GOVERNMENT OF
WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS

Area Permit Number: CPS 9484/1
File Number: DWERVT8956
Duration of Permit: 07 April 2022 to 07 April 2024

PERMIT HOLDER

City of Busselton

LAND ON WHICH CLEARING IS TO BE DONE

Carey Street Road reserve (PIN 11438916), Reinscourt
Ford Road reserve (PIN 11438922), Reinscourt
Lot 79 on Deposited Plan 222226 (Crown Reserve 6334), Reinscourt
Water Feature (PIN 11725416), Reinscourt

AUTHORISED ACTIVITY

The Permit Holder shall not clear more than 0.13 hectares of native vegetation within the area hatched yellow in Figure 1 of Schedule 1.

CONDITIONS

1. Avoid, minimise, and reduce impacts and extent of clearing

In determining the *native vegetation* authorised to be cleared under this permit, the permit holder must apply the following principles, set out in descending 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.

2. Weed and dieback management

When undertaking any clearing authorised under this permit, the permit holder must take the following measures to minimise the risk of 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;

(c) restrict the movement of machines and other vehicles to the limits of the areas to be cleared; and

(d) undertake chemical spraying when water levels are at the lowest point.

3. Directional clearing

The permit holder must conduct clearing activities in a slow, progressive manner towards *native vegetation* to allow fauna to move into adjacent *native vegetation* ahead of the clearing activity.

4. Fauna Management - nesting water birds

(a) The permit holder must inspect the area authorised to be cleared under this permit prior to works commencing and for the duration of clearing for any native fauna that may be present.

(b) Where fauna have been identified under condition 4(a), works must cease until the fauna have escaped into adjacent habitat.

5. Records that must be kept

The permit holder must maintain records relating to the listed relevant matters in accordance with the specifications detailed in Table 1.

Table 1: Records that must be kept

No.	Relevant matter	Specifications
1.	In relation to the authorised clearing activities generally	(a) the species composition, structure, and density of the cleared area; (b) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings; (c) the date that the area was cleared; (d) the size of the area cleared (in hectares); (e) the method of clearing utilised; (f) the direction that clearing was undertaken; (g) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 1; (h) actions taken to minimise the risk of the introduction and spread of *weeds* and *dieback* in accordance with condition 2; and (i) actions taken to manage fauna in accordance with condition 4.

6. Reporting

The permit holder must provide to the *CEO* the records required under condition 5 of this permit when requested by the *CEO*.

DEFINITIONS

In this permit, the terms in Table have the meanings defined.

Table 2: Definitions

Term	Definition
CEO	Chief Executive Officer of the department responsible for the administration of the clearing provisions under the *Environmental Protection Act 1986*.
clearing	has the meaning given under section 3(1) of the EP Act.
condition	a condition to which this clearing permit is subject under section 51H of the EP Act.

Term	Definition
dieback	means the effect of *Phytophthora* species on native vegetation.
department	means the department established under section 35 of the *Public Sector Management Act 1994* (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	*Environmental Protection Act 1986* (WA)
fill	means material used to increase the ground level, or to fill a depression.
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.
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
weeds	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.

END OF CONDITIONS

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

Officer delegated under Section 20
of the Environmental Protection Act 1986

14 March 2022

SCHEDULE 1

The boundary of the area authorised to be cleared is shown in the map below (Figure 1).

