zone		
11/19/2020	[redacted]	**POSSMOV3**	[redacted]	1 Single adult; appeared female	A fairly small, low drey in an Agonis. Initially thought to be empty but the WRtP quickly left drey at the first disturbance. It clambered round the canopy of the Agonis.	Single male WRtP in drey *in A. flexuosa*. Moved into canopy and this brought down gently; WRtP walked into Watsonia in safe zone then climbed into a *Kunzea*. Drey moved into nearby *Kunzea*.	Drey moved S27
11/19/2020	[redacted]	**TWODREYS**	[redacted]	1 Single adult male	Two large dreys in an Agonis. Neither could be confirmed to contain a WRtP but an animal emerged from one of the dreys shortly after disturbance around the tree began. It	Usual procedure followed: surrounding trees and bushes and low branches removed, fence opened up and tree wih WRtP in canopy pushed towards gap in fence and thus safe zone. When the canopy and WRtP were at about head height, the structure of the tree meant that the WRtP could not be brought any closer to the ground, and it was short of a safe tree by about 5m. With the WRtP at the end of a dead stem, the	Parts installed in Kunzea S29

					remained in the canopy and actually returned to the drey as the tree was coming down, although did not actually enter the drey.	net was held out to it and it climbed onto the net. It was then carried on the net into the safe zone and to a safe tree. The drey was not very solid but parts of it were installed into a *Kunzea*.	
11/23/2020	[redacted]			No Possums		Supervised clearing and checked trees	
11/23/2020	[redacted]	**DAGPO4**	[redacted]	2 (mother & subadult joey)	There was a large drey containing mother and	All trees surrounding were removed and an artificial drey was installed below the possums. I then disturbed the	

	[redacted]				joey (subadult). Unfortunately, there was no direct canopy connectivity to trees outside of the clearing area as was the case in previous weeks.	possums by rustling the drey so they would move out. It took some convincing but the 2 possums climbed out and settled high in the canopy. We then left them with the hope that they would use the artificial drey.	
11/24/2020	[redacted]	**DAGPO4**		1 (joey but not mother)		Artificial drey was checked and joey was inside but not mother. The fauna bag was placed over the drey and taken to the other side of College Ave and placed in a Peppermint tree. WP: DAG04R. When the bag was taken off, the joey came out and sat on the drey for a few minutes, then returned to the drey.	
11/24/2020	[redacted]	**DAGPO1**	[redacted]		Drey but no possum	The excavator driver was able to gently lower the drey down to the ground but no possums were inside. The drey was flimsy and was not salvaged.	

	[redacted]						
	[redacted]	DAGPO	[redacted]	2 (mother & joey)	Mother and young in drey	The excavator driver used the machine to lean the tree with drey on to another tree outside of the clearing area. With some encouragement (a gentle poke with a pole) the mother and joey moved through the canopy onto the neighbouring tree into safety. The drey was salvaged and relocated 30 metres away – WP: S82	S82
11/24/2020	[redacted]					several peppermints and 2 eucalypts were removed by the arborists, none of which had signs of possums. There was a large flooded gum (E.rudis01) with several large hollows ideal for possums. The arborist was planning to climb the tree to look for hollows	

						until a beehive was spotted. A decision was made to deal with the hive in the morning when the bees are less active.	
11/25/2020	[redacted]	**E.rudis01**	[redacted]	3 possums	3 possums all in hollows in large Flooded Gum	The arborists poisoned the bees in the large Flooded Gum and waited until it took effect. Working with the arborists, each potential hollow in the tree was checked. In the end 3 WRt possums were found in hollows. The first was a small spout about 6 metres above the ground in which the possum was about 30cm in the hollow. the spout was blocked with cloth, the limb was cut well below where the possum was located and safely hoisted to the ground using a pulley system. The 2nd possum was located in a shallow hollow in the fork of the tree 3 metres above the ground. The limbs were too big to cut out and lower, so the possum was captured and bagged, kept in a protected, shaded area. The 3rd possum was in a hollow in one of the main trunks about 10 metres from the ground. This possum was similarly	S63, S64, S65

						dealt as the 1st – stuffed hollow with bag, cut well below possum and slowly lowered down. All three possums were relocated a few hundred metres NW to fringing vegetation along Vasse-Wonnerup estuary where large Flooded Gum, peppermints and Melaleuca were present. The 2 hollows were hoisted up attached to the trunk of flooded gums about 5 metres above the ground, on the NE side of the tree to avoid the worst weather (WP: S64 and S65). The third possum was released onto the trunk of a flooded gum where it climbed up into a neighbouring peppermint tree. An artificial drey was placed in the peppermint (WP: S63).	
11/25/2020	[redacted]	**DMELPO4**	[redacted]	1 male WRTP	Male in Drey in *Melaleuca*	One *Melaleuca* had a Male possum in a drey that we disturbed from its drey and tried to catch but no luck. From about 3 metres it jumped to the ground and scrambled into the thick scrub. About 10 minutes later we	

						found it up a small tree, After making an attempt to catch it, it was decided that it was better to leave it alone and put up 2 artificial dreys.	
11/26/2020		**DMELPO4**			Artificial dreys empty	The surrounding vegetation was also clear of possums.	S62
						The excavator worked through the first 100 metres of bush quite quickly until we encountered 2 occupied dreys, both were in *Melaleuca*. First, the excavator cleared the bushland around the tree and flattened the grass to limit the hiding spots.	
11/26/2020	[redacted]	**DMELPO1**	[redacted]	1		The drey was quite low down and would have be able to reach it with a ladder if the possum remained undisturbed. Unfortunately, the possum woke up and climbed to the top of the shrub. The stems of the shrub were narrow so the digger was not needed. By hand, the excavator driver pulled the stem that the possum was on down towards the ground. I was waiting there with a net and a third person positioned himself in front of a log pile to	Poss Release Point: 50H 344706.4 6274252.173 S59

						prevent the possum from going to ground. When the stem was at about a 45 degree angle, the possum jumped into the net, I hand-captured it and bagged it. It was then released in bushland in between the Water Corp depot and Vasse-Wonnerup estuary on the other side of Queen Elizabeth (WP: Poss release point). It was a male. That area contained several large peppermints with good canopy connectivity.	
11/26/2020	[redacted]	**DMELCUT1**	[redacted]	2		This drey was higher up and tree was sturdier so the digger was needed. The excavator slowly leant the tree over, mid-lean a possum exited the drey and climbed to the end of the branch. With one person keeping an eye on the rouge possum, the excavator driver brought the tree down further to the point where the drey could be searched to find a Joey, which was quickly hand-captured and bagged. The mother was at chest height on the other side of the branch so I moved around and hand-	S55, S58

						captured and bagged her as well. Both mother and joey were released into the same patch of bushland (WP: Poss release point). It was decided that no more clearing would be undertaken today so the mulcher could catch up and get rid of the remaining green waste.	
11/27/2020	[redacted]	DAGPO13	[redacted]	1		The excavator cleared trees around the drey which disturbed the possum. It moved a few trees along and went to the tallest part of the tallest tree. Once clearing around this tree was undertaken, The excavator gently grabbed the trunk and lowered it to the ground. 2 helpers were on hand to surround the possum if it went to ground. A risk of being so close to the road was the possum could track in that direction so the helpers did their best to block that pathway. At about 2 metres, the possum leapt to the ground and it was captured and put in the bag. The possum was a Female with no	S60, S61

						pouch young, it had a scar on its back in-between the back and tail. It was released across the road, north of the Water Corp depot and its drey was relocated (S61).	
11/27/2020	[redacted]	**DAGPO21**	[redacted]		No possum	Drey relocated to S56	S56

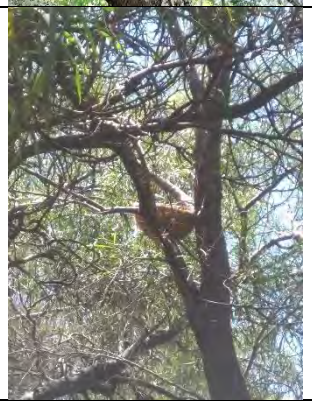
Appendix 4. Table showing relocated and artificial dreys and logs installed in safe areas of the project area. Types of shelters are:

DoCo= Dome with coconut fibre (and Agonis leaves), Dom = Dome (with Agonis leaves only), CuCo = Cup with coconut fibre, Cup = Cup (with Agonis leaves only), Buc = Plastic Bucket, Hol = Hollow, Nat = Relocated Natural Drey. Poss. = number of Possums observed using the shelter. The locations of each shelter are plotted in Figures 4 and 5.

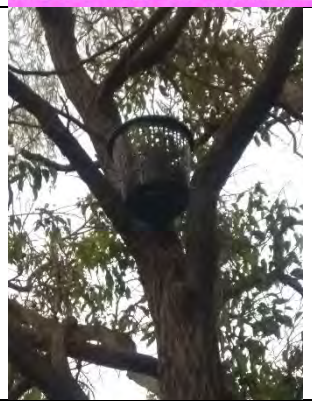
ID	Easting	Northing	Type	Tree	Poss.	Used	Photos	Notes
S1	[redacted]		DoCo	E. rudis	0	Unused		Collapsed coconut, very close to edge of works
S2			Dom	A. flexuosa	0	Unused		Very close to edge of works

S3	[redacted]		Dom	A. flexuosa	0	Unused		old leaves only
S4			DoCo	E. rudis	0	Unused		Coconut collapsed – needs repair

S5	[redacted]	[redacted]	Dom	E. rudis	0	Unused	 	Old Agonis, Dense
S6	[redacted]	[redacted]	DoCo	C. calophylla	0	Used		some newer Agonis leaves, likely recent use - Rattus burst out of drey when checked

								
S7	[redacted]	[redacted]	Dom	A. flexuosa	0	Unused		Only old leaves in drey
S8	[redacted]	[redacted]	CuCo	A. flexuosa	0	Unused		old leaves only

								
S9	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Blown down
S10	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Degraded

S11	[redacted]	[redacted]	Cup	A. flexuosa	0	Unused		Old leaves only
S12	[redacted]	[redacted]	Buc	E. marginata	0	Unused		empty

								
S13	[redacted]	[redacted]	CuCo	A. flexuosa	0	Unused	 	dry Agonis leaves

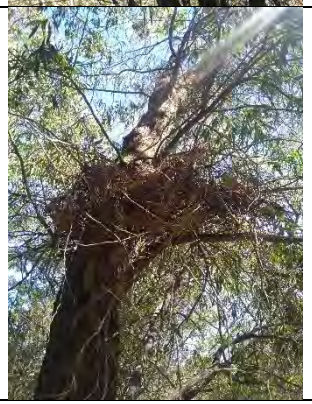
S14	[redacted]	Cup	A. flexuosa	0	Unused		Lots of dead leaves
S15		Buc	A. flexuosa	0	Unused		Few leaves
S16		Nat	A. flexuosa	0	Unused		degraded

S17	[redacted]	[redacted]	CuCo	A. flexuosa	0	Unused	 	Lots of brown, old leaves
S18	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Brown old Agonis

S19	[redacted]	Cup	A. flexuosa	0	Unused		Exposed location
S20		Buc	A. flexuosa	0	Unused		Dead leaves, no evidence of use
S21		CuCo	A. flexuosa	0	Unused		lots of dead Agonis leaves, pole camera photo taken

S22	[redacted]	Nat	A. flexuosa	0	Unused		Platform still there but disused
S23		Cup	A. flexuosa	0	Unused		Leaves mostly gone
S24		DoCo	C. calophylla	0	Unused		coconut collapsed

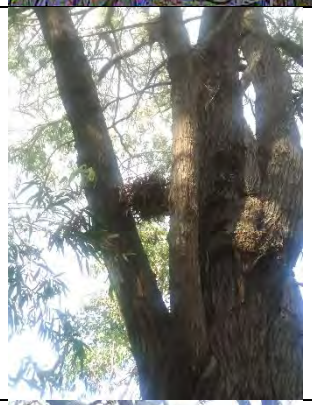
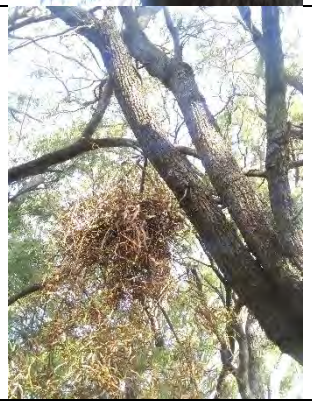
								
S25	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		No fresh Agonis
S26	[redacted]	[redacted]3779	Nat	Kunzea sp.	0	Unused		in good condition

S27	[redacted]	Nat	Kunzea sp.	0	Unused		Collapsed
S28		Nat	Kunzea sp.	0	Used		light leaf cover but possibly used
S29		Nat	A. flexuosa	0	Unused		Degraded

S30	[redacted]	[redacted]	CuCo	C. calophylla	0	Used	 	been used but empty. Coconut collapsed
S31	[redacted]	[redacted]	Cup	C. calophylla	0	Unused		few leaves

S32	[redacted]	[redacted]	CuCo	A. flexuosa	0	Used	 	may have been used
S33	[redacted]	[redacted]	Dom	A. flexuosa	0	Unused		Old leaves

								
S34	[redacted]	[redacted]	Buc	A. flexuosa	0	Unused		Few leaves
S35	[redacted]	[redacted]	DoCo	A. saligna	0	Unused		

								
S36	[redacted]	[redacted]	Cup	A. flexuosa	0	Unused		Few leaves
S37	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Falling down

S38	[redacted]	[redacted]	Nat	A. flexuosa	1	Used		Only old leaves seen from outside but drey in good condition, possum inside
S39	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Old leaves but still in good condition

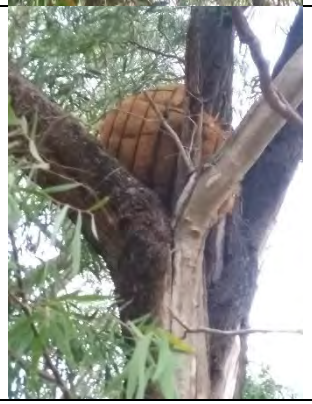
S40	[redacted]	[redacted]	Cuco	A. flexuosa	0	Unused	 	Old leaves
S41	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Degraded, still some Agonis leaves in it

S42	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Degraded
S43	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Large drey, good condition
S44	[redacted]	[redacted]	Buc	A. flexuosa	0	Unused		Old leaves

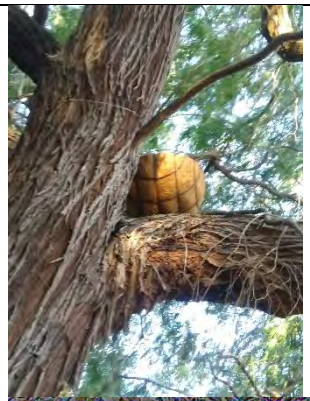
S45	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused	No photo	Good condition, old leaves
S46	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused	 	Good condition
S47	[redacted]	[redacted]	Nat	A. flexuosa	0	Unused		Degraded

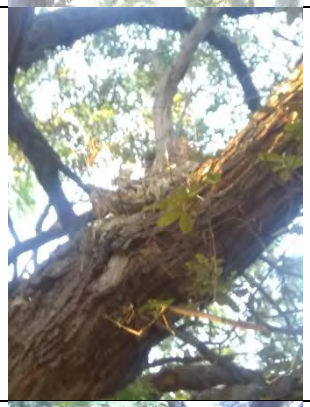
S48	[redacted]	Cup	A. flexuosa	0	Unused		Old leaves
S49		CuCo	A. flexuosa	0	Used		Coconut Base pulled out
S50		Buc	A. flexuosa	0	Unused		No evidence of use

S51	[redacted]		Cup	A. flexuosa	0	Unused	 	Lots of old leaves
S52			CuCo	A. flexuosa	0	Unused		Few leaves left

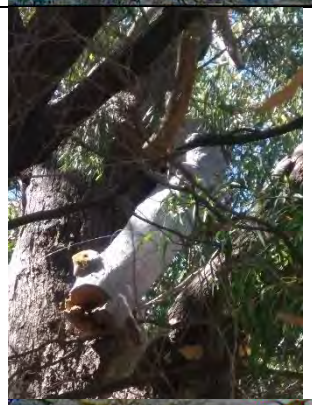
	[redacted]							
S53			Cup	A. flexuosa	0	Unused		few leaves
S54			DoCo	A. flexuosa	0	Unused		Artificial Drey originally installed at D05R but then relocated to D23H, material had been rearranged - possible possum use but empty on 25/01/21

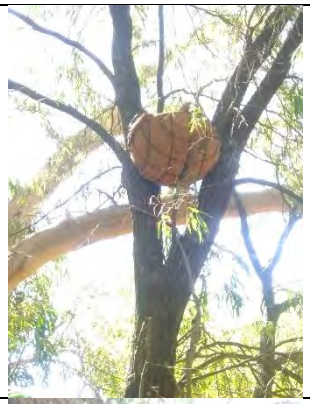
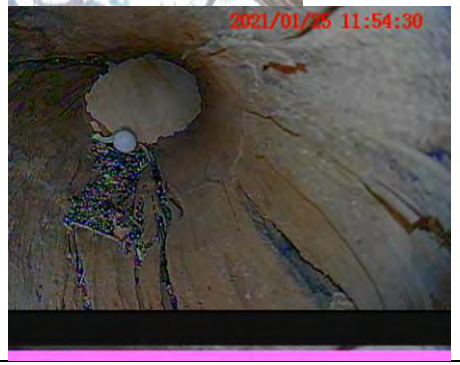
	[redacted]							
S55			DoCo	M. cuticularis	0	Unused		Collapsed Difficult for possum to enter – needs repair
S56			Nat	A. flexuosa	0	Unused		Large Agonis

S57	[redacted]	CuCo	A. flexuosa	0	Unused	 	Large Agonis, very full, old drey inserted into shelter
S58		Cup	A. flexuosa	0	Used		Fresh leaves present, likely used, but empty when checked

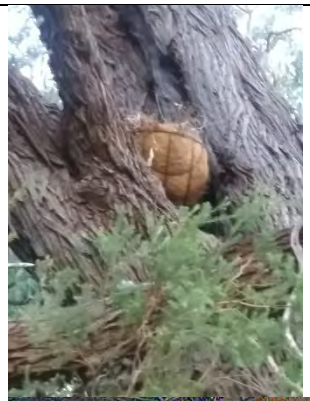
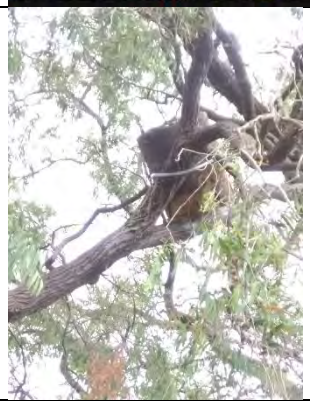
S59	[redacted]	Nat	A. flexuosa	0	Unused		Still some Agonis leaves
S60		Cup	A. flexuosa		Unused		Still some Agonis leaves
S61		DoCo	A. flexuosa	0	Unused		Coconut collapsed – needs repair

S62	[redacted]	DoCo	A. flexuosa	0	Unused	 	Coconut collapsed – needs repair
S63	[redacted]	Hol	E. patens	0	Unused		Approx. 8m high, relocated from E. rudis in Links Ct

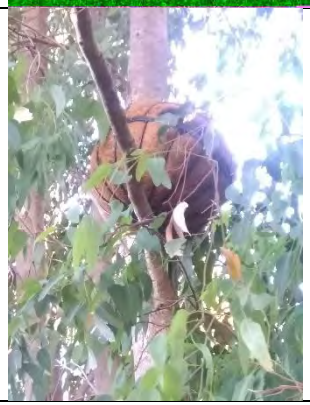
								
S64	[redacted]	[redacted]	Hol	E. patens	0	Unused	 	relocated from E. rudis in Links Ct

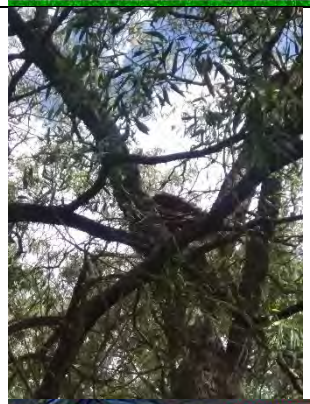
S65	[redacted]		DoCo	A. flexuosa	0	Unused		Coconut dome collapsed
S66			Hol	C. calophylla	0	Unused	 	pigeon egg inside, another broken on ground below

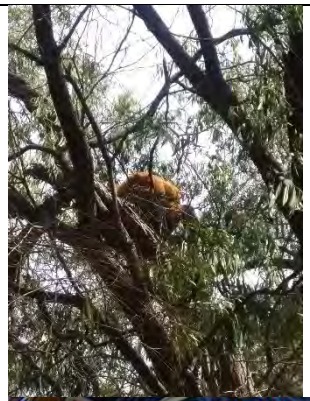
S67	[redacted]		Cup	E. marginata	0	Unused		few old leaves
S68			DoCo	A. flexuosa	0	Used	 	coconut taken and placed further up tree, some blown down

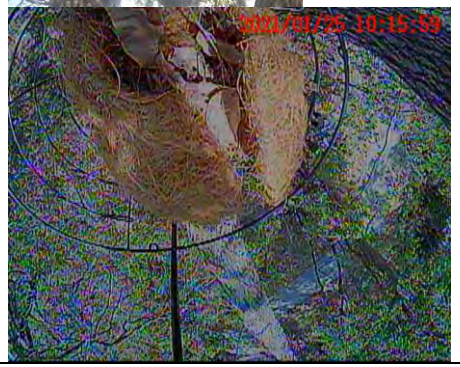
S69	[redacted]	DoCo	A. flexuosa	0	Unused	 	natural drey inserted into artificial drey, Coconut collapsed
S70		Hol	A. flexuosa	1	Used		Possum in base of log

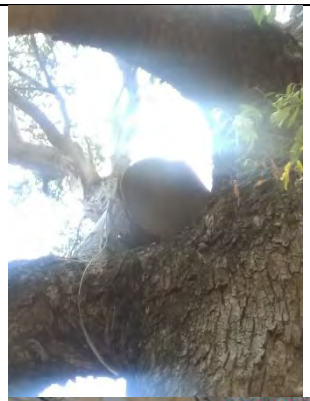
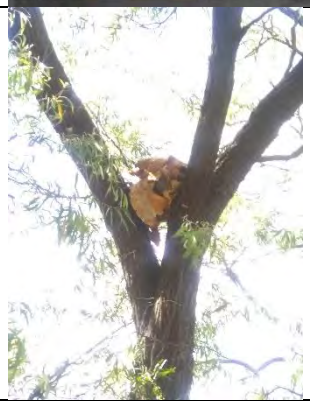
								
S71	[redacted]	[redacted]	CuCo	A. flexuosa	0	Used	 	coconut rearranged, removed from base
S72	[redacted]	[redacted]	Nat				No photo	RELOCATED DREY NOT FOUND

S73	[redacted]	Hol	A. flexuosa	0	Unused	 	A few old leaves only
S74		DoCo	E. rudis	0	Used		coconut still in good condition, looks like it has been used, although not very recently

								
S75	[redacted]	[redacted]	Hol	A. flexuosa	0	Used	 	Slightly green leaves in bottom, probably used but not recently

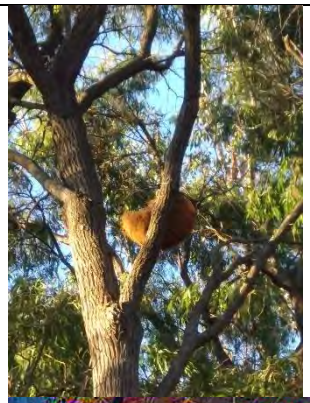
S76	[redacted]		DoCo	A. flexuosa	1	Used	 	coconut rearranged – visible from the outside, possum inside
S77			Hol	C. calophylla	1	Used		Possum inside

								
S78	[redacted]	[redacted]	CuCo	C. calophylla	0	Unused	 	coconut collapsed. Needs repair

S79	[redacted]	[redacted]	Hol	E. rudis	1	Used	 	Possum in back of log
S80	[redacted]	[redacted]	DoCo	A. flexuosa	1	Used		Klara's Lodge. Paperbark had been rearranged – visible from outside, possum inside.

								
S81	[redacted]		Hol	A. flexuosa	0	Unused		
S82			Nat	A. flexuosa	0	Unused		Dry, collapsed

S83	[redacted]	Hol	C. calophylla	0	Unused		
S84		Nat	Ground	0	Unused		On ground, blown out of tree
S85		DoCo	E. marginata	0	Unused		Coconut collapsed – needs repair

S86	[redacted]	DoCo	C. calophylla	0	Unused	 	
S87		Cup	A. flexuosa	0	Unused		In Large Agonis

Appendix 5. Possum notes from Vasse Diversion Drain Monitoring, January 2021 (not in artificial shelters). See also Figure 6.

ID	Date	Easting	Northing	Possums	Notes
WP1	22/01/2021	[redacted]		1	Same hollow as possum from DEUCP1 used when displaced - good that it was retained
WP2	22/01/2021			1	Mother still in drey immediately adjacent to clearing area, great that this was left
WP3	22/01/2021			1	Joey drey next to 49
WP4	20/01/2021			1	Possum near drey 57
WP5	21/01/2021			1	Adult animal on top / next to drey overlooking clearing area. Good to have kept this tree and drey.
WP7	17/11/2020			0	Old drey, retained
WP8	17/11/2020			0	Old drey, retained
WP9	25/01/2021			0	Natural drey, no possum
WP10	25/01/2021			2	Two possums in natural drey in Banksia attenuata
WP11	25/01/2021			0	Natural drey, no possum
WP12	25/01/2021			0	Natural drey, no possum
WP13	25/01/2021			1	Possum, not in drey
WP15	25/01/2021			0	Natural drey
WP16	25/01/2021			1	Possum, not in drey
WP17	25/01/2021			1	Possum in drey
WP18	25/01/2021			0	Natural drey, no possum
WP19	25/01/2021			0	Natural drey, no possum
WP20	22/01/2021			1	Likely occupied
WP21	22/01/2021			1	One possum in natural drey
WP22	25/01/2021			1	Natural drey with possum
WP23	22/01/2021			2	Two possums in natural drey
WP24	22/01/2021			2	Very low down - approx. 1.5 m
WP25	22/01/2021			0	NOT MOVED - but has deteriorated
WP26	25/01/2021			1	Possum, not in drey

WP27	21/01/2021	[redacted]	0	Three old, collapsed dreys on boundary formerly D04Bound
WP28	21/01/2021		0	Two old dreys high in the tree, one Bronzewing Pigeon nest low down - note 63 (not 636) in notes, and DO Out in original study
WP29	21/01/2021		1	Single possum, not in drey
WP30	24/01/2021		1	Possum, spotlighted
WP31	24/01/2021		1	Possum, spotlighted
WP33	24/01/2021		2	Possum, spotlighted
WP34	24/01/2021		1	Brushtail possum, spotlighted
WP35	25/01/2021		0	Natural drey, no possum
WP36	21/01/2021		1	Adult possum, near joey
WP37	21/01/2021		1	Possum joey, near mother
WP38	21/01/2021		1	Possum, not in drey
WP39	21/01/2021		2	Two possums in natural drey
WP40	21/01/2021		1	Possum
WP41	25/01/2021		1	Natural drey with possum

Monitoring of the Western Ringtail Possum following Clearing along the Vasse Diversion Drain, Busselton

Year One

January 2021 – January 2022



Image 1: Western Ringtail Possum adult with juvenile using rope bridge (J Bamford)

Prepared for: Water Corporation
PO Box 210,
Mandurah, WA, 6210

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12th June 2022

Executive Summary

The Water Corporation widened the Vasse Diversion Drain in Busselton in 2020 - 2021 for flood mitigation, and since the conservation significant Western Ringtail Possum occurs in remnant vegetation that was impacted by drain widening, Bamford Consulting Ecologists was commissioned to undertake the displacement of possums prior to clearing along the drain in two areas: a [redacted]). BCE was also commissioned to conduct ongoing monitoring of the population and their use of installed shelters and rope bridges over a ten-year period, as a condition of the approval of the drain widening project. This report covers the first year of post-disturbance monitoring (January 2021 – January 2022).

Of the 43ha project area surveyed in 2019 prior to the project's approval, where 206 dreys and at least 66 possums were recorded, only 1.9ha was cleared in 2020. Forty-one dreys and hollows and 36 possums were identified in the impact area prior to clearing. Prior to and during clearing in November 2020, all possums were successfully relocated into adjacent vegetation without mortality or injury. Of the 41 dreys found, 23 were able to be relocated, and a further 63 artificial shelters (dreys and hollows) have been installed, making a total of 87 new shelter locations (a commitment was made to provide 82 additional shelters). Rope bridges were also installed along the north side of the drain adjacent to [redacted] and [redacted] to increase connectivity and reduce the need for possums to go to the ground to travel between trees, where they are at risk of predation by foxes, cats and dogs.

Since most possums could remain within their home ranges, handling was avoided where possible to minimise stress. In most cases, animals could be displaced into adjacent vegetation without handling them. Trees were checked and animals displaced immediately prior to clearing, to avoid them returning to the clearing area. Eleven possums had to be hand-captured and moved; four were moved without touching them, while contained within or holding onto the top of an artificial or natural drey; two were moved while within hollows; and two were moved by encouraging them to climb onto the net and carrying them to safety while perched on top of the net. The remaining 17 were displaced by gently disturbing them from their dreys and herding them to adjacent, safe trees. Clearing debris was then removed immediately to prevent animals trying to return.

Six monitoring periods were undertaken during Year One; January, March, April / May, August, September 2021, and January 2022. There were 38 possums recorded in the area adjacent to works in January 2021, following the disturbance. The numbers remained remarkably stable, with a minimum of 31 recorded in March 2021, which is consistent with the dispersal of juveniles, and had increased to 45 in January 2022. This increase may be due to the provision of additional shelters, or a result of the wet spring, which may have improved the quality of food plants available to the animals. It seems likely that many of the animals found during monitoring are those who were displaced from the impact area but have stayed within their remaining home ranges.

In January 2021 14 possums were found on branches, not associated with shelters, however by January 2022, although several animals were at the entrances of shelters or outside because of hot weather, all were associated with shelters.

Both Brushtail and Western Ringtail Possums were recorded using rope bridges, indicating that the design is successful. Future monitoring of rope bridges will determine which bridges are used most often, and the extent to which they are contributing to connectivity.

Relocated dreys were used initially then most became disused, except for two, which were still in use in September 2021. One of these was still being maintained in January 2022.

Artificial shelters were used consistently throughout the year. Twelve to 18% of possums located during monitoring periods were using artificial shelters. The lowest usage was during the September monitoring period, when mothers have large joeys, and probably prefer natural dreys which they can 'extend'. Artificial 'short hollows' were the most commonly occupied (80% were used in at least one monitoring period) with plastic filter buckets also being surprisingly popular (60%). Coconut-lined dreys were used until possums harvested the coconut for use elsewhere, after which they were less attractive. Artificial shelters lined with paperbark and coconut appear more attractive and lasted longer than coconut alone, however additional trials will need to be made to confirm this due to the small sample size (only 2 dreys due to the availability of sustainably sourced paperbark)

Unlike the results of monitoring along the Vasse Diversion Drain between [redacted], possums have not been detected in any of the artificial dreys at the VROS since March 2021. It is likely that fragmentation of the area has made it unsuitable for possums, and this is likely to continue unless revegetation occurs in collaboration with the farmers adjacent to the site.

Tranen Revegetation SouthWest is continuing revegetation work, which will provide increased food and connectivity. Once vegetation has established, it should also provide additional locations for natural dreys to be constructed, and possibly result in an increase in the population of possums. Additional dreys and an increase in possum numbers should be detectable within the ten-year monitoring timeframe for the project.

Relocated natural dreys performed an important function immediately following displacement of the possums but will need replacement as they deteriorate to maintain the numbers of additional dreys provided, as committed to as part of approvals for the project. While this is a requirement, the possums are now constructing their own dreys, so it will be interesting to see if increasing the numbers of artificial dreys increases usage of them.

Revegetation should proceed as quickly as practical to ensure the animals continue to have sufficient food resources to support them during lean times. The increased connectivity provided by plantings will also allow possums to move between the population along the drain and the rest of Busselton, improving the species' long-term viability in the area.

Results of the first year of monitoring suggest that the displacement and disturbance due to drain works had not greatly impacted possum numbers, that artificial shelters are helping to

house the population and that rope bridges are of a suitable design to keep possums off the ground and improve connectivity. Future work will help to better assess these initial findings, and effects of revegetation work, which is likely to provide significant positive impact within the next ten years.

INTRODUCTION

The Water Corporation manages a network of drains in the vicinity of Busselton and in October 2020 – April 2021 works were undertaken to widen the Vasse Diversion Drain for flood mitigation. This widening affected some vegetation alongside the drain, but not the full width of this vegetation. An Environmental Impact Assessment conducted by GHD (2017) found that the Western Ringtail Possum *Pseudocheirus occidentalis*, which is a listed conservation significant species (Critically Endangered under both the Federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Western Australian Biodiversity Conservation Act 2016*) occurred in vegetation adjacent to the drain. Widening of the drain could affect >0.5ha of what might be primary corridor habitat for the species (*sensu* DEWHA 2009) and based on EPBC Act Policy Statement 3.10 (DEWHA 2009), this would be a significant impact. Therefore, the Department of Biodiversity, Conservation and Attractions requested the Water Corporation provide more information on the distribution and abundance of this species along the drain. Bamford Consulting Ecologists was commissioned to undertake this work in 2019.

The Vasse Drain Diversion Upgrade project was assessed Bilaterally by the DWER Native Vegetation branch under Part V of the EP Act [WA] and by AWE under the EPBC Act 1999 [Cwth] and the project was referred under the *EPBC Act* (Cwth). The project is a '*Controlled Action*,' so all activities must be undertaken in compliance with conditions set in the EPBC 2017/7932 Approval Conditions.

Following surveys of the 43ha project area in March 2019, where 206 dreys and at least 66 possums were recorded, areas were revised and only 2.16ha was identified as the impact area to be cleared in 2020.

A Fauna Management Plan for the Vasse Diversion Drain Upgrade was developed by Bamford Consulting Ecologists as part of the Approvals process and provides a detailed description of commitments and approach, as well as a summary of current research on Western Ringtail Possums and their requirements (Bamford et al., 2020). Implementation of the plan commenced in October 2020, prior to works commencing.

The Water Corporation committed to revegetation to re-establish and improve connectivity of vegetation, and the installation of rope bridges and fauna shelters, including ten years of maintenance and monitoring with the aim that any long-term effect of the works will be a positive one. Bamford Consulting Ecologists was commissioned to undertake relocation and subsequent monitoring of fauna in response to the disturbance and amelioration activities. The agreed approach was to gently displace the animals from the clearing zone but keep them within their home ranges where possible. By avoiding or minimising handling, personnel were able to keep stress to the animals to a minimum. Cowan et al. (2020), links the poor survival of relocated animals to the stress associated with their capture, handling and transport. Studies of Western Ringtail Possums report high mortality of relocated animals (Clarke, 2011, Thompson & Thompson, 2009). Transfer of parasites (Dunlop & Watson. 2022) can also occur when animals are moved out of their home ranges. Since the disturbance

was only to affect a narrow area, displacement, rather than translocation was the preferred option.

Western Ringtail Possums are nocturnal and shelter in tree hollows, or build shelters called 'dreys' in which they sleep during the day. Dreys are clumps of twigs and leaves that are generally quite conspicuous and placed in the mid canopy of trees (See Images 8 & 9 in Appendix 1). A possum may have five to eight dreys across a home range of 0.5 – 1.5ha, and home ranges overlap (Jones, 2000).

Clearing works were carried out from October to December 2020 and construction was completed in April 2021. Artificial shelters were installed, Western Ringtail Possums and other fauna were displaced from the clearing areas in October and November 2020, and a survey was carried out in January 2021 to make a preliminary assessment of the shelters and the possum population following displacement. Monitoring of possums and their use of shelters and rope bridges has continued during 2021 – 2022 and this report covers Year One of the study; the period of January 2021 to January 2022.

Over its ten-year period, the monitoring program aims to determine:

- the effects of disturbance on the numbers and distribution of Western Ringtail Possums adjacent to the disturbance areas along the Vasse Diversion Drain.
- Whether artificial shelters are used by possums and can contribute to the maintenance of the population, post disturbance
- Which shelter designs are preferred by Western Ringtail Possums,
- Whether rope bridges will be used by possums and are therefore effective in improving connectivity in a disturbed landscape
- Whether revegetation is being accessed by possums and results in increased habitat for the species during a ten-year period.

This Year One report analyses data collected to date to inform these questions.

METHODS

Description of Project Area

The project area consists of land along two parts of the Vasse Diversion Drain (Figure 1). The northern area lies between the Busselton Bypass Road in the south and Bussell Highway in the north and includes some extra land in small reserves to the south of the drain. Much of the vegetation consists of Peppermint *Agonis flexuosa* forest and woodland, with varying proportions of Marri *Corymbia calophylla*, Flooded Gum *Eucalyptus rudis*, Jarrah *Eucalyptus marginata,* Coojong *Acacia saligna,* Swamp Banksia *Banksia littoralis*, Modong *Melaleuca priessiana* (Saltwater Paperbark *Melaleuca cuticularis* where the drain crosses The Broadwater), Spearwood *Kunzea* sp., and occasional other tree and tall shrub species. The understorey is generally in poor condition. Vegetation is in best condition on the south side of

the drain, between [redacted] and the [redacted]. Open areas of weedy grasses are present, although these are being managed as part of rehabilitation.

The southern area lies adjacent to the [redacted] Rd and includes land on the [redacted], as well as encompassing a section of the Vasse River. This is the site of the Vasse River Overflow Structure (VROS). The vegetation is generally degraded and in places parkland cleared and grazed, with an open woodland of Peppermint and Flooded Gum, some planted, non-native eucalypts and some riparian woodland along the Vasse River The trees which provided some connectivity through the site were removed for construction of the VROS, so the remaining vegetation is fragmented (see Figure 1c).

