

Memorandum

30 August 2019

To: Water Corporation

Copy to: NA

From: (Contact details redacted)

Murdoch University

Subject: Vasse Diversion Drain Mussel Survey

Job Number: Murdoch IRMA ID 19058

1. Scope

Water Corporation proposes to reconstruct the levee banks of the Vasse Diversion Drain (VDD) ensure the VDD passes the 1% Annual Exceedance Probability (AEP, i.e. 1 in 100 flood event). This would occur over an approximately six kilometre length of the VDD extending from the Golf Course near Chapman Hill Road through to the vicinity of High School in Queen Elizabeth Avenue. The works will involve widening selected sections of the VDD to achieve a consistent freeboard of 0.5m along the levee banks.

This project has been referred CPS8191/1 and deemed a controlled action and is being assessed by Department of Water and Environmental Regulation (DWER) under the Bilateral Agreement in accordance with section 45 of the Environmental Protection and Biodiversity Conservation Act 1999. Carter's Freshwater Mussel *Westralunio carteri* was known to be present within the footprint of the proposed works. *Westralunio carteri* is the only freshwater mussel species in the south-west of Western Australia and has lost approximately 50% of its former habitat through salinisation and habitat degradation. The species is classified as Vulnerable under the EPBC Act and the IUCN Red List of threatened species, and as Schedule 3 Vulnerable under the Western Australian Wildlife Conservation Act 1950.

Water Corporation engaged the services of specialist freshwater ecologists from the Harry Butler Institute (Murdoch University) to undertake a desktop review and field survey for *W. carteri* around the Vasse Diversion Drain reconstruction footprint. The outcomes used to inform the assessment and approvals process relating to the proposed works; specifically, the development of an Environmental Management Plan for *W. carteri*.

This Memorandum outlines the initial findings of both of the desktop and field surveys. It provides an assessment of the potential impacts of the works on *W. carteri* in the area, and provides recommendations for minimising potential impacts to the species.

2. Desktop survey

Existing data on the distribution of *W. carteri* in Vasse Diversion Drain and the adjacent lower Vasse River was sourced using the Murdoch University *W. carteri* database, the DBCA threatened and priority ecological communities database, Australian Faunal Directory, and DPIRD Western Australian Inland Fish Database and grey and published literature searches.

The desktop review revealed that species locations for *W. carteri* within the Vasse Diversion Drain were available from five studies between 2006-2019 (Figure 1). The survey by Slack-Smith (2006) recorded the occurrence of the Carter's Freshwater Mussel within the footprint area although noted detected high levels of mortality. Lymbery et.al (2008) also revealed the presence of the mussel within the VDD footprint but only alive upstream of Chapman Hill Rd. Le Ma (2018) also detected the species near the outlet to the lower Vasse River. The species is also mentioned as being present in the lower Vasse River in Department of Water (2010) but no site information was included. Previous surveys by Murdoch University between 2017-2019 also revealed the species is present from the lower Vasse River downstream from the connection to the Vasse Diversion Drain (Beatty et al., 2017, 2018, 2019).

The recent study by GHD (2019) recorded the species alive upstream of Chapman Hill Rd (i.e. approximately 700 metres of river). The study also found past evidence of the species existing downstream throughout the majority of the proposed works footprint, however, these were all dead animals (i.e. shells) (Figure 2).

The results of the desktop survey therefore strongly suggested that the species currently restricted in its extant distribution upstream of the Chapman Hill River in the lower Vasse Diversion Drain. Given that GHD (2019) only surveyed the species at only two sites in that region of the proposed reconstruction footprint, the current field survey focussed on that section of the VDD in order to provide a more comprehensive understanding of the abundance and distribution.

3. Field survey

The field survey was conducted at 15 sites on the VDD upstream of Chapman Hill Rd on July 30th 2019 following the methods outlined in Klunzinger et al. (2012). As the species favours bank habitats (Ma, 2018) and due to excessive water depths at the time of sampling, both banks were surveyed at the majority of sites, but not the off-bank habitats. The survey would therefore likely detect the species if present at each and provide a reasonable estimate of the distribution and relative abundance of the species within the upstream extent of the proposed reconstruction footprint.

The survey revealed the following distribution and densities of *W. carteri* (Figures 2, 3).

- 1) The species was present throughout the proposed VDD reconstruction footprint upstream of Chapman Hill Rd.
- 2) A total of 192 alive and seven dead mussels were recorded at a mean density of 7.4 mussels.m⁻² (± 1.76 S.E.).
- 3) There was no difference in the abundance of *W. carteri* between the right (mean of 7.5.m⁻²) and left (mean of 6.7.m⁻²) banks.