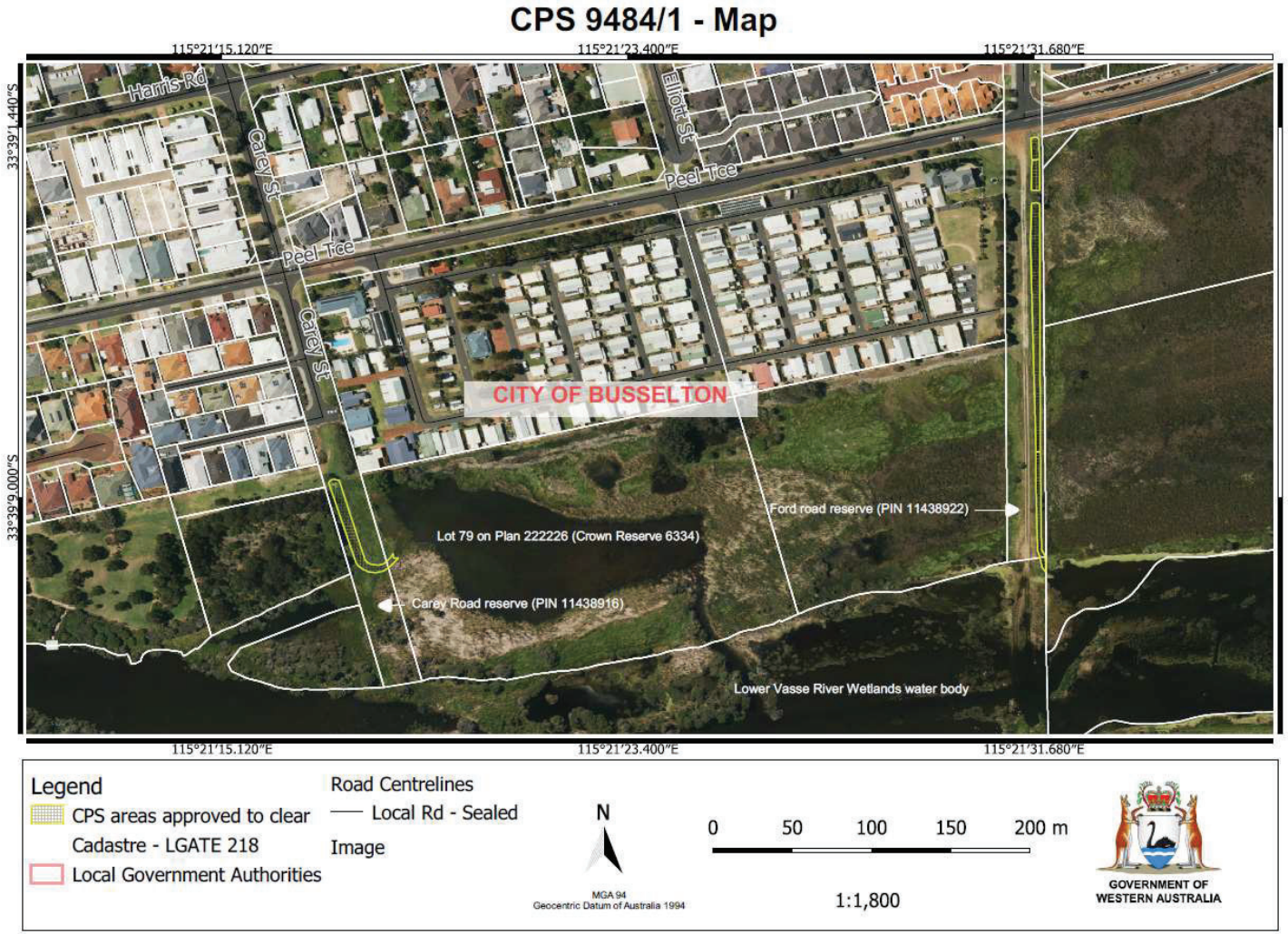

Figure 1: Map of the boundary of the area within which clearing may occur

Government of Western Australia
Department of Water and Environmental Regulation

Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9484/1
Permit type:	Area permit
Applicant name:	City of Busselton
Application received:	09 November 2021
Application area:	0.13 hectares (ha)
Purpose of clearing:	*Typha orientalis* management
Method of clearing:	Mechanical and/or selective application of herbicide in summer
Property:	Carey Street Road reserve (PIN 11438916) Ford Road reserve (PIN 11438922) Lot 79 on Deposited Plan 222226 (Crown Reserve 6334) Water Feature (PIN 11725413)
Location (LGA area/s):	City of Busselton
Localities (suburb/s):	Reinscourt

1.2. Description of clearing activities

The proposed clearing is to selectively clear robust herbaceous native sedge, *Typha orientalis,* occurring and impacting on man-made drainage corridors capacity to discharge onto the Vasse wetland.

The purpose of the proposed clearing is to prevent localised flooding near residential estate and to maintain the engineering design and capacity of the open drains.

The vegetation proposed to be cleared is distributed across two separate areas within areas subject to inundation (see Figure 1, Section 1.5).

The drain areas proposed to be cleared are approximately 5 meters wide. One of the drains is approximately 270 meters long and the other drain is approximately 60 meters long.