The total area cleared was 1.9ha (see Figure 1 a, b and c), however the project area for this study also includes sites in adjacent bushland and rehabilitation areas into which artificial shelters, relocated dreys and rope bridges have been installed, and will increasingly include the rehabilitation areas as plantings mature and become attractive to possums.

(a)


LEGEND
Approved Clearing Area
1:5,000 at A4
0 40 80 120
Metres
Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD
N
WATER
CD00116
Vasse Diversion Drain
Equivalent to part of Plan 8191/1 a

(b)


LEGEND
Approved Clearing Area
1:5,500 at A4
0 50 100 150
Metres
Coordinate System: GDA 1994 MGA Zone 50
Vertical Datum: AHD
N
WATER
CD00116
Vasse Diversion Drain
Equivalent to part of Plan 8191/1 a

(c)



Figure 1 (a,b,c). *The project areas. The northern site (a and b) stretches from Busselton Bypass Road in the south to Queen Elizabeth Avenue in the north. Figure 1(c)shows the Vasse River Overflow Structure (VROS) site. Areas that were cleared are hatched yellow.*

Approach

This report covers the first year of a ten-year study following the disturbance and relocation of possums due to clearing. All relocation work was carried out in accordance with the Fauna Management Plan for the Vasse Diversion Drain Upgrade (Bamford et al., 2020) and focussed on minimal disturbance to the animals. During clearing, animals had been displaced as little as possible, ideally within their existing home ranges, while moving them from the impact area. In most cases, this was able to be done without capturing the possums, to minimise disturbance and stress to the animals. Thirty-six possums were displaced from the clearing area during operations. All animals were relocated successfully without injury or mortality. In most cases, the animals were moved no more than 20 metres and in some cases as little as five metres. Details of the displacement techniques employed are given in Bamford et al. (2021).

Since most animals were not handled, they were not individually marked, so assessment of the population is undertaken by recording numbers and locations of animals and dreys. Given the sedentary nature of most of the animals, this is likely to be an accurate measure of the impact due to clearing and means that disturbance of the animals (and confounding of the results by the impacts of handling) has been kept to an absolute minimum.

Rope bridges are monitored using motion sensitive cameras, observation and scat records to search for evidence of use.

Survey methods

Monitoring is undertaken by Amanda (Mandy) Bamford (B.Sc. Hons. Zool.) and Mike Bamford (B.Sc. Hons. Ph.D. Biol.). Mandy and Mike have many years of experience in management of the Western Ringtail Possum (hereafter referred to as possum). The work was carried out under DBCA Permit numbers TFA 2020-0149 and FR28000164, undertaken with reference to the Fauna Management Plan for the Vasse Diversion Drain Upgrade (Bamford et al, 2020) and informed by observations in Bamford et al (2021). Field assistance was provided by Jake Bamford (B.C.I.) and Joshua Bamford (B.Sc. B.Mus. Hons. M.A.), and Data Management was undertaken by Joshua Bamford.

Possum monitoring was carried out in January, March, April / May, August, and September 2021, and January 2022. Monitoring was carried on fine days once the sun was up to protect camera equipment and minimise disturbance to possums. Previous experience (Bamford pers. obs.) is that possums are often only dozing on overcast days or at first light and are easily disturbed. In bright sunlight they are usually firmly asleep and dreys may be checked without disturbing them. All artificial shelters and relocated natural dreys were checked with binoculars or a pole camera to assess their status and check for possums. Natural dreys, hollows and possums sighted out of dreys adjacent to the cleared area were also recorded opportunistically. Recognising that it was important to minimise disturbance during monitoring, the pole camera was used for the minimal time, and just close enough to check for activity and take a photo, to disturb the animals as briefly as possible. In some natural dreys, it was not possible to access the drey using the pole camera without disturbing the animal, in which case the drey was checked using binoculars.

Handling of Fauna

No fauna requires handling as part of the post disturbance monitoring phase of the project. Checking of dreys is done with minimal disturbance and cameras are unbaited, so do not alter the behaviour of the animals. Bamford Consulting Ecologists operates under Scientific Use Licence U261 2021-2022 and if animals require handling for any reason, personnel use techniques outlined in the Fauna Sampling Manual by Bamford et al. (2013).

Relocated and Artificial Dreys

As outlined in the Fauna Management Plan (Bamford et al., 2020), a range of shelter types was installed in the project area in a variety of locations to augment the shelters available in relocation areas and trial the attractiveness to possums of the different designs. The types included:

Relocated Natural Drey – a drey cut out from a tree before it was cleared and wired up into a tree outside the clearing zone.

Relocated Long Hollow – a long hollow cut from a tree in the clearing zone. There were only two of these so results are lumped with Short Hollows in this report.

Short Hollow – a short hollow log, capped at one end and chained with plastic coated chain to a tree, to minimise damage to the tree branch. Short hollows were chosen to trial as they may prove less attractive to European Honeybees *Apis mellifera* than long hollows and possums will shelter in short natural hollows.

Dome – a wire dome made from two hanging baskets wired together, with a quarter cut out for the entrance and lined with *Agonis flexuosa* leaves and twigs.*

Dome with Coconut Dome – a wire dome with matching coconut fibre liner and entrance hole. Two of these also contained paperbark*

Cup – a single hanging basket installed as a wire cup.*

Cup with Coconut – a single hanging basket lined with coconut.*

Plastic bucket – a plastic filter bucket.*

*In all cases, WA Peppermint *Agonis flexuosa* sprigs from the possum's nearest tree were added to each artificial drey to try to mimic as closely as possible the natural smell of the animal's home range. In some instances where an animal's natural drey could not be salvaged, material from the natural drey was added to an artificial drey to make the drey smell more familiar to the animal and perhaps make it more likely to be used.

Artificial shelters were installed throughout the project area, outside the impact area. Eighteen dreys and hollows were installed by Tree Surgeons WA, while they were installing the rope bridges. The remaining 68 relocated and artificial dreys were installed by Bamford Consulting Ecologists' personnel. Details of all dreys relocated and all installed shelters are given in Figures 2 and 3 and Appendices 2 and 3. Examples of shelter designs are provided in Appendix 1, Images 2 to 7.



Figure 2. *Locations of shelters for Western Ringtail Possums installed along the Vasse Drain in Busselton in October and November 2020.*



Figure 3. *The southern project area (VROS) off* [redacted] *Road along the Vasse Diversion Drain and extending north along a natural drainage line, showing installed artificial shelters in red. The green marker was the location of a large Eucalyptus rudis from which a possum was displaced during clearing. It ran to a hollow (marked in white), behaving as if it knew the location. This hollow immediately adjacent to works was occupied in January 2021, despite active construction taking place nearby. Since March 2021, the hollow has been unoccupied, however a new natural drey was discovered in March 2021, further to the north-east along the river (see Appendix 2, Figure 15)*

Monitoring of Artificial Shelters

A check of all artificial shelters was carried out on six occasions throughout 2021 (January, March, April-May, August, September) and in January 2022. All locations were checked, shelters were photographed, and the state of the shelters recorded, noting any that needed repair or replacement. A pole camera was used to determine if the shelters were occupied by possums or had evidence of recent use (see Appendix 1, Image 34).

Monitoring of Natural Dreys

During the monitoring, a number of new Natural Dreys were discovered in the study area. Locations and occupancy of these dreys were recorded, and they were added to future monitoring sessions. If a natural drey became disused and fell from the tree it was excluded from future monitoring. Natural dreys that remained in trees continued to be checked, as these will sometimes be repaired and reused by possums.

Monitoring of Rope Bridges

A range of brands (Reconyx, Bushnell, Acorn, Swift Enduro) of motion sensitive cameras were trialled to monitor use of the rope bridges on three sessions of three nights during the year. The trials were undertaken to determine which cameras would appropriately target animal movement and not record the movement of ropes or branches. Three, one hour watches were also undertaken using binoculars.

When analysing camera data, groups of images of the same species taken less than five minutes apart were scored as a single instance to avoid overestimating the number of animals using the bridges.

In addition, opportunistic searches for scats underneath the rope bridges were undertaken during other monitoring activities.

RESULTS

Numbers of Possums

Figures 4 and 5 show the locations of Western Ringtail Possums prior to displacement, to provide context for interpreting the results of post-disturbance monitoring.



Figure 4. *Locations of Western Ringtail Possums along the Vasse Drain in Busselton in October and November 2020, prior to displacement. White dots denote possums +/- joeys which were displaced, blue points indicate possums which were on the border of clearing works and were not moved as their trees were retained. Two of these retained trees contained possums in January 2021, despite being immediately adjacent to construction work, and one of them was occupied in January 2022.*



***Figure 5**. Locations of Western Ringtail Possums in the southern (VROS) site prior to displacement in November 2020. See Appendix 2, Figure 15 for results from January 2021 onwards.*

Summary tables of data for Year One of monitoring are given in Table 1 and Appendix 2. Figures 7 to 9 illustrate the usage of natural and artificial dreys, and the numbers of possums in each monitoring period.

Numbers and locations of Possums

In January 2021, 14 of 38 possums (37%) were on branches not associated with dreys while six were using artificial shelters (16%). In January 2022, eight of 45 possums (18%) were using artificial shelters and although some were outside, or in the entrance of their drey, all possums were associated with dreys (see Figure 6). The numbers of natural dreys in January 2021 was 18 but in January 2022 it was 35. The overall number of possums was also higher in January 2022 than in 2021 (38 in January 2021, and 45 in January 2022).

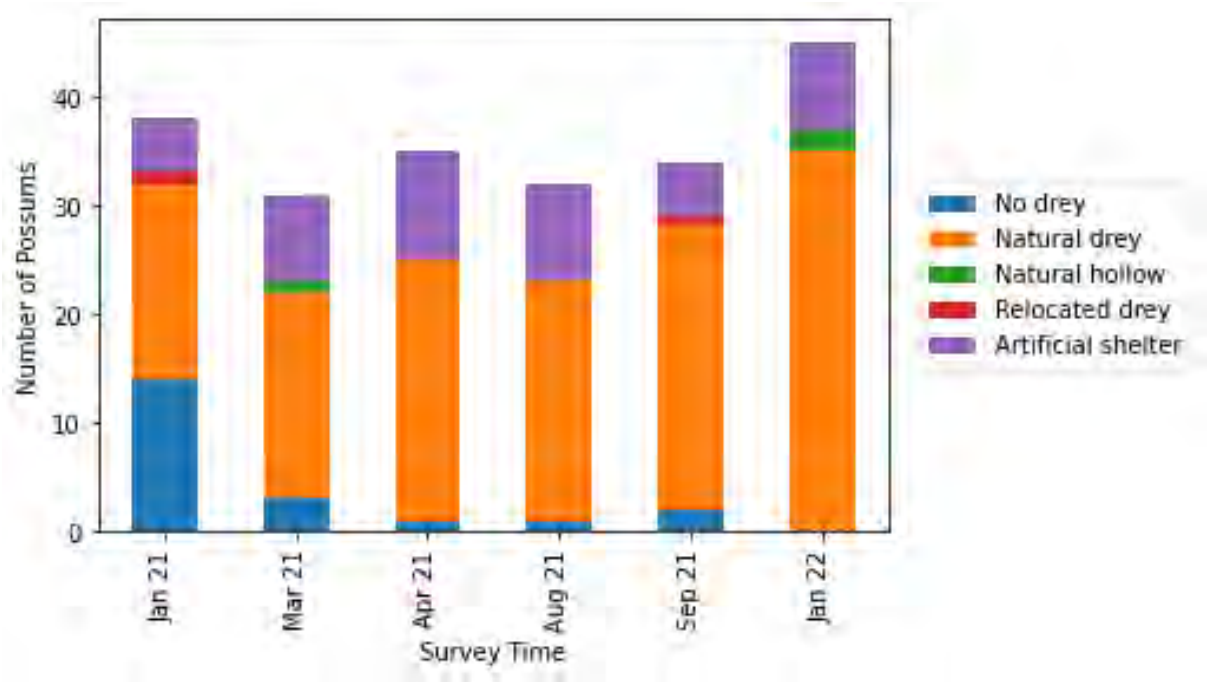


Figure 6. *Use of natural and artificial shelters by Western Ringtail Possums along the Vasse Diversion Drain in Busselton between January 2021 and January 2022.*

Artificial shelters were used consistently throughout the year. Twelve to 18% of possums located during monitoring periods were using artificial shelters. The lowest usage was during the September monitoring period when 12% of possums were in artificial shelters. Artificial 'short hollows' were the most commonly occupied (80% were used in at least one monitoring period) with 60% (4 out of 6) plastic filter buckets being used on at least one occasion (see Table 1 and Figure 7). Coconut-lined dreys were used until possums harvested the coconut for use elsewhere, after which they not used. Two artificial shelters were lined with paperbark and coconut and one of these was used in five of six monitoring periods. The second was also used and lasted longer than coconut alone, however additional trials will need to be made to confirm this due to the small sample size (only two dreys contained paperbark due to the availability of sustainably sourced material).

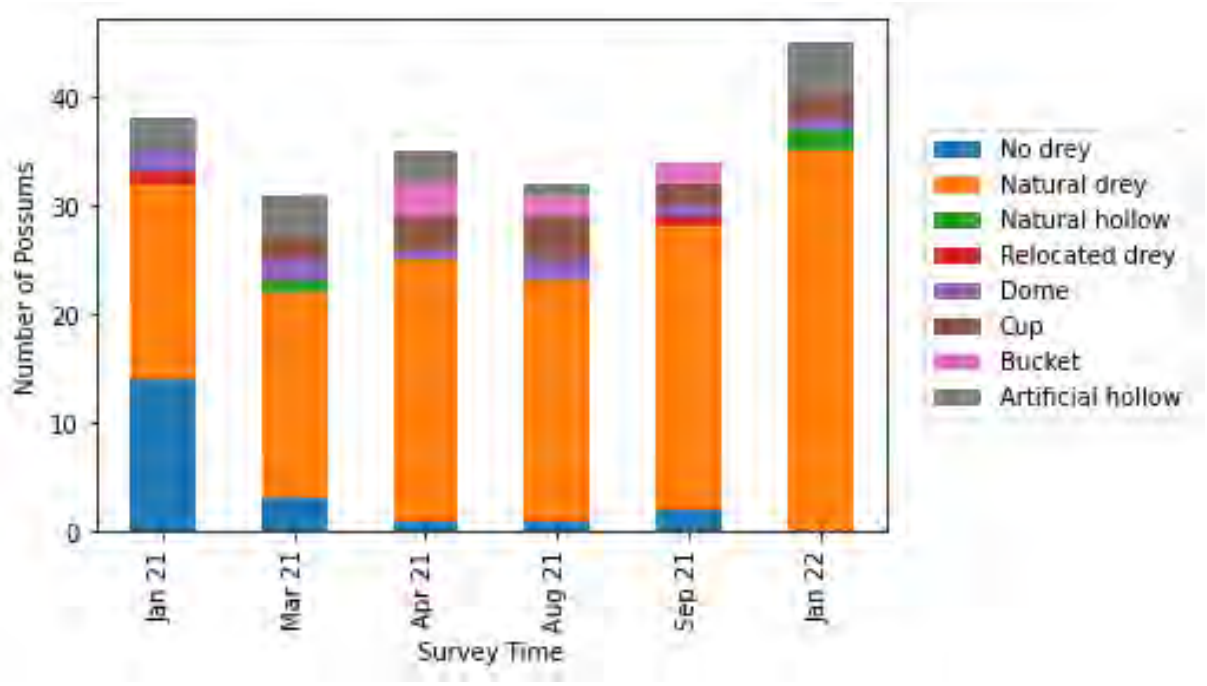


Figure 7. *Comparison of the use of a range of artificial shelter designs by Western Ringtail Possums along the Vasse Diversion Drain in Busselton between January 2021 and January 2022.*

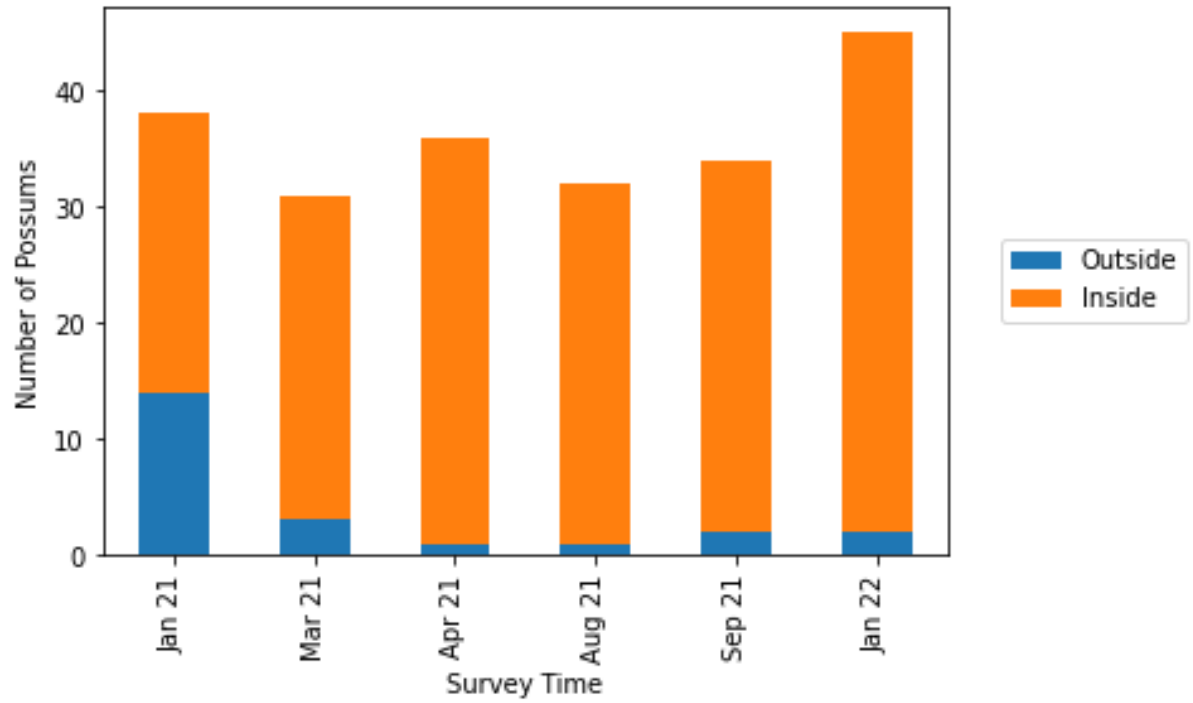


Figure 8. *Comparison between possums inside and outside dreys between January 2021 and January 2022. Note that the 14 animals outside dreys in January 2021 did not appear to be associated with dreys. In March 2021, only four animals were outside, and did not appear to be associated with dreys. Subsequently, most animals were near to a natural or artificial drey. In January 2022, all animals were associated with dreys.*

Table 1. *Numbers and designs of artificial shelters installed along the Vasse Diversion Drain and their use by possums from January 2021 – January 2022.*

Shelter type	Number installed	Number occupied in at least one monitoring period	Notes	Percentage of drey type occupied or used in at least one monitoring period
Relocated Natural Drey (NAT)	24	2	Two occupied in Sept 2021 One of these was maintained but empty in Jan 2022	2 (1%)
Dome with Coconut (DoCo)	17	4 (+1 maintained but empty when checked)	One drey was occupied in all but Jan 2022, others only occupied on one monitoring period. 2 of the 5 had paperpark as well as coconut. Most of the coconut fibre had been rearranged or removed by Jan 2022.	5 (29%)
Cup without Coconut (Cup)	12	1		1 (8%)
Cup with Coconut (CuCo)	14	6		6 (43%)
Installed or relocated Hollow (Hol)	10	8	3 hollows were occupied on 3 monitoring periods, 1 hollow was occupied twice, 3 hollows were occupied on a single monitoring period	8 (80%)
Dome without Coconut (Dom)	5	1	This drey has lots of peppermint twigs, and was open but sheltered	1 (20%)
Plastic Filter Bucket (Buc)	6	4	One was occupied in 3 of six monitoring periods	4 (60%)
Totals	**87**	**26**	**1** (maintained)	**27 (30%)**
Totals excluding relocated dreys	**63**	**24**	**1** (maintained)	**38%**

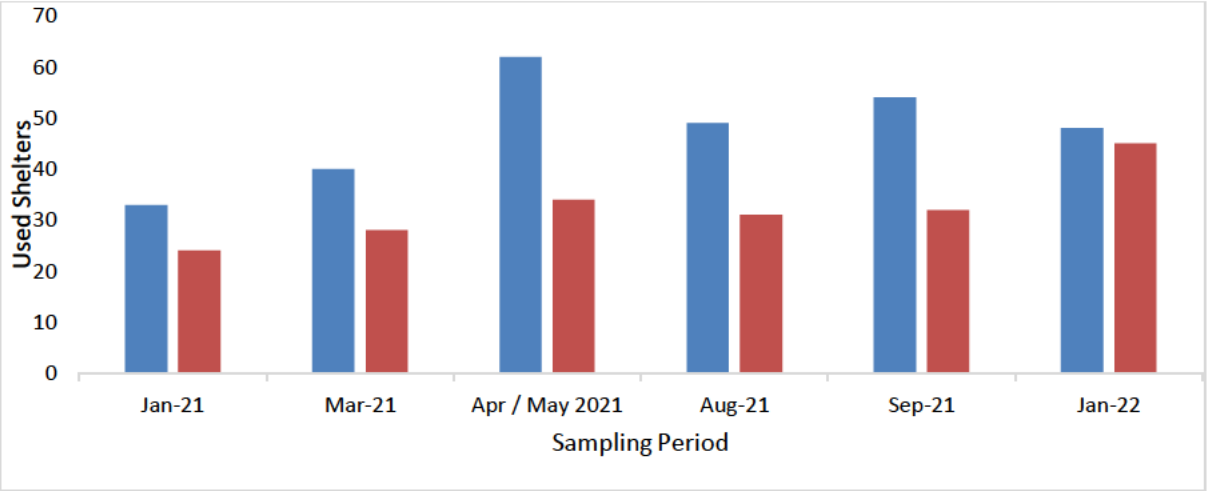


Figure 9. *Numbers of shelters with evidence of use (blue) and occupied (red) during January 2021 – January 2022 monitoring periods. Used shelters included those that were occupied when checked, and those which had signs of recent use, such as fresh leaves, an obvious entrance and open area inside. This is likely an underestimate, as artificial and natural hollows are often not lined, and so recent use is difficult to determine.*

Construction of Natural Dreys

Appendix 2, Figures 12 to 14 show time series with the locations of natural dreys constructed between January 2021 and January 2022. The largest number of new natural dreys was recorded in March 2021, with a small number of new ones being recorded in subsequent monitoring periods.

Use of Rope Bridges

During the first two camera sessions, sensitivity settings and movement of rope bridges and vegetation were problematic, resulting in over 24,000 photos, with no images of possums. One photo was taken of a juvenile White-faced Heron perched on one of the bridges. In January 2022 however, three instances of bridge use by possums were recorded over two nights in the revegetation area adjacent to [redacted]. One was a Brushtail Possum, while the other two instances were of Western Ringtail Possums. A solitary Western Ringtail Possum was recorded on 19/01/22, and a female and joey were photographed over a five-minute period on 20/01/22, walking along, and perching on the rope. See Images 15 to 22, in Appendix 1, and on the cover of this report.

Western Ringtail Possum scats were observed under the rope bridge adjacent to [redacted] area in September 2021. See Image 26 in Appendix 1.

Behavioural Observations

January 2022 monitoring period (18 – 22 January 2022) occurred during an extended period of 38 degree days. A number of possums in January 2022 were observed with tails hanging out of dreys and hollows (Appendix 1, Image 31), and one was on its back with its pouch open and exposed to the air (Appendix 1, Image 30). Another hollow contained a collection of fur at the entrance which appeared to have been pulled out by the possum (see Appendix 1, Image 29).

One mother and joey were on the ground in a culvert with damp soil and green foliage when we came to check their drey, presumably keeping cool. When they saw us, they ran up the nearby tree and sat near their drey. We avoided photographing the drey and moved on quickly to minimise further disturbance.



Figure 10. *Opportunistic records of Western Ringtail Possums along the Vasse Drain in Busselton during January 2021. Three of the natural dreys (white points) contained two possums. Data for other monitoring periods is displayed in Appendices 2 and 3.*



Figure 11. *Use of artificial shelters by Western Ringtail Possums along the Vasse Drain in Busselton during January 2021. Red points indicate shelters which contained possums when surveyed, blue points indicate shelters which contained green Agonis leaves or where coconut fibre had been rearranged.*

DISCUSSION

The first year of Possum monitoring following the drain widening works on the VDD and VROS has produced some encouraging preliminary results. The overall numbers of Possums have remained remarkably stable throughout the year; from 38 in January 2021, dropping to a minimum of 32 in August 2021 and increasing to 45 in January 2022. This suggests that the widening works have not had a large impact on the population numbers to date.

The use of the displacement technique outlined in the Fauna Management Plan for the Vasse Diversion Drain Upgrade (Bamford et al., 2020) to move possums from the clearing area appears to have been successful. All 36 possums were displaced from the clearing area without injury, many needing to be moved by less than 20 m. Most would only have been moved within their existing home ranges. By avoiding or minimising handling, personnel were able to keep stress to the animals to a minimum. Cowan et al. (2020), links the poor survival of relocated animals to the stress associated with their capture, handling and transport. Studies of Western Ringtail Possums report high mortality of relocated animals (Clarke, 2011, Thompson & Thompson, 2009) however observations from the first year of the present study suggest that many animals remained in the area following displacement. Ongoing surveys will better inform these preliminary observations.

Relocated dreys were probably important initially but most became disused once the possums had the opportunity to build new dreys or adopted artificial shelters. Interestingly, two relocated dreys were being used in September 2021 and one was still being maintained in January 2022 although was not occupied on the day of monitoring. Since possums have multiple dreys in their home range, the animal almost certainly uses this drey on occasions.

Artificial shelters were adopted quickly and have been used consistently throughout the monitoring period. The availability of additional shelter is likely to have supported the population of possums following displacement and may have contributed to the sustained increase in numbers of possums in January 2022 by providing additional shelter for newly independent juveniles.

While relocated dreys probably perform an important function temporarily, ultimately they will need to be replaced with additional artificial shelters, to fulfil commitments made as part of project approvals to install double the number of artificial shelters as were removed and maintaining them for ten years (DWER Clearing permit CPS 8191/1). Many new, natural dreys were constructed adjacent to the clearing area between January and March 2021, suggesting that some displaced possums had chosen a new location within their home range and built a natural drey. Smaller numbers of new, natural dreys continued to be constructed in areas adjacent to the clearing area, throughout the rest of the sampling period (Figures 12 to 15, Appendix 1), probably at a rate more consistent with the natural turnover of dreys due to disturbance caused by weather events and other non-human impacts. It will be interesting to see if increasing the numbers of artificial dreys increases usage of them in the long term, or if some animals prefer to build their own.

Many new, natural dreys were constructed across the site between January and March 2021. Some were close to maternity dreys, suggesting that juveniles had initially built dreys close to their mothers. The construction of many natural dreys during this period may also have been due to displaced animals constructing new dreys to replace the dreys that were cleared, and those relocated dreys which had begun to deteriorate. In January 2021, 14 possums were counted on branches, apparently not associated with dreys, whereas in March 2021 only four were not associated with dreys. Although three possums were out of their dreys in January 2022 (probably due to the hot weather), all of them were associated with dreys. In particular, one mother and joey were on the ground in a culvert with damp soil and green foliage when we came to check their drey, presumably keeping cool. When they saw us, they ran up the nearby tree and sat near their drey. We avoided photographing the drey and moved on quickly to minimise further disturbance. It would be interesting to compare the number of natural dreys constructed between January and March in future years, without the disturbance caused by displacement and drain widening works.

The number of possums using natural hollows is probably an underestimate, as the pole camera is not always able to detect them, if the hollow is curved. In January 2022, two animals were detected because their tails were hanging from their hollow. In some parts of their range with a greater number of trees with large hollows, Western Ringtail Possums rarely build dreys and are often difficult to detect without spotlighting transects, as they spend their days deep in hollow trees. Since the numbers of suitable natural hollows in the trees along the Vasse Diversion Drain is small, and spotlighting transects were carried out at the site before works began, the numbers of animals remaining undetected within the study site is likely to be low (less than five animals).

During the hot weather in January 2022, possums exhibited a range of behaviours probably associated with cooling. Hanging tails in the breeze, plucking hair and exposing bare skin on their tails, bellies and pouches, and seeking shelter in cool, damp vegetation are all behaviours that are likely to help the possums to manage their temperature in heat extremes. Saliva spreading has been observed to be used as a cooling mechanism in Red Kangaroos (Dawson et al., 1974). Van Helden et al. (2021) found Western Ringtail Possum abundance to be correlated to canopy cover in Albany. Revegetation and continued access to shady gardens are likely to be important to the long-term survival of the possum population in Busselton.

Artificial shelters are being used by the possums, with the preferred designs varying perhaps due to seasonal changes in weather conditions, or the breeding cycle of the animals. Artificial ‘short hollows’ were the most commonly occupied design (80% were used in at least one monitoring period). Short hollows seem to be preferred in the non-breeding season, however only one artificial hollow was observed to be used by a mother with a joey, presumably because hollows are not easily expanded to accommodate a growing joey. In Busselton, maternity dreys sometimes have a ‘granny flat’ arrangement when the juvenile is close to independence (pers. obs.), and this would be more difficult to accommodate in a short hollow. Short hollows are highly favoured at other times of year however and have the advantage over large hollows that to-date, none has attracted feral bees.

Artificial shelters were used consistently throughout the year. Twelve to 18% of possums located during monitoring periods were using artificial shelters. The lowest usage was during the September monitoring period, when mothers have large joeys, and probably prefer natural dreys which they can 'extend'.

Black plastic buckets were initially unused but were a popular choice in August and September 2021. One bucket was occupied on three of the six monitoring periods. Domes were popular when covered with coconut but were mostly unused once the coconut was removed by the possums or had collapsed. One peppermint lined dome without coconut was also used. Two coconut-lined domes also contained paperbark. Both these domes were used, one was occupied in five of the six monitoring periods. It is possible that the waterproofing and insulating properties of paperbark, long recognised and utilised by Noongar people (Hansen and Horsfall, 2019) are also valued by the possums. Artificial shelters lined with paperbark and coconut appear more attractive and lasted longer than coconut alone, however additional trials will need to be made to confirm this due to the small sample size (only two dreys due to the availability of sustainably sourced paperbark).

Cups were used consistently and continued to be used even when coconut had deteriorated, unlike the domes, possibly because the animals could escape more easily and felt less vulnerable to predators than inside an immovable wire frame with only one exit.

These are preliminary data only on the preference of different artificial drey designs and are confounded to some extent by the short-term disturbance caused by the drain widening project, and by the deterioration in coconut, which may have changed the attractiveness and functionality of the coconut-lined cups and domes. The reduction in use of the domes may have been due to the increase in natural dreys, and the possums' preference for sheltering in dreys they have constructed themselves, or it may simply be that they are no longer as attractive once the coconut has been removed. In some cases, the coconut was harvested by the possums to construct an alternate drey elsewhere! Additional artificial shelters are required to be added to replace the deteriorated relocated natural dreys, so it is proposed that these dreys be a selection of paperbark-lined, coconut fibre and plastic filter buckets, to provide further data on the most effective shelters to support populations of possums in disturbed areas with insufficient natural shelter. To answer this question, it would be necessary to maintain a more regular monitoring regime than has been proposed beyond Year One. This would allow additional coconut and paperbark-lined dreys, and plastic filter buckets to be progressively reintroduced and monitored throughout the site at different times of year, to account for seasonal variation in drey choice. This possibility will be discussed with the client.

VROS

Clearing in the VROS area has resulted in a highly fragmented landscape, and possums and the artificial dreys are on a 'dead end' without connectivity, and with less vegetation than in 2020, so are probably less attractive to possums. The artificial dreys in the VROS area were used initially, and although one possum stayed immediately adjacent to the VROS area in a natural hollow (WP1 in Figure 15, Appendix 2) throughout most of the construction period, it

was no longer in the hollow in March 2021 and a natural drey (466) was found further north along the river, which was probably constructed by this individual (see Figure 15, Appendix 2). By September 2021, this drey had deteriorated and no evidence of possums was found in the area. This is probably to be expected, given the number of trees removed and the consequent loss of habitat and connectivity. If trees are replanted outside the VROS structure, this effect could be reversed in time, however the land surrounding the VROS area is privately owned farmland, so any plantings in the area would need to be negotiated with the landowner.

Rope Bridges

Rope bridges were used by both Brushtail and Western Ringtail Possums. It is encouraging to find clear evidence of their use. Previous studies such as Yokochi and Bencini (2015) which monitored Western Ringtail Possums' use of rope bridges, found that the animals began using them within 36 days of installation. In their study the structures were heavily engineered, static bridges which move less in windy conditions, and tend to have less vegetation to interfere with the functioning of cameras. The movement of ropes and branches has made monitoring of the bridges in this study more difficult than expected, resulting in thousands of photos of non-target objects at high sensitivity, and no photos at lower sensitivity. The results of the trial of different camera brands was encouraging, with Swift Enduro demonstrating the most effective detection of possums. We will therefore deploy more Swift Enduro cameras in the coming year to better assess rope bridge usage.

Despite the difficulty of achieving consistent results, we were able to demonstrate that the bridge design is successful. Western Ringtail Possums are comfortable using the bridges and were recorded on consecutive nights in January 2022, along with a Brushtail Possum. A sequence of several minutes shows a mother and joey wandering along a bridge very securely (see Images 22 to 25 in Appendix 1).

The value of each tree

Bamford et al (2021) noted that animals were continuing to use trees retained immediately adjacent to the clearing area while work continued on site and emphasised the importance of retaining individual trees where possible. Several of the trees in the strip of vegetation immediately adjacent to the impact area continue to be used by possums. These include several trees with dreys which were marked to be cleared in November 2020. After consideration, a decision was made by the client and contractor to retain them. Three animals recorded in January 2021 were in dreys or hollows directly overlooking the construction site but the animals had persisted in them, tolerating the disturbance. These sites continued to be used during 2021 and one retained, natural drey, immediately adjacent to the drain, was still in use in January 2022. Decisions made to reduce clearing, even by a single tree, can improve the outcome for fauna.

In order to maintain the displaced animals at the site in the long term despite the reduction in habitat, it is essential that additional food resources are provided in the form of revegetation, as soon as is practical. Although food resources do not appear to be limiting at present and

all animals appear in good condition, there is a risk that drought conditions or insufficient nitrogen in leaves will begin to affect the population. The wide range of plant species selected for revegetation and being implemented by Tranen (Tranen Revegetation SouthWest, 2020), including Coojong *Acacia saligna, Kunzea sp.* and Marri *Corymbia calophylla,* as well as WA Peppermint *Agonis flexuosa,* and a range of understorey plants will provide the varied diet which Mathieson et al. (2020) found Western Ringtail Possums prefer. Some plants are already beginning to resprout along the fence line adjacent to the impact area and will rapidly begin to provide additional food (see Image 32, Appendix 1).

Revegetation will also re-establish and enhance connectivity, supplemented by the rope bridges which were installed by Tree Surgeons WA. Increased connectivity will allow possums to move between the population along the drain and the rest of Busselton to access food resources, expand home ranges and find mates, improving the species' long-term viability in the area. Rope bridges and revegetation will also enable possums to travel without going to the ground, avoiding the risks of Foxes and cars, both identified as major threats to the viability of the Busselton population by (Yokochi *et al.,* (2015).

An alternative explanation to the increase in numbers of possums in January 2022 could be lack of connectivity; if juveniles were unwilling or unable to disperse to other areas due to reduced connectivity. This seems unlikely, as researchers such as Yokochi et al. (2015) have suggested that stranded animals tend to go to the ground and cross roads (with associated mortality) and possums have demonstrated their ability to use the installed rope bridges.

Engaging the community

Part of the long-term success of the project will be engaging the community in areas adjacent to the drain with possum conservation, helping them to value the critically endangered species which shares their suburb. Many of the animals monitored in this study have home ranges which overlap with residential and industrial properties, and so the actions of the human occupants of their home ranges could have a huge impact of the success or otherwise of the Water Corporation's rehabilitation in the area. Encouraging residents to retain and replant native trees, provide connectivity above ground to keep possums away from domestic pets, and being prepared to accept the occasional rose bloom or nectarine being harvested by possums (or netting the trees) will help to ensure the possums' long-term survival in the suburbs. There is increasing evidence that Western Ringtail Possums survive better in suburbs than they do in remnant bushland (Van Helden et al., 2020, Busschots et al., 2021), so residents can play a vital role in the species' conservation.

Although the Vasse Diversion Drain Widening Project has caused disruption to the Busselton population of Western Ringtail Possums in the short term, it has the potential to contribute to the possums' long term survival by improving the availability of high nutrient foliage for food, increasing the availability of suitable structures for protection/breeding, and canopy continuity to escape predation and other threats, all issues identified as important by Department of Parks and Wildlife, (2017) and Bamford et al., (2019). In addition, ongoing engagement with residents adjoining the drain to encourage them to make their backyards possum-friendly will

contribute to sustaining the possum population in the long term. Future monitoring of the Western Ringtail Possum population along the drain as part of this project will help to show if this potential is realised and can be sustained.

CONCLUSIONS

While only preliminary data, the first year of possum monitoring at the VDD and VROS sites suggests that the minimal displacement method, choosing to retain trees that were on the border of the development, providing artificial shelters and rope bridges have minimised the impact on the possum population. The population has remained stable, and shown a slight increase in January 2022, suggesting a good survival of juveniles following the 2021 breeding season. The increase in numbers is probably a reflection of high rainfall in spring but may also reflect the provision of additional shelter.

Relocated natural dreys were probably important in the short term but most became disused after a few months, and most possums were found in newly constructed natural dreys, and in artificial shelters by March 2021. A small number of relocated natural dreys continue to be used however the provision of additional artificial dreys is likely to be helping to support a higher population. Artificial dreys were used by the possums at a rate of 12 to 18% (percent of possums recorded in an artificial shelter during a monitoring period), although there appeared to be a seasonal pattern in their preferred designs. Artificial hollows appeared to be favoured in the non-breeding season, whereas plastic buckets and cups with coconut were chosen at other times of year. More paperbark lined domes should be trialled once a sustainable source of paperbark is identified, as the sample size is too small at present. There is insufficient data to draw firm conclusions yet regarding drey design, because of the confounding effects of disturbance and seasonality, and harvesting of coconut by possums.