- 4) The species was in relatively low densities (<0.2 mussels.m⁻²) in the first ~200m upstream of Chapman Hill Rd, and the section immediately (~75m) upstream and downstream of the outlet to the lower Vasse River. The other sections of the VDD had relatively consistent density of between ~10-15 mussels.m⁻².
- 5) Extrapolating the mean density of *W. carteri* to the entire ~680 m of VDD reconstruction footprint provides an estimated total abundance of ~10,043 (± 2429) mussels assuming distribution is limited to 1m from each bank.

4. Summary of impacts and mitigation recommendations

The proposed drain reconstruction works in the VDD will have a very high probability of causing mortality to *W. carteri* upstream of the Chapman Hill Rd. This is due to the high likelihood of physical damage or removal of mussels during the reconstruction of the levee banks.

- 1) Prior to the proposed works, it is recommended that individual *W. carteri* be relocated from the ~700 stretch of the VDD upstream of the Chapman Hill Rd.
- 2) Removal should be achieved by an intensive hand searching particularly targeting near-bank habitats and then prompt transportation in biosecure, aerated, insulated containers to a secure relocation site.
- 3) Subject to additional site assessment and approvals, it is recommended that the Taylor's Lake relocation site within the Iluka Capel Wetlands be used to house the relocated mussels within purpose built cages. This site was identified as a suitable site for housing the species within the *Busselton Eastern Link Project: Carter's Freshwater Mussel Westralunio carteri Environmental Management Plan* (Beatty et al., 2019).
- 4) It is also recommended that that the Environmental Management Plan for *W. carteri* that will need to be prepared for the current VDD reconstruction project directly aligns with the above EMP. This includes following the management objectives, targets, monitoring protocols and triggers outlined in Beatty et al. (2019).
- 5) Following the completion of the proposed works, a field assessment should occur to confirm that the habitat conditions within the VDD upstream of Chapman Hill Rd are suitable for the species to be restocked. The assessment of habitat suitability should meet the relocation trigger values outlined in Beatty et al. (2019).
- 6) It is recommended that all relocated *W. carteri* be restocked within the VDD upstream of Chapman Hill Rd at densities not exceeding those recently recorded in the VDD by GHD (2019) and the current survey.
- 7) The proposed relocation activity will require the granting of a Regulation 17 Application for a licence to take (i.e. capture, collect, disturb, study) fauna for scientific purposes. It will also require approved exemption from DPIRD (Application To Collect Fish Under Exemption From Fish Resources Management Act 1994 And Regulations).