1.3. Decision on application

Decision:	Granted
Decision date:	14 March 2022
Decision area:	0.13 hectares of native vegetation, as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 14 days and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix A) and relevant datasets (see Appendix E), the clearing principles set out in Schedule 5 of the EP Act (see Appendix B), relevant planning instruments and any other matters considered relevant to the assessment (see Section 3). The Delegated Officer also took into consideration the purpose of the clearing, to remove *Typha orientalis,* an invasive native species capable of aggressive invasions that can transform ecosystems unless it is actively managed (Western Australian Herbarium 1998).

The assessment identified that the proposed clearing will result in:

- potential removal/disturbance of nesting habitat for Priority 4 *Oxyura australis* (Blue billed duck)
- potential disturbance of fauna species of conservation significance habitat
- potential spread of weed and dieback
- potential pollution by applying herbicides

After consideration of the available information, as well as the applicant's minimisation and mitigation measures (see Sections 3.1), the Delegated Officer decided to grant a clearing permit subject to the following requirements conditioned on the clearing permit, to manage and address the impacts of clearing:

- avoid and minimise measures to reduce the impacts and extent of clearing
- take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback
- preclearing site inspections
- undertake slow, progressive one directional clearing to allow terrestrial fauna to move into adjacent habitat ahead of the clearing activity
- undertake chemical spraying when water levels are at the lowest point