Since 41 dreys were removed during clearing, replacement of relocated natural dreys is required to meet the condition 15 of DWER Purpose Permit CPS8191/1 (Bamford et al. 2020) to increase the number of additional shelters to 82. This would require an additional 18 shelters. These could include a range of artificial designs, as well as replacing coconut in some existing dreys. Follow-up monitoring is recommended to determine whether the loss of coconut is a factor in the reduced use of domes later in the monitoring period. At present, twice yearly monitoring is to be conducted. Increasing the frequency of monitoring (ideally six, but at least three times per year) would assist in assessing the use of replenished and additional artificial dreys and would provide greater confidence in conclusions about preferred drey design.

In January 2021, a number of possums were observed without an associated drey, however in January 2022, despite numbers of possums being higher, all were associated with dreys, even if they were outside them, suggesting that they had adjusted to their altered home ranges and new shelters after 12 months. Future monitoring will demonstrate if the higher population can be maintained, with increased shelter, food plants and connectivity.

The rope bridge design has been demonstrated to be appropriate for use by possums, therefore increasing connectivity for urban possums in the area.

Once revegetation is established sufficiently to provide additional food sources for the possums, monitoring will demonstrate if possum numbers rise, and if the population expands to use additional areas of the study site which are currently unsuitable.

RECOMMENDATIONS

- A proportion of artificial shelters where coconut fibre is collapsing should be repaired. This will need to be done sequentially so as not to bias the results of the disturbance study, and to account for any seasonal effects in their use.
- Relocated Natural Dreys should be replaced with artificial shelters to bring the total back up to the 82 shelters required as part of DWER Purpose Permit CPS8191/1, condition 15. This would require an additional 18 shelters. Additional short hollows, plastic filter buckets and wire domes / cups with paperbark and coconut seem the best choice, given preliminary results.
- To gain a detailed understanding of the seasonal usage of artificial dreys, monitoring would need to be maintained at four - six times per year beyond Year One. The existing program reverts to twice yearly sampling from 2022 onwards, which will collect enough data to measure the overall population size and expansion into the revegetation areas but will not provide sufficient data to detect seasonal usage of the site, including changing preferences for artificial drey designs. This information would be valuable to collect to inform future rehabilitation projects if budget were available to maintain a more frequent monitoring regime.
- Revegetation should continue as quickly as possible to increase food resources and connectivity.
- Additional monitoring time may be required to detect and re-check all natural dreys once revegetation is advanced enough to support additional possums. This may require an additional day's monitoring for each session from the 2024 season.
- The location of the Fox den identified in Bamford et.al. (2021), south of the drain in the Council reserve is still active. This observation should be forwarded to the City of Busselton Environmental Officers for their information.
- Residents should be encouraged to plant appropriate food and shelter plants for possums to improve connectivity and support their continued occurrence in the suburbs of Busselton.
- The Busselton community should be provided with opportunities to learn more about the possums and promote their occurrence as an asset. This could include workshops to make artificial shelters, plant local plants and encourage a sense of custodianship of the possums.
- When clearing works are required in areas containing Western Ringtail Possums, displacement rather than relocation should be the preferred option to minimise disturbance to the animals, provided that sufficient habitat remains.
- Every tree is important for species such as Western Ringtail Possums. In situations where trees are on the border of a development, they should be retained if possible.

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Appendix 1. Photographs













Images 2-7. *A selection of designs of Artificial Shelters: Dome – no coconut (Dom); Short Hollow (Hol); Cup with coconut (CuCo); Cup – no Coconut (Cup); Plastic Bucket (Buc); Dome with coconut (DoCo). More detailed analysis will be possible once more data has been collected.*





Image 8 (left). *A platform natural drey containing a Western Ringtail Possum mother and large joey taken in October 2020.*

Image 9 (right*). A dome-shaped natural drey containing one or two possums. Numbers of possums can be difficult to determine in dome-shaped dreys without disturbing the occupants.*



Image 10. *An example of a Relocated Natural Drey. Relocated Natural Dreys were probably an important interim measure in November 2020 for newly displaced possums. One Relocated Drey were still being maintained in January 2022 but others were disused, or had deteriorated.*



Image 11. *Relocated Natural drey in use during the September 2021 monitoring period. Although most relocated natural dreys were only used for a short period and were not maintained, two of them have continued to be maintained and used. The dark fur of the possum is visible between the twigs near the top of the drey.This drey was unoccupied when checked January 2022 but was still being so was likely still in use.*



Image 12. *Motion sensitive cameras were attached to trees and directed towards the rope bridges. It was difficult to position them in positions without vegetation obstructing the view of the ropes, and setting the sensitivity so that they would detect possums without taking large numbers of photos of moving rope and branches.*



Image 13. *Multiple dreys in one flowering Melaleuca nesophila. Although this species is not native to the South-West, it produces abundant nectar and is a good example of the non-native food resources available in the suburbs of Busselton.*





Images 14 & 15. *Possums frequently harvested coconut fibre from the coconut-lined dreys resulting in the denuding of most lined cups and dreys by January 2022. Additional lined dreys will need to be provided to augment the number of lined dreys available for Possums in this study.*



Image 16. *Rope Bridge along [redacted] installed by Tree Surgeons WA. Project Approvals require six rope bridges to be maintained for 10 years to help improve connectivity for possums, so they do not need to come to the ground.*



Image 17. *Revegetation along College Ave installed by Tranen Revegetation SouthWest. These plantings will increase connectivity, shelter and food supplies.*



Image 18. *Brushtail Possum on rope bridge adjacent to* [redacted] *on 20 January 2022, demonstrating that the design is suitable for both species of possums.*



Image 19. *Western Ringtail Possum crossing the rope bridge adjacent to* [redacted] *in Busselton on 19th January 2022. First in a series of three photos (Images 19 – 21)*



Image 20. *Western Ringtail Possum crossing the rope bridge adjacent to* [redacted] *in Busselton on 19th January 2022. Second in a series of three photos (Images 19 – 21)*



Image 21. *Western Ringtail Possum crossing the rope bridge adjacent to* [redacted] *in Busselton on 19th January 2022. Third in a series of three photos (Images 19 – 21)*



Image 22. *Western Ringtail Possums crossing the rope bridge adjacent to [redacted]. This is the first in a series of four images (Images 22-25) of a mother and joey walking across and perching on the rope (selected from a group of 20 images captured on January 20 2022). The animals appeared unconcerned by the rope, very comfortable walking across and stayed on the rope for several minutes.*



Image 23. *Western Ringtail Possums crossing the rope bridge adjacent to* [redacted] *This is the second in a series of four images (Images 22-25) of a mother and joey walking across and perching on the rope (selected from a group of 20 images captured on January 20 2022). The animals appeared unconcerned by the rope, very comfortable walking across and stayed on the rope for several minutes.*



Image 24. *Western Ringtail Possums crossing the rope bridge adjacent to* [redacted] *This is the third in a series of four images (Images 22-25) of a mother and joey walking across and perching on the rope (selected from a group of 20 images captured on January 20 2022). The animals appeared unconcerned by the rope, very comfortable walking across and stayed on the rope for several minutes.*



Image 25. *Western Ringtail Possums crossing the rope bridge adjacent to* [redacted]*. This is the fourth in a series of four images (Images 22-25) of a mother and joey walking across and perching on the rope (selected from a group of 20 images captured on January 20 2022). The animals appeared unconcerned by the rope, very comfortable walking across and stayed on the rope for several minutes.*





Images 26 & 27. *Possum scat with boot for scale (left). One of several found on the path beneath the rope bridge south of* [redacted] *(right) during the September 2021 monitoring period in the area to be revegetated. Scats had not been recorded along the pathway prior to the rope bridges being installed.*



Image 28. *A Western Ringtail Possum in an artificial hollow in January 2022. Artificial hollows were frequently occupied by single animals outside the breeding season but held more than one animal on only one occasion. Mothers and joeys were more commonly seen in dreys, perhaps because they provide the opportunity to 'build on' extra space for the joey.*

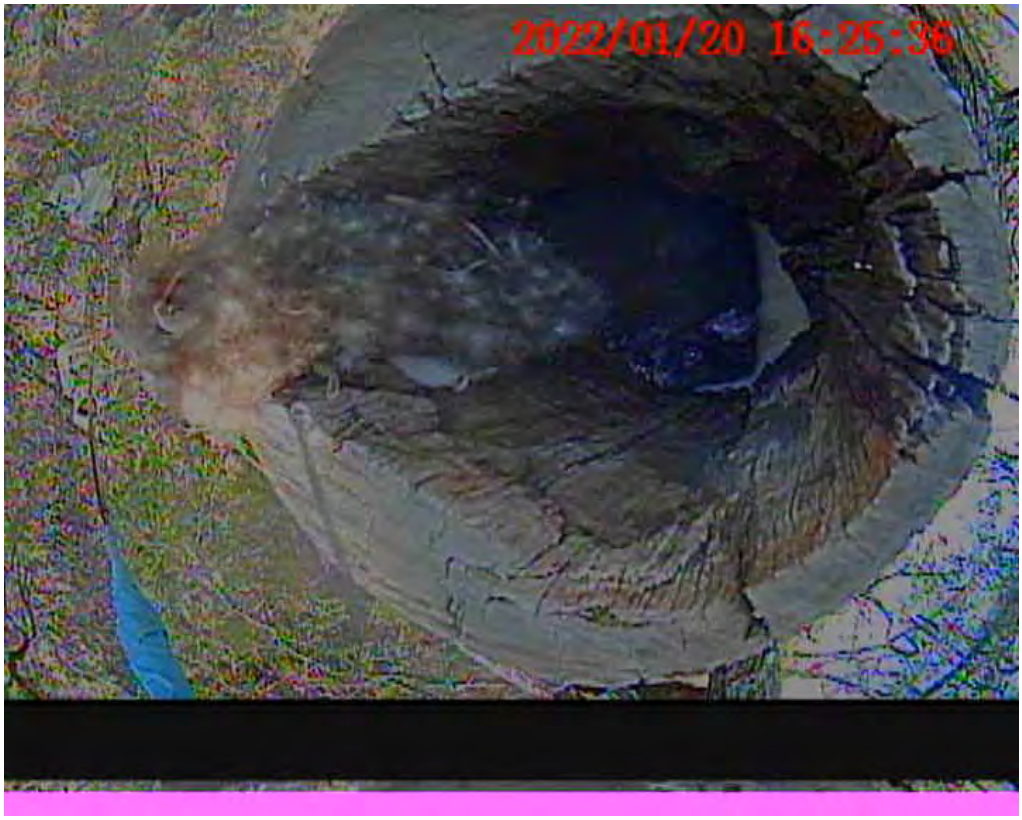


Image 29. *Western Ringtail Possum in January 2022, keeping cool in 38 deg. heat. This individual appeared to have removed fur from its body, presumably to help with thermoregulation.*



Image 30. *Western Ringtail Possum in January 2022, keeping cool in 38 deg. heat. This individual appeared to be exposing the bare skin under its tail and spreading saliva on and in the pouch to help it thermoregulate.*



Image 31. *An occupied natural hollow at the corner of* [redacted] *in January 2022. The tail of a possum is visible, hanging from the entrance to the hollow. This behaviour was frequently observed in January 2022 when the temperature was 38 degrees. Presumably hanging the tail out of the hollow is used as a cooling mechanism.*



Image 32. *Retained WA Peppermint tree (Agonis flexuosa) containing a natural drey on the edge of the impact area on the south side of the drain which contained a possum in all but two monitoring periods, even during works. A decision was made to retain this tree although it was on the edge of the clearing zone. Its continued use by a possum throughout 2021 - 2022 illustrates the importance of decisions to retain individual trees. Also visible are regenerating Coojong (Acacia saligna) seedlings, which will provide important, high-nitrogen forage for possums within two years.*



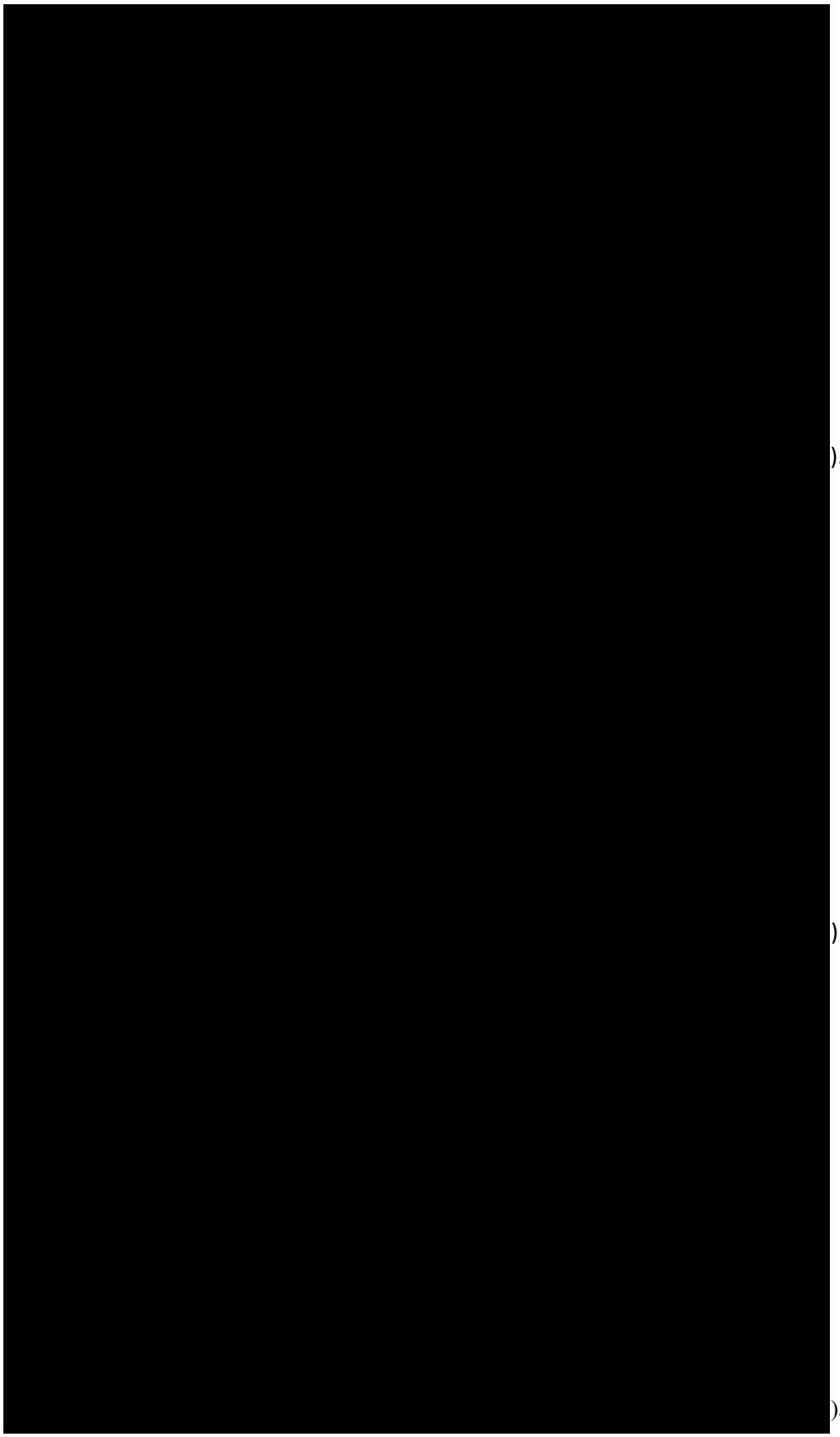


Image 33 (left). *By January 2021, a number of the artificial shelters containing coconut had been rearranged. In this case, the possum obviously preferred to choose an alternate location to create its own shelter using coconut from the artificial drey!*

Image 34 (right). *Artificial Shelters were checked using a pole camera if necessary. Examples of pole camera images may be seen in Images 28 to 30.*

Appendix 2. Time series maps showing Natural and Artificial Dreys (January 2021) and the new Natural Dreys discovered in each subsequent monitoring period (March 2021 – January 2022).

Figure 12. Western end of the drain to [redacted]



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Figure 12 (cont.)

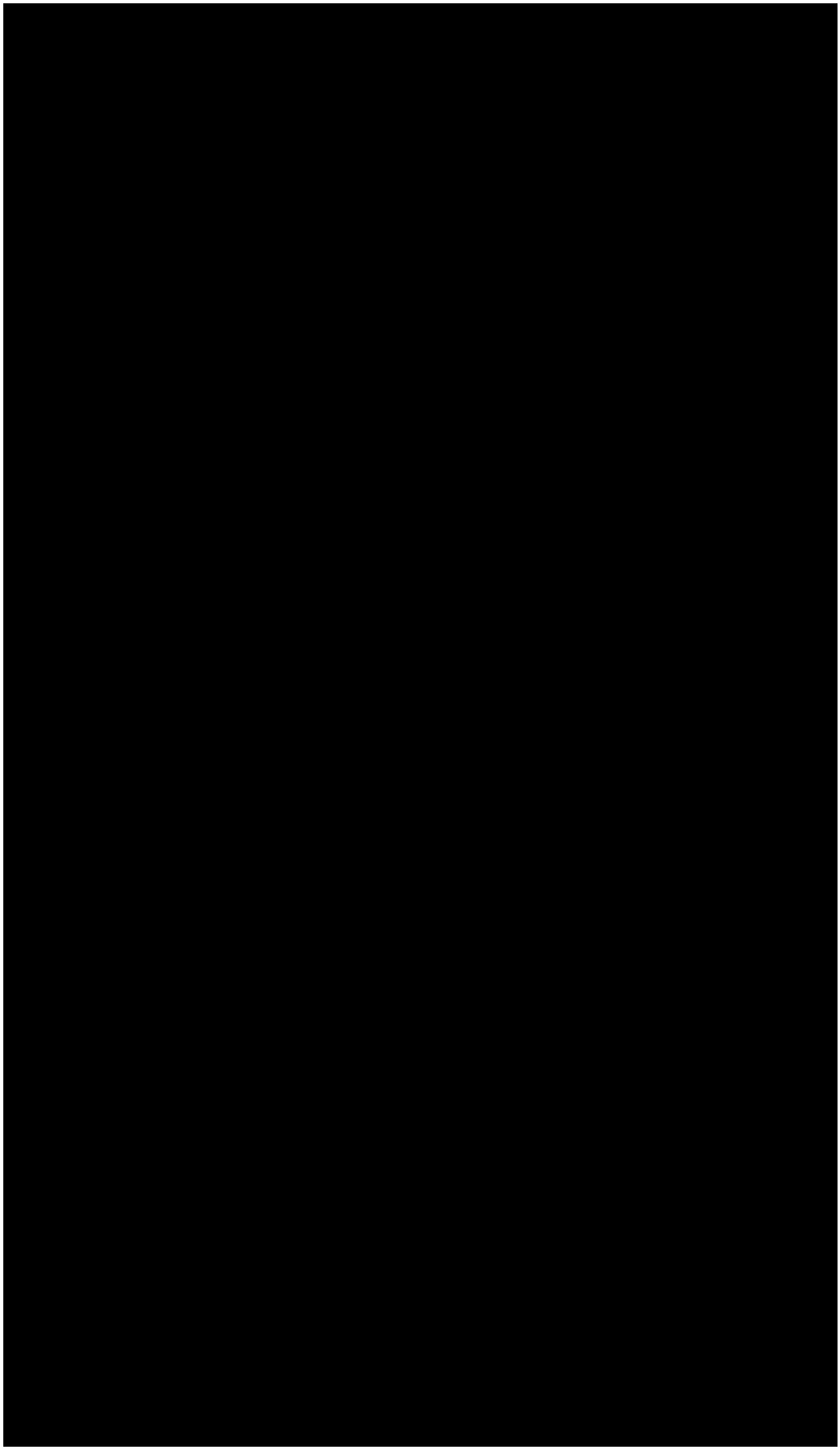


Figure 13. Central section of [redacted]. Time series maps showing Natural and Artificial Dreys (January 2021) and the new Natural Dreys discovered in each subsequent monitoring period (March 2021 – January 2022).



Figure 13 (cont.)

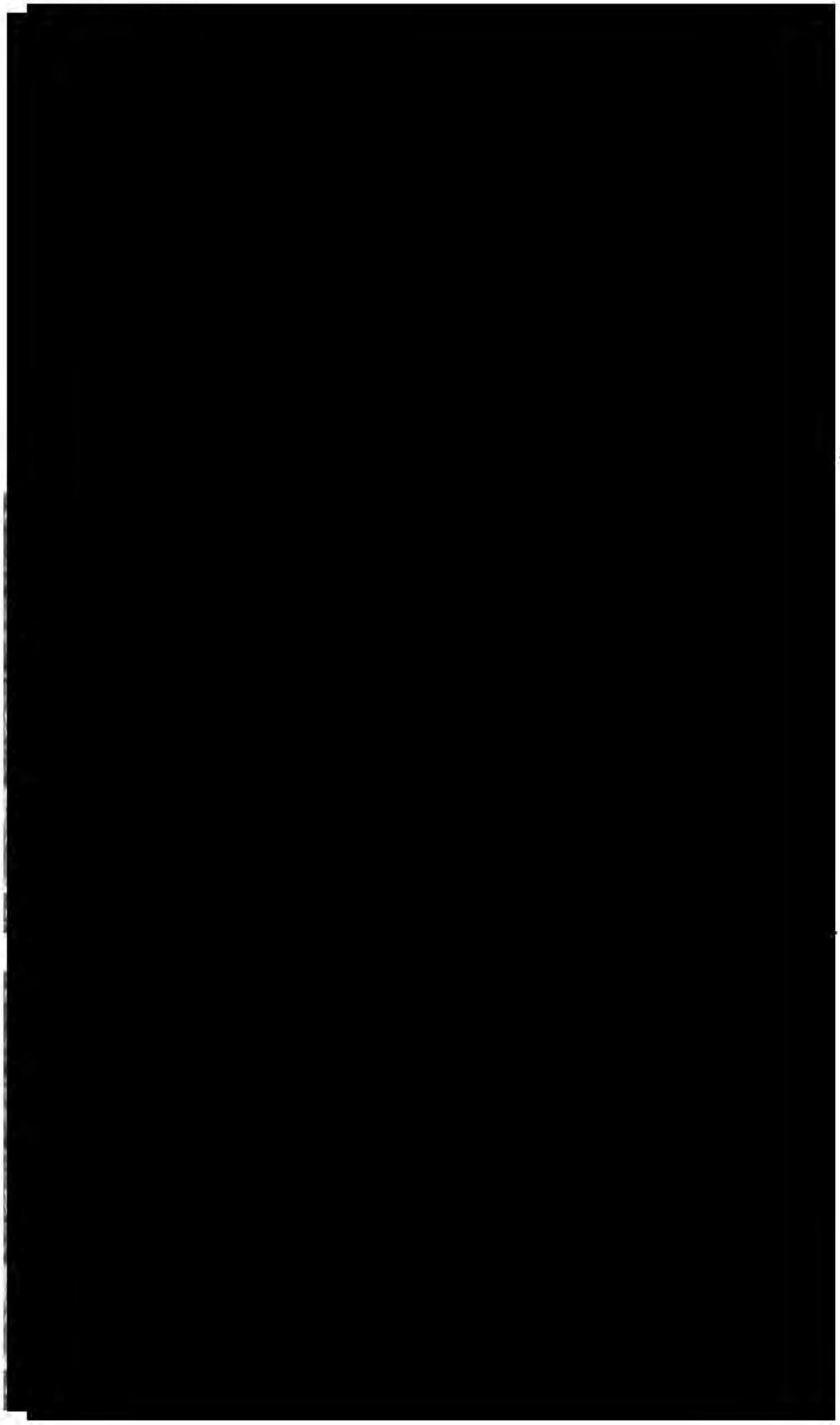


Figure 14. Eastern end of [redacted], showing the [redacted]. Time series maps showing Natural and Artificial Dreys (January 2021) and the new Natural Dreys discovered in each subsequent monitoring period (March 2021 – January 2022).

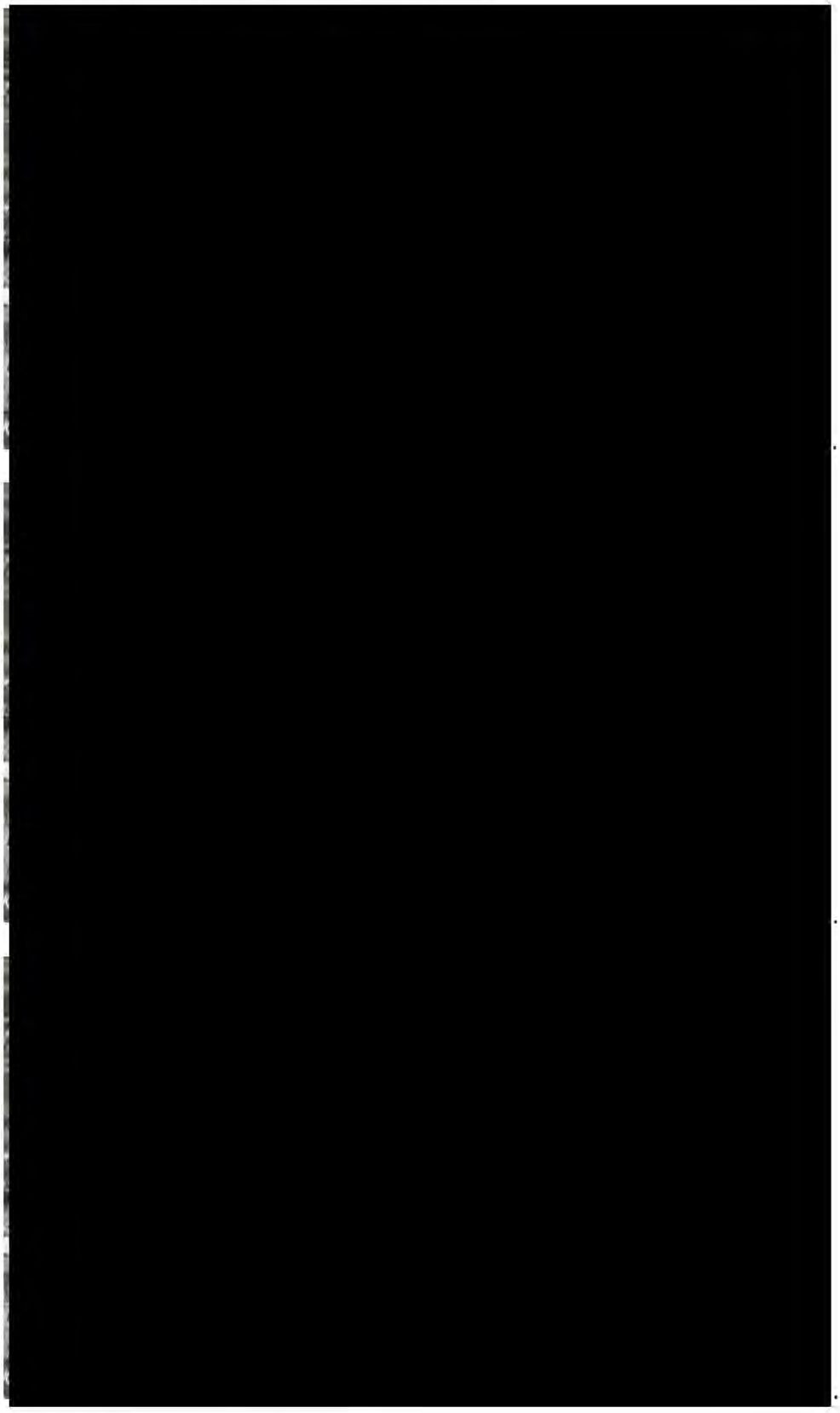
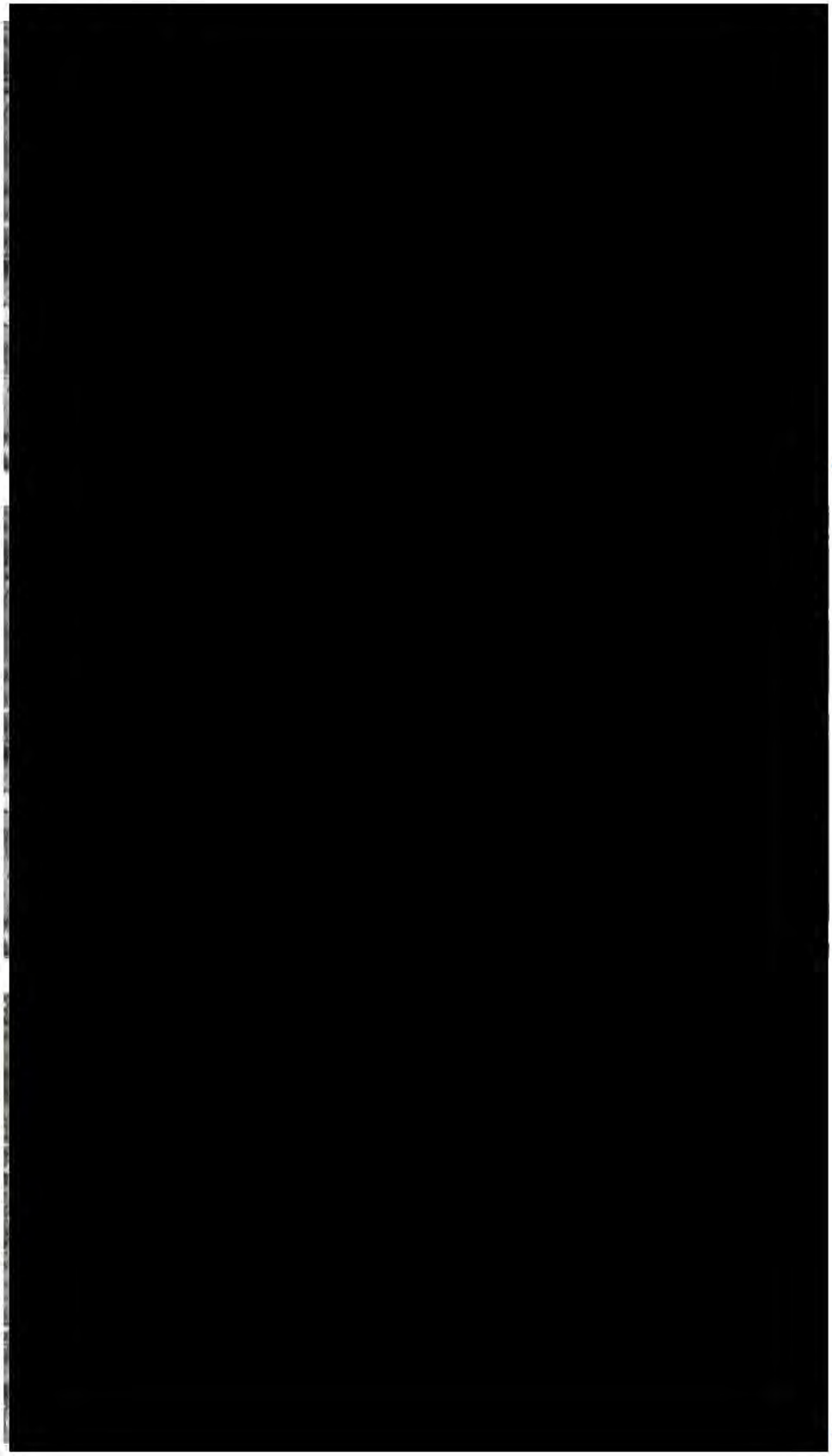


Figure 14 (cont.)

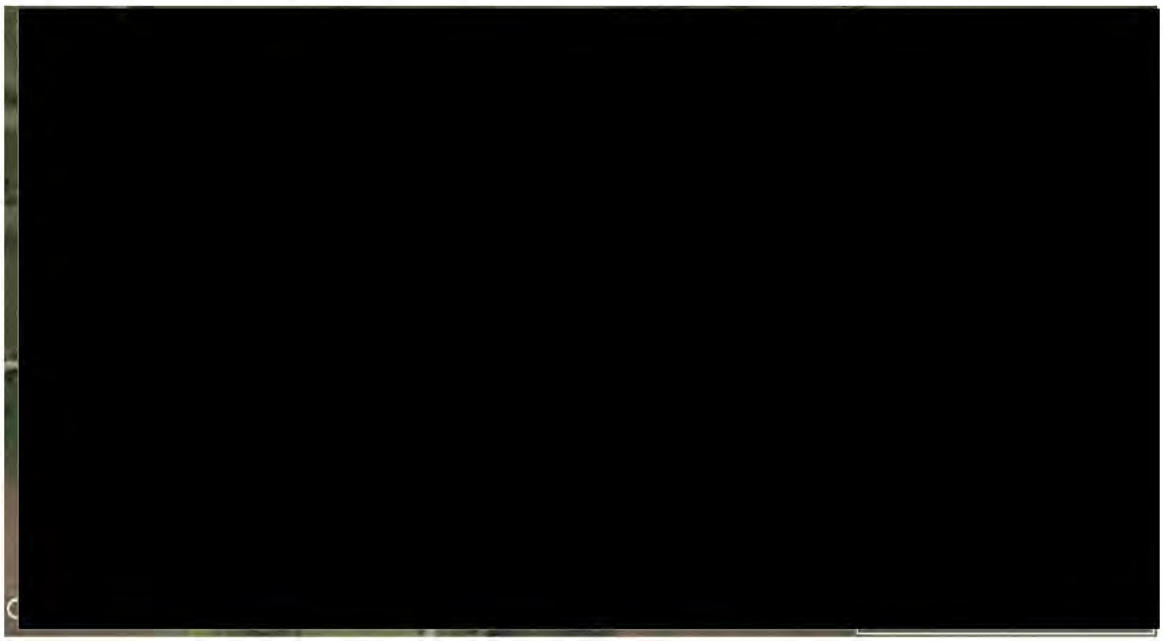


d).

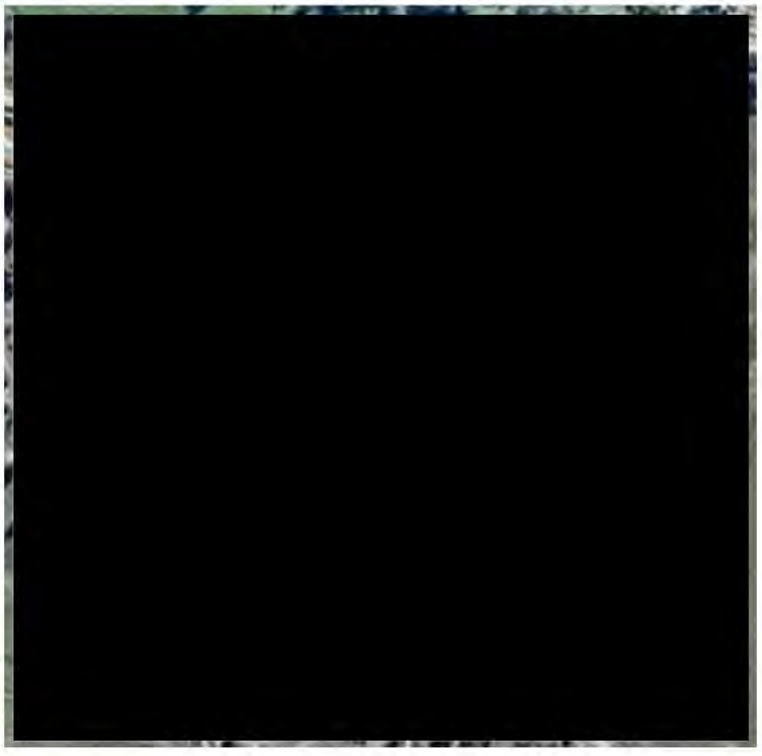
e).

f).

Figure 15. Vasse River Overflow Structure (VROS) area. Time series maps showing Natural and Artificial Dreys (January 2021) and a new Natural Drey discovered in March 2021. No additional dreys were discovered at the VROS after March 2021.



a).



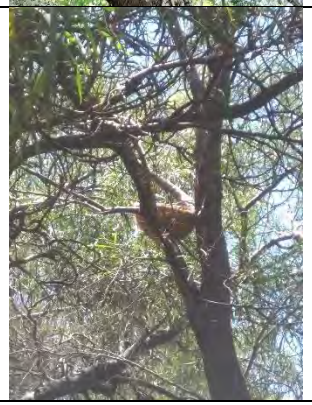
b).

Appendix 3. Table showing relocated and artificial dreys and logs installed outside the clearing zone of the project area. Types of shelters are: DoCo= Dome with coconut fibre (and Agonis leaves), Dom = Dome (with Agonis leaves only), CuCo = Cup with coconut fibre, Cup = Cup (with Agonis leaves only), Buc = Plastic Bucket, Hol = Hollow, Nat = Relocated Natural Drey. Poss. = number of Possums observed using the shelter. The locations of each shelter are plotted in Figures 4 and 5.