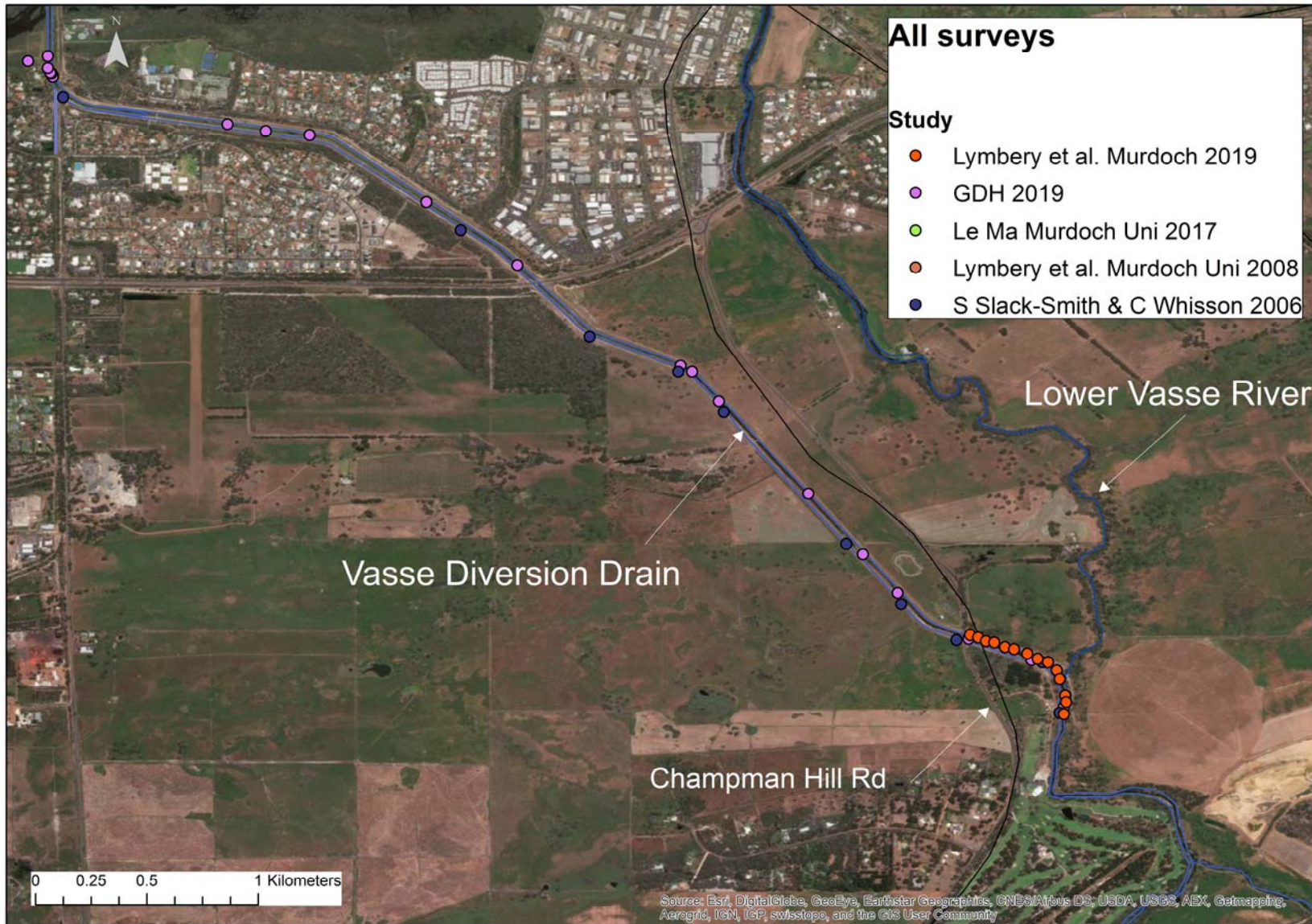


Figure 1: Location of historical survey sites for *W. carteri* within the proposed VDD reconstruction zone.