ID	Easting	Northing	Type	Tree	Possum numbers during 6 monitoring periods: Jan, Mar, May, Aug, Sept 2021, Jan 2022	Used	Photos	Notes
S1	[redacted]	[redacted]	DoCo	E. rudis	0 0 0 0 0 0 0	Unused		Collapsed coconut, very close to edge of works

S2	[redacted]	Dom	A. flexuosa	0 0 0 0 0 0	Unused		Very close to edge of works
S3		Dom	A. flexuosa	0 0 0 0 0 0	Unused		old leaves only
S4		DoCo	E. rudis	0 1 0 0 0 0	used		Coconut collapsed – needs repair

S5	[redacted]	Dom	E. rudis	0 0 0 0 0 1	Used		Old Agonis, Dense
S6	[redacted]	DoCo	C. calophylla	0 0 0 0 0 0	Used		some newer Agonis leaves, likely recent use - Rattus burst out of drey when checked

								
S7	[redacted]		Dom	A. flexuosa	0 0 0 0 0 0	Unused		Only old leaves in drey
S8			CuCo	A. flexuosa	0 0 0 0 0 0	Unused		old leaves only

								
S9	[redacted]		Nat	A. flexuosa	0 0 - - - -	Unused		Blown down
S10			Nat	A. flexuosa	0 – 0 - - -	Unused		Degraded, then not found

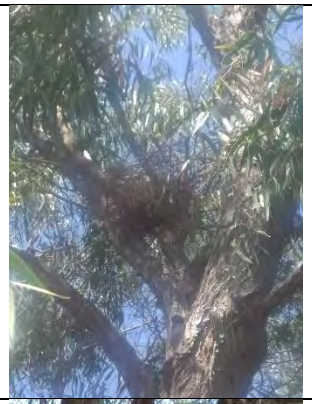
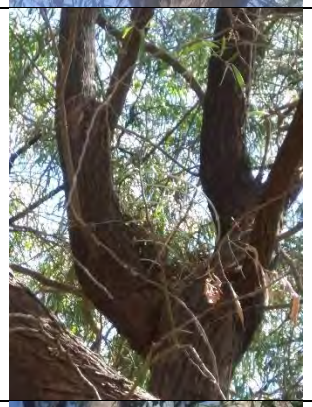
S11	[redacted]		Cup	A. flexuosa	0 0 0 0 0 0	Unused		Old leaves only
S12			Buc	E. marginata	0 0 0 0 0 0	Unused	The image part with relationship ID rId96 was not found in the file.	empty

								
S13	[redacted]	[redacted]	CuCo	A. flexuosa	0 1 0 0 0 0	Unused	 	dry Agonis leaves

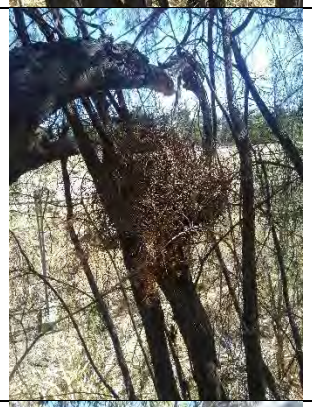
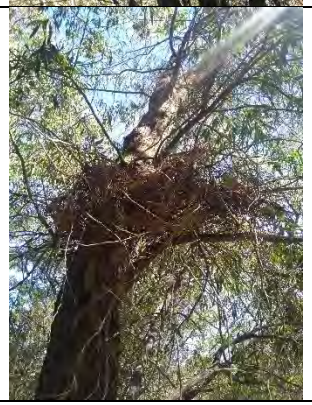
S14	[redacted]	Cup	A. flexuosa	0 0 0 0 0 0	Unused		Lots of dead leaves
S15		Buc	A. flexuosa	0 0 1 1 1 0	Used		Few leaves, occupied in May, August and Sept
S16		Nat	A. flexuosa	0 0 ----	Unused		Degraded, then not found

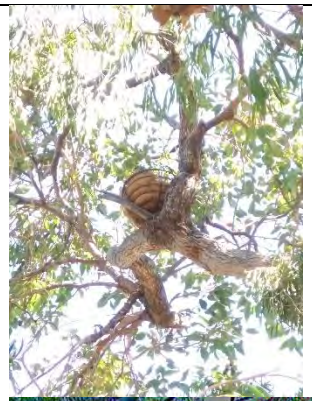
S17	[redacted]	CuCo	A. flexuosa	0 0 0 0 0 0	Unused		Lots of brown, old leaves
S18		Nat	A. flexuosa	0 0 0 0 0 0	Unused		Brown old Agonis

S19	[redacted]		Cup	A. flexuosa	0 0 0 0 0 0	Unused		Exposed location
S20			Buc	A. flexuosa	0 0 0 0 0 0	Unused		Dead leaves, no evidence of use
S21			CuCo	A. flexuosa	0 0 0 1 0 0	Used		lots of dead Agonis leaves, pole camera photo taken. Occupied on one occasion.

S22	[redacted]	Nat	A. flexuosa	0 0 - - - -	Unused		Platform still there but disused, then not found
S23		Cup	A. flexuosa	0 0 0 0 0 0	Unused		Leaves mostly gone
S24		DoCo	C. calophylla	0 0 0 0 0 0	Unused		coconut collapsed

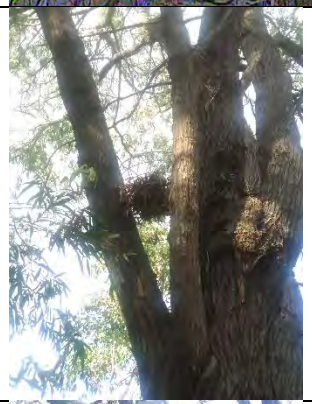
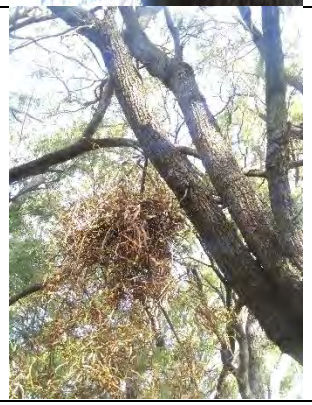
								
S25	[redacted]		Nat	A. flexuosa	0 0 0 0 0 0	Unused		No fresh Agonis
S26			Nat	Kunzea sp.	0 0 0 0 0 0	Unused		in good condition.

S27	[redacted]	Nat	Kunzea sp.	0 0 0 0 0 0	Unused		Collapsed
S28		Nat	Kunzea sp.	0 0 0 0 0 -	Used		light leaf cover but possibly used. Not found in Jan 2022
S29		Nat	A. flexuosa	0 0 0 0 - -	Unused		Degraded, not found in Sept 21

S30	[redacted]	CuCo	C. calophylla	0 0 1 1 0 1	Used	 	been used but empty. Coconut collapsed. Often used during the year.
S31		Cup	C. calophylla	0 0 0 0 0 0	Unused		few leaves

S32	[redacted]	CuCo	A. flexuosa	0 0 0 0 0 0	Used	 	may have been used
S33		Dom	A. flexuosa	0 0 0 0 0 0	Unused		Old leaves

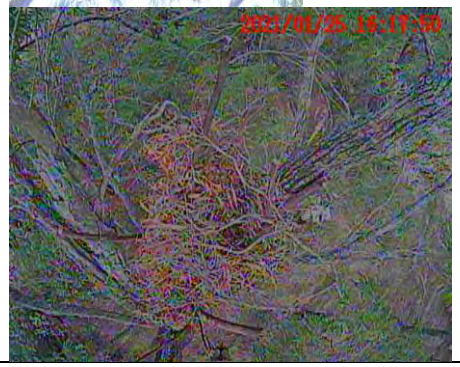
								
S34	[redacted]		Buc	A. flexuosa	0 0 1 0 1 0	Used		Few leaves
S35			DoCo	A. saligna	0 0 0 0 0 0	Unused		

								
S36	[redacted]		Cup	A. flexuosa	0 0 0 0 0 0	Unused		Few leaves
S37			Nat	A. flexuosa	0 0 0 0 0 0	Unused		Falling down

S38	[redacted]	Nat	A. flexuosa	1 0 0 0 0 0	Used	 	Only old leaves seen from outside but drey in good condition, possum inside in January 2021 then not occupied subsequently
S39		Nat	A. flexuosa	0 0 0 0 0 0	Unused		Old leaves but still in good condition

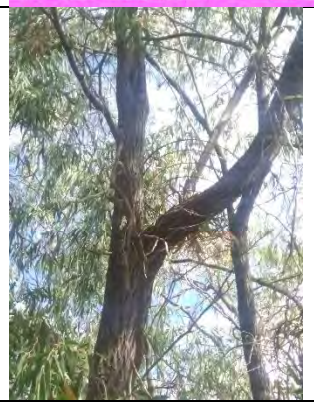
S40	3[redacted]		Cuco	A. flexuosa	0 0 0 1 0 0	Used	 	Occupied in August
S41	3		Nat	A. flexuosa	0 0 0 0 1 0	Unused		Degraded, still some Agonis leaves in it

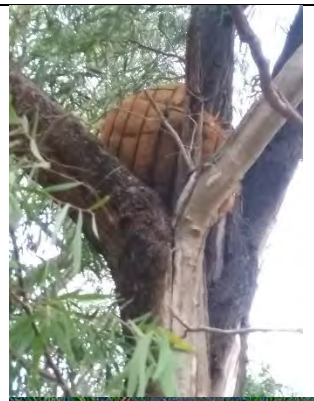
S42	[redacted]	Nat	A. flexuosa	0 0 0 0 0 0	Unused		Degraded
S43		Nat	A. flexuosa	0 0 0 0 0 0	Unused		Large drey, good condition
S44		Buc	A. flexuosa	0 0 1 0 0 0	Used		Old leaves. Occupied in April / May

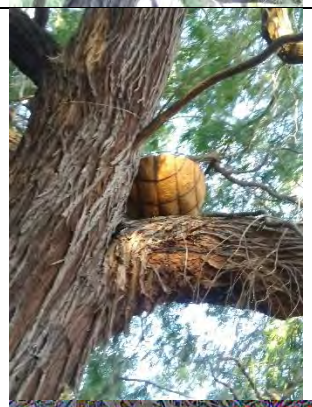
S45	[redacted]		Nat	A. flexuosa	0 0 0 0 0 0	Unused	No photo	Good condition, old leaves
S46			Nat	A. flexuosa	0 0 0 0 0 0	Unused	 	Good condition

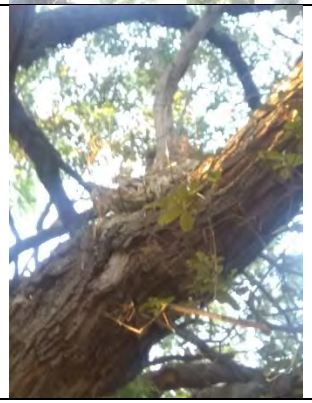
S47	[redacted]	Nat	A. flexuosa	0 0 0 0 0 0	Unused		Degraded
S48		Cup	A. flexuosa	0 0 1 0 1 0	Used		Old leaves, occupied in April / May and September
S49		CuCo	A. flexuosa	0 1 0 0 0 0	Used		Coconut Base pulled out, occupied in March

S50	[redacted]		Buc	A. flexuosa	0 0 0 1 0 0	Used		Occupied in August
S51			Cup	A. flexuosa	0 0 0 0 0 0	Unused	 	Lots of old leaves

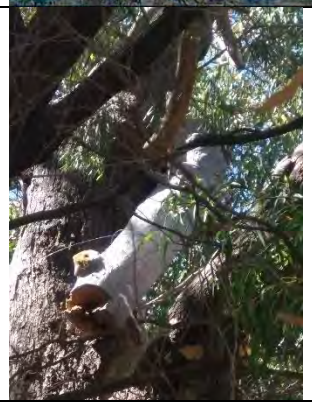
S52	[redacted]	CuCo	A. flexuosa	0 0 0 0 0 0	Unused	 	Few leaves left
S53		Cup	A. flexuosa	0 0 0 0 0 0	Unused		few leaves

S54	[redacted]	DoCo	A. flexuosa	0 0 0 0 0 0	Unused	 	Artificial Drey originally installed at D05R but then relocated to D23H, material had been rearranged - possible possum use but empty on 25/01/21. No subsequent evidence of use.
S55		DoCo	M. cuticularis	0 0 0 0 0 0	Unused		Collapsed Difficult for possum to enter – needs repair

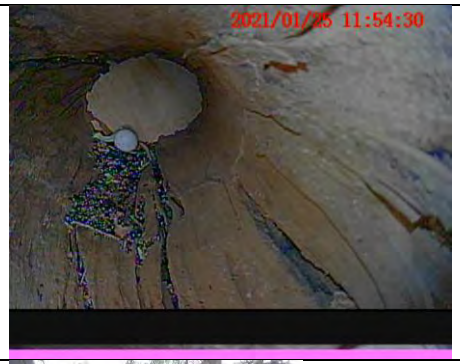
S56	[redacted]	Nat	A. flexuosa	0 0 0 0 1 0	Used		Large Agonis. Used in September, still maintained
S57		CuCo	A. flexuosa	0 0 0 0 0 0	Unused	 	Large Agonis, very full, old drey inserted into shelter

S58	[redacted]	Cup	A. flexuosa	0 0 0 0 0 0	Used		Fresh leaves present, likely used, but empty when checked in Jan 2021. Not occupied when checked subsequently
S59		Nat	A. flexuosa	0 0 0 0 0 0	Unused		Still some Agonis leaves
S60		Cup	A. flexuosa	0 0 0 0 0 0	Unused		Still some Agonis leaves

S61	[redacted]	DoCo	A. flexuosa	0 0 0 0 0 0	Unused		Coconut collapsed – needs repair
S62		DoCo	A. flexuosa	0 0 0 0 0 0	Unused	 	Coconut collapsed – needs repair

S63	[redacted]	Hol	E. patens	0 0 0 1 0 0	Used	 	Approx. 8m high, relocated from E. rudis in Links Ct. Occupied in August
S64		Hol	E. patens	0 0 0 0 0 0	Unused		relocated from E. rudis in Links Ct

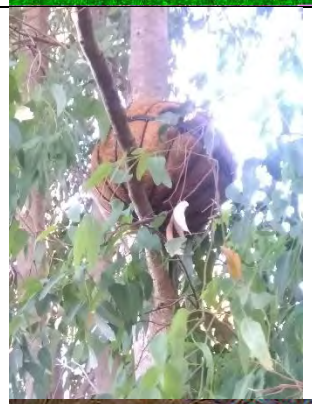
								
S65	[redacted]		DoCo	A. flexuosa	0 0 0 0 0 0	Unused		Coconut dome collapsed
S66			Hol	C. calophylla	0 0 0 0 0 0	Unused		pigeon egg inside, another broken on ground below in Jan 2021. Nest in September 2021 (probably Bronzewing).

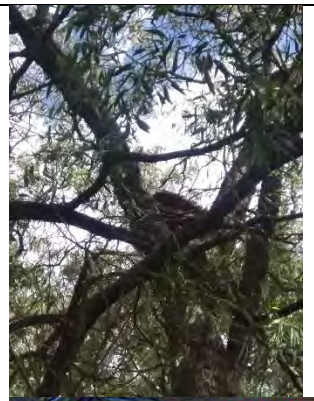
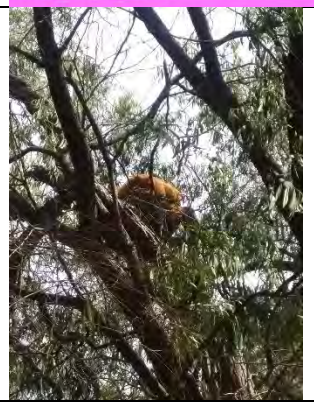
								
S67	[redacted]		Cup	E. marginata	0 0 0 0 0 0	Unused		few old leaves
S68			DoCo	A. flexuosa	0 0 0 0 0 0	Used		coconut taken and placed further up tree, some blown down

								
S69	[redacted]	[redacted]	DoCo	A. flexuosa	0 0 0 1 0 0	Used	 	natural drey inserted into artificial drey, Coconut collapsed in Jan 21, but occupied in August

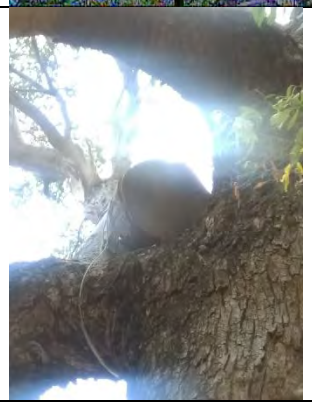
S70	[redacted]	Hol	A. flexuosa	1 1 0 0 0 0	Used	 	Possum in base of log in Jan and Mar 21.
S71		CuCo	A. flexuosa	0 0 1 1 0 1	Used		coconut rearranged, removed from base, occupied in April / May, August and Jan 2022

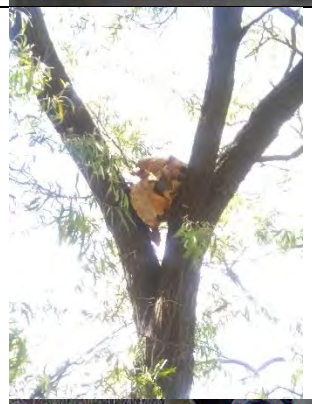
								
S72	[redacted]		Nat		0 – 0 -0 0 -		No photo	deteriorated and difficult to locate
S73			Hol	A. flexuosa	0 0 0 0 0 1	Used		A few old leaves only. Occupied in Jan 2022

								
S74	[redacted]	[redacted]	DoCo	E. rudis	0 0 0 0 0 0	Used	 	coconut still in good condition, looks like it had been used, in January 2021, but not since.

S75	[redacted]	Hol	A. flexuosa	0 0 0 0 0 1	Used	 	Slightly green leaves in bottom, probably used in Jan 2021, occupied in Jan 2022
S76		DoCo	A. flexuosa	1 0 0 0 0 0	Used		coconut rearranged – visible from the outside, possum inside. Not recorded as occupied since Jan 21

								
S77	[redacted]	[redacted]	Hol	C. calophylla	1 2 1 0 0 1	Used	 	Possum regularly recorded. The only short hollow which has recorded a mother and joey inside (Mar 21)

S78	[redacted]	CuCo	C. calophylla	0 0 0 0 0 0	Unused	 	coconut collapsed. Needs repair
S79		Hol	E. rudis	1 0 1 0 0 0	Used		Possum recorded on two occasions

								
S80	[redacted]	[redacted]	DoCo	A. flexuosa	1 1 1 1 1 0	Used	 	Klara's Lodge. Paperbark had been rearranged – visible from outside, possum inside all but Jan 2022. One of only two dreys with Paperbark, which may be key to its success.

S81	[redacted]		Hol	A. flexuosa	0 0 0 0 0 1	Used		Used in Jan 2022
S82			Nat	A. flexuosa	0 0 0 0 0 0	Unused		Dry, collapsed
S83			Hol	C. calophylla	0 1 1 0 0 1	Used		Occupied in 3 of 6 monitoring periods

S84	[redacted]	Nat	Ground	0 0	Unused			On ground, blown out of tree. Not found after March 21
S85		DoCo	E. marginata	0 0 0 0 0 0	Unused			Coconut collapsed – needs repair
S86		DoCo	C. calophylla	0 0 0 0 0 0	Unused			

								
S87	[redacted]		Cup	A. flexuosa	0 0 0 0 0 0	Unused	 	In Large Agonis
S88			Cup	A. flexuosa	- - 0 0 0 0	Used		Coconut removed

Appendix F
Revegetation and rehabilitation



tranen revegetation southwest







Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #3

Activity Date(s):	24/12/20 – 21/01/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.

Previous Action Taken

Date(s):	Activity	Description
01/09/20 – 06/10/20	Preliminary weed control	Blanket and spot spraying across all reveg areas. Priority weeds, woody weed treatment and slashing of Eastern PEC and VDD Embankment sections.
19/10/20 – 26/10/20	Possum infrastructure	Installation of rope bridges and nesting boxes across revegetation zones. Primarily in Possum Corridor and Eastern PEC Zones.
13/10/20 – 06/11/20	Initial Aboriginal engagement	2x on-country and at GCLN meetings with Undalup Association and Roelands Village. Engagement of Aboriginal businesses in vegetation salvage.
26/10/20 – 10/11/20	ESA Clearing and fencing	Progressive clearing of native and non-native vegetation along ESA fencing alignment. Installation of 1.2m fence with shade cloth along ESA boundary.
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.

14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.

Note: A more comprehensive report will be prepared to provide full descriptions and evidence of works undertaken for the project. This document will be updated regularly during the course of the project and will complement the revegetation monitoring reports to be provided as part of the project requirements.

Photographs



Brushwall and Brush Palisades Western Bank – January 2021



Wide Image of Western Bank – January 2021



Initial Weed Cover Western Bank – September 2020



Completion of Matting and Brushwall – January 2021



Western Bank Typical Condition – September 2020



Completion of Matting and Brushwall – January 2021

tranen revegetation southwest



Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #4

Activity Date(s):	19/01/21 – 22/02/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
22/01/21 – 22/02/21	Baseline monitoring report	Preparation and submission of baseline monitoring report. This report provides further definition of completion criteria and an overview of site conditions prior to commencement of on-ground works.
08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
11/02/21 – 18/02/21	Greenwaste and woody weeds	Clearing and removal of Greenwaste (weed and dead material). 30m³ of weed material disposed of at waste facility and over 100m³ stockpiled on site for future removal and respreading of larger logs for habitat.
17/02/21	Aboriginal engagement – Undalup Association	On-country meeting and consultation with Cultural Custodians to discuss the project scope for the development of cultural / biodiversity nodes within the site. Confirmation to commence works 12/02/21.

19/02/21	Embankment palisade construction	Commencement of installation of vegetated palisade areas on the VDD Embankments. Includes procurement of all materials.

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.

Note: A more comprehensive report will be prepared to provide full descriptions and evidence of works undertaken for the project towards the end of Stage 2 (August 2021). This document will be updated progressively during the course of the project and will complement the revegetation monitoring reports to document in detail the works undertaken, and outcomes achieved.

Photographs



VDD W Embankment Matting – February 2021



VDD E Embankment Matting – February 2021



VDD Quindalup Dune Soil Respread Complete – February 2021



Western PEC Pre-Greenwaste Removal – January 2021



Western PEC Post-Greenwaste Removal – February 2021



Western PEC Greenwaste Stockpile Example– February 2021



VDD W Embankment Palisades (In-Progress) – February 2021

Seed Collected To Date By Project - By Batch

Project ID: P875C **Project Name:** VDD Upgrade Revegetation Implementation

Batch ID	Species	Location (Sub-location)	Weight (g)	Collection Date	Specimens	Grade
SW211041	Alyxia buxifolia	Peppermint Grove Beach (Peppermint Grove Beach)		19-Jan-21	50+	
SW211039	Anigozanthos manglesii	Carbunup Reserve (Carbunup Reserve)		19-Jan-21	50+	
SW211088	Anigozanthos manglesii	Carbunup Reserve (Carbunup Reserve)		17-Feb-21	50+	
SW211029	Anigozanthos manglesii	Christine Byatt (Christine Byatt)		15-Jan-21	50+	
SW211096	Anigozanthos manglesii	Dunsborough (Armstrong Reserve)		28-Jan-21	20+	
SW211095	Burchardia congesta	Dunsborough (Armstrong Reserve)		28-Jan-21	20+	
SW211031	Clematis pubescens	Aravina (Aravina)	8.7	15-Jan-21	3	A
SW211067	Dichopogon capillipes	Quedjinmia Reserve (Quedjinmia Reserve)		12-Feb-21	50+	
SW211065	Dichopogon capillipes	Quedjinmia Reserve (Quedjinmia Reserve)	1.2	09-Feb-21	20+	A
SW211040	Hakea lissocarpha	Ambergate Reserve (Ambergate Reserve)	43.4	19-Jan-21	50+	A
SW211025	Hakea prostrata	Ambergate Reserve (Ambergate Reserve)	2.3	13-Jan-21	10+	A
SW211026	Hakea varia	Ambergate Reserve (Ambergate Reserve)	4.0	13-Jan-21	20+	A
SW211059	Hakea varia	Hair Place (Hair Place)	41.9	12-Feb-21	50+	A
SW211022	Hovea trisperma	Ambergate Reserve (Ambergate Reserve)	0.1	13-Jan-21	3	A
SW211082	Pimelea rosea	Lot 26 Quindalup South Rd (Lot 26 Quindalup South Rd)	34.0	09-Feb-21	50+	A
SW211081	Pimelea rosea	Lot 26 Quindalup South Rd (Lot 26 Quindalup South Rd)	42.0	12-Feb-21	50+	A
SW211024	Stackhousia monogyna	Ambergate Reserve (Ambergate Reserve)	19.8	13-Jan-21	10+	A
SW211030	Tripterococcus brunonis	Aravina (Aravina)		15-Jan-21	50+	
SW211023	Tripterococcus brunonis	Ambergate Reserve (Ambergate Reserve)		13-Jan-21	10+	
SW211028	Tripterococcus brunonis	Christine Byatt (Christine Byatt)		15-Jan-21	5+	
SW211089	Xanthorrhoea brunonis	Carbunup Reserve (Carbunup Reserve)		17-Feb-21	50+	
SW211091	Xanthorrhoea brunonis	Carbunup Reserve (Carbunup Reserve)		18-Feb-21	50+	
SW211092	Xanthorrhoea gracilis	Carbunup Reserve (Carbunup Reserve)		18-Feb-21	50+	
SW211093	Xanthorrhoea preissii	Carbunup Reserve (Carbunup Reserve)		18-Feb-21	20+	
SW211090	Xanthorrhoea preissii	Carbunup Reserve (Carbunup Reserve)		17-Feb-21	20+	

Note: Blank seed weight indicates batch has not been processed yet.

Seed Collected To Date By Project - By Batch

Project ID: P875C **Project Name:** VDD Upgrade Revegetation Implementation

Total no. of Batches: **25** Unprocessed: **15** Total Seed Processed to Date (g): **197.4**

Total no. of Species: **15**

tranen revegetation southwest







Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #5 March 2021

Activity Date(s):	23/02/21 – 23/03/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
23/02/21 – 23/03/21	Weed control	Weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
03/03/21 – 09/03/21	Palisade construction	Construction and completion of 3x palisade areas along the western embankment.
12/03/21 – 19/03/21	Aboriginal engagement	Two days of Undalup's indigenous ranger team (x3) performing site preparation tasks (weed control, rubbish removal and fuel load reduction) in the Southern PEC zone. Additional reporting to be provided in the next period.
17/03/21 – 22/03/21	Mulch installation	675m³ of mulch supplied and spread (mechanical and manual) across 9,000m² of the eastern PEC zone.

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.

24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.
19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
22/01/21 – 22/02/21	Baseline monitoring report	Preparation and submission of baseline monitoring report. This report provides further definition of completion criteria and an overview of site conditions prior to commencement of on-ground works.
08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
11/02/21 – 18/02/21	Greenwaste and woody weeds	Clearing and removal of Greenwaste (weed and dead material). 30m³ of weed material disposed of at waste facility and over 100m³ stockpiled on site for future removal and respreading of larger logs for habitat.
17/02/21	Aboriginal engagement – Undalup Association	On-country meeting and consultation with Cultural Custodians to discuss the project scope for the development of cultural / biodiversity nodes within the site. Confirmation to commence works 12/02/21.

Photographs



VDD Embankment Palisade Northern Section W Bank - March 2021



VDD Embankment Palisade Central Section W Bank - March 2021



VDD Embankment Palisade Southern Section W Bank- March 2021



Eastern PEC Pre-Weed Control Condition N Aspect – September 2020



Eastern PEC Mulch Completion N Aspect – March 2021



Eastern PEC Pre-Weed Control Condition S Aspect– September 2020



Eastern PEC Mulch Completion S Aspect– March 2021

tranen revegetation southwest







Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #6 May 2021

Activity Date(s):	24/03/21 – 25/05/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
24/03/21 – 25/05/21	Weed control	On-going follow-up weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
24/03/21 – 07/05/21	Aboriginal engagement – Wadandi Rangers	On-going support for site works from Undalup Association's Wadandi rangers both on site and at GCLN. Please see attached progress reports from Undalup.
19/04/21 – 23/04/21	Ripping	Soil ripping via tractor mounted tine across Central PEC and Quindalup Dune revegetation zones. Approx. 1.5 ha covered.
13/05/21 – 21/05/21	Mulch installation	315m³ of mulch supplied and spread (mechanical and manual) across 6,000m² of the Quindalup Dune zone.
24/03/21 – 25/05/21	Procurement	Purchase and delivery of corflute tree guards, stakes and root barrier.

Previous Action Taken

Date(s):	Activity	Description
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26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
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01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
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04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
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19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
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08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
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Photographs



Quidalup Dune Ripping – May 2021



Quidalup Dune Mulch completion – May 2021



#4:31 Vasse River Diversion Drain

Stage 2: Part I Report 1: March 2021

Undalup Association Inc.

& Tranen

Undalup Association Inc
Project Manager: Rachelle Cousins
Wadandi Snr Ranger: Juanita Evans

KAYA / WELCOME:

The Undalup Association Inc. would like to acknowledge the Traditional Owners and Elders whose cultures and customs have nurtured, and continue to nurture, the land we all walk and live on, here on Boodjar. We Respect the presence of the ancestors (Demmala Goomala) who's Spirits (Djanga) reside on country (Boodja) and walk their feet (djenna) on the land, their heart spirit (djanga korda) flow through all creation. We all come together for Country (Boodja).

INTRODUCTION

Undalup is also honouring a place for healing and connection to Wadandi Boodjar (Country), embracing the elements given to us from Boodjar Ngarngk (Earth Mother), celebrating the meeting place and bringing harmony on the land we all walk together.
Wadandi Cultural Custodian, Undalup Chairperson, Iszaac 'Waalitj' Webb

ABOUT UNDALUP:

Undalup embraces the Aboriginal culture and with the shared ownership of all our projects and cultural events we believe will lead towards a more reconciled and respectful future giving us all a sense of belonging drawing everyone into the cultural, spiritual, heritage and historical aspects of the area. Through the development of genuine partnerships, relationships, interpretation and support of the process of reconciliation, together with stakeholder and community education and co-operation, we believe the Undalup Association Inc. will grow and prosper for the benefit of the whole community.

The Undalup Association has a large membership with over 80% being Aboriginal people. The Undalup Association has formed partnerships with **Act–Belong–Commit**. The goal of the Act-Belong-Commit campaign is to encourage people to become more proactive about their mental health.

Organisation: Undalup Association Inc
ABN: 91 308 448 476
Address: PO Box 985, Margaret River, WA 6285
Contact: Admin – Rachelle Cousins
Mobile: 0437782840
Email: undalup@outlook.com
ATO: Registered for GST

ABOUT TRANEN:

Tranen, are revegetation specialists, being a company in the South West of WA, who are engaging in contractual works with the Undalup Association being located in the Wadandi Boodja region of the Bibbulmun Nation, South West WA.

Tranen has recently been awarded contractual works with the Water Corporation, in regards to the Vasse Drain upgrade works, located in Busselton WA.

Tranen's primary focus is revegetating, rehabilitating, and restoring natural ecosystems around the southwest of Australia using native species. They are a small team of dedicated professionals focused on building relationships with their clients to provide quality, practical, cost-effective and sustainable revegetation solutions.

Tranen Contacts:

Alex Johnston – Southwest Project Manager – M: 0411089044 E: alex.johnston@tranen.com.au
Matthew Blunt – Southwest Director – M: 0400165729 E: matt.blunt@tranen.com.au

PROJECT SUMMARY

Water Corp have a requirement for Aboriginal engagement as part of Tranen's contract, which will provide plenty of opportunities to build a relationship with Undalup that will be meaningful and long-term. Tranen have engaged Undalup to focus and prioritise project works on key sites or "Biodiversity Nodes" within the restoration zones (project-within-a-project-style) utilising traditional management practices in combination with current best-practice industry standard NRM approaches. The aim is to provide the opportunity for the Undalup Association's Wadandi Rangers to work more independently and utilise Traditional knowledge where possible, contributing to meeting some of our other organisational objectives in meaningful employment / skills development for trainees and staff, opportunities to develop business capability, providing spaces for on-country cultural awareness / promotion and develop a community-based framework for on-going custodianship of these sites beyond the current project timeline.

The Biodiversity Node sites are located within the Restoration Zones based on indicative locations in the Tranen Revegetation Plan. The concept is to start restoration works from a single point (rather than using a defined site boundary). The plan from there is to work progressively out from this point in a staged and methodical manner, meeting some of the basic criteria, being: appropriate weed management, establishment of common / foundation native species, introducing less-common/rare species, implementing traditional fire management and integrating more "cultural restoration" of these areas.

SCOPE OF WORKS

The Undalup Association is commencing Stage 2 works with Tranen, Consultation was held in February with Undalup's Wadandi Cultural Custodian Iszaac Webb and project manager Rachelle Cousins, with Alex Johnston and Matthew Blunt from Tranen.
The Wadandi Aboriginal rangers were selected, and each one has completed all OH&S requirements, and the Water Corporations online induction, having a vast knowledge of seed collection and plant identification, as all Wadandi Rangers are currently undertaking their Cert I & II in Conservation & Land management with Greening Australia.

The Undalup Association will complete each week a JSA, covering general safety requirements and any assessing possible onsite hazards each day of work that apply to the project and they will have task specific risk assessment for everyone performing works, using tools and equipment on site, each Ranger to sign each day ands each weeks JSA is attached in this report.

There will be a quick start-up/toolbox meeting and site induction at the start of each lot of project works with Tranen and Undalup's project managers with the Wadandi Rangers on site.

KEY OUTCOMES

Tranen are aiming to achieve the following:

- Build a foundation for future collaborative arrangements for this project;
- Save some plants from clearing and get them healthily growing in the nursery;

- Everyone involved learns some new skills and develops new knowledge, while getting paid;
- Everything is done safely and no one is put at risk;
- We develop some genuine interest and engagement from those involved in the project in what we are trying to achieve in the long-term.

Potential Outcomes:

- Sufficient space to allow for on-going expansion of the site over the long-term;
- Striking a balance between establishing an area that is accessible and visible for promotion / practicality purposes, but not so exposed that it gets overly used or vandalised. This could be balanced by establishing a few different sites for different purposes;
- Ability to restore the site is achievable in the context of project budgets and time;
- A site that has the potential to become a culturally significant meeting place, given enough time;
- Encapsulates as much of the ecological, cultural and social intended benefits of the wider project as possible;
- In essence, a nice place to meet, sit, appreciate the work done to heal country / restore what once was and connect to the land in the middle of an urban area.

PROJECT NRM TASKS:

NRM-based tasks that will be undertaken as part of the project, some do not require any specific skills or qualifications, other may require specific training, qualifications and/or licences. The following is a brief summary of some of the key ones:

- Weed control: Key initial site preparation task. Manual and mechanical control does not require formal qualifications, but any herbicide application requires operators to have a valid WA Pesticide Technician Licence issued by the WA Dept of Health if performing weed control on a commercial basis, which will be undertaken by a licenced contractor, due to RESPECTING Cultural LORE, No poisons on Boodja.
- Fire management: This is a great opportunity to undertake under the guidance of Wadandi Cultural Custodians, incorporating traditional knowledge, having the burn piles on site burnt in a culturally respectful manner, keeping in mind that the City of Busselton and FESA will need to be closely consulted;
- Seed collection: There is potential for involvement in this critical part of the project; Undalup looking at obtaining a licencing for taking flora species, and having qualified Rangers on site who have the knowledge and experience for seed collection, is an extra bonus.
- Propagation: We have already made some in-roads in this space thanks to GCLN. We will continue to engage with GCLN to assist propagating our recent savaged vegetation and can expand on this to include assisting the nursery with propagation for all plants at GCLN for the project;
- Planting: There will be opportunities for plenty of planting over the course of the project. We can focus primarily on our salvaged plants and others propagated at GCLN, but there will likely also be opportunities to assist with planting across the wider project area;
- Monitoring: Very good opportunity to assist in the monitoring of revegetation success and overall storytelling of the project. It would be ideal to establish a monitoring and reporting program for our Biodiversity Nodes and we can assist developing skills in vegetation monitoring.
- Wadandi Ranger Team leader will be taking photos each week on the project teams progress and complete a weekly report which will be complied into a monthly report and presented to Tranen at the end of each Month.

Day 1: Friday 12/03/2021



Job Site: Glen Meere Ramble

Wadandi Rangers: Juanita Evans, Jamie Hurst and Seth Richardson.

Scope of works: Rubbish, household plants, weed removal and creating fuel piles for future burning.

- At the beginning of the day a Job Site Hazard Analysis was conducted with Alex Johnston from Tranen.
- We addressed Occupational Health and Safety procedures for correct and safe usage of all tools used on the work site, including the pole saw and whipper snipper, ensuring the wearing of Personal Protective Equipment and correct use procedures at all times.



- Removed rubbish and weeds from the first site zone. This processed was carried out by each person covering a section from the designated zone.
- Weeds were then placed into bags to be removed from the site.
- We raked dry leaves into small piles and moved dry wood to hold the leaves in place to create several small piles of fuel for future fire burn offs.
- There was incredible amount of dry leaves located on the site. We removed several bags of dry leaves from the work site in order to reduce the abundant amount of leaves, to ensure the burn offs would be conducted safely without an excess level of fuel that would be conducted at a later date.
- A whipper snipper was used to remove the tall dead grass that deemed hazardous located in close proximity to the burn off piles.
- We pulled several different weed species and placed them in bags.



- Household species that were located on site were potted and removed in order to ensure only native species remained in the bushland area. Household plants can take much needed minerals and nutrients from native species as well as spread and take over the landscape.
- Dense areas of dry dead wood was chopped with the pole saw, although a chainsaw will be need to remove a lot of the remaining dead wood located in severe dense areas.
- The Pole saw was also used to cut tree limbs that were low hanging and were intruding too close to burn off piles and walk areas. The green wood was then placed onto the trailer to be removed from the site. Dead wood that was removed from trees or located on the ground was moved to the piles of leaves and used as a buffer to hold the leaves in place in windy weather conditions and hopefully reduce chances of animals or people disturbing the fuel piles for future burning.



- Places where an abundance of weeds were located we placed a stake with red tape to ensure the area would be addressed later and if needed sprayed for weeds that may return after being disturbed. Also for the area to be reassessed in case any weeds were missed as there were many weeds that were widespread, travelled on the wind and were hidden amongst dense terrain. Areas where an enormous amount of weeds were removed will need to be continually monitored.

- The bags of rubbish, weeds, dry leaves and several green wood branches were loaded onto the trailer and taken to the tip. Each bag was weighed providing the total content of weeds, dry leaves and rubbish that was removed from the site in the first designated zone.

Total Number of Bags: 17 Bags.

General Waste	Green Waste
20kg	297.5kg

































Job Site Hazard Analysis

tranen

Date	12/3/21
Prepared by	A. JOHNSTON
Project number and name	P875C VOD 52.
Job location	Busselton.
Task details	Rubbish & weed removal.

Are there SWMSs for the main activities?	Y
If yes, have they been reviewed by the crew?	Y
Will this work affect others on site? If so, involve them in this	N
Is appropriate PPE available for the work?	Y

Risk rating matrix

Consequence	How likely is it to occur? extremely	very	likely	unlikely	rarely
catastrophic	1 H	1 H	1 H	2 M	3 L
serious	1 H	1 H	2 M	2 M	3 L
moderate	1 H	2 M	2 M	2 M	3 L
minor	2 M	2 M	2 M	3 L	3 L
insignificant	3 L	3 L	3 L	3 L	3 L

Potential site hazards	✓ if yes	Comment / Controls - If necessary, provide further details in table below
Uneven ground	✓	
Falling objects	✓	
Plant interaction	✓	
Traffic interaction	✓	
Underground services	–	
Extreme weather	–	
Insects	✓	
Snakes	✓	
Water hazards	✓	
Access hazards	✓	
Steep slopes	–	
Remote location	–	
Other (specify)		

Other matters	Response
Nominate emergency assembly point	Return to vehicle
Is use of "hands-free" while driving prohibited?	Y/N
Is smoking prohibited on the entire site?	Y/N

Each participant is to sign off to indicate consultation and training in the content of this JSHA and SWMSs	
Employee name / company (if not Tranen)	Initials
A. JOHNSTON	AJ
Juanita Evans	J.E.
Seth Richardson	S.R.
Janie Hurst	J.H.

Activity	Possible activity hazard	Risk rating	Hazard controls	Rating with ctrl	Responsibility
Special requirements for COVID-19	Spread of the virus	1 H	Follow Procedure SW-13 and site-specific controls as below:	2M	
Rubbish & Weed Hand	Manual handling - injury	2M.	Take breaks, rotate tasks, stretches, correct technique don't overload	3L	All.
	Slips & trips	2M	Correct footwear, work steadily. don't overload.	3L	All.
	Cuts & abrasions from litter	2M	Gloves, wrapping	3L	
	- Meth labs	2M	leave alone - report	3L	All.
	Bites stings	2M.	Avoid areas	3L	All.
Pole Saw/Hedge Trimmer	1H	Stand away from falling branches, work steadily. follow OHS procedures at all times,	3L	ALL	

Wear PPE. Follow Operation Safety procedures

Day 2: Friday 19/03/2021









Job Site: Glen Meere Ramble

Wadandi Rangers: Juanita Evans, Jamie Hurst and Seth Richardson.

Scope of works: Rubbish, household plants, weed removal and creating fuel piles for future burning.

- Started the day with a Job Site Hazard Analysis.
- Recapped the OHS of safety tools used on site, including the pole saw and whipper snipper, ensuring the wearing of PPE and correct use procedures.
- The swampy area water level was now significantly reduced, therefore we were able to remove general waste that had ended up into the swampy area. We also removed large rocks, bricks, dried wood and weeds throughout the area. Once the area was cleared we all took turns clearing the high grass with the whipper snipper.
- Removed rubbish from the entire zone from fence line on the corner near the swampy area to behind the childcare centre. Some rubbish was difficult to remove as the rubbish was severely decomposing and a lot was buried beneath layers of leaf matter and dirt.
- The weed removal of several weeds deemed quite challenging, the fluffy weeds were travelling by the wind. The fluffy weeds were difficult to bag as often had to be individually picked up and were wide spread. The weed removal of the creeper weed was also difficult as it was deeply embedded between the dense native vegetation. Locating and unravelling the creeping weed in order to remove it without damaging the native flora and fauna was a timely process. Also we needed to be careful not to get the poisonous sap on us, as this can temporarily cause a person to go blind.
- Several bags of general waste big and small was removed from the site this included a bean bag, a table, many glass bottles, broken glass and paper waste. A lot of the rubbish had been there so long that it had started to decompose.
- Places where there were abundance of weed matter were staked and red tape was applied to ensure area could be sprayed in case weed seed or roots were still located in the identified area.
- Near the swampy area near the fence the pole saw was used to tidy up and remove low hanging branches that blocked walkways. Dead wood placed in a pile to be used for fuel for burn off piles at a later date and green wood was placed on the trailer to go to the tip.
- The bags that were place on the trailer were taken to the tip and each bag was weighed providing the total content of weeds and rubbish that was removed from the site throughout all the zones.
- Removed weeds rubbish from the entire zone from fence line to behind childcare centre. Near the child care centre there are still weeds on site that need to be removed. As well as some household plants and other general waste.

- In the swampy area near the fence line, near the childcare centre there was a large number of general waste products sitting in the stagnate water that seemed quite polluted. Also several rats were observed near the water site.



Total Number of Bags: 15 Bags.

General Waste	Green Waste
12kg	146.5kg















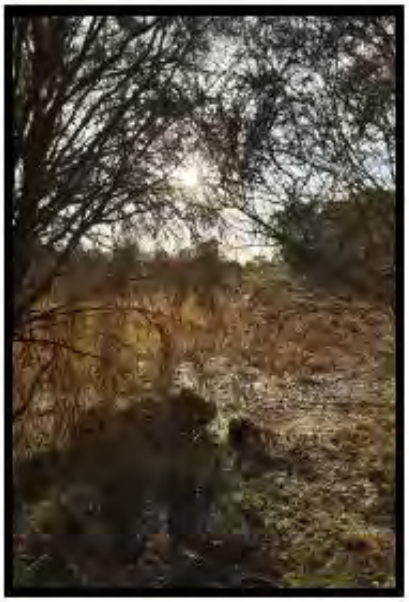


















Job Site Hazard Analysis

Date	19/3/21
Prepared by	Juanita Evans
Project number and name	P875C V0052
Job location	Busselton
Task details	Rubbish and Weed removal

Are there any SWMSs for the main activities?	Y
If yes, have they been reviewed by the crew?	Y
Will this work affect others on site? If so, invoice them in this	N
Is appropriate PPE available for the work?	Y

Risk rating Matrix

Consequences	How likely is it to occur? Extremely	Very	Likely	Unlikely	Rarely
Catastrophic	1H	1H	1H	2M	3L
Serious	1H	1H	2M	2M	3L
Moderate	1H	2M	2M	2M	3L
Minor	2M	2M	2M	3L	3L
Insignificant	3L	3L	3L	3L	3L

Potential Site Hazards	✓ If yes	Comments / Controls - if necessary, provide further details in table below
Uneven ground	✓	
Falling objects	✓	
Plant interaction	✓	
Traffic interaction	✓	
Underground services	–	
Extreme weather	–	
Insects	✓	
Snakes	✓	
Water hazards	✓	
Access hazards	✓	
Steep slopes	–	
Remote location	–	
Other (specify)		

Other matters	Response
Nominate emergency assemble point	Return to vehicle
In use of "hands-free" while driving prohibited?	Y/(N)
Is smoking prohibited on the entire site?	Y/(N)

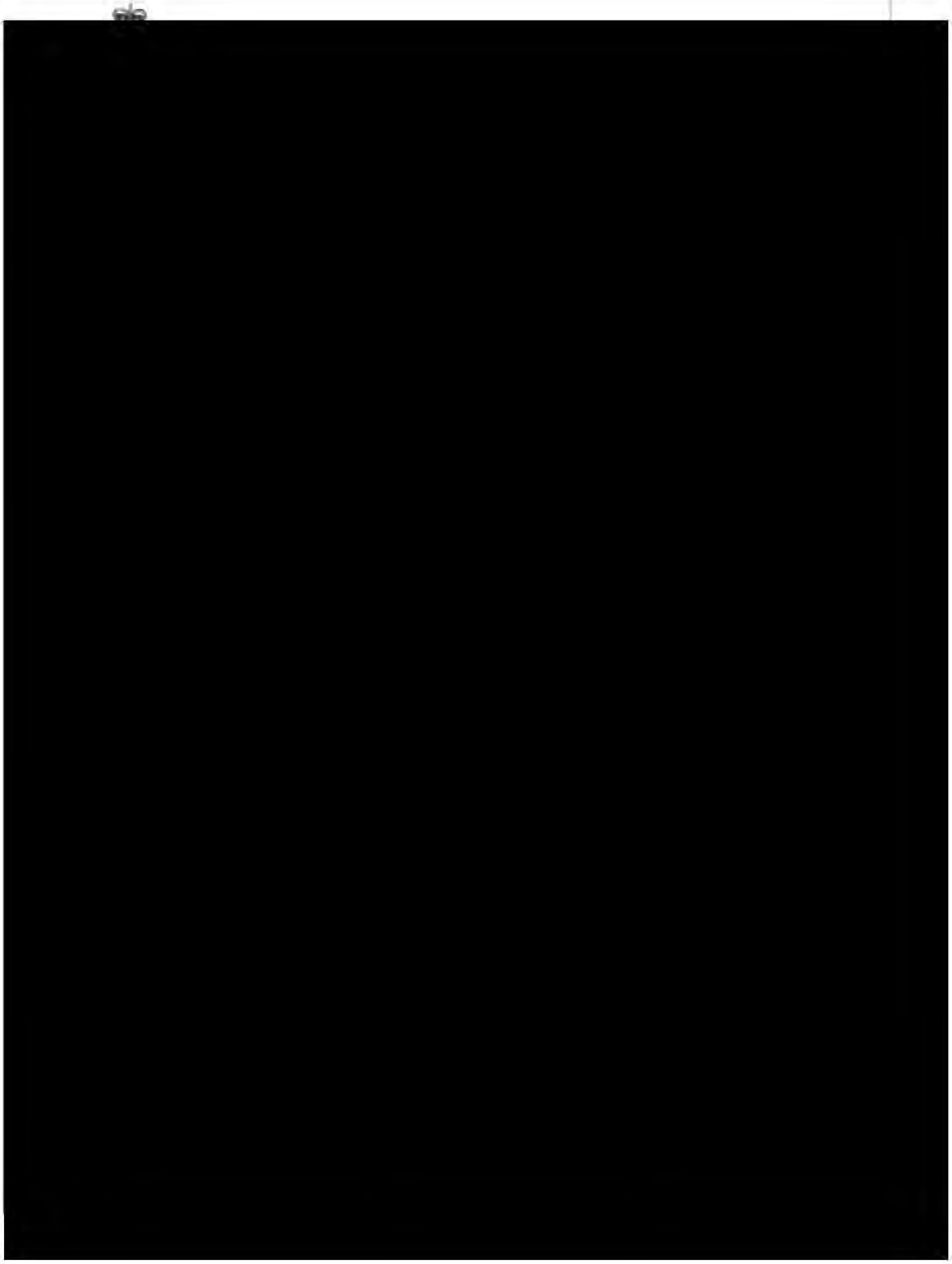
Each participant is to sign off to indicate consultation and training in the content of this JSHA and SWMSs

Employee name / company	Initials
Juanita Evans	J.E.
Seth Richardson	SR
Jamie Hurst	JH

Activity	Possible activity hazard	Risk rating	Hazard controls	Rating with ctrl	Responsibility
Special requirements for COVID-19	Spread of the virus	1H	Follow procedure SW-13 and site-specific controls as below:	2M	
Rubbish and weed removal	Manual handling injury	2M.	Take breaks, rotate tasks, stretches don't overload	3L	All
	Slip and trips	2M.	correct footwear, work steadily don't overload	3L	All
	Cuts and abrasions from litter →	2M	Gloves, wrap PPE	3L	All
	Meth Labs	2M	Leave alone - Report	3L	All
	Bites and stings	2M	Avoid areas	3L	All

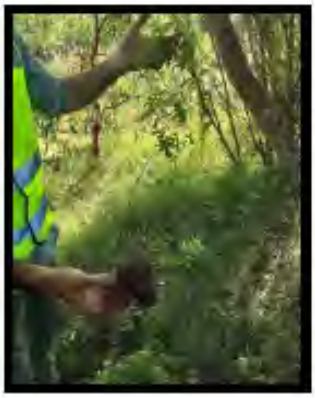
On this day we found wallets containing ID, these were taken to the local Police station and handed in.

Copy of Police report.



Day 3: Friday 26/03/2021









Job Site: Glen Meere Ramble

Wadandi Rangers: Juanita Evans, Seth Richardson and Richard Swan

Scope of works: Rubbish, household plants, weed removal and creating fuel piles for future burning.

- Started the day with a Job Site Hazard Analysis.
- Recapped the OHS of safety procedures for all tools used on site ensuring the wearing of PPE.
- Today we continued with the removal of all the weeds from behind the childcare centre just off from the dirt path walkway. Due to the enormous amount of weeds that were present and the fact that a lot of the weeds were mixed throughout the native terrain removal and location of all the weeds deemed quite difficult.
- There were several weeds that were removed from this zone behind the childcare centre this included Euphorbia terracina also known as Geraldton Carnation. This weed was a particularly difficult weed to remove as it was evident from the walk area on the path behind the childcare centre travelling approximately five metres back and was widespread, weaved amongst the native terrain with its strong, deep woody root system. The weed had to be pulled out by hand, removing its entire root system to release the native vegetation. Once established the Euphorbia terracina is able to invade undisturbed vegetation. With its rapid growth and prolific seed capabilities the Euphorbia terracina is able to out compete native species for space, light, nutrients and can have serious impacts on the native species germination potential.
- Another troublesome weed was the Lagurus ovatus commonly known as Hare's Tail Grass this weed was quite spread out amongst the native terrain. In some locations the Lagurus ovatus was located in clusters all together and in other locations it was found spread out in few numbers. The weed was observed to be at different stages of its development, unfortunately it seems a lot of the seed has already been released from this particular weed.
- There were several large and small household succulents that were bagged, potted and removed from the site.
- We continued walking along the entire zone from behind the childcare centre to the corner of the fence near the original swampy area to search for and remove any weeds from the path area. Searching from the path walkway, amongst the terrain and to the constructed fence line. Several weeds were hard to get out as they were located far back under dense terrain. A lot of the terrain seemed to contain dry, dead wood which will need to be removed and cleared so the weeds can be properly addressed in more dense areas.
- Once we had filled the trailer with several bags of weeds, rubbish, green wood branches and small to large sized household plants we took all the waste to the tip to be weighed and discarded in its correct locations.

Total Number of Bags: 12 Bags.

The 12 bags were filled with two tip trips, due to the large amount of household plants that were removed from the site all the bags did not fit in one trip to the tip.





General Waste	Green Waste
8kg	56kg











































Ongoing Work:

- There are several woody dense areas on the worksite that need to be cleared and made into fuel piles to reduce that possibility of fire risks.
- There also a lot of green waste from people's homes and gardens being located on the site, especially lawn mowing waste.
- Also there is quite a lot of rubbish still unattainable as it is located in water locations.
- There are several native species that have vines wrapped around them, hindering their natural development and will need to be altered or removed in order to protect the strangled species.











POWER




Euphorbia terracina - Geraldton Carnation Weed - Florabase - The Western Australian Flora
Retrieved on 27-03-2021
https://florabase.dpaw.wa.gov.au/browse/profile/4648

Lagurus ovatus - Hare's Tail Grass - Florabase - The Western Australian Flora
Retrieved on 27-03-2021
https://florabase.dpaw.wa.gov.au/browse/profile/467

Currently there is still piles of fuel load ready for burning.

Now the Wadandi Rangers have their Chainsaw certificates, on return to this site area of works, the larger logs and dead branches can be cut up for potential fire wood.

Many thanks for the opportunity to have the Wadandi rangers working with Tranen and the Water Corporation.

Job Site Hazard Analysis

Date	26/3/2021
Prepared by	Juanita Evans
Project number and name	P875C YDDS2
Job location	Busselton
Task details	Rubbish and Weed removal

Are there any SWMSs for the main activities?	Y
If yes, have they been reviewed by the crew?	Y
Will this work affect others on site? If so, invoice them in this	N
Is appropriate PPE available for the work?	Y

Risk rating Matrix

Consequences	How likely is it to occur? Extremely	Very	Likely	Unlikely	Rarely
Catastrophic	1H	1H	1H	2M	3L
Serious	1H	1H	2M	2M	3L
Moderate	1H	2M	2M	2M	3L
Minor	2M	2M	2M	3L	3L
Insignificant	3L	3L	3L	3L	3L

Potential Site Hazards	✓ If yes	Comments / Controls - if necessary, provide further details in table below
Uneven ground	✓	
Falling objects	✓	
Plant interaction	✓	
Traffic interaction	✓	
Underground services	–	
Extreme weather	–	
Insects	✓	
Snakes	✓	
Water hazards	✓	
Access hazards	✓	
Steep slopes	–	
Remote location	–	
Other (specify)		

Other matters	Response
Nominate emergency assemble point	Return to vehicle
In use of "hands-free" while driving prohibited?	Y (N)
Is smoking prohibited on the entire site?	Y (N)

Each participant is to sign off to indicate consultation and training in the content of this JSHA and SWMSs

Employee name / company	Initials
Juanita Evans	J.E
Seth Richardson	SR
Richard Swan	RS

Activity	Possible activity hazard	Risk rating	Hazard controls	Rating with ctrl	Responsibility
Special requirements for COVID-19	Spread of the virus	1H	Follow procedure SW-13 and site-specific controls as below:	2M	
Rubbish and Weed removal	Manual handling injury	2M	Take breaks, rotate tasks stretches use correct lifting techniques, don't overload.	3L	All
	Slip and trips	2M	Correct footwear, work steadily don't overload	3L	All
	Cuts and abrasions from litter	2M	Gloves, Wrap litter before picking it up if sharp.	3L	All
	Meth Labs	2M	Leave alone - Report	3L	All
	Bites and stings	2M	Avoid areas	3L	All
	Pole Saw	1H	Stand away from falling branch, work steadily, follow OHS procedures at all times, Wear PPE, Follow opperation safety procedures.	3L	All



#4:31 Vasse River Diversion Drain

Stage 2: Part II Report 2: May 2021

Undalup Association Inc.

& Tranen

Undalup Association Inc
Project Manager: Rachelle Cousins
Wadandi Snr Ranger: Juanita Evans



Geographe Community Landcare Nursery

Geographe Community Landcare Nursery is a local, self-funded not for profit organisation. First established in 2001 at the Capel Wetlands Centre then relocated to the current site at Busselton in 2002 and continues expanding and developing with the most recent modifications completed in 2020. Geographe Community Landcare Nursery provides specialist information for local plants in the southwest region of Western Australia. There are over two hundred local native species and one hundred additional species available for landcare, rehabilitation and gardens. Geographe Community Landcare Nursery specialists are consistently experimenting with new species and techniques for plant germination in this local biodiversity hotspot.

The nursery is managed by friendly, experienced plant specialists providing information and advice about local plants including plant recognition and garden designs. The Nursery aims to provide a happy and safe work environment for all volunteers. With an on the job learning philosophy along with friendly staff and more experienced volunteers readily available to assist newer volunteers with tasks and activities available at the nursery. The nursery provides a great opportunity for anyone interested in their local fauna and wanting to learn about plants, extend their interest and or knowledge of local species by participating in nursery activities, in a community involvement setting. Volunteers can participate with timeframes that are flexible and tailored to the individual, participating from an hour or two or participating the whole day. The tasks can also be tailored to suit individuals with special needs.

There are several educational opportunities and services provided by the Geographe Community Landcare Nursery to assist to improve local organisations and community groups to learn about plants within their region. Catering to school groups, special interest groups and supported by learning and training opportunities, through a range of seminars held at the nursery, off site and consultancy services. Mentoring people interested in learning about plant identification, seed collecting or becoming one of the nursery's licensed seed collectors.

Day 4: Friday 09/04/2021









Job Site: Geographe Community Landcare Nursery

Wadandi Rangers: Juanita Evans, Jamie Hurst and Seth Richardson.

Scope of works: Weed removal from previously rescued potted plants and weed removal from worksite.

- We started the day with a viewing of the site where Rod explained all the different purposes and functions of each area of the Nursery. The rescue plant area was our work site for the day, preserving all the plants that were still viable and creating a work place free from weeds within the pots and on the ground.
- We removed all the weeds from the rescued plants that were located in pots on the tables. We carefully looked at each one in order to determine if the targeted plant was still viable hidden amongst all the weeds that were interfering with the rescued plants development in the pot.
- The plants that could be saved amongst the weeds, if needed we potted the plants with fresh soil, making sure to compress the soil to support the plants.
- Once all the table potted plants had been checked and removed of all weeds, saving any vegetation with green shoots we removed all the weeds from the larger potted plants below the tables. Also again any plants that were still viable were potted in a new pot filled with fresh new soil in order to preserve the target plant species.
- We removed all the weeds that were in abundance located around the work zone, under the tables and walkways. Pulling all the roots out by hand removing the weeds at their roots.
- Once all the plants that were still viable had been preserved, free from intruding weeds and the work zone had been cleared of all weeds on the ground we cleaned up our work station, clearing off the tables removing all excess soil, removing all trays to the tray bin located at the entry point of the Geographe Landcare Nursery and stacked all the pots into their sizes.





















































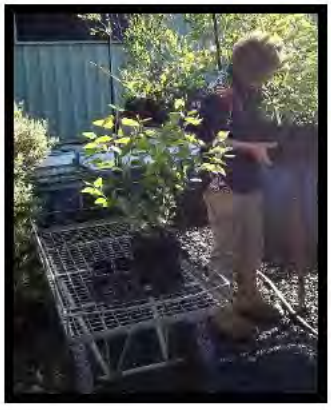


Day 5: Friday 23/04/2021









Job Site: Geographe Community Landcare Nursery

Wadandi Rangers: Juanita Evans, Jamie Hurst and Seth Richardson.

Scope of works: Selecting, identifying and beautifying the plants for selling purposes, clearing the garden and landscape for future nursery projects.

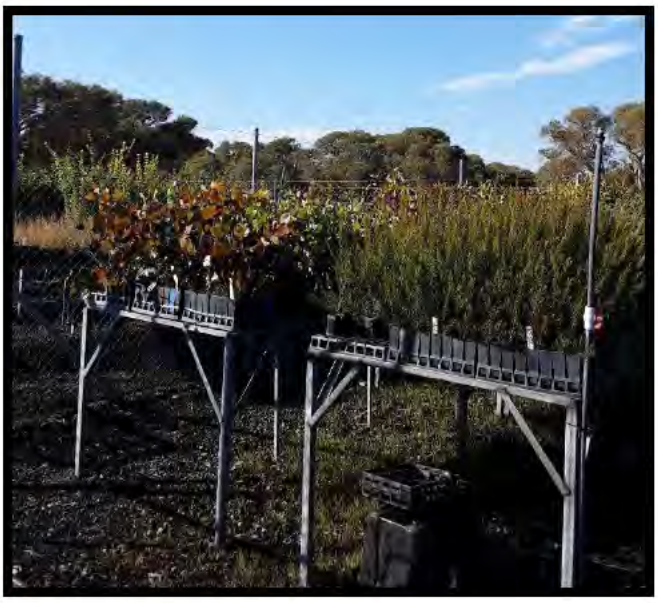
- We started the day with selecting several plant species at Rod's request. We moved several plant trays from different sections of the nursery by placing the trays on the trolleys and relocating the trays to the retail section of the nursery to go on display for selling. Selecting the most vibrant and healthy plants on the trays of 12 small pots.
- The plants that had a few weeds or shrivelled parts within each pot needed to be removed and beautified for increasing the plants selling potential. With the help of the nursery volunteers they showed us the process of how to beautify the plants for the retail table. The process involved pulling out, cutting out and removing the undesirable weeds and plant parts, then adding new soil before placing the plant trays on the tables to be ideally sold.
- The plants needed to have their identification tags attached to each tray of plants, so we located all the plant name tags that were available and attached the correct tag to each tray of plants.
- The identification tags have the scientific name and a brief description to help identify each tray of plants to the public. Also there are staff who are quite knowledgeable about each species on display and are willing to assist customers with and enquires.
- The front area of the Geographe Community Landcare Nursery needed clearing from all the tall grass and weeds that had invaded the area. As well as a large quantity of branches that were blocking the garden areas.
- Before commencing work with tools on the site, we conducted a discussion on correct handling and wearing of PPE while using tools on site. We used two whippersnappers to clear the area.
- Once the area had been cleared we moved the excess branches, sticks and green waste to be stacked up into a pile to be burnt at a later date.

































































Day 6: Friday 30/04/2021



Job Site: Geographe Community Landcare Nursery

Wadandi Rangers: Juanita Evans, Jamie Hurst and Seth Richardson.

Scope of works: Moving tables to create more space and plant locations, weed removal from garden area out the front of the nursery, clearing of the terrain down the from side of the nursery closest proximity to the road side and tidying up of all the branches located throughout the area.



- We started the day by moving the tables in the nursery. During our previous visits to the nursery we removed various intruding weeds from the potted rescue plants and cleared off a couple of the tables within the area, now we needed to move the empty tables to a new location. We moved one of the tables closer to the plants on the far side of the rescued plant zone and placed all the rescue potted plants to the newly moved table. Upon moving each potted plants we examined each plant ensuring that each pot remained weed free and if any weeds were detected we removed them. The remaining table was shifted to a different location within the nursery to be filled with more plants to be prepped and eventually made ready to be sold.



- Near the entry garden area of the nursery we removed all the weeds within and near the garden focusing on removing the weeds at the root system. The *Solanum nigrum* commonly known as Black Berry Nightshade weed had a particularly tenacious root system and required more effort to ensure the root system was adequately removed.
- Once all the weeds had been eradicated we had a brief discussion on safety, ensured all PPE and safety procedures and requirements were adhered to while using tools on site before commencing work with the whipper snipper and chainsaw. Each of us took turn using the whipper snipper to trim all the tall grass and unwanted terrain, clearing the entire area all the way along the far side of the property. We also removed the high grass amongst the trees that was not too close to the woody terrain.



- Next the dry branches that were too heavy to be lifted were cut down to more manageable sizes and were moved to the single wood pile that had started to be compiled on the property.
- We ended the day by moving all the dead wood branches from around the entire area, now more visible since we had just completed clearing area. Then we located all other wood piles on the property and created a single pile of wood to be burnt at a later date.

























































































Day 7: Friday 07/05/2021



Job Site: Geographe Community Landcare Nursery

Wadandi Rangers: Juanita Evans, Jamie Hurst and Seth Richardson.

Scope of works: Separating Baumea juncea from larger clumps into small clumps. (Due to the weather condition we were unable to complete the outdoor tasks organised for the day and remained inside separating plants).

- We started the day by moving trays of Baumea juncea situated in rectangle pots to the indoor table area where they needed to be potted into smaller cylinder pots and broken up into smaller clumps. We collected all the equipment we needed for the potting activity. Then we removed each plant from the pot and removed any weeds that were located in the pot. Then we cut off a small section of the matted root system at the bottom of the plant in order to assist with the separation process. We carefully broke up the plant into smaller sections ensure that each newly formed sections still had their roots attached. Next we placed each newly divided section into a container where water and seasol had been added, this assisted with helping the newly separated plants not go into shock and allowed us to separate the clumps even more as the liquid made the separation process easier. Then the clumps were smaller enough the plants were placed into the small cylinder pots. Once all the plants had been potted into the smaller clumps in the smaller pots we used the watering can to give the more water and seasol. Lastly we moved all the empty pots and trays to the cleaning area, washed the equipment we used, put the equipment away and cleaned our work station.

















tranen revegetation southwest



Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #7 June 2021

Activity Date(s):	26/05/21 – 23/06/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
27/05/21	Procurement: Tree stake supply	Supply of all hardwood stakes (1800x50x50mm) for mature trees.
04/06/21 & 17/06/21	Weed control	On-going weed control focussing on the QD and VDD Embankment areas prior to planting
22/06/21 – 24/06/21	Procurement: Seedling supply	Supply of all seedlings (exc. lower embankment) for the Quindalup Dune and VDD Embankment zones. Total number of seedlings: 23,610

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.

04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.
19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
22/01/21 – 22/02/21	Baseline monitoring report	Preparation and submission of baseline monitoring report. This report provides further definition of completion criteria and an overview of site conditions prior to commencement of on-ground works.
08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
11/02/21 – 18/02/21	Greenwaste and woody weeds	Clearing and removal of Greenwaste (weed and dead material). 30m³ of weed material disposed of at waste facility and over 100m³ stockpiled on site for future removal and respreading of larger logs for habitat.
17/02/21	Aboriginal engagement – Undalup Association	On-country meeting and consultation with Cultural Custodians to discuss the project scope for the development of cultural / biodiversity nodes within the site. Confirmation to commence works 12/02/21.
23/02/21 – 23/03/21	Weed control	Weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
03/03/21 – 09/03/21	Palisade construction	Construction and completion of 3x palisade areas along the western embankment.
12/03/21 – 19/03/21	Aboriginal engagement	Two days of Undalup's indigenous ranger team (x3) performing site preparation tasks (weed control, rubbish removal and fuel load reduction) in the Southern PEC zone. Additional reporting to be provided in the next period.

17/03/21 – 22/03/21	Mulch installation	675m³ of mulch supplied and spread (mechanical and manual) across 9,000m² of the eastern PEC zone.
24/03/21 – 25/05/21	Weed control	On-going follow-up weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
24/03/21 – 07/05/21	Aboriginal engagement – Wadandi Rangers	On-going support for site works from Undalup Association's Wadandi rangers both on site and at GCLN. Please see attached progress reports from Undalup.
19/04/21 – 23/04/21	Ripping	Soil ripping via tractor mounted tine across Central PEC and Quindalup Dune revegetation zones. Approx. 1.5 ha covered.
13/05/21 – 21/05/21	Mulch installation	315m³ of mulch supplied and spread (mechanical and manual) across 6,000m² of the Quindalup Dune zone.
24/03/21 – 25/05/21	Procurement	Purchase and delivery of corflute tree guards, stakes and root barrier.

Confirmed Species and Allocations – QD & VDD Embankments

tranen
revegetation southwest

Revegetation Zones	Area (m2)	Seedling Density (plants / m2)	Total Seedlings
Quindalup Dune Low Fuel	1,254	1.3	1,599
Quindalup Dune Open	3,299	1.0	3,232
Quindalup Dune Restoration	3,355	1.8	5,892
VDD Embankment Restoration	6,848	2.4	16,387

	Quindalup Dune			
Species	**Quindalup Dune Low Fuel**	**Quindalup Dune Open**	**Quindalup Dune Restoration**	**VDD Embankment Restoration - Upper**
Tree Species				
Agonis flexuosa	0	300	800	0
Sub-Total	**0**	**300**	**800**	**0**
Shrub Species				
Acacia cochlearis	0	0	500	800
Acacia littorea	0	0	500	800
Diplolaena dampieri	0	0	100	0
Hibbertia cuneiformis	0	150	500	800
Melaleuca cuticularis	0	0	0	400
Olearia axilaris	0	100	100	600
Phyllanthus calycinus	0	100	150	250
Rhagodia baccata	500	200	300	600
Spyridium globulosum	0	0	500	500
Sub-Total	**500**	**550**	**2,650**	**4,750**
Herbs and Groundcover Species				
Hardenbergia comptoniana	0	50	50	0
Scaevola crassifolia	0	150	100	600
Sub-Total	**0**	**200**	**150**	**600**
Rushes and Sedges				
Ficinia nodosa	1099	500	500	5037
Juncus kraussii	0	0	0	0
Juncus kraussii - advanced	0	0	0	0
Lepidosperma gladiatum	0	1682	1792	2500
Sub-Total	**1,099**	**2,182**	**2,292**	**7,537**
TOTAL	**1,599**	**3,232**	**5,892**	**12,887**

tranen revegetation southwest



Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #8 July 2021

Activity Date(s):	24/06/21 - 25/07/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
01/07/21	Matting	Completion of matting along the final section (700m²) of the VDD Embankment near the pedestrian bridge.
05/07/21 - 19/07/21	Planting	21,543 seedlings installed in the QD and VDD Embankment zones. Lower Embankment to be planted in spring. Refer to table attached for details.
08/07/21	Ripping	0.5ha of the Western PEC zone (Corner of College Ave / QE Ave) was ripped prior to mulch spreading.
12/07/21 - 16/07/21	Mulching	Mechanical spreading of mulch across the Central and Western PEC zones. Total of 7,000m² spread. Further manual spreading / trimming to be completed.
12/07/21	Tree removal and greenwaste removal	Removal of unstable tree at the Donovan property and removal of greenwaste from the Western PEC zone.
21/07/21 - 22/07/21	Plant deliveries and batching	Delivery and batching of remaining seedlings for 2021. See attached table for details
22/07/21 - 23/07/21	Fencing	QD and Embankment zone post & rail and public management fencing completed.
25/06/21 - 22/07/21	Weed control	Various follow-up herbicide weed control undertaken where possible, including: QD, VDD Embankments, Western PEC, Central PEC, Eastern PEC and Western Basin PEC.
25/06/21 - 22/07/21	Aboriginal engagement - Undalup Association	Undalup Wadandi Rangers assisting Geographe Community Landcare Nursery preparing stock for the project and assisting with capacity upgrades.

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.
19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
22/01/21 – 22/02/21	Baseline monitoring report	Preparation and submission of baseline monitoring report. This report provides further definition of completion criteria and an overview of site conditions prior to commencement of on-ground works.

08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
11/02/21 – 18/02/21	Greenwaste and woody weeds	Clearing and removal of Greenwaste (weed and dead material). 30m³ of weed material disposed of at waste facility and over 100m³ stockpiled on site for future removal and respreading of larger logs for habitat.
17/02/21	Aboriginal engagement – Undalup Association	On-country meeting and consultation with Cultural Custodians to discuss the project scope for the development of cultural / biodiversity nodes within the site. Confirmation to commence works 12/02/21.
23/02/21 – 23/03/21	Weed control	Weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
03/03/21 – 09/03/21	Palisade construction	Construction and completion of 3x palisade areas along the western embankment.
12/03/21 – 19/03/21	Aboriginal engagement	Two days of Undalup's indigenous ranger team (x3) performing site preparation tasks (weed control, rubbish removal and fuel load reduction) in the Southern PEC zone. Additional reporting to be provided in the next period.
17/03/21 – 22/03/21	Mulch installation	675m³ of mulch supplied and spread (mechanical and manual) across 9,000m² of the eastern PEC zone.
24/03/21 – 25/05/21	Weed control	On-going follow-up weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
24/03/21 – 07/05/21	Aboriginal engagement – Wadandi Rangers	On-going support for site works from Undalup Association's Wadandi rangers both on site and at GCLN. Please see attached progress reports from Undalup.
19/04/21 – 23/04/21	Ripping	Soil ripping via tractor mounted tine across Central PEC and Quindalup Dune revegetation zones. Approx. 1.5 ha covered.
13/05/21 – 21/05/21	Mulch installation	315m³ of mulch supplied and spread (mechanical and manual) across 6,000m² of the Quindalup Dune zone.
24/03/21 – 25/05/21	Procurement	Purchase and delivery of corflute tree guards, stakes and root barrier.
27/05/21	Procurement: Tree stake supply	Supply of all hardwood stakes (1800x50x50mm) for mature trees.
04/06/21 & 17/06/21	Weed control	On-going weed control focussing on the QD and VDD Embankment areas prior to planting
22/06/21 – 24/06/21	Procurement: Seedling supply	Supply of all seedlings (exc. lower embankment) for the Quindalup Dune and VDD Embankment zones. Total number of seedlings: 23,610

2021 Final Planting List and Current Progress

tranen revegetation southwest

Vasse Diversion Drain Upgrade
2021 Final Planting List

Species	Quindalup Dune			VDD Embankments		Central and Western PEC				TOTAL
	Quindalup Dune Low Fuel	Quindalup Dune Open	Quindalup Dune Restoration	VDD Embankment Restoration - Upper	VDD Embankment Restoration - Lower	Western PEC Open	Western PEC Restoration	Central PEC Restoration	Western Basin PEC Drainage	
Tree Species										
Agonis flexuosa	0	100	159	100	0	160	200	280	0	999
Banksia grandis	0	0	0	0	0	40	100	220	0	360
Banksia littoralis	0	0	0	0	0	0	0	250	50	300
Corymbia calophylla	0	0	0	0	0	50	100	200	0	350
Eucalyptus rudis	0	0	0	0	0	25	0	100	50	175
Melaleuca preissiana	0	0	0	0	0	0	0	0	50	50
Melaleuca rhaphiophylla	0	0	0	0	0	0	0	0	50	50
Sub-Total	**0**	**100**	**159**	**100**	**0**	**275**	**400**	**1,050**	**200**	**2284**
Shrub Species										
Acacia cochlearis	0	0	500	800	0	0	0	0	0	1300
Acacia littorea	0	0	564	800	0	0	0	0	0	1364
Acacia pulchella	0	0	0	0	0	100	250	500	0	850
Acacia saligna	0	0	0	0	0	0	50	200	0	250
Acacia stenoptera	0	0	0	0	0	0	60	60	0	120
Adenanthos meisneri	0	0	0	0	0	100	300	400	0	800
Gompholobium tomentosum	0	0	0	0	0	100	200	391	0	691
Hakea prostrata	0	0	0	0	0	0	200	400	0	600
Hakea varia	0	0	0	0	0	0	200	300	25	525
Hibbertia cuneiformis	0	150	500	610	0	64	128	128	0	1580
Hibbertia racemosa	0	0	0	0	0	0	80	120	0	200
Hovea trisperma	0	0	0	0	0	0	71	120	0	191
Jacksonia furcellata	0	0	0	0	0	0	250	365	0	615
Kunzea glabrescens	0	0	0	0	0	0	150	250	25	425
Melaleuca cuticularis	0	0	0	400	200	0	0	0	0	600
Olearia axillaris	0	100	100	600	0	0	0	0	0	800
Rhagodia baccata	500	200	300	600	0	0	0	0	0	1600
Spyridium globulosum	0	0	500	500	0	0	250	500	0	1750
Xanthorrhoea brunonis	0	0	0	0	0	50	150	300	0	500
Xanthorrhoea preissii	0	0	0	0	0	0	50	200	0	250
Sub-Total	**500**	**450**	**2,464**	**4,310**	**200**	**414**	**2,389**	**4,234**	**50**	**15011**
Herbs and Groundcover Species										
Anigozanthos manglesii	0	0	0	0	0	200	400	500	0	1100
Centella asiatica	0	0	0	0	0	0	0	4000	0	4000
Conostylis aculeata	0	0	0	0	0	200	400	500	0	1100
Dampiera linearis	0	0	0	0	0	200	200	300	0	700
Hardenbergia comptoniana	0	50	50	0	0	100	100	150	0	450
Kennedia prostrata	0	0	0	0	0	0	200	350	0	550
Patersonia occidentalis	0	0	0	0	0	200	400	500	0	1100
Scaevola calliptera	0	0	0	0	0	100	250	300	0	650
Scaevola crassifolia	0	150	100	600	0	0	0	0	0	850
Sub-Total	**0**	**200**	**150**	**600**	**0**	**1,000**	**1,950**	**6,600**	**0**	**10500**
Rushes and Sedges										
Baumea juncea	0	0	0	0	0	337	300	1000	273	1910
Carex preissii	0	0	0	0	0	0	0	300	200	500
Ficinia nodosa	1099	500	500	5037	0	0	0	0	0	7136
Gahnia trifida	0	0	0	0	0	0	0	300	200	500
Juncus kraussii	0	0	0	0	1300	0	0	0	0	1300
Juncus kraussii - advanced	0	0	0	0	2000	0	0	0	0	2000
Lepidosperma gladiatum	0	1582	1492	2300	0	0	0	0	0	5374
Lepidosperma longitudinale	0	0	0	0	0	0	0	0	300	300
Sub-Total	**1,099**	**2,082**	**1,992**	**7,337**	**3,300**	**337**	**300**	**1,600**	**973**	**19020**
TOTAL	**1,599**	**2,832**	**4,765**	**12,347**	**3,500**	**2,026**	**5,039**	**13,484**	**1,223**	**46,815**
Tree Guards	0	0	0	0	0	1,689	0	8,484	950	11,123
Planted to date (No.)	1,599	2,832	4,765	12,347	0	0	0	0	0	**21,543**
Planted to date (%)	100%	100%	100%	100%	0%	0%	0%	0%	0%	**46%**

Selected Site Progress Images



VDD Embankment Matting - July 2021



Quindalup Dune Completed Fencing, Mulch and Planting - July 2021



Quindalup Dune Planting - July 2021



VDD Embankment Planting and Fencing - July 2021



Western PEC Restoration Zone Ripping - July 2021



Central PEC Restoration Zone Mulching - July 2021

tranen revegetation southwest







Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #9 August 2021

Activity Date(s):	26/07/21 - 23/08/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
27/07/21	Slashing VDD Levees (separate PO)	Manual slashing (brushcutter) of VDD levee external banks adjacent to revegetation areas. Performed under separate work order.
27/07/21 - 28/07/21	Mulch spreading (manual)	Final manual trim of mulched areas in Central PEC and Western PEC planting areas. Additional assistance provided by Undalup Association.
30/07/21 - 13/08/21	Aboriginal engagement	Assistance with manual spreading of mulch at Western PEC. 2 days (30/08 & 13/08).
03/08/21 - 18/08/21	Weed control	Targeted spot spraying within 2021 planting sites over 4 days. Additional retreatment of 2022 planting sites (EPEC, Possum Corridor) blanket spraying.
05/08/21 - 20/08/21	C. procera monitoring	Commenced monitoring growth and health of known & reference populations of C. procera adjacent to construction boundary.
09/08/21 - 10/08/21	WPEC fencing	324m of fencing installed around Western PEC Restoration Zone. Inc. 1.2m ringlock + 900mm rabbit mesh skirt. 2m clearance from base of levee.
13/08/21	Mulch spreading	Transport and spreading of mulch from WPEC to QD Zone eastern bank.
13/08/21 - 19/08/21	Mature trees install	Install 214 mature trees along pathway in CPEC. Included root barrier, soil conditioner, Terracottem, mulching, stakes and ties.
23/08/21	CPEC planting	Commencement of planting along CPEC inc. tree guards and fertiliser tablets. Final planting list included below.