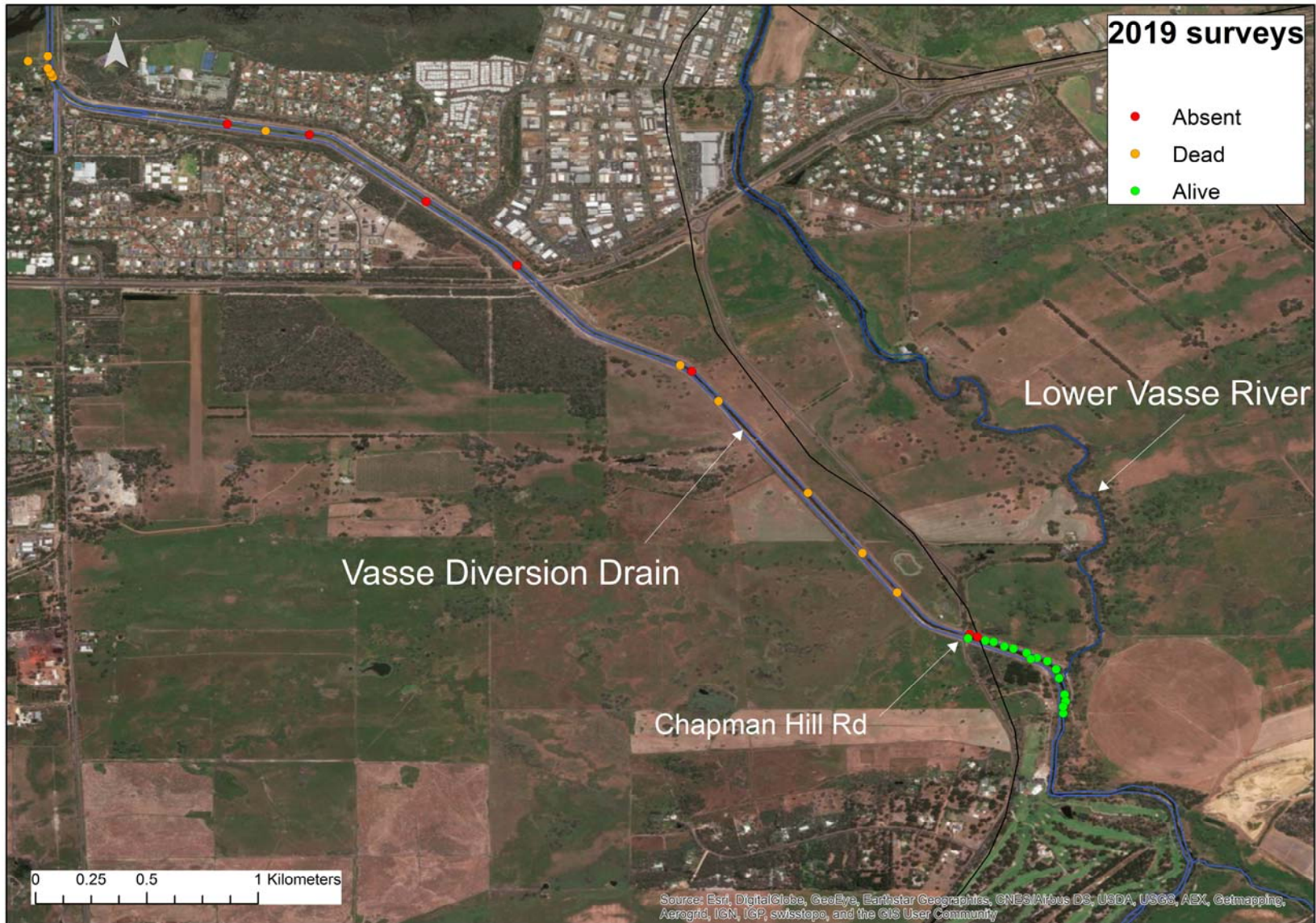


Figure 2: Current distribution of *W. carteri* based on the surveys of GHD (2019) and the current field survey within the proposed VDD reconstruction zone.

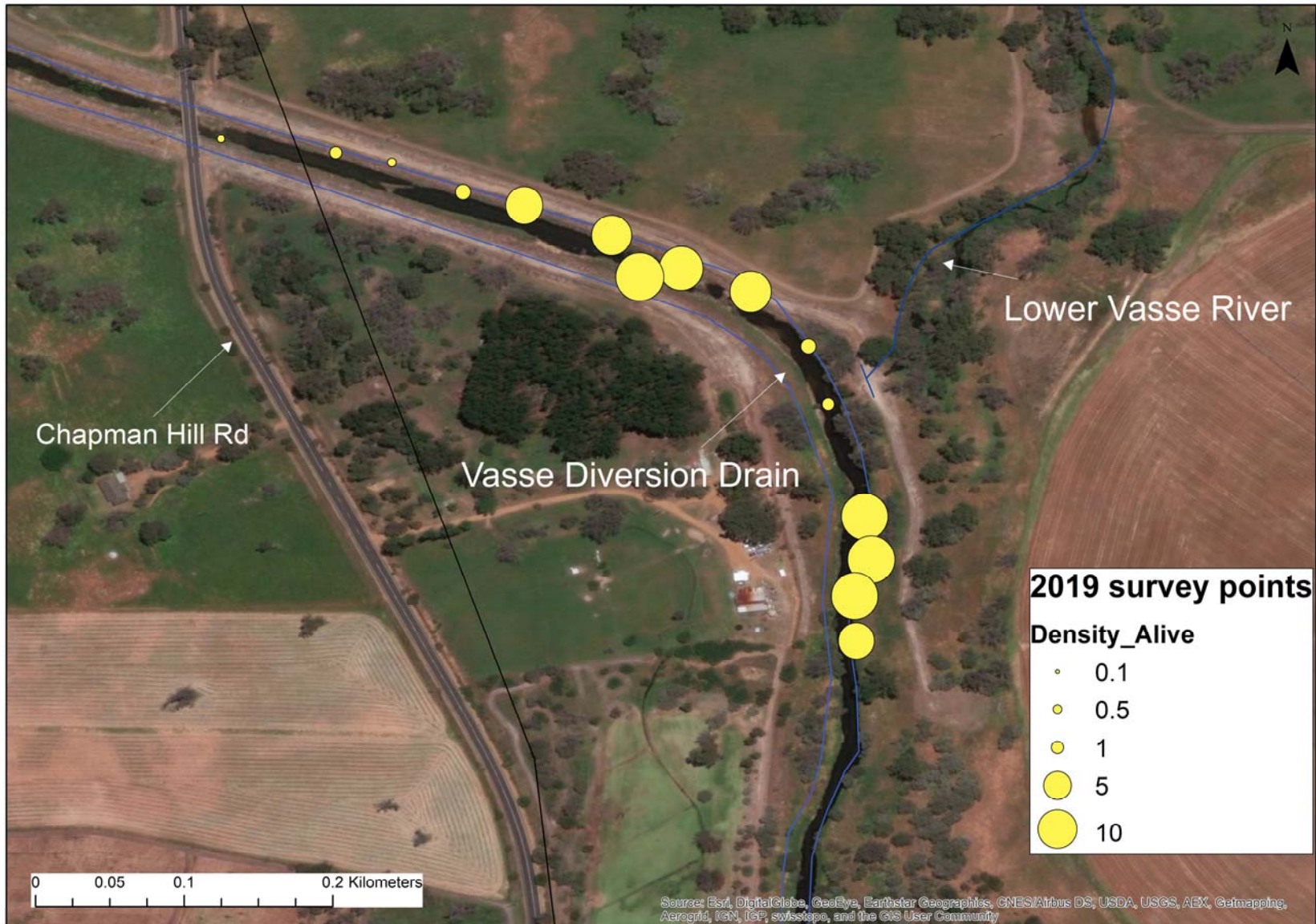


Figure 3: Mean density of *W. carteri* within the upstream section of the proposed VDD reconstruction footprint.

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