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
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22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
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08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
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23/02/21 – 23/03/21	Weed control	Weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
03/03/21 – 09/03/21	Palisade construction	Construction and completion of 3x palisade areas along the western embankment.
12/03/21 – 19/03/21	Aboriginal engagement	Two days of Undalup's indigenous ranger team (x3) performing site preparation tasks (weed control, rubbish removal and fuel load reduction) in the Southern PEC zone. Additional reporting to be provided in the next period.
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24/03/21 – 07/05/21	Aboriginal engagement – Wadandi Rangers	On-going support for site works from Undalup Association's Wadandi rangers both on site and at GCLN. Please see attached progress reports from Undalup.
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13/05/21 – 21/05/21	Mulch installation	315m³ of mulch supplied and spread (mechanical and manual) across 6,000m² of the Quindalup Dune zone.
24/03/21 – 25/05/21	Procurement	Purchase and delivery of corflute tree guards, stakes and root barrier.
27/05/21	Procurement: Tree stake supply	Supply of all hardwood stakes (1800x50x50mm) for mature trees.
04/06/21 & 17/06/21	Weed control	On-going weed control focussing on the QD and VDD Embankment areas prior to planting
22/06/21 – 24/06/21	Procurement: Seedling supply	Supply of all seedlings (exc. lower embankment) for the Quindalup Dune and VDD Embankment zones. Total number of seedlings: 23,610

01/07/21	Matting	Completion of matting along the final section (700m²) of the VDD Embankment near the pedestrian bridge.
05/07/21 - 19/07/21	Planting	21,543 seedlings installed in the QD and VDD Embankment zones. Lower Embankment to be planted in spring. Refer to table attached for details.
08/07/21	Ripping	0.5ha of the Western PEC zone (Corner of College Ave / QE Ave) was ripped prior to mulch spreading.
12/07/21 - 16/07/21	Mulching	Mechanical spreading of mulch across the Central and Western PEC zones. Total of 7,000m² spread. Further manual spreading / trimming to be completed.
12/07/21	Tree removal and greenwaste removal	Removal of unstable tree at the Donovan property and removal of greenwaste from the Western PEC zone.
21/07/21 - 22/07/21	Plant deliveries and batching	Delivery and batching of remaining seedlings for 2021. See attached table for details
22/07/21 - 23/07/21	Fencing	QD and Embankment zone post & rail and public management fencing completed.
25/06/21 - 22/07/21	Weed control	Various follow-up herbicide weed control undertaken where possible, including: QD, VDD Embankments, Western PEC, Central PEC, Eastern PEC and Western Basin PEC.
25/06/21 - 22/07/21	Aboriginal engagement - Undalup Association	Undalup Wadandi Rangers assisting Geographe Community Landcare Nursery preparing stock for the project and assisting with capacity upgrades.

2021 Final Planting List and Current Progress

tranen revegetation southwest

Vasse Diversion Drain Upgrade
2021 Final Planting List

Species	Quindalup Dune			VDD Embankments		Central and Western PEC				TOTAL
	Quindalup Dune Low Fuel	Quindalup Dune Open	Quindalup Dune Restoration	VDD Embankment Restoration - Upper	VDD Embankment Restoration - Lower	Western PEC Open	Western PEC Restoration	Central PEC Restoration	Western Basin PEC Drainage	
Tree Species										
Agonis flexuosa	0	100	159	100	0	160	200	280	0	999
Banksia grandis	0	0	0	0	0	40	100	220	0	360
Banksia littoralis	0	0	0	0	0	0	0	250	50	300
Corymbia calophylla	0	0	0	0	0	50	100	200	0	350
Eucalyptus rudis	0	0	0	0	0	25	0	100	50	175
Melaleuca preissiana	0	0	0	0	0	0	0	0	50	50
Melaleuca rhaphiophylla	0	0	0	0	0	0	0	0	50	50
Sub-Total	**0**	**100**	**159**	**100**	**0**	**275**	**400**	**1,050**	**200**	**2284**
Shrub Species										
Acacia cochlearis	0	0	500	800	0	0	0	0	0	1300
Acacia littorea	0	0	564	800	0	0	0	0	0	1364
Acacia pulchella	0	0	0	0	0	100	250	500	0	850
Acacia saligna	0	0	0	0	0	0	50	200	0	250
Acacia stenoptera	0	0	0	0	0	0	60	60	0	120
Adenanthos meisneri	0	0	0	0	0	100	300	400	0	800
Gompholobium tomentosum	0	0	0	0	0	100	200	391	0	691
Hakea prostrata	0	0	0	0	0	0	200	400	0	600
Hakea varia	0	0	0	0	0	0	200	300	25	525
Hibbertia cuneiformis	0	150	500	610	0	0	0	0	0	1260
Hibbertia racemosa	0	0	0	0	0	100	200	350	0	650
Hovea trisperma	0	0	0	0	0	0	71	120	0	191
Jacksonia furcellata	0	0	0	0	0	0	250	365	0	615
Kunzea glabrescens	0	0	0	0	0	0	150	250	25	425
Melaleuca cuticularis	0	0	0	400	200	0	0	0	0	600
Olearia axillaris	0	100	100	600	0	0	0	0	0	800
Rhagodia baccata	500	200	300	600	0	0	0	0	0	1600
Spyridium globulosum	0	0	500	500	0	0	250	500	0	1750
Xanthorrhoea brunonis	0	0	0	0	0	50	150	300	0	500
Xanthorrhoea preissii	0	0	0	0	0	0	50	200	0	250
Sub-Total	**500**	**450**	**2,464**	**4,310**	**200**	**450**	**2,381**	**4,336**	**50**	**15141**
Herbs and Groundcover Species										
Anigozanthos manglesii	0	0	0	0	0	200	400	500	0	1100
Centella asiatica	0	0	0	0	0	0	0	6000	0	6000
Conostylis aculeata	0	0	0	0	0	200	400	500	0	1100
Dampiera linearis	0	0	0	0	0	200	200	300	0	700
Hardenbergia comptoniana	0	50	50	0	0	100	100	150	0	450
Kennedia prostrata	0	0	0	0	0	0	200	350	0	550
Patersonia occidentalis	0	0	0	0	0	200	400	500	0	1100
Scaevola calliptera	0	0	0	0	0	100	250	300	0	650
Scaevola crassifolia	0	150	100	600	0	0	0	0	0	850
Sub-Total	**0**	**200**	**150**	**600**	**0**	**1,000**	**1,950**	**8,600**	**0**	**12500**
Rushes and Sedges										
Baumea juncea	0	0	0	0	0	337	300	1000	273	1910
Carex preissii	0	0	0	0	0	0	0	300	200	500
Ficinia nodosa	1099	500	500	5037	0	0	0	0	0	7136
Gahnia trifida	0	0	0	0	0	0	0	300	200	500
Juncus kraussii	0	0	0	0	1300	0	0	0	0	1300
Juncus kraussii - advanced	0	0	0	0	2000	0	0	0	0	2000
Lepidosperma gladiatum	0	1582	1492	2300	0	0	0	0	0	5374
Lepidosperma longitudinale	0	0	0	0	0	0	0	0	300	300
Sub-Total	**1,099**	**2,082**	**1,992**	**7,337**	**3,300**	**337**	**300**	**1,600**	**973**	**19020**
TOTAL	**1,599**	**2,832**	**4,765**	**12,347**	**3,500**	**2,062**	**5,031**	**15,586**	**1,223**	**48,945**
Tree Guards	**0**	**0**	**0**	**0**	**0**	**1,725**	**0**	**8,586**	**950**	**11,261**
Fertiliser tablets	**1,599**	**2,832**	**4,765**	**12,347**	**0**	**2,026**	**5,031**	**9,586**	**0**	**38,186**
Planted to date (No.) - 24.08.21	1,599	2,832	4,765	12,347	0	0	0	1200	0	**22,743**
Planted to date (%)	100%	100%	100%	100%	0%	0%	0%	8%	0%	**46%**

Selected Site Progress Images



Levee slashing and trimming CPEC mulch complete - July 2021



WPEC Restoration Zone fencing complete - Aug 2021



Mulch spreading complete at QD Zone on eastern bank - Aug 2021



Mature trees installed along pathway in CPEC - Aug 2021



VDD Embankment following flood event showing accretion of alluvial sediment - Aug 2021

tranen revegetation southwest







Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #10 September 2021

Activity Date(s):	24/08/21 - 23/09/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
24/08/21 - 21/09/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
25/08/21 - 10/09/21	Planting and guard install	Install remaining plants and guards in CPEC and Western PEC Restoration Zone. Total of 14,617 plants and 11,261 guards installed.
30/08/21 - 13/09/21	Planting and guard install (Undalup Association)	Installation of plants and guards in WPEC Open zone. Total of 3,149 plants and 2,539 guards installed.
13/09/21 - 21/09/21	Planting and guard install (Undalup Association)	Installation of plants and guards in CPEC swale zone. Total of 6,000 plants installed in swale.
23/09/21	Tree install	Plant remaining mature tree in QD Zone and install signage.

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.
19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
22/01/21 – 22/02/21	Baseline monitoring report	Preparation and submission of baseline monitoring report. This report provides further definition of completion criteria and an overview of site conditions prior to commencement of on-ground works.

08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
11/02/21 – 18/02/21	Greenwaste and woody weeds	Clearing and removal of Greenwaste (weed and dead material). 30m³ of weed material disposed of at waste facility and over 100m³ stockpiled on site for future removal and respreading of larger logs for habitat.
17/02/21	Aboriginal engagement – Undalup Association	On-country meeting and consultation with Cultural Custodians to discuss the project scope for the development of cultural / biodiversity nodes within the site. Confirmation to commence works 12/02/21.
23/02/21 – 23/03/21	Weed control	Weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
03/03/21 – 09/03/21	Palisade construction	Construction and completion of 3x palisade areas along the western embankment.
12/03/21 – 19/03/21	Aboriginal engagement	Two days of Undalup's indigenous ranger team (x3) performing site preparation tasks (weed control, rubbish removal and fuel load reduction) in the Southern PEC zone. Additional reporting to be provided in the next period.
17/03/21 – 22/03/21	Mulch installation	675m³ of mulch supplied and spread (mechanical and manual) across 9,000m² of the eastern PEC zone.
24/03/21 – 25/05/21	Weed control	On-going follow-up weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
24/03/21 – 07/05/21	Aboriginal engagement – Wadandi Rangers	On-going support for site works from Undalup Association's Wadandi rangers both on site and at GCLN. Please see attached progress reports from Undalup.
19/04/21 – 23/04/21	Ripping	Soil ripping via tractor mounted tine across Central PEC and Quindalup Dune revegetation zones. Approx. 1.5 ha covered.
13/05/21 – 21/05/21	Mulch installation	315m³ of mulch supplied and spread (mechanical and manual) across 6,000m² of the Quindalup Dune zone.
24/03/21 – 25/05/21	Procurement	Purchase and delivery of corflute tree guards, stakes and root barrier.
27/05/21	Procurement: Tree stake supply	Supply of all hardwood stakes (1800x50x50mm) for mature trees.
04/06/21 & 17/06/21	Weed control	On-going weed control focussing on the QD and VDD Embankment areas prior to planting
22/06/21 – 24/06/21	Procurement: Seedling supply	Supply of all seedlings (exc. lower embankment) for the Quindalup Dune and VDD Embankment zones. Total number of seedlings: 23,610

01/07/21	Matting	Completion of matting along the final section (700m²) of the VDD Embankment near the pedestrian bridge.
05/07/21 - 19/07/21	Planting	21,543 seedlings installed in the QD and VDD Embankment zones. Lower Embankment to be planted in spring. Refer to table attached for details.
08/07/21	Ripping	0.5ha of the Western PEC zone (Corner of College Ave / QE Ave) was ripped prior to mulch spreading.
12/07/21 - 16/07/21	Mulching	Mechanical spreading of mulch across the Central and Western PEC zones. Total of 7,000m² spread. Further manual spreading / trimming to be completed.
12/07/21	Tree removal and greenwaste removal	Removal of unstable tree at the Donovan property and removal of greenwaste from the Western PEC zone.
21/07/21 - 22/07/21	Plant deliveries and batching	Delivery and batching of remaining seedlings for 2021. See attached table for details
22/07/21 - 23/07/21	Fencing	QD and Embankment zone post & rail and public management fencing completed.
25/06/21 - 22/07/21	Weed control	Various follow-up herbicide weed control undertaken where possible, including: QD, VDD Embankments, Western PEC, Central PEC, Eastern PEC and Western Basin PEC.
25/06/21 - 22/07/21	Aboriginal engagement - Undalup Association	Undalup Wadandi Rangers assisting Geographe Community Landcare Nursery preparing stock for the project and assisting with capacity upgrades.
27/07/21	Slashing VDD Levees (separate PO)	Manual slashing (brushcutter) of VDD levee external banks adjacent to revegetation areas. Performed under separate work order.
27/07/21 - 28/07/21	Mulch spreading (manual)	Final manual trim of mulched areas in Central PEC and Western PEC planting areas. Additional assistance provided by Undalup Association.
30/07/21 - 13/08/21	Aboriginal engagement	Assistance with manual spreading of mulch at Western PEC. 2 days (30/08 & 13/08).
03/08/21 - 18/08/21	Weed control	Targeted spot spraying within 2021 planting sites over 4 days. Additional retreatment of 2022 planting sites (EPEC, Possum Corridor) blanket spraying.
05/08/21 - 20/08/21	C. procera monitoring	Commenced monitoring growth and health of known & reference populations of C. procera adjacent to construction boundary.
09/08/21 - 10/08/21	WPEC fencing	324m of fencing installed around Western PEC Restoration Zone. Inc. 1.2m ringlock + 900mm rabbit mesh skirt. 2m clearance from base of levee.
13/08/21	Mulch spreading	Transport and spreading of mulch from WPEC to QD Zone eastern bank.
13/08/21 - 19/08/21	Mature trees install	Install 214 mature trees along pathway in CPEC. Included root barrier, soil conditioner, Terracottem, mulching, stakes and ties.
23/08/21	CPEC planting	Commencement of planting along CPEC inc. tree guards and fertiliser tablets. Final planting list included below.

2021 Final Planting List and Current Progress

tranen revegetation southwest

Vasse Diversion Drain Upgrade
2021 Final Planting List

	Quindalup Dune			VDD Embankments		Central and Western PEC				
Species	**Quindalup Dune Low Fuel**	**Quindalup Dune Open**	**Quindalup Dune Restoration**	**VDD Embankment Restoration - Upper**	**VDD Embankment Restoration - Lower**	**Western PEC Open**	**Western PEC Restoration**	**Central PEC Restoration**	**Western Basin PEC Drainage**	**TOTAL**
Tree Species										
Agonis flexuosa	0	100	159	100	0	160	200	280	0	999
Banksia grandis	0	0	0	0	0	40	100	220	0	360
Banksia littoralis	0	0	0	0	0	0	0	250	50	300
Corymbia calophylla	0	0	0	0	0	50	100	200	0	350
Eucalyptus rudis	0	0	0	0	0	25	0	100	50	175
Melaleuca preissiana	0	0	0	0	0	0	0	0	50	50
Melaleuca rhaphiophylla	0	0	0	0	0	0	0	0	50	50
Sub-Total	**0**	**100**	**159**	**100**	**0**	**275**	**400**	**1,050**	**200**	**2284**
Shrub Species										
Acacia cochlearis	0	0	500	800	0	0	0	0	0	1300
Acacia littorea	0	0	564	800	0	0	0	0	0	1364
Acacia pulchella	0	0	0	0	0	100	250	500	0	850
Acacia saligna	0	0	0	0	0	0	50	200	0	250
Acacia stenoptera	0	0	0	0	0	0	60	60	0	120
Adenanthos meisneri	0	0	0	0	0	100	300	400	0	800
Gompholobium tomentosum	0	0	0	0	0	100	200	391	0	691
Hakea prostrata	0	0	0	0	0	0	200	400	0	600
Hakea varia	0	0	0	0	0	0	200	300	25	525
Hibbertia cuneiformis	0	150	500	610	0	0	0	0	0	1260
Hibbertia racemosa	0	0	0	0	0	100	200	350	0	650
Hovea trisperma	0	0	0	0	0	0	71	120	0	191
Jacksonia furcellata	0	0	0	0	0	0	250	365	0	615
Kunzea glabrescens	0	0	0	0	0	0	150	250	25	425
Melaleuca cuticularis	0	0	0	400	200	0	0	0	0	600
Olearia axillaris	0	100	100	600	0	0	0	0	0	800
Rhagodia baccata	500	200	300	600	0	0	0	0	0	1600
Spyridium globulosum	0	0	500	500	0	0	250	500	0	1750
Xanthorrhoea brunonis	0	0	0	0	0	50	150	300	0	500
Xanthorrhoea preissii	0	0	0	0	0	0	50	200	0	250
Sub-Total	**500**	**450**	**2,464**	**4,310**	**200**	**450**	**2,381**	**4,336**	**50**	**15141**
Herbs and Groundcover Species										
Anigozanthos manglesii	0	0	0	0	0	200	400	500	0	1100
Centella asiatica	0	0	0	0	0	0	0	6000	0	6000
Conostylis aculeata	0	0	0	0	0	200	400	500	0	1100
Dampiera linearis	0	0	0	0	0	200	200	300	0	700
Hardenbergia comptoniana	0	50	50	0	0	100	100	150	0	450
Kennedia prostrata	0	0	0	0	0	0	200	350	0	550
Patersonia occidentalis	0	0	0	0	0	200	400	500	0	1100
Scaevola calliptera	0	0	0	0	0	100	250	300	0	650
Scaevola crassifolia	0	150	100	600	0	0	0	0	0	850
Sub-Total	**0**	**200**	**150**	**600**	**0**	**1,000**	**1,950**	**8,600**	**0**	**12500**
Rushes and Sedges										
Baumea juncea	0	0	0	0	0	337	300	1000	273	1910
Carex preissii	0	0	0	0	0	0	0	300	200	500
Ficinia nodosa	1099	500	500	5037	0	0	0	0	0	7136
Gahnia trifida	0	0	0	0	0	0	0	300	200	500
Juncus kraussii	0	0	0	0	1300	0	0	0	0	1300
Juncus kraussii - advanced	0	0	0	0	2000	0	0	0	0	2000
Lepidosperma gladiatum	0	1582	1492	2300	0	0	0	0	0	5374
Lepidosperma longitudinale	0	0	0	0	0	0	0	0	300	300
Sub-Total	**1,099**	**2,082**	**1,992**	**7,337**	**3,300**	**337**	**300**	**1,600**	**973**	**19020**
TOTAL	**1,599**	**2,832**	**4,765**	**12,347**	**3,500**	**2,062**	**5,031**	**15,586**	**1,223**	**48,945**
Tree Guards	**0**	**0**	**0**	**0**	**0**	**1,725**	**0**	**8,586**	**950**	**11,261**
Fertiliser tablets	**1,599**	**2,832**	**4,765**	**12,347**	**0**	**2,026**	**5,031**	**9,586**	**0**	**38,186**
Planted to date (No.) - 24.09.21	1,599	2,832	4,765	12,347	0	2062	5031	15586	1223	**45,445**
Planted to date (%)	100%	100%	100%	100%	0%	100%	100%	100%	100%	**93%**

Selected Site Progress Images



CPEC Planting complete - September 2021



WPEC Restoration Zone Planting Complete - September 2021



Western PEC Open Planting Complete (Undalup) - September 2021



Quindalup Dune Mature Trees and Signage - September 2021

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Vasse Diversion Drain Upgrade Revegetation – Water Corporation

Post Activity Report #11 December 2021

Activity Date(s):	24/09/21 - 16/12/21	**Conducted By:**	Alex Johnston
Site Reference:	VDD Upgrade Revegetation	**Reviewed By:**	Matt Blunt
Area (ha):	14.5ha		

Action Taken

Date(s):	Activity	Description
(05/08/21) - 13/10/21	C. procera monitoring	Weekly inspections and recording of *Caladenia procera* population within the SPEC. Inspections conducted from August to October.
1/10/21	Weed control; tree guard maintenance	Manual and herbicide weed control. Removal and reinstatement of damaged tree guards. Central PEC
04/10/21	Weed control	Manual and herbicide weed control. QD & Western PEC.
14/10/21	Weed control	Manual and herbicide weed control. QD
20/10/21 - 21/10/21	Levee slashing	1/12 slashing of levee external embankments adjacent to revegetation sites.
21/10/21	Weed control	Manual and herbicide weed control. Western PEC
25/10/21 - 26/10/21	Planting	Completed planting of lower VDD Embankments (3,500 plants total).
10/11/21 - 11/11/21	Weed control	Manual and herbicide weed control. QD, WPEC & CPEC
10/11/21 & 15/11/21	Palisade construction	4/4 palisade area construction in Quindalup Dune.
16/11/21 - 17/11/21	Monitoring	Quadrat set-up and monitoring of all revegetation areas
20/11/21 - 30/11/21	Plant orders	Developing and ordering the tubestock planting list for 2022. 30% deposit required upfront to secure orders.
06/12/21 - 14/12/21	Weed control	Manual and herbicide weed control. QD, WPEC, CPEC and Eastern PEC.
06/12/21	Watering	Watering of all mature tree in CPEC. Total of 4000L

Previous Action Taken

Date(s):	Activity	Description
26/10/20 – 05/11/20	Vegetation salvage	Selective removal, transport and initial propagation of native species within clearing area. Performed in collaboration with Aboriginal businesses and GCLN.
26/10/20 – 02/11/20	Pathway construction and hardstand removal	Installation of 150m x 2m crushed limestone pathway through Quindalup Dune Zone. Removal and stockpiling of gravel material from former Water Corp Depot for later removal and replacement with appropriate topsoil.
14/10/20 – 15/10/20	Baseline monitoring	Performed baseline monitoring of all revegetation zones. 34 quadrats and 34 photo monitoring points + bushland condition monitoring.
01/10/20 – 20/11/20	Plant and embankment material procurement	Procurement and delivery of all embankment materials for future works. Confirmation of tubestock and mature tree orders for 1st year planting in 2021.
24/11/20 – 08/12/20	Brushlog fabrication	Construction of 300 Brushlog units. Pre-fabrication prior to install for safe and efficient transport and installation.
24/11/20 – 24/12/20	Weed control	Selective herbicide application, hand weeding and slashing. Focus on areas planned for revegetation in 2021.
24/11/20 – 21/12/20	Embankment regrading	Mechanical and manual regrading of embankments, exotic tree stump removal and various green waste removal.
26/11/20 – 23/12/20	Matting	Installed over 800m² of coir mesh across the western VDD Embankment zone.
02/12/20 – 23/12/20	Brushwall installation	50m Initial section of brushwall installed on western bank + 20m of embankment palisade.
04/01/21 – 21/01/21	Weed control	Manual, mechanical and chemical weed control along VDD embankments.
11/01/21 – 15/01/21	Brushwalling	Installation of 110lm of brushwall along western bank + 65lm of mid-slope brush palisade. Total brushwall is now 160lm + 85lm of brush palisade.
13/01/21 – 15/01/21	Matting	Installation of 1,200m² of coir mesh matting. Total matting area is now approx. 2,000m²
13/01/21 – 19/01/21	Weed control	Selective and targeted follow-up herbicide spraying across a number of revegetation areas.
19/01/21 – 18/02/21	Local provenance material collections	Establishment of project seed bank and selective collections of provenance seed from nearby reserves. 12 man-days completed in total. Partial processing of collected seed and seed bank storage as required. See attached status report.
22/01/21 – 22/02/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.
22/01/21 – 08/02/21	Embankment regrading and matting	Continuation of bank preparation and matting on western embankment (200m²) and majority of eastern embankment (800m²). Total matting and embankment preparation areas is now approx. 3,000m²
22/01/21 – 22/02/21	Baseline monitoring report	Preparation and submission of baseline monitoring report. This report provides further definition of completion criteria and an overview of site conditions prior to commencement of on-ground works.

08/01/21 – 11/02/21	Relocation and respreading topsoil	Relocation of soil stockpiles in the Quindalup Dune zone to allow for ACM removal. Respreading soil following confirmation of ACM removal.
04/02/21 – 22/02/21	Mulch procurement and site preparation planning	Confirm mulch order and deposit for material. Planning for distribution and logistics of mulch cartage and stockpiling. Coordination and confirmation of machinery for spreading.
09/02/21 – 12/02/21	Aboriginal engagement – Roelands Village	Contribution to four days of machinery operation training for Roelands Village civil construction trainees. The works were undertaken to assist the Geographe Community Landcare Nursery increase nursery capacity to accommodate additional requirements for the project.
11/02/21 – 18/02/21	Greenwaste and woody weeds	Clearing and removal of Greenwaste (weed and dead material). 30m³ of weed material disposed of at waste facility and over 100m³ stockpiled on site for future removal and respreading of larger logs for habitat.
17/02/21	Aboriginal engagement – Undalup Association	On-country meeting and consultation with Cultural Custodians to discuss the project scope for the development of cultural / biodiversity nodes within the site. Confirmation to commence works 12/02/21.
23/02/21 – 23/03/21	Weed control	Weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
03/03/21 – 09/03/21	Palisade construction	Construction and completion of 3x palisade areas along the western embankment.
12/03/21 – 19/03/21	Aboriginal engagement	Two days of Undalup's indigenous ranger team (x3) performing site preparation tasks (weed control, rubbish removal and fuel load reduction) in the Southern PEC zone. Additional reporting to be provided in the next period.
17/03/21 – 22/03/21	Mulch installation	675m³ of mulch supplied and spread (mechanical and manual) across 9,000m² of the eastern PEC zone.
24/03/21 – 25/05/21	Weed control	On-going follow-up weed control across various revegetation zones. Re-treating WPEC, CPEC, EPEC & QD zones. Herbicide spraying, manual and woody weeds
24/03/21 – 07/05/21	Aboriginal engagement – Wadandi Rangers	On-going support for site works from Undalup Association's Wadandi rangers both on site and at GCLN. Please see attached progress reports from Undalup.
19/04/21 – 23/04/21	Ripping	Soil ripping via tractor mounted tine across Central PEC and Quindalup Dune revegetation zones. Approx. 1.5 ha covered.
13/05/21 – 21/05/21	Mulch installation	315m³ of mulch supplied and spread (mechanical and manual) across 6,000m² of the Quindalup Dune zone.
24/03/21 – 25/05/21	Procurement	Purchase and delivery of corflute tree guards, stakes and root barrier.
27/05/21	Procurement: Tree stake supply	Supply of all hardwood stakes (1800x50x50mm) for mature trees.
04/06/21 & 17/06/21	Weed control	On-going weed control focussing on the QD and VDD Embankment areas prior to planting
22/06/21 – 24/06/21	Procurement: Seedling supply	Supply of all seedlings (exc. lower embankment) for the Quindalup Dune and VDD Embankment zones. Total number of seedlings: 23,610

01/07/21	Matting	Completion of matting along the final section (700m²) of the VDD Embankment near the pedestrian bridge.
05/07/21 - 19/07/21	Planting	21,543 seedlings installed in the QD and VDD Embankment zones. Lower Embankment to be planted in spring. Refer to table attached for details.
08/07/21	Ripping	0.5ha of the Western PEC zone (Corner of College Ave / QE Ave) was ripped prior to mulch spreading.
12/07/21 - 16/07/21	Mulching	Mechanical spreading of mulch across the Central and Western PEC zones. Total of 7,000m² spread. Further manual spreading / trimming to be completed.
12/07/21	Tree removal and greenwaste removal	Removal of unstable tree at the Donovan property and removal of greenwaste from the Western PEC zone.
21/07/21 - 22/07/21	Plant deliveries and batching	Delivery and batching of remaining seedlings for 2021. See attached table for details
22/07/21 - 23/07/21	Fencing	QD and Embankment zone post & rail and public management fencing completed.
25/06/21 - 22/07/21	Weed control	Various follow-up herbicide weed control undertaken where possible, including: QD, VDD Embankments, Western PEC, Central PEC, Eastern PEC and Western Basin PEC.
25/06/21 - 22/07/21	Aboriginal engagement - Undalup Association	Undalup Wadandi Rangers assisting Geographe Community Landcare Nursery preparing stock for the project and assisting with capacity upgrades.
27/07/21	Slashing VDD Levees (separate PO)	Manual slashing (brushcutter) of VDD levee external banks adjacent to revegetation areas. Performed under separate work order.
27/07/21 - 28/07/21	Mulch spreading (manual)	Final manual trim of mulched areas in Central PEC and Western PEC planting areas. Additional assistance provided by Undalup Association.
30/07/21 - 13/08/21	Aboriginal engagement	Assistance with manual spreading of mulch at Western PEC. 2 days (30/08 & 13/08).
03/08/21 - 18/08/21	Weed control	Targeted spot spraying within 2021 planting sites over 4 days. Additional retreatment of 2022 planting sites (EPEC, Possum Corridor) blanket spraying.
05/08/21 - 20/08/21	C. procera monitoring	Commenced monitoring growth and health of known & reference populations of C. procera adjacent to construction boundary.
09/08/21 - 10/08/21	WPEC fencing	324m of fencing installed around Western PEC Restoration Zone. Inc. 1.2m ringlock + 900mm rabbit mesh skirt. 2m clearance from base of levee.
13/08/21	Mulch spreading	Transport and spreading of mulch from WPEC to QD Zone eastern bank.
13/08/21 - 19/08/21	Mature trees install	Install 214 mature trees along pathway in CPEC. Included root barrier, soil conditioner, Terracottem, mulching, stakes and ties.
23/08/21	CPEC planting	Commencement of planting along CPEC inc. tree guards and fertiliser tablets. Final planting list included below.
24/08/21 - 21/09/21	Weed control	Follow-up herbicide application to areas to be revegetated in 2021.

25/08/21 - 10/09/21	Planting and guard install	Install remaining plants and guards in CPEC and Western PEC Restoration Zone. Total of 14,617 plants and 11,261 guards installed.
30/08/21 - 13/09/21	Planting and guard install (Undalup Association)	Installation of plants and guards in WPEC Open zone. Total of 3,149 plants and 2,539 guards installed.
13/09/21 - 21/09/21	Planting and guard install (Undalup Association)	Installation of plants and guards in CPEC swale zone. Total of 6,000 plants installed in swale.
23/09/21	Tree install	Plant remaining mature tree in QD Zone and install signage.

2021 Final Planting List

tranen revegetation southwest

Vasse Diversion Drain Upgrade
2021 Final Planting List

Species	Quindalup Dune			VDD Embankments		Central and Western PEC				TOTAL
	Quindalup Dune Low Fuel	Quindalup Dune Open	Quindalup Dune Restoration	VDD Embankment Restoration - Upper	VDD Embankment Restoration - Lower	Western PEC Open	Western PEC Restoration	Central PEC Restoration	Western Basin PEC Drainage	
Tree Species										
Agonis flexuosa	0	100	159	100	0	160	200	280	0	999
Banksia grandis	0	0	0	0	0	40	100	220	0	360
Banksia littoralis	0	0	0	0	0	0	0	250	50	300
Corymbia calophylla	0	0	0	0	0	50	100	200	0	350
Eucalyptus rudis	0	0	0	0	0	25	0	100	50	175
Melaleuca preissiana	0	0	0	0	0	0	0	0	50	50
Melaleuca rhaphiophylla	0	0	0	0	0	0	0	0	50	50
Sub-Total	**0**	**100**	**159**	**100**	**0**	**275**	**400**	**1,050**	**200**	**2284**
Shrub Species										
Acacia cochlearis	0	0	500	800	0	0	0	0	0	1300
Acacia littorea	0	0	564	800	0	0	0	0	0	1364
Acacia pulchella	0	0	0	0	0	100	250	500	0	850
Acacia saligna	0	0	0	0	0	0	50	200	0	250
Acacia stenoptera	0	0	0	0	0	0	60	60	0	120
Adenanthos meisneri	0	0	0	0	0	100	300	400	0	800
Gompholobium tomentosum	0	0	0	0	0	100	200	391	0	691
Hakea prostrata	0	0	0	0	0	0	200	400	0	600
Hakea varia	0	0	0	0	0	0	200	300	25	525
Hibbertia cuneiformis	0	150	500	610	0	0	0	0	0	1260
Hibbertia racemosa	0	0	0	0	0	100	200	350	0	650
Hovea trisperma	0	0	0	0	0	0	71	120	0	191
Jacksonia furcellata	0	0	0	0	0	0	250	365	0	615
Kunzea glabrescens	0	0	0	0	0	0	150	250	25	425
Melaleuca cuticularis	0	0	0	400	200	0	0	0	0	600
Olearia axillaris	0	100	100	600	0	0	0	0	0	800
Rhagodia baccata	500	200	300	600	0	0	0	0	0	1600
Spyridium globulosum	0	0	500	500	0	0	250	500	0	1750
Xanthorrhoea brunonis	0	0	0	0	0	50	150	300	0	500
Xanthorrhoea preissii	0	0	0	0	0	0	50	200	0	250
Sub-Total	**500**	**450**	**2,464**	**4,310**	**200**	**450**	**2,381**	**4,336**	**50**	**15141**
Herbs and Groundcover Species										
Anigozanthos manglesii	0	0	0	0	0	200	400	500	0	1100
Centella asiatica	0	0	0	0	0	0	0	6000	0	6000
Conostylis aculeata	0	0	0	0	0	200	400	500	0	1100
Dampiera linearis	0	0	0	0	0	200	200	300	0	700
Hardenbergia comptoniana	0	50	50	0	0	100	100	150	0	450
Kennedia prostrata	0	0	0	0	0	0	200	350	0	550
Patersonia occidentalis	0	0	0	0	0	200	400	500	0	1100
Scaevola calliptera	0	0	0	0	0	100	250	300	0	650
Scaevola crassifolia	0	150	100	600	0	0	0	0	0	850
Sub-Total	**0**	**200**	**150**	**600**	**0**	**1,000**	**1,950**	**8,600**	**0**	**12500**
Rushes and Sedges										
Baumea juncea	0	0	0	0	0	337	300	1000	273	1910
Carex preissii	0	0	0	0	0	0	0	300	200	500
Ficinia nodosa	1099	500	500	5037	0	0	0	0	0	7136
Gahnia trifida	0	0	0	0	0	0	0	300	200	500
Juncus kraussii	0	0	0	0	1300	0	0	0	0	1300
Juncus kraussii - advanced	0	0	0	0	2000	0	0	0	0	2000
Lepidosperma gladiatum	0	1582	1492	2300	0	0	0	0	0	5374
Lepidosperma longitudinale	0	0	0	0	0	0	0	0	300	300
Sub-Total	**1,099**	**2,082**	**1,992**	**7,337**	**3,300**	**337**	**300**	**1,600**	**973**	**19020**
TOTAL	**1,599**	**2,832**	**4,765**	**12,347**	**3,500**	**2,062**	**5,031**	**15,586**	**1,223**	**48,945**
Tree Guards	**0**	**0**	**0**	**0**	**0**	**1,725**	**0**	**8,586**	**950**	**11,261**
Fertiliser tablets	**1,599**	**2,832**	**4,765**	**12,347**	**0**	**2,026**	**5,031**	**9,586**	**0**	**38,186**
Planted to date (No.) - 27.10.21	1,599	2,832	4,765	12,347	3,500	2062	5031	15586	1223	**48,945**
Planted to date (%)	100%	100%	100%	100%	100%	100%	100%	100%	100%	**100%**

Selected Site Progress Images



Quindalup Dune - September 2020



Quindalup Dune - December 2021



VDD Embankment - September 2020



VDD Embankment - December 2021



VDD Embankment - December 2021



VDD Embankment Palisades- December 2021



Western PEC Restoration - December 2021



Central PEC Restoration - December 2021

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revegetation southwest



Vasse Diversion Drain Upgrade Revegetation
Spring 2021 Vegetation Monitoring Report

Water Corporation

P875C-05-Rev0

February 2022

PERTH

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Bayswater WA 6053
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SOUTHWEST

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Disclaimer

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1 INTRODUCTION

The Vasse Diversion Drain (VDD) is a 100-year-old strategic infrastructure corridor, constructed in the 1920s to create more arable land in the catchment. Its primary function now, is to prevent flooding of the Busselton Township. Water Corporation have upgraded the drain and associated infrastructure to better accommodate future flood events.

The upgrade works required the clearing of 2.16 ha of existing vegetation, much of which was in a degraded state, although some of which is locally and nationally significant habitat.

Tranen Revegetation Southwest (Tranen) was commissioned by Water Corporation to prepare a Revegetation Plan for environmental offset works across approximately 14 ha related to the Vasse Diversion Drain (VDD) Upgrade Project CPS8191/1.

The revegetation works have the following objectives:

1. Mitigate the effects of vegetation clearing within the local area and maximise local environmental benefits
2. Build on existing and previous successful environmental enhancement projects undertaken locally
3. Enhance habitat for the western ringtail possum (WRP) and provide connectivity between areas of local distribution, and
4. Facilitate better connection and engagement between the local environment and community.

The overarching strategy for the revegetation works is to re-create naturally occurring and connected vegetation communities that are appropriate for their geographic location, support long-term ecological function and provide suitable habitat for critical species.

The revegetation plan (the plan) was also designed to consider key management requirements for native vegetation in an urban context. Due to a number of factors requiring consideration, additional layers of complexity were inherent in the development of an appropriate revegetation strategy.

The plan seeks to progressively establish focal areas of high biodiversity, with native vegetation forming a discontinuous mosaic-like corridor of variable structural composition and biological complexity, to reflect natural vegetation community structure. The offset sites are to be maintained for ten years to ensure that a long-term sustainable outcome is achieved.

1.1 Current Project Status

Initial revegetation works commenced in spring 2020. This is the second vegetation monitoring report prepared for the project, the first of which was a baseline survey completed in spring 2020, prior to clearing works.

Revegetation works are being undertaken over several years due to the variable completion timing of staged construction works, and the offset sites covering variable conditions and environments. The data presented in this report is to be considered interim and a more comprehensive dataset will be progressively developed as works are completed.

The data presented in this report provides an early indication of progress towards meeting the completion criteria and is a means to demonstrate if the project is currently on the correct trajectory to meeting these targets by the end of the ten-year monitoring and maintenance period. Table 1 outlines the status of works in each revegetation zone as of spring 2021.

Table 1 Revegetation Site Status - Spring 2021

Item	Zone	Site Preparation	Initial Planting	Monitoring Quadrat(s)
1.0	Zone 1 - Quindalup Dune	Complete	Complete	Q1 - Q4
2.0	Zone 2 - VDD Embankments	Complete	Complete	Q5 - Q8
3.0	Zone 3 - QE Ave Swale	Commenced	Not Commenced	Q9 - Q11
4.0	Zone 4 - PEC Upland			
4.1	Zone 4.1 - Possum Corridor PEC	Commenced	Not Commenced	Q15 - Q17
4.2	Zone 4.2 - Western PEC	Commenced	Complete (Partial)	Q12 - Q14
4.3	Zone 4.3 - Central PEC	Complete	Complete	Q18 - Q20
4.4	Zone 4.4 - Eastern PEC	Commenced	Not Commenced	Q21 - Q31
4.5	Zone 4.5 - Southern PEC	Commenced	Not Commenced	N/A
5.0	Zone 5 - Drainage PEC			
5.1	Zone 5.1 - Western Basin PEC	Complete	Completed	Q32
5.2	Zone 5.2 - Southern Swale PEC	Commenced	Not Commenced	Q33 - Q34

1.2 Project Background

The project area (the "site") is separated into five key management zones based on existing and expected (in degraded areas) vegetation communities. Some are further broken down into sub-zones with different management and rehabilitation strategies.

Initial revegetation quantities and planting densities for these zones were determined based on the pre-existing native vegetation cover and the percentage of each zone available for intensive revegetation works. These are summarised as follows:

- Zone 1 – Quindalup Dune
- Zone 2 – VDD Embankments
- Zone 3 – Queen Elizabeth Avenue Swale (QE Ave Swale)
- Zone 4 – PEC Upland
    - Zone 4.1 – Possum Corridor PEC
    - Zone 4.2 – Western PEC
    - Zone 4.3 – Central PEC
    - Zone 4.4 – Eastern PEC
    - Zone 4.5 – Southern PEC
- Zone 5 – Drainage PEC
    - Zone 5.1 – Western Basin PEC, and
    - Zone 5.2 – Southern Swale PEC.

Prior to the commencement of revegetation works, Tranen undertook a baseline vegetation survey to establish monitoring quadrats across the revegetation areas and perform an assessment of vegetation condition. These quadrats were established temporarily prior to commencing of civil works and are to be reinstated following completion of these works in the same location where possible. A subsequent ten-year monitoring program commenced in spring 2021, with monitoring undertaken biannually for the first two years and annually for the remaining eight years. The following is a summary of the planned monitoring schedule:

1. Spring 2020 (baseline)
2. Spring 2021– current assessment
3. Autumn 2022
4. Spring 2022
5. Autumn 2023
6. Spring 2023
7. Spring 2024
8. Spring 2025
9. Spring 2026
10. Spring 2027
11. Spring 2028
12. Spring 2029
13. Spring 2030, and
14. Spring 2031.

This, the second of 14 scheduled assessments, was undertaken between the 16th and 17th November 2021 by Alex Johnston of Tranen Revegetation Southwest.

1.3 Approval Conditions and Completion Criteria

This project has been assessed Bilaterally by the Department of Water and Environment Regulation (DWER) Native Vegetation branch under Part V of the EP Act [WA] and by the Department of Agriculture, Water and Environment (DAWE) under the EPBC Act 1999 [cth].

The development of this plan has been guided by the approved clearing permit issued by DWER. The permit includes the provision of the Completion Criteria required to be achieved at the end of the project period. The following is an excerpt from Section 17 of the permit:

Table 2 Completion Criteria - DWER Clearing Permit CPS 8191/1

Criterion	Aspect	Scale	Completion Criteria Description	Monitoring Frequency
1	Per cent *weed* cover	Average of *quadrat* data and site traverse	<15 per cent weed cover across all sites	Bi-annually in the first 2 years, and annually for the next 8 years
2	Declared *weeds*	Site traverse	Absence of declared weeds	Bi-annually in the first 2 years, and annually for the next 8 years
3	Per cent bare ground	Average of *quadrat* data and site traverse	Per cent of bare ground to be no greater than that recorded in the *pre clearing surveys*.	Bi-annually in the first 2 years, and annually for the next 8 years
4	Vegetation condition	Site traverse	The condition of the vegetation to be in a good to very good condition on average across the revegetation area (Keighery 1994).	Bi-annually in the first 2 years, and annually for the next 8 years
5	Native vegetation cover/density	Average of *quadrat* data	>70 per cent native cover	Bi-annually in the first 2 years, and annually for the next 8 years
6	Species richness	Average of *quadrat* data	>70 per cent of species planted represented across all sites respectively (PEC, GCWS & QD) as outlined in the species list provided in the Project Revegetation Plan	Bi-annually in the first 2 years, and annually for the next 8 years
7	*Conospermum caeruleum var. Busselton*	Site traverse / direct survival observation	>50 per cent survival rate to be achieved	Bi-annually in the first 2 years, and annually for the next 8 years

1.4 Definition and Clarification of Completion Criteria

Further clarification for the application of the key Completion Criteria has been prepared to precisely define the attributes to be measured and how this will be assessed for the duration of the project period. A summary of the baseline quadrat data and directly comparable applicable Completion Criteria is provided in Appendix 3. The following sections provide the definition and interpretation of criteria with further clarification of how the quantitative data is proposed to be measured and analysed.

1.4.1 Native Vegetation Cover

Native vegetation cover is defined by the projected foliage cover of all living above-ground biomass (including, but not limited to, foliage, reproductive structures and stems) of plants considered indigenous to the given location. This includes overall cover from all representative strata. However, existing mature canopy cover (overstorey) will be excluded from initial assessments so that cover assessments do not misrepresent the progress of rehabilitation efforts. Mature Native Canopy Cover will initially be captured as additional data, but not considered in the Native Vegetation Cover assessments. This data will only be reviewed if it is believed that the established vegetation is affecting progress by competing with and influencing the development of new plants.

Native vegetation cover, as defined above, is measured as a proportional representation of area in percent cover. The requisite Completion Criteria is for >70% cover as a mean percentage cover of all monitoring quadrats.

1.4.2 Weed Cover and Declared Weeds

Weeds are defined as per the Clearing Permit as "*not indigenous to the area concerned*". Cover is defined as per the native vegetation cover interpretation above.

Weed cover as defined above is measured as a proportional representation of area in percent cover. The requisite completion criteria is for <15% cover as a mean percentage cover of all monitoring quadrats. No stem counts, individual species cover, species rankings or similar have been incorporated into the capture of data, although presence / absence of each species will be recorded in each quadrat.

Declared weeds known to exist on site are currently: arum lily (*Zantedeschia aethiopica*) and bridal creeper (*Asparagus asparagoides*). These are assessed for presence / absence during quadrat assessment and will be mapped via site traverse for distribution in future assessments across site annually during growth/reproductive phase (spring).

1.4.3 Bare Ground Cover

Bare ground cover is defined as exposed soil / substrate not covered by native vegetation, weeds, litter, mulch or other organic material measured as a percentage.

The requisite completion criterion for bare ground cover is determined as a mean percentage cover of all monitoring quadrats to be no greater cover than that determined during "pre-clearing surveys". In the absence of this data from previous surveys, the initial baseline data captured during this assessment will become the target going forwards. The Completion

Criteria is therefore defined as <16% Bare Ground Cover, as determined during this assessment.

It should be noted that bare ground cover in analogous natural vegetation communities may reflect higher levels of bare ground cover and this is to be considered as part of the overall assessment of this target.

1.4.4 Native Species Richness

Native species richness is defined as the total number of unique native species identified within the monitoring quadrats. The Completion Criteria requires establishment of >70% of species used in the rehabilitation of each distinct vegetation community. The following provides a summary of the requirements for each vegetation community:

Table 3 Completion Criteria – Native Species Richness

Vegetation Community	Total No. Species for Revegetation	No. Species Required (Completion Criteria)
Quindalup Dune (QD)	17	12
Geographe Coastal Wetland System (GCWS)	18	13
Priority Ecological Community (PEC)	48	34
Project Total	66	-

The total number of species for revegetation is based on the primary species list provided in the revegetation plan and overall project totals are not included as part of the completion criteria. Any additional native species indigenous to the area that have self-recruited but are not included in the primary species list will be counted towards the species richness totals.

1.4.5 Vegetation Condition

Vegetation Condition is defined as the rating given to native vegetation in reference to the impact of disturbance on each of the vegetation strata and the ability of the community to regenerate, as per the most widely accepted scale, the "Keighery Vegetation Condition Scale" (Keighery 1994). This scale provides an indicative assessment of vegetation condition across the site, which is subjective based on the survey method, precision and scale of the assessment.

Future assessments of vegetation condition, particularly in the early stages of establishment, will need to be considered in the context of establishing vegetation, as this is difficult to accurately define within the parameters of the Keighery scale. The focus of future assessments will be on the vegetation's demonstration of successional establishment and progress on a trajectory to ultimately meet the definitions set out in the Keighery scale.

Vegetation condition is to be surveyed at a broad level to determine average condition across defined revegetation areas based on the criteria provided above. The Completion Criteria states a condition of "Good" to "Very Good" on average across the revegetation area, which has been interpreted as >50% of total area classified as "Good" condition or better.

1.4.6 Conospermum caeruleum var. Busselton

The Completion Criterion for *C. caeruleum var. Busselton* is defined by a >50% survival to be achieved and measured through a count of all individuals present. Due to the ambiguity in the wording of the criterion, it is interpreted as a survival rate of >50% for originally planned numbers of the species (300 individuals), which equates to a minimum of 150 individuals surviving at the end of the project period. Mapping of individuals through geospatial data capture will be presented as part of on-going assessments.

2 MONITORING METHODOLOGY

The success of revegetation works is determined through analysing a combination of quantitative and qualitative assessment methodologies. This combined approach provides a comprehensive overview of the trajectory of revegetation works and how this is compares to the completion criteria. Quantitative data is collected through monitoring quadrats and site traverses, with a qualitative assessment undertaken during each assessment event to provide a broader overview of the progress of revegetation works. Photo monitoring of both quadrats and general images of site during traverses will provide additional qualitative information to assist with developing an overall assessment.

2.1 Monitoring Quadrat Establishment

Thirty-four (34) 5 m x 5 m monitoring quadrats were installed on site, with placement determined through a process of stratified random sampling. Quadrat locations were randomly distributed across all key revegetation zones based on their respective area and level of planned revegetation input to ensure adequate representation of revegetation progress across the entire site. The locations of each quadrat are presented in Appendix 1.

Each quadrat was marked with galvanised steel droppers in each corner, orientated in a north, south, east, west configuration where possible. The co-ordinates for each quadrat were marked with a GPS at the central point of the quadrat, and the quadrats will be reinstated in the same locations. The co-ordinates for the quadrats and photo points are shown in Table 3.

An image of each quadrat was also taken, orientated to best capture the entire monitoring quadrat and the surround revegetation area, to provide context to the quadrat location and an improved overview of each particular monitoring location.

Table 4 GPS Coordinates of Quadrats in Revegetation Zones

Quadrat GPS Coordinates (GDA 94, MGA Zone 50)			
Quadrat Name	**Easting**	**Northing**	**Revegetation Zone (Composition)**
Q1	344553	6274563	QD Open
Q2	344555	6274502	QD Rest
Q3	344552	6274444	QD Open
Q4	344557	6274372	QD Rest
Q5	344565	6274601	VDD ER
Q6	344571	6274423	VDD ER
Q7	344597	6274682	VDD ER
Q8	344603	6274406	VDD ER
Q9	344610	6274307	QEA SR
Q10	344609	6274193	QEA SR
Q11	344618	6274057	QEA SR
Q12	344680	6273941	W PEC Rest
Q13	344593	6273934	W PEC Rest
Q14	344728	6273805	W PEC Open
Q15	344813	6273905	PC Open
Q16	345136	6273854	PC Open
Q17	345822	6273648	PC Open
Q18	345388	6273795	C PEC Rest
Q19	345646	6273757	C PEC Rest
Q20	346013	6273493	C PEC Rest
Q21	346353	6273273	E PEC LF
Q22	346312	6273517	E PEC Open
Q23	346222	6273402	E PEC Open
Q24	346351	6273239	E PEC Open
Q25	346548	6273149	E PEC Open
Q26	346678	6273194	E PEC Open
Q27	346179	6273391	E PEC Rest
Q28	346292	6273439	E PEC Rest
Q29	346246	6273332	E PEC Rest
Q30	346398	6273211	E PEC Rest
Q31	346438	6273152	E PEC Rest
Q32	344675	6273819	WB PEC Drain
Q33	345807	6273553	SS PEC Drain
Q34	345998	6273412	SS PEC Drain

2.1.1 Modification of Quadrat Locations

The location of four quadrats (Q3, Q8, Q31 & Q33) were modified since the baseline monitoring event in spring 2020. This was due to changes to site access and modification to revegetation design since construction works were completed. This will not have any material effect on the data as there have been no changes to vegetation classifications or revegetation zones.

2.2 Quadrat Monitoring Methodology

The following quantitative and qualitative data were recorded within each quadrat during this baseline assessment. All individual quadrat recording sheets are provided in Appendix 4.

Quantitative data:

- Native species present
- Overall native vegetation cover (excluding mature native canopy cover)
- Mature native canopy cover
- Weed species present
- Overall weed species cover, and
- Total bare ground cover (excludes foliage, litter, mulch etc.).

Qualitative data:

- Current site conditions (topography, adjacent infrastructure, signs of disturbance, etc.)
- Presence of fauna, disease, pests, and
- Additional notes as required.

2.3 Site Traverse Methodology

Site traverses are conducted to identify the presence of *C. caeruleum var. Busselton* and declared weeds within the entire site as they may occur outside of the quadrats. They will also be used to provide a qualitative assessment of overall progress of the revegetation works, to determine if zone progress is accurately reflected in the quadrat data, and for overall site condition ratings. This is to be undertaken as a general observational on-foot traverse of the site with data recorded in the form of photographs, qualitative notes and georeferenced data points of observed declared weeds and *C. caeruleum* var. Busselton where appropriate.

Site images captured as part of the site traverses are provided in Appendix 6.

2.4 Vegetation Condition Assessment Methodology

Vegetation condition was assessed and mapped using a combination of desktop and ground-truthing methods. The data was collated and refined to provide an average condition rating across distinct areas, maintaining consistency with the revegetation classifications and zones where possible. Each feature mapped was attributed with a condition rating utilising the Keighery Vegetation Condition Scale. As the assessment of vegetation condition can be subjective and with the potential for it to be infinitely refined in scale, this broader assessment methodology provides an efficient means to capture the key data and present clearly defined areas to allow for effective comparisons in future assessments.

3 RESULTS AND DISCUSSION

A summary of all key quantitative data is presented in Appendix 3. The following presents the results and analysis of each data attribute assessed as part of this monitoring event.

3.1 Native Vegetation Cover

Figure 1 details the vegetation cover of all native species recorded in each of the quadrats.

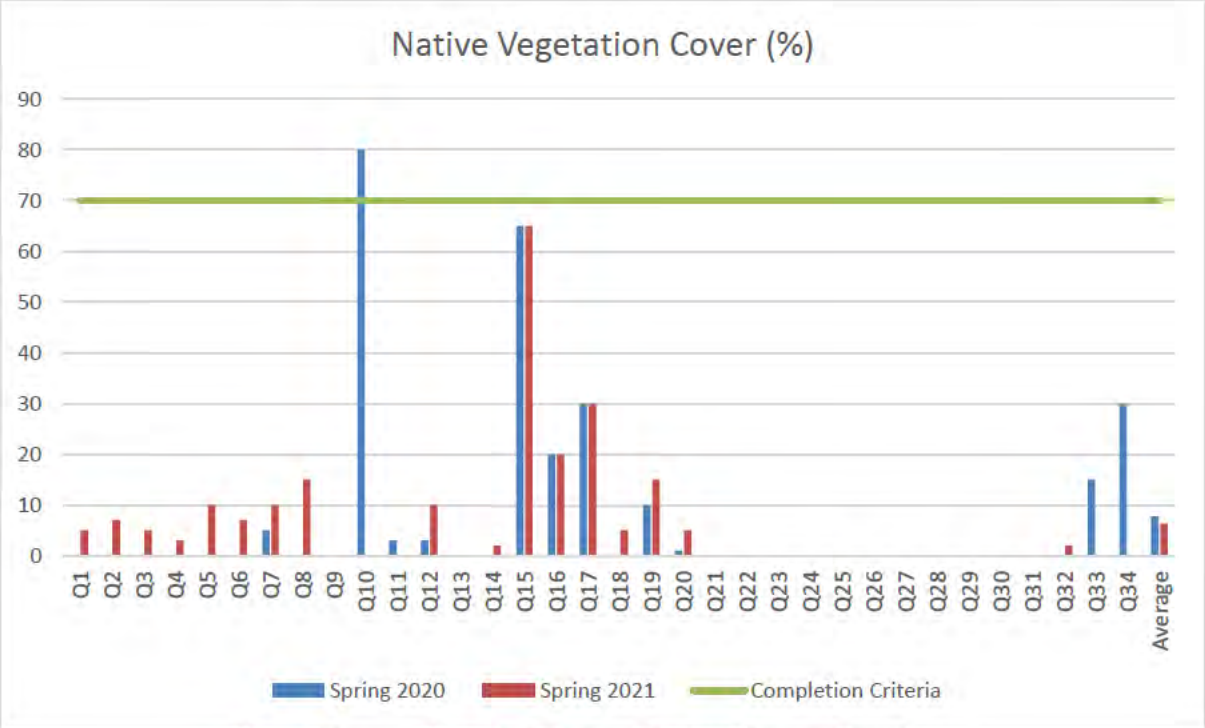


Figure 1 Quadrat Data – Native Vegetation Cover

Average native vegetation cover across all quadrats was 6%, down from 8% cover in spring 2020. The number of quadrats recording 0% cover reduced from 23 quadrats to 17 quadrats since spring 2020. 14 quadrats showed an increase in cover, 16 quadrats had no change and four quadrats showed a decrease in cover. The most significant reduction in native cover occurred in quadrats Q10, with a reduction from 80% native cover to 0% since the last monitoring event.

General site observations correspond with the low level of native vegetation cover observed in the quadrats. Native cover continues to be variable across monitoring quadrats and revegetation zones.

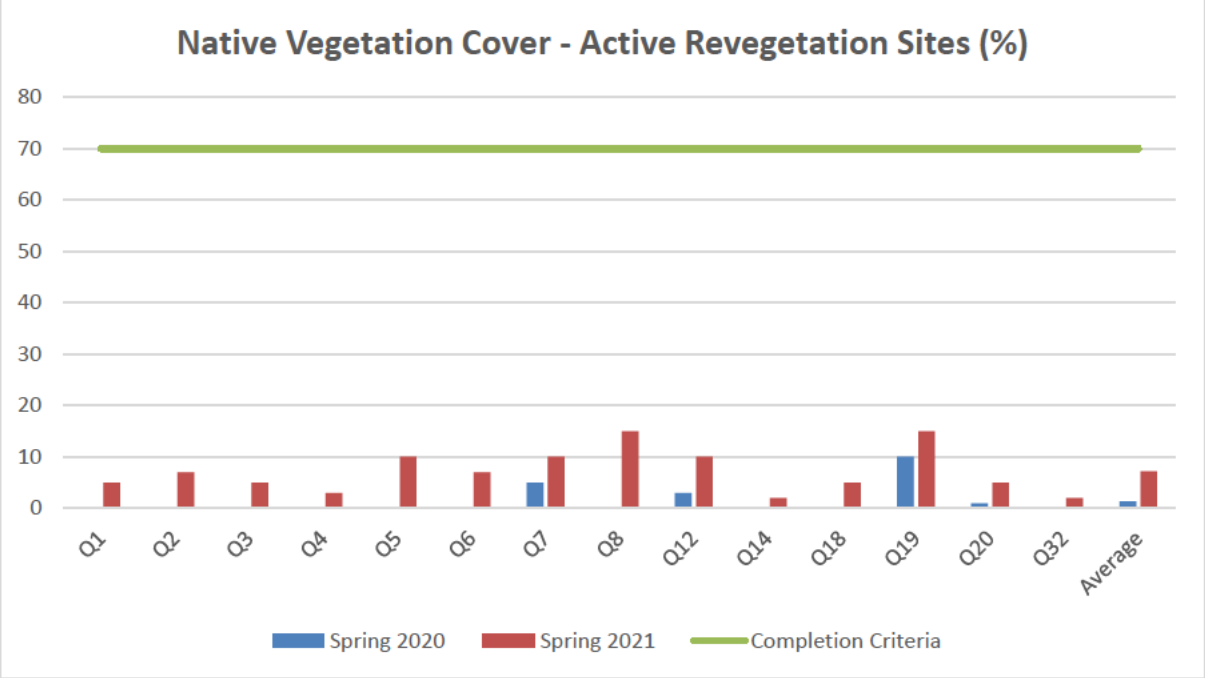


Figure 2 Quadrat Data – Native Veg Cover - Revegetation Sites Only

Figure 2 presents vegetation cover quadrat data for areas where active planting works were undertaken. All quadrats have shown an increase in cover since spring 2020, with overall cover increasing from 1% to 7% in these areas. Average native vegetation cover across the site remains significantly below the Completion Criteria of 70%, which is expected for this very early stage of development given it is a ten-year target. However, the cover is a significant increase, and is consistent across the quadrats, indicating consistent overall positive progress towards the target.

The key factors influencing the change in overall cover are vegetation clearing works undertaken during the upgrade of the VDD, and subsequent revegetation works undertaken in a number of areas in winter / spring 2021. The QE Ave Swale and Southern Swale revegetation zones were completely cleared during construction activities and this resulted in a reduction in mean vegetation cover in the quadrat data. Conversely, revegetation works were commenced in the Quindalup Dune, VDD Embankments, Western PEC and Central PEC zones and this has resulted in minor, but significant, increase in vegetation cover.

It is anticipated, and demonstrated in the data, that recent revegetation areas will only exhibit minor increases in vegetation cover during the early stages of establishment. Growth rates and cover of establishing vegetation are expected to accelerate over the next few years as the plants settle in and mature.

To reiterate comments in the previous report regarding native cover, the data presented at this stage does not include existing mature canopy cover, which was recorded independently at 28%. This mature canopy data can provide a skewed representation of rehabilitation success when included in the early phases of establishment. The omission of this attribute is critical for the assessment of the current ecological condition of the site, and for guiding remedial activity. Initially, the mature trees provide some habitat for the WRP but do not provide overall ecosystem services or connectivity across multiple vegetation strata, or connectivity across the greater landscape. Once the vegetation derived from rehabilitation reaches maturity the canopy cover from pre-existing vegetation will be included in the assessments.

3.2 Weeds

Figure 3 details the cover of all weed species recorded in each of the quadrats.

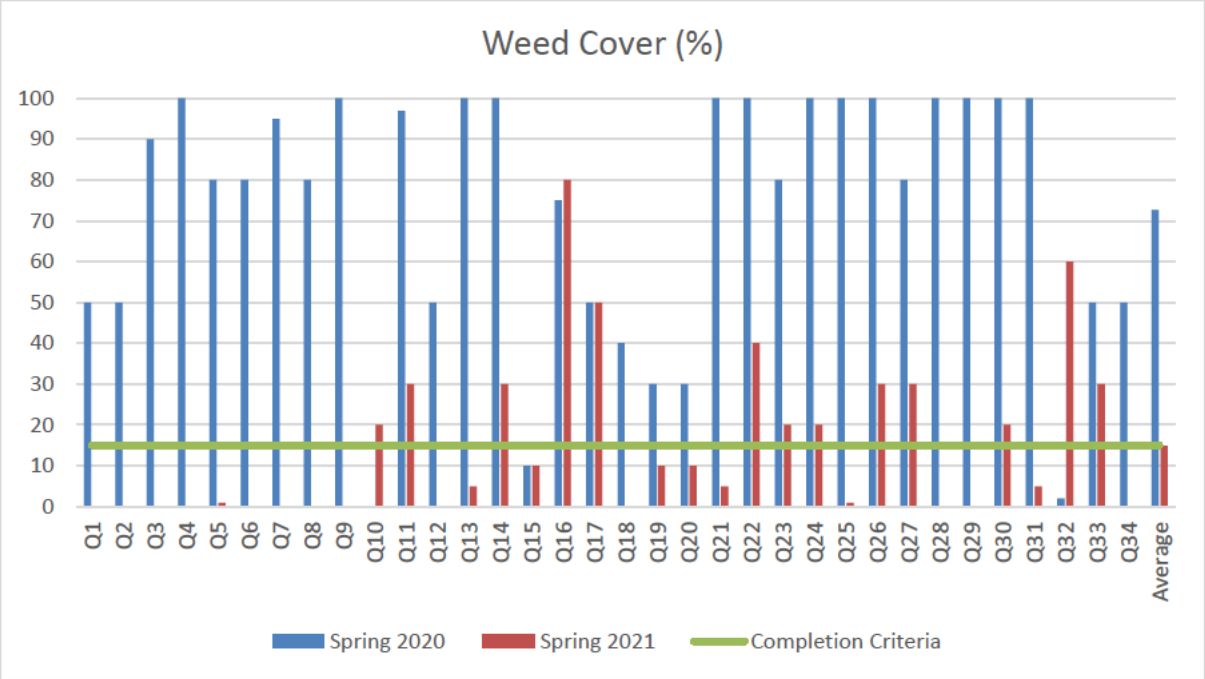


Figure 3 Quadrat Data – Weed Cover

Average weed cover across the quadrats is 15%, down from 73% in spring 2020. Three quadrats demonstrated an increase in weed cover, with all other quadrats showing a reduction of weed cover. No quadrats recorded 100% weed cover, down from 13 quadrats in the previous period. The highest cover recorded was 80% in Q16. Weed cover below 0.5% was recorded in 13 locations of the 34 locations.

Average weed cover recorded in the quadrats has significantly reduced since spring 2020, with an almost five-fold reduction overall and only three quadrats recording an increase in cover. The weed cover criterion is now currently being met across the site and in 62% of quadrats individually. The most significant decreases have occurred in the Quindalup Dune and Eastern PEC zones, where previous weed cover has reduced from approximately 90% to less than 1%. The reduction in weed cover can be directly attributed to regular and targeted weed control works undertaken across the site. This has been achieved through a combination of control methods, such as: blanket / spot herbicide spraying and mechanical / manual removal.

Dominant weed species continue to be annual and perennial grasses, although proportionally less dominant due to targeted control efforts. Weed species distribution has become more variable in general due to weed succession as a result of the removal of dominant grasses.

3.2.1 Declared Weeds

Two quadrats recorded the presence of the declared weed arum lily (*Zantedeschia aethiopica*) (Q15 & Q27). Bridal creeper (*Asparagus asparagoides*) was not recorded within any of the quadrats, although it was detected in some discrete areas of the Possum Corridor zone.

Targeted control of declared weeds appears to have been effective as site traverses identified a reduced distribution and occurrence since spring 2020, specifically of arum lily. This species was observed in moderate abundance in the Possum Corridor revegetation zone only and was not observed in zones where it was previously detected, these being: Quindalup Dune, Western PEC, Central PEC and Eastern PEC. The Possum Corridor zone is to be targeted further in future seasons as revegetation works are planned and implemented.

3.3 Bare Ground Cover

Figure 4 details the bare ground cover recorded in each of the quadrats.



Figure 4 Quadrat Data – Bare Ground Cover

Bare ground cover varied significantly across the quadrats, with an overall average cover of 25%, up from 16% recorded in spring 2020.

Average bare ground cover across the quadrats is higher than the criteria of 16.3%, set during the previous assessment. The increase in bare ground is a direct result of the significant reduction in weed cover overall (through construction and control efforts), although this has somewhat been offset through the addition of mulch and matting in a number of revegetation zones. Further inferences can be made on this criterion as the revegetation program is implemented.

3.4 Species Richness

Figure 5 details the species richness recorded in each of the quadrats. Figure 6 provides a collation of quadrat data based on vegetation communities to reflect the respective completion criteria for each.

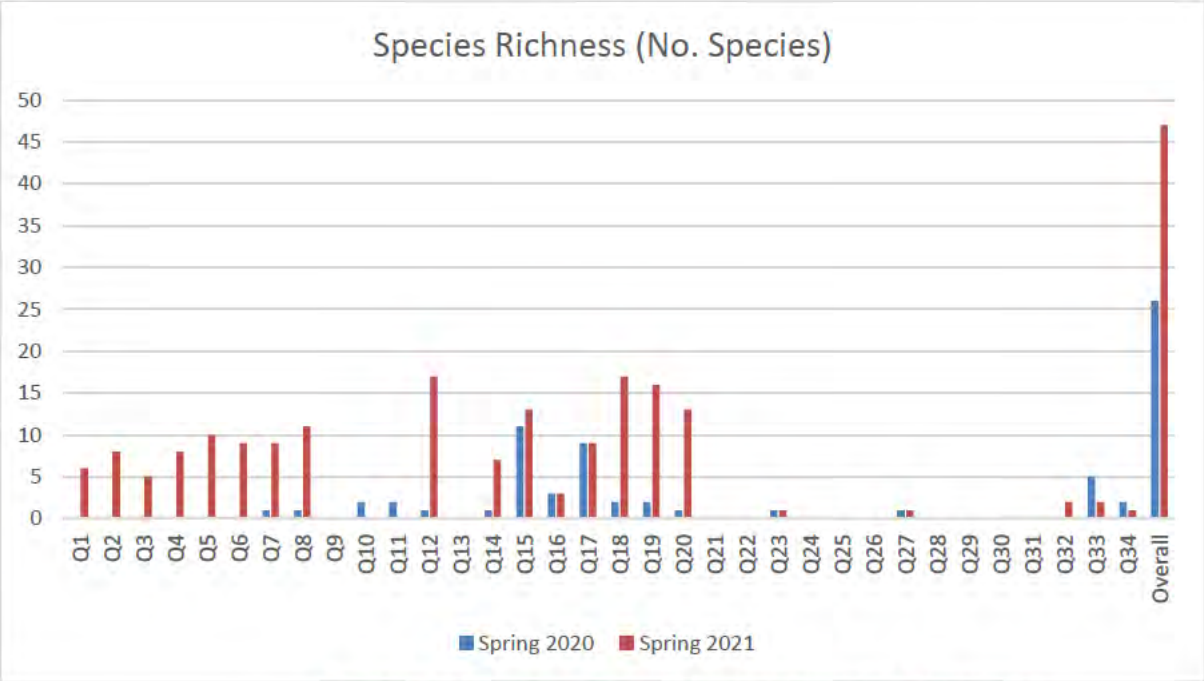


Figure 5 Quadrat Data – Overall Species Richness

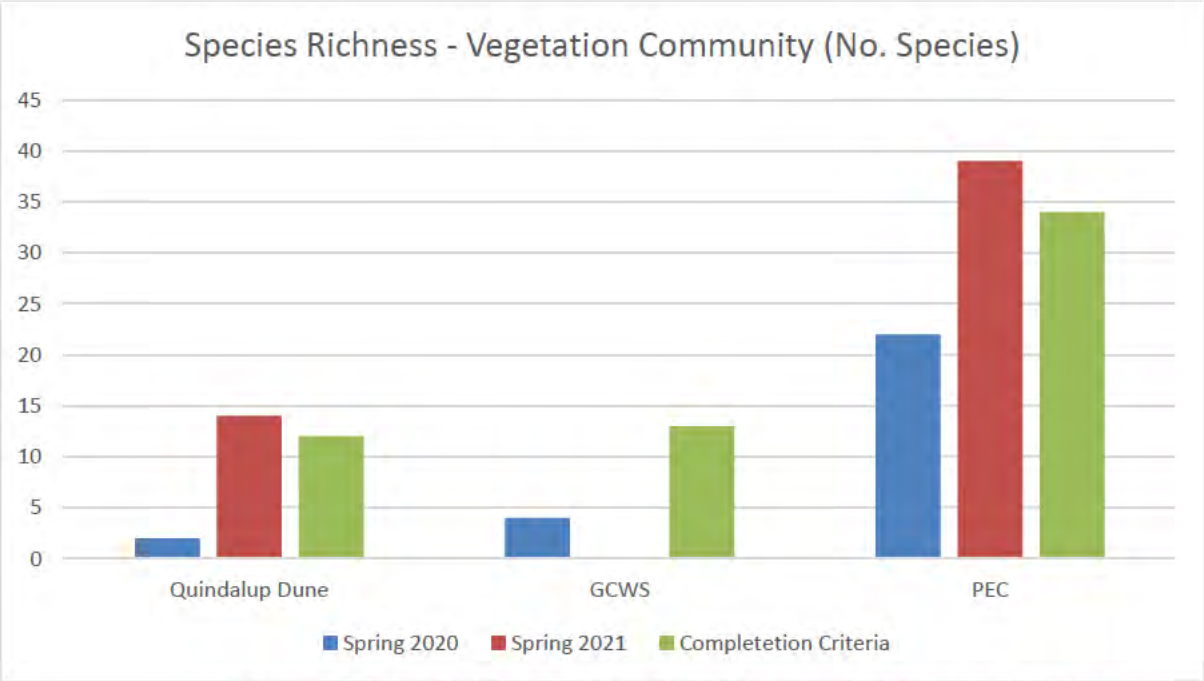


Figure 6 Quadrat Data – Species Richness by Community Type

Overall species richness has increased from 26 species in spring 2020 to 47 species in spring 2021. Fifteen quadrats showed an increase in species richness, 15 quadrats recorded no change and four quadrats showed a decrease in species richness.

Overall species richness for the site based on quadrat data almost doubled since spring 2020, primarily as a result of planting works greatly increasing the diversity of species. The only

quadrats recording a reduction in species were in areas cleared as part of construction works. The following provides an analysis of species richness based on the respective vegetation communities and their relevant criteria:

Quindalup Dune: A total of 14 species were recorded across the quadrats (up from two in spring 2020), which represents all species included in the revegetation planting and indicates appropriate distribution and survival of planted species. Sites within this vegetation community are meeting the species richness criterion of 12 species.

Geographe Coastal Wetland System: No native species were recorded in these quadrats (down from four in spring 2020) due to the entire site being cleared as part of construction works. Intensive planting is scheduled to occur in 2022 and further assessment of this zone will be conducted in subsequent monitoring periods.

Priority Ecological Community: A total of 39 species were recorded across the quadrats (up from 22 in spring 2020), which includes all planted species and a number of additional native species naturally occurring in these areas. Sites within this community are currently meeting the completion criterion for species richness. No native species were recorded in the Eastern PEC zone due to its previously degraded state and no revegetation works occurring prior to the assessment.

3.5 Vegetation Condition

Figure 7 details the vegetation condition percentage comparison recorded across all revegetation areas for 2020 and 2021. Figure 8 shows the relative proportions of each zone meeting the target (good / very good condition) and not (completely degraded/degraded). A map of vegetation condition is provided in Appendix 2.

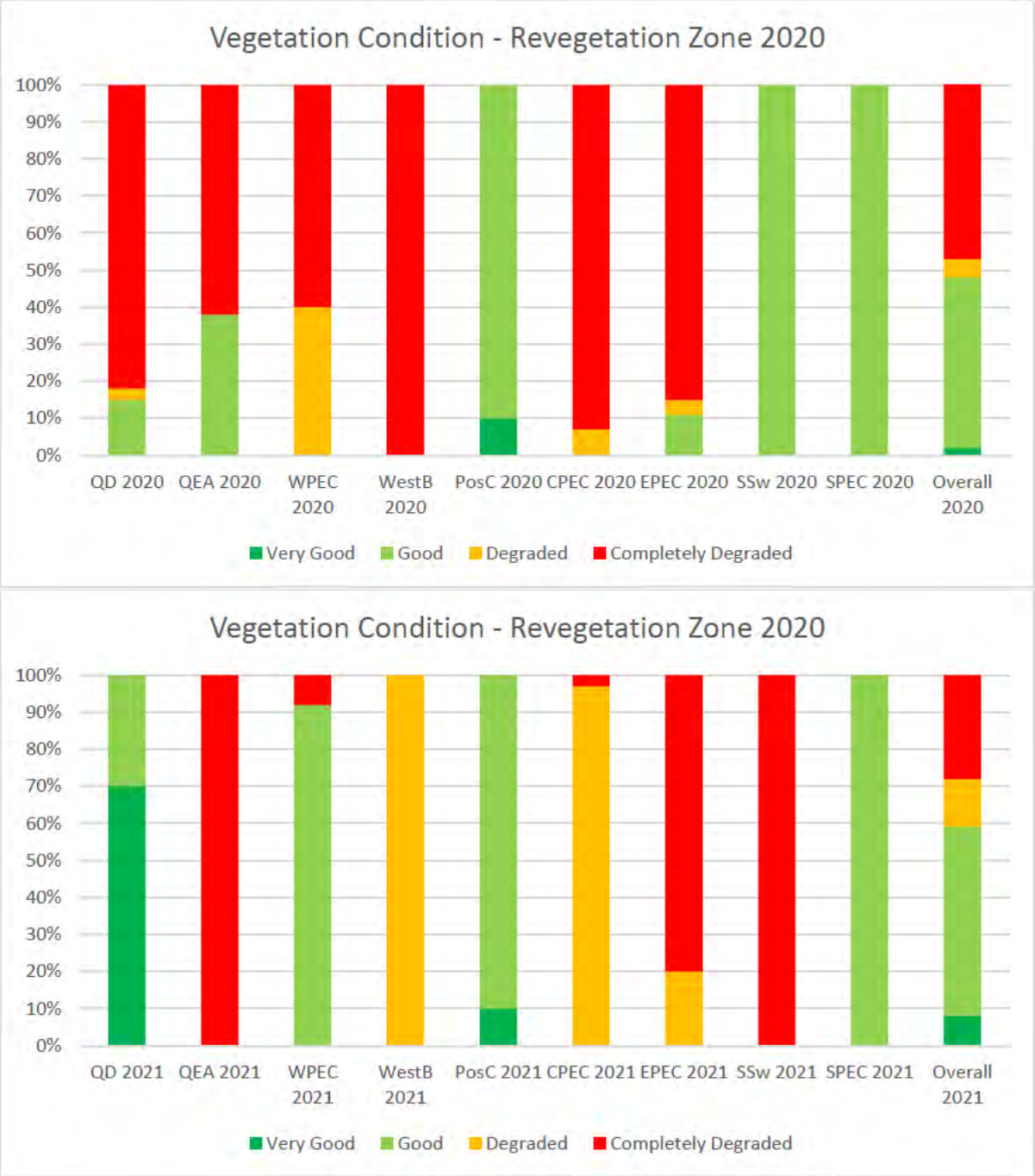


Figure 7 Vegetation Condition – 2020 / 2021



Figure 8 Vegetation Condition – Completion Criteria

Overall 59% of the total area was assessed as in good condition or above, up from 48% in spring 2020 (adjusted from previous report to include SPEC revegetation zone). Vegetation condition was variable across the revegetation zones, with the QD zone demonstrating the most significant improvement in condition, from 85% degraded / completely degraded to 100% good or better. Conversely, the Southern Swale changed from 100% good condition to 100% completely degraded over the same period.

The overall condition of vegetation across the site has improved from the previous assessment and is now well above the completion criteria of >50% of the site in good condition or better. The greatest improvement in condition is in the Quindalup Dune and Western PEC, where intensive site preparation, planting and weed control works have been undertaken. The Southern Swale changed from 100% in good condition or better to 100% degraded due to the entire area being cleared during construction works.

The Southern PEC revegetation zone has been included in the data for both 2020 and 2021 now, due to changes in the overall project footprint. It is the reason for changes to data in the previous report.

4 CONCLUSIONS

In summary, this monitoring event is only the first assessment to take place following completion of construction in some zones and is therefore very preliminary in nature. Works implemented to date for the revegetation offset only represent 28% of the overall project. Where revegetation works have been conducted, significant improvements across most quantifiable metrics have been observed, as well as qualitatively across the site. Significant revegetation works will continue to be implemented in subsequent years, with the aim of completing all initial revegetation works by the end of 2023.

The overall results from this assessment indicate the site is progressing positively towards meeting the ten-year completion criteria and already indicates a significant improvement over baseline conditions. The results are variable across respective revegetation zones as it is only relatively early in the project timeline. Civil construction works were ongoing through the first half of 2021, and revegetation works had only recently been implemented in some areas at the time of the assessment., which has resulted in the variable results across the project site.

Weed cover, Quindalup Dune species richness, Priority Ecological Community species richness and vegetation condition criteria are meeting the targets. Works will continue to ensure that the exceedance of these targets are maintained for the entire project period. Native vegetation cover remains comparatively low but in line with expectations for this early stage of development. This criterion takes significant time to achieved as plants take years to mature. Growth rates and more accurate conclusions on progress for this metric will be made in subsequent assessments.

The criterion for *Conospermum caeruleum var. Busselton* was not assessed at this time. This species is currently in production at nurseries and was not ready for planting in 2021. This will be assessed in future events once the plants have been installed.

Weed levels presently meet the targets in all rehabilitated areas. Much reduced populations of declared weeds were recorded during this assessment, with arum lily now confined to just one zone. Mapping of individuals across the site will be undertaken in spring 2022 and re-assessed as required until the end of the project period.

5 REFERENCES

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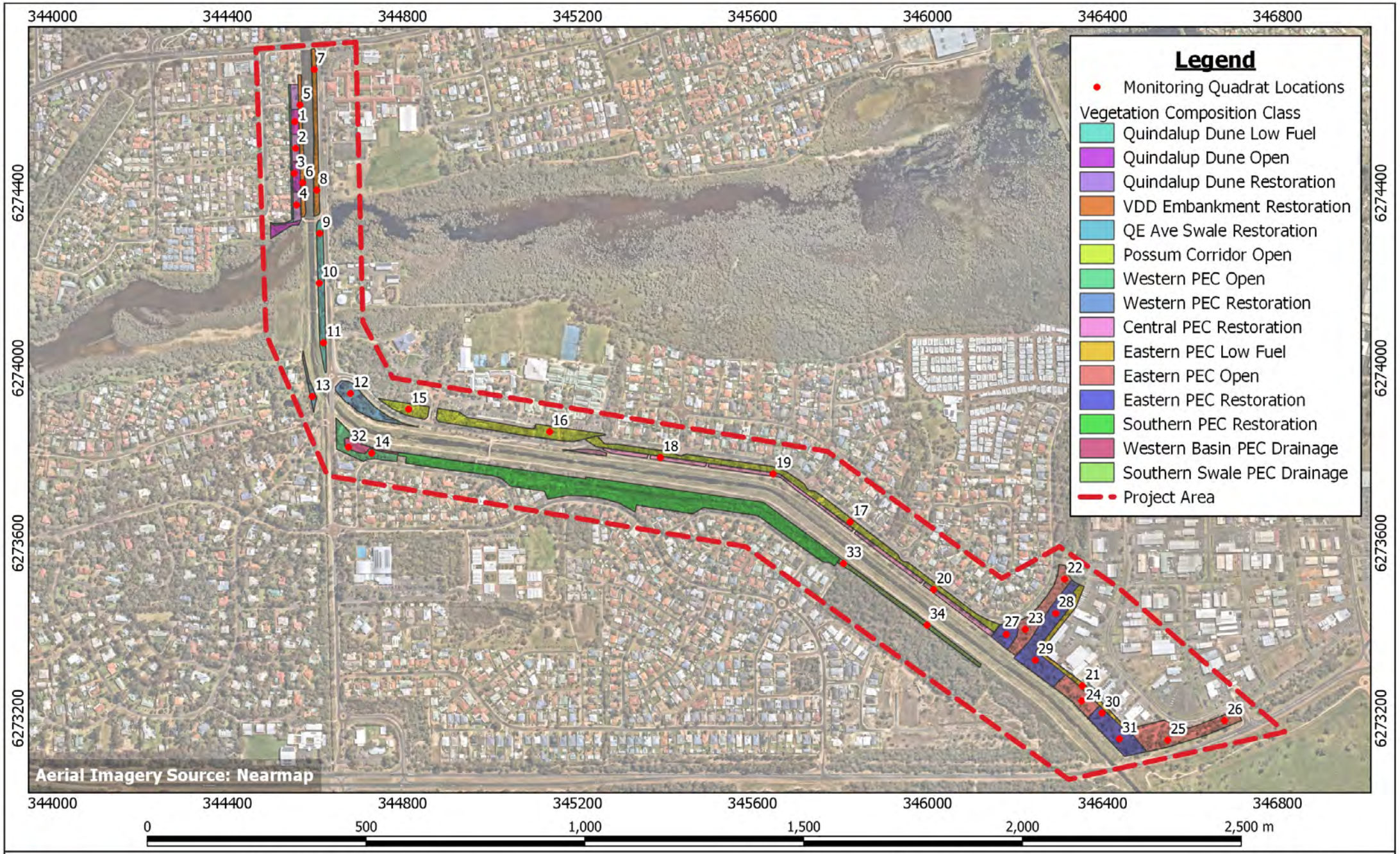
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Tranen 2020b. Vasse Diversion Drain Upgrade Baseline Monitoring Report, P875C-04-Rev0. September 2020.

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Western Australia Environmental Protection Authority 2016. Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment. December 2016.

Appendix 1 Map of Monitoring Locations



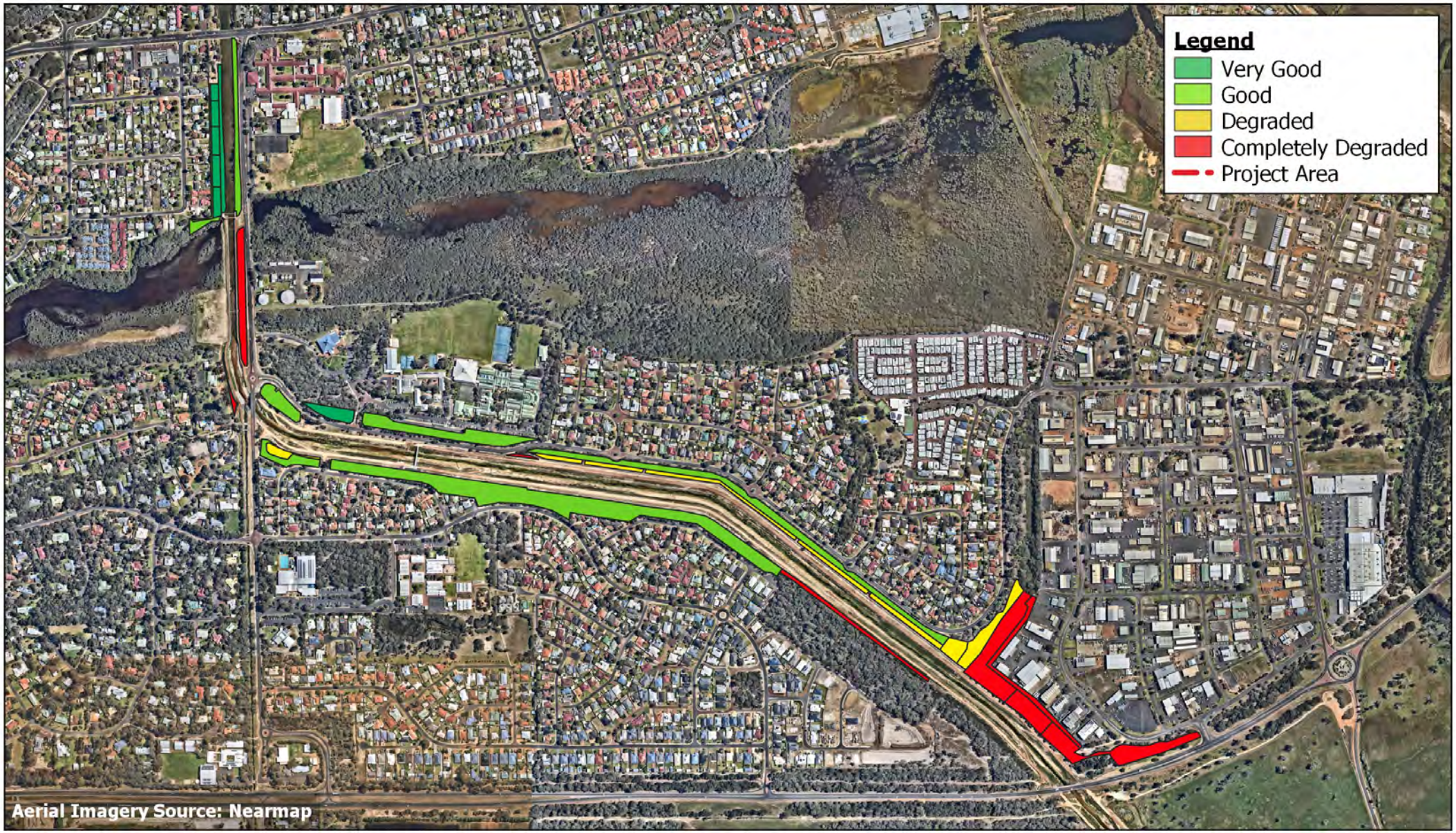
tranen
revegetation southwest

Project: VDD Upgrade Revegetation
Project Number: P875C
Client: Water Corporation

Drawing: Monitoring Quadrat Locations
Drawing Number: P875C-02
Revision: 0

Date: 04/01/21
Drawn By: AJ

Appendix 2 Vegetation Condition Map



0 500 1,000 1,500 2,000 2,500 m

tranen
revegetation southwest

Project: VDD Upgrade Revegetation
Project Number: P875C
Client: Water Corporation

Drawing: Bushland Condition
Drawing Number: P875C-06
Revision: 0

Date: 08/02/22
Drawn By: AJ

N

Appendix 3 Monitoring Quadrat Data Summary

Assessed Completion Criteria								
Quadrat and Vegetation Composition		Native Cover (%)	Weed Cover (%)	Bare Ground Cover (%)	Native Species Richness (No. of species) - QD	Native Species Richness (No. of species) - GCWS	Native Species Richness (No. of species) - PEC	Vegetation Condition
Completion Criteria		**70**	**15**	**16.3**	**12 (QD)**	**13 (GCWS)**	**34 (PEC)**	**>50% Good Condition or Above**
Q1	QD Open	5	0	0	6			
Q2	QD Rest	7	0	0	8			
Q3	QD Open	5	0	0	5			
Q4	QD Rest	3	0	0	8			
Q5	VDD ER	10	1	30	10			
Q6	VDD ER	7	0	20	9			
Q7	VDD ER	10	0	0	9			
Q8	VDD ER	15	0	10	11			
Q9	QEA SR	0	0	100		0		
Q10	QEA SR	0	20	80		0		
Q11	QEA SR	0	30	70		0		
Q12	W PEC Rest	10	0	0			17	
Q13	W PEC Rest	0	5	95			0	
Q14	W PEC Open	2	30	0			7	
Q15	PC Open	65	10	0			13	
Q16	PC Open	20	80	0			3	
Q17	PC Open	30	50	0			9	
Q18	C PEC Rest	5	0	20			17	
Q19	C PEC Rest	15	10	60			16	
Q20	C PEC Rest	5	10	50			13	
Q21	E PEC LF	0	5	0			0	
Q22	E PEC Open	0	40	10			0	
Q23	E PEC Open	0	20	20			1	
Q24	E PEC Open	0	20	0			0	
Q25	E PEC Open	0	1	90			0	
Q26	E PEC Open	0	30	50			0	
Q27	E PEC Rest	0	30	30			1	
Q28	E PEC Rest	0	0	0			0	
Q29	E PEC Rest	0	0	0			0	
Q30	E PEC Rest	0	20	0			0	
Q31	E PEC Rest	0	5	0			0	
Q32	WB PEC Drain	2	60	30			2	
Q33	SS PEC Drain	0	30	70			2	
Q34	SS PEC Drain	0	0	0			1	
Avg/Overall		**6.4**	**14.9**	**24.6**	**14**	**0**	**39**	**59%**

Appendix 4 Individual Quadrat Record Sheets

Quadrat Information	
Site / Quadrat Name:	VDD Q1
Quadrat GPS Location:	GDA94 (MGA Z50) 344552E; 6274562S
Current Site Conditions (Vegetation Composition Class):	Old depot site - gravel area (Quindalup Dune Open)

Native Species		Comments:
Ficinia nodosa		
Hardenbergia comptoniana		
Hibbertia cuneiformis		
Lepidosperma gladiatum		
Rhagodia baccata		
Scaevola crassifolia		

Weed Species		Comments:

Cover (%)		Comments:
Native Cover	5	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q2
Quadrat GPS Location:	GDA94 (MGA Z50) 344554E; 6274501S
Current Site Conditions (Vegetation Composition Class):	Old depot site - gravel area (Quindalup Dune Restoration)

Native Species		Comments:
Acacia cochlearis		
Acacia littorea		
Agonis flexuosa		
Ficinia nodosa		
Hibbertia cuneiformis		
Lepidosperma gladiatum		
Rhagodia baccata		
Spyridium globulosum		

Weed Species		Comments:
Avena barbata		
Medicago polymorpha		
Ptilotus sp.		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	7	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q3
Quadrat GPS Location:	GDA94 (MGA Z50) 344551E; 6274444S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Quindalup Dune Open)

Native Species		Comments:
Acacia cochlearis		
Ficinia nodosa		
Hardenbergia comptoniana		
Lepidosperma gladiatum		
Scaevola crassifolia		

Weed Species		Comments:
Conyza sp.		
Lolium rigidum		
Plantago lanceolata		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	5	
Native Canopy cover	40	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q4
Quadrat GPS Location:	GDA94 (MGA Z50) 344556E; 6274372S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Quindalup Dune Restoration)

Native Species		Comments:
Acacia cochlearis		
Acacia littorea		
Agonis flexuosa		
Ficinia nodosa		
Hardenbergia comptoniana		
Lepidosperma gladiatum		
Rhagodia baccata		
Spyridium globulosum		

Weed Species		Comments:
Conyza sp.		
Cynodon dactylon		
Ricinus communis		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	3	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q5
Quadrat GPS Location:	GDA94 (MGA Z50) 344564E; 6274600S
Current Site Conditions (Vegetation Composition Class):	Man-made internal levee embankment (VDD Embankment - Western)

Native Species		Comments:
Acacia cochlearis		
Acacia littorea		
Agonis flexuosa		
Ficinia nodosa		
Hibbertia cuneiformis		
Lepidosperma gladiatum		
Olearia axillaris		
Rhagodia baccata		
Scaevola crassifolia		
Spyridium globulosum		

Weed Species		Comments:
Conyza sp.		
Raphanus raphanistrum		

Cover (%)		Comments:
Native Cover	10	
Native Canopy cover	0	
Weed Cover	1	
Bare Ground	30	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q6
Quadrat GPS Location:	GDA94 (MGA Z50) 344570E; 6274442S
Current Site Conditions (Vegetation Composition Class):	Man-made internal levee embankment (VDD Embankment - Western)

Native Species		Comments:
Acacia cochlearis		
Agonis flexuosa		
Ficinia nodosa		
Hibbertia cuneiformis		
Lepidosperma gladiatum		
Olearia axillaris		
Rhagodia baccata		
Scaevola crassifolia		
Spyridium globulosum		

Weed Species		Comments:
Cakile maritima		
Lolium rigidum		

Cover (%)		Comments:
Native Cover	7	
Native Canopy cover	60	
Weed Cover	0	
Bare Ground	20	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q7
Quadrat GPS Location:	GDA94 (MGA Z50) 344597E; 6274681S
Current Site Conditions (Vegetation Composition Class):	Man-made internal levee embankment (VDD Embankment - Eastern)

Native Species		Comments:
Acacia cochlearis		
Acacia littorea		
Ficinia nodosa		
Hibbertia cuneiformis		
Juncus kraussii		
Lepidosperma gladiatum		
Olearia axillaris		
Rhagodia baccata		
Scaevola crassifolia		

Weed Species		Comments:
Raphanus raphanistrum		
Vicia sativa		

Cover (%)		Comments:
Native Cover	10	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q8
Quadrat GPS Location:	GDA94 (MGA Z50) 344602E; 6274405S
Current Site Conditions (Vegetation Composition Class):	Man-made internal levee embankment (VDD Embankment - Eastern)

Native Species		Comments:
Acacia cochlearis		
Acacia littorea		
Bolboscheonus cauldwellii		
Ficinia nodosa		
Hibbertia cuneiformis		
Juncus kraussii		
Lepidosperma gladiatum		
Melaleuca cuticularis		
Olearia axillaris		
Rhagodia baccata		
Scaevola crassifolia		

Weed Species		Comments:
Foeniculum vulgare		
Medicago polymorpha		
Pelargonium capitatum		
Plantago lanceolata		

Cover (%)		Comments:
Native Cover	15	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	10	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q9
Quadrat GPS Location:	GDA94 (MGA Z50) 344610E; 6274320S
Current Site Conditions (Vegetation Composition Class):	Man-made drainage swale (Queen Elizabeth Ave Swale Restoration)

Native Species		Comments:

Weed Species		Comments:

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	100	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q10
Quadrat GPS Location:	GDA94 (MGA Z50) 344612E; 6274183S
Current Site Conditions (Vegetation Composition Class):	Man-made drainage swale (Queen Elizabeth Ave Swale Restoration)

Native Species		Comments:

Weed Species		Comments:

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	20	
Bare Ground	80	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q11
Quadrat GPS Location:	GDA94 (MGA Z50) 344618E; 6274056S
Current Site Conditions (Vegetation Composition Class):	Man-made drainage swale (Queen Elizabeth Ave Swale Restoration)

Native Species		Comments:

Weed Species		Comments:
Watsonia sp.		
Erharta spp.		
Cynodon dactylon		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	30	
Bare Ground	70	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q12
Quadrat GPS Location:	GDA94 (MGA Z50) 344680E; 6273940S
Current Site Conditions (Vegetation Composition Class):	Depression between roadway - gravel turnaround (Western PEC Restoration)

Native Species		Comments:
Acacia pulchella		
Acacia saligna		
Adenanthos meisneri		
Agonis flexuosa		
Anigozanthos manglesii		
Banksia grandis		
Baumea juncea		
Conostylis aculeata		
Corymbia calophylla		
Dampiera linearis		
Gompholobium tomentosum		
Hakea prostrata		
Hakea varia		
Hardenbergia comptoniana		
Kennedia prostrata		
Scaevola calliptera		
Spiridium globulosum		

Weed Species		Comments:

Cover (%)		Comments:
Native Cover	10	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q13
Quadrat GPS Location:	GDA94 (MGA Z50) 344592E; 6273934S
Current Site Conditions (Vegetation Composition Class):	Between private property and W levee (Western PEC Restoration)

Native Species		Comments:

Weed Species		Comments:
Plantago lanceolata		
Raphanus raphanistrum		
Conyza sp.		
Ptilotus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	40	
Weed Cover	5	
Bare Ground	95	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q14
Quadrat GPS Location:	GDA94 (MGA Z50) 344728E; 6273804S
Current Site Conditions (Vegetation Composition Class):	Degraded bushland (Western PEC Open)

Native Species		Comments:
Adenanthos meisneri		
Banksia grandis		
Conostylis acculeata		
Corymbia calophylla		
Hardenbergia comptoniana		
Hibberia hypericoides		
Pattersonia occidentalis		

Weed Species		Comments:
Cynodon dactylon		

Cover (%)		Comments:
Native Cover	2	
Native Canopy cover	75	
Weed Cover	30	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q15
Quadrat GPS Location:	GDA94 (MGA Z50) 344813E; 6273905S
Current Site Conditions (Vegetation Composition Class):	Degraded bushland - bewteen informal b ke paths (Possum Corridor Open)

Native Species		Comments:
Acacia pulchella		
Agonis flexuosa		
Austrostipa sp.		
Caladenia attingens		
Conospermum caeruleum var. Busselton		
Conostylis aculeata		
Hardenbergia comptoniana		
Jacksonia furcellata		
Lepidosperma longitudinale		
Lomandra sp.		
Phyllanthus calycinus		
Spyridium globulosum		
Thysanotus sp.		

Weed Species		Comments:
Briza maxima		
Cynodon dactylon		
Erharta longifolia		
Euphorbia terracina		
Sonchus sp.		
Zantedeschia aethiopica		

Cover (%)		Comments:
Native Cover	65	
Native Canopy cover	60	
Weed Cover	10	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q16
Quadrat GPS Location:	GDA94 (MGA Z50) 345135E; 6273853S
Current Site Conditions (Vegetation Composition Class):	Degraded bushland - previous infill revegetation area (Possum Corridor Open)

Native Species		Comments:
Conostylis candicans		
Lepidosperma gladiatum		
Spyridium globulosum		

Weed Species		Comments:
Avena barabata		
Briza maxima		
Conyza sp.		
Erharta longifolia		
Euphorbia pepulus		
Solanum nigrum		
Sonchus sp.		
Taraxacum khatoonae		

Cover (%)		Comments:
Native Cover	20	
Native Canopy cover	50	
Weed Cover	80	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q17
Quadrat GPS Location:	GDA94 (MGA Z50) 345822E; 6273647S
Current Site Conditions (Vegetation Composition Class):	Degraded bushland - adjacent strip adjacent to College Ave (Possum Corridor Open)

Native Species		Comments:
Agonis flexuosa		
Austrostipa sp.		
Corymbia calophylla		
Gompholobium tomentosum		
Hardenbergia comptoniana		
Hibbertia cuniformis		
Lomandra sp. 1		
Lomandra sp. 2		
Spyridium globulosum		

Weed Species		Comments:
Avena barabata		
Briza maxima		
Conyza sp.		
Erharta longifolia		
Euphorbia pepulus		

Cover (%)		Comments:
Native Cover	30	
Native Canopy cover	70	
Weed Cover	50	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q18
Quadrat GPS Location:	GDA94 (MGA Z50) 345388E; 6273794S
Current Site Conditions (Vegetation Composition Class):	Drainage swale adjacent to DUP - N bank (Central PEC Restoration)

Native Species		Comments:
Acacia pulchella		
Acacia saligna		
Adenanthos meisneri		
Agonis flexuosa		
Anigozanthos manglesii		
Banksia grandis		
Baumea juncea		
Conostylis aculeata		
Corymbia calophylla		
Dampiera linearis		
Gompholobium tomentosum		
Hakea prostrata		
Hakea varia		
Hardenbergia comptoniana		
Kennedia prostrata		
Scaevola calliptera		
Spiridium globulosum		

Weed Species		Comments:
Avena barabata		
Conyza sp.		
Erharta longifolia		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	5	
Native Canopy cover	5	
Weed Cover	0	
Bare Ground	20	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q19
Quadrat GPS Location:	GDA94 (MGA Z50) 345646E; 6273757S
Current Site Conditions (Vegetation Composition Class):	Drainage swale adjacent to DUP - N bank (Central PEC Restoration)

Native Species		Comments:
Adenanthos meisneri		
Agonis flexuosa		
Anigozanthos manglesii		
Banksia grandis		
Banksia littoralis		
Baumea juncea		
Conostylis aculeata		
Corymbia calophylla		
Gahnia trifida		
Gompholobium tomentosum		
Hakea prostrata		
Hakea varia		
Kennedia prostrata		
Kunzea glabrescens		
Scaevola calliptera		
Xanthorrhoea preissii		

Weed Species		Comments:
Avena barbata		
Briza minor		
Conyza sp.		
Juncus microcephalus		

Cover (%)		Comments:
Native Cover	15	
Native Canopy cover	10	
Weed Cover	10	
Bare Ground	60	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q20
Quadrat GPS Location:	GDA94 (MGA Z50) 346013E; 6273493S
Current Site Conditions (Vegetation Composition Class):	Drainage swale adjacent to DUP - N bank (Central PEC Restoration)

Native Species		Comments:
Acacia saligna		
Adenanthos meisneri		
Agonis flexuosa		
Banksia grandis		
Banksia littoralis		
Baumea juncea		
Centella asiatica		
Conostylis aculeata		
Daviesia physodes		
Hakea prostrata		
Hakea varia		
Kennedia prostrata		
Patersonia occidentalis		

Weed Species		Comments:
Plantago lanceolata		

Cover (%)		Comments:
Native Cover	5	
Native Canopy cover	10	
Weed Cover	10	
Bare Ground	50	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q21
Quadrat GPS Location:	GDA94 (MGA Z50) 346352E; 6273273S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Low Fuel)

Native Species		Comments:

Weed Species		Comments:
Cynodon dactylon		
Lolium rigidum		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	5	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q22
Quadrat GPS Location:	GDA94 (MGA Z50) 346312E; 6273517S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Open)

Native Species		Comments:

Weed Species		Comments:
Cynodon dactylon		
Hypochaeris radiata		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	50	
Weed Cover	40	
Bare Ground	10	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q23
Quadrat GPS Location:	GDA94 (MGA Z50) 346222E; 6273402S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Open)

Native Species		Comments:
Agonis flexuosa		

Weed Species		Comments:
Anagallis arvensis		
Avena barbata		
Hypochaeris radiata		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	70	
Weed Cover	20	
Bare Ground	20	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q24
Quadrat GPS Location:	GDA94 (MGA Z50) 346351E; 6273239S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Open)

Native Species		Comments:

Weed Species		Comments:
Cynodon dactylon		
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	20	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q25
Quadrat GPS Location:	GDA94 (MGA Z50) 346548E; 6273150S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Open)

Native Species		Comments:

Weed Species		Comments:
Cynodon dactylon		
Bromus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	20	
Weed Cover	1	
Bare Ground	90	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q26
Quadrat GPS Location:	GDA94 (MGA Z50) 346678E; 6273193S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Open)

Native Species		Comments:

Weed Species		Comments:
Cynodon dactylon		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	20	
Weed Cover	30	
Bare Ground	50	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q27
Quadrat GPS Location:	GDA94 (MGA Z50) 346179E; 6273390S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Restoration)

Native Species		Comments:
Agonis flexuosa		

Weed Species		Comments:
Avena barbata		
Cynodon dactylon		
Erharta longifolia		
Euphorbia peplis		
Sonchus sp.		
Zantedeschia aethiopica (PRIORITY)		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	35	
Weed Cover	30	
Bare Ground	30	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q28
Quadrat GPS Location:	GDA94 (MGA Z50) 346292E; 6273439S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Restoration)

Native Species		Comments:

Weed Species		Comments:
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	30	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q29
Quadrat GPS Location:	GDA94 (MGA Z50) 346245E; 6273332S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Restoration)

Native Species		Comments:

Weed Species		Comments:

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	0	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q30
Quadrat GPS Location:	GDA94 (MGA Z50) 346398E; 6273211S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Restoration)

Native Species		Comments:

Weed Species		Comments:
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	80	
Weed Cover	20	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q31
Quadrat GPS Location:	GDA94 (MGA Z50) 346438E; 6273152S
Current Site Conditions (Vegetation Composition Class):	Parkland cleared (Eastern PEC Restoration)

Native Species		Comments:

Weed Species		Comments:
Sonchus sp.		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	10	
Weed Cover	5	
Bare Ground	0	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q32
Quadrat GPS Location:	GDA94 (MGA Z50) 346675E; 6273818S
Current Site Conditions (Vegetation Composition Class):	Stormwater compensating basin (Western Basin PEC Drainage)

Native Species		Comments:
Baumea juncea		
Centella asiatica		

Weed Species		Comments:
Juncus microcephalus		
Symphyotrichum squamatum		

Cover (%)		Comments:
Native Cover	2	
Native Canopy cover	20	
Weed Cover	60	
Bare Ground	30	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q33
Quadrat GPS Location:	GDA94 (MGA Z50) 345807E; 6273552S
Current Site Conditions (Vegetation Composition Class):	Vegetated drainage swale (Southern Swale PEC Drainage)

Native Species		Comments:
Acacia saligna		
Bolboschoenus cauldwellii		

Weed Species		Comments:
Cynodon dactylon		
Cyperus rotundus		
Eragrostis curvula		
Gladiolus sp.		
Juncus microcephalus		
Lotus sp.		
Plantago lanceolata		
Romulea rosea		
Taraxacum khatoonae		

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	30	
Bare Ground	70	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Quadrat Information	
Site / Quadrat Name:	VDD Q34
Quadrat GPS Location:	GDA94 (MGA Z50) 345998E; 6273411S
Current Site Conditions (Vegetation Composition Class):	Vegetated drainage swale (Southern Swale PEC Drainage)

Native Species		Comments:
Acacia saligna		

Weed Species		Comments:
Arctotheca calendula		
Cynodon dactylon		
Cyperus rotundus		
Gladiolus sp.		
Lolium rigidum		
Raphanus raphanistrum		
Taraxacum khatoonae		

Native Density		Comments:
Stem density (stems / m2)	0.0	

Cover (%)		Comments:
Native Cover	0	
Native Canopy cover	0	
Weed Cover	30	
Bare Ground	70	

Other		Comments:
Prescence of Fauna	N	
Presence of Disease / Pests	N	

Additional Comments:

Appendix 5 Monitoring Quadrat Images



Q1 – spring 2020



Q1 – spring 2021



Q2 – spring 2020



Q2 – spring 2021



Q3 – spring 2020



Q3 – spring 2021 (Revised Location)



Q4 – spring 2020



Q4 – spring 2021 (Revised Location)



Q5 – spring 2020



Q5 – spring 2021



Q6 – spring 2020



Q6 – spring 2021



Q7 – spring 2020



Q7 – spring 2021



Q8 – spring 2020



Q8 – spring 2021



Q9 – spring 2020



Q9 – spring 2021



Q10 – spring 2020



Q10 – spring 2021



Q11 – spring 2020



Q11 – spring 2021



Q12 – spring 2020



Q12 – spring 2021



Q13 – spring 2020



Q13 – spring 2021



Q14 – spring 2020



Q14 – spring 2021



Q15 – spring 2020



Q15 – spring 2021



Q16 – spring 2020



Q16 – spring 2021



Q17 – spring 2020



Q17 – spring 2021



Q18 – spring 2020



Q18 – spring 2021



Q19 – spring 2020



Q19 – spring 2021



Q20 – spring 2020



Q20 – spring 2021



Q21 – spring 2020



Q21 – spring 2021



Q22 – spring 2020



Q22 – spring 2021



Q23 – spring 2020



Q23 – spring 2021



Q24 – spring 2020



Q24 – spring 2021



Q25 – spring 2020



Q25 – spring 2021



Q26 – spring 2020



Q26 – spring 2021



Q27 – spring 2020



Q27 – spring 2021



Q28 – spring 2020



Q28 – spring 2021



Q29 – spring 2020



Q29 – spring 2021



Q30 – spring 2020



Q30 – spring 2021



Q31 – spring 2020



Q31 – spring 2021 (Revised Location)



Q32 – spring 2020



Q32 – spring 2021



Q33 – spring 2020



Q33 – spring 2021



Q34 – spring 2020



Q34 – spring 2021

Appendix 6 General Site Images



VDD Embankment Previous Condition – September 2020



VDD Embankment Current Condition – December 2021



Quindalup Dune Previous Condition – September 2020



Quindalup Dune Current Condition – December 2021



Western PEC Previous Condition – September 2020



Western PEC Current Condition – December 2021

Appendix G
Regulator liaison



Shenae Blakiston

From: [redacted]watercorporation.com.au>
Sent: Friday, 5 February 2021 2:15 PM
To: [redacted]
Cc: [redacted]
Subject: CPS8191/1, 2017/7932, CD00116 - Vasse Diversion Drain Upgrade - Western Ringtail Possum Report
Attachments: CD00116_-_FINAL_Report_WRt_Possums_Vasse_Diversion_Drain_Upgrade__01.21-v2.pdf

Follow Up Flag: Follow up
Flag Status: Completed

CAUTION: This email originated from outside of RPS.

Good Afternoon

Water Corporation is please to provide a copy of the Fauna Relocation and first monitoring event report for the Vasse Diversion Drain Upgrade Project. This report is provided in compliance with the following conditions:

DWER CPS 8191/1	Conditions 13, 14 and 15
EPBC 2017/7932	Conditions 2 and 3

A copy of this report will be uploaded to the project website after specific locations and sensitive information has been redacted from the document.

We are proud to say that there have been no possum mortalities to date, and some of the artificial dreys are already in use. The Corporation is also pleased to advise that the final clearing footprint is *1.9 ha*, this is 0.26ha below the approved clearing area. Our civil contactor and Bamford Consulting Ecologists worked closely to identify and retain vegetation where possible.

The next maintenance and monitoring event for the Bridges and Fauna Shelters is scheduled for early March 2020. This will involve installation of some replacement shelters and trialling a couple more designs. We are excited to be contributing data to the increasing pool of knowledge about managing impacts and conservation of the Western Ringtail Possum.

Water Corporation is also partnering with GeoCatch for *World Wildlife Day*, and will be holding a competition with the local community to obtain photographs of possums utilising the bridges that have been installed.

If you have any further questions about the report or the results of this report. Please feel free to contact me.

Kind regards

[redacted]

watercorporation.com.au

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