Clearing Permit Decision Report

1.5. Site map

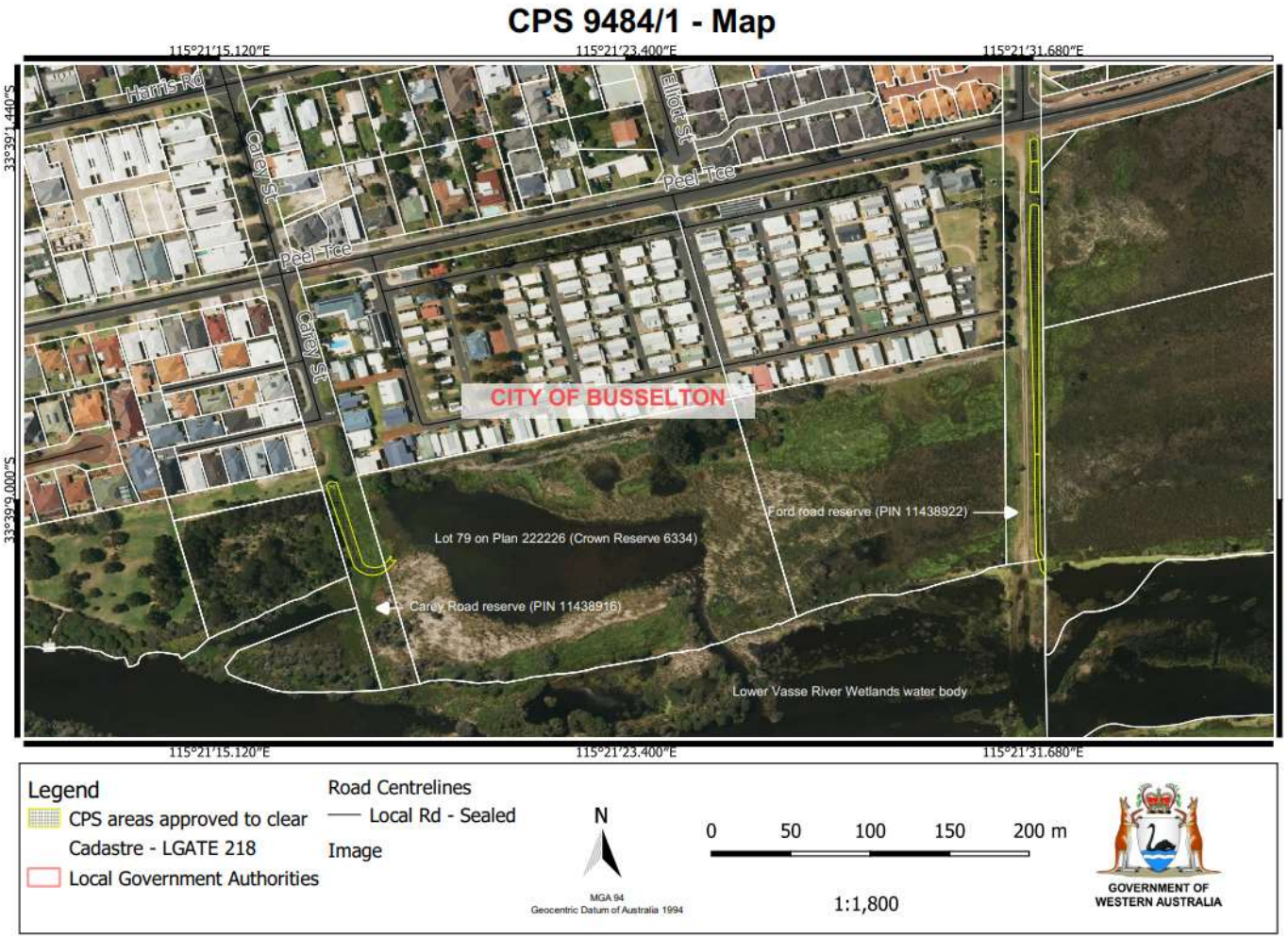

Figure 1 Map of the application area

The areas crosshatched yellow indicate the areas authorised to be cleared under the granted clearing permit.

2 Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the polluter pays principle
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Rights in Water and Irrigation Act 1914* (RIWI Act)
- *Soil and Land Conservation Act 1945* (WA)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

The applicant has proposed the following mitigation measures (City of Busselton, 2021):

- Use an excavator to clean out the drain for the first 200m. The excavator would work from the existing track adjacent to the drain. The material would be removed from the site once the free water had drained. Care will be taken to avoid root disturbance and damage to any of the *Melaleuca viminea* along the drain.
- To use a more sensitive approach for the section of drain beyond 200m within the Coastal Saltmarsh Threatened Ecological Community (TEC), this section could be slashed by hand or sprayed once the site dries out. This should be done by a suitably qualified and experienced weed contractor without impact to the adjacent native species within the wetlands.
- To only clear vegetative material from the batters and channel of the drain and not to extend further than the side of the existing eastern bank of the drain.

The Delegated Officer was satisfied that the applicant has made a reasonable effort to avoid and minimise potential impacts of the proposed clearing on environmental values.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix A) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values.

The assessment against the clearing principles (see Appendix B) identified that the impacts of the proposed clearing may present a risk to fauna, flora, conservation areas, and land and water resources. The consideration of these impacts, and the extent to which they can be managed through conditions applied in line with sections 51H and 51I of the EP Act, is set out below.

3.2.1. Biological values (flora) - Clearing Principles (a)

Assessment

Typha orientalis (Typha) is a type of sedge that is native to Western Australia. This species is capable of aggressive invasions that can transform ecosystems unless it is actively managed (Western Australian Herbarium, 1998). Without management, Typha can develop quickly into a monoculture and cover an entire water body.

The proposed clearing will target only *Typha* and therefore, it is unlikely any conservation significant flora occurring adjacent to stands of *Typha* will be negatively impacted during removal. According to available records, no priority or threatened flora are occurring or likely to occur, within stands of *Typha* within the application area.

The proposed clearing is to reduce the rate of spread and allow natural recruitment of other native plant species in areas where *Typha* has been removed. Areas relatively free of *Typha* will be monitored and controlled to ensure numbers remain low.

A licenced pest controller will be engaged for weed spraying (City of Busselton, 2021).

Conclusion

Based on the above assessment, the proposed clearing is unlikely to result in a significant loss in biodiversity or impact populations of threatened and priority flora. Habitat for conservation significant flora species recorded within the local area is unlikely to be impacted by the proposed clearing.

Conditions

Nil management conditions required for this environmental value.

3.2.2. Biological values (fauna) - Clearing Principles (b)

Assessment

The vegetation within the application area provides suitable habitat for several fauna species of conservation significance including but not limited to *Oxyura australis* (Blue-billed duck) and *Isoodon fusciventer* (Quenda, southwestern brown bandicoot).

The Priority 4 *Oxyura australis* (Blue-billed duck), has 50 records within the local area. Blue-billed duck breeds in secluded, densely vegetated situations with the nest constructed in Typha beds or other vegetation, generally over water. Nests are usually constructed from dead Typha leaves and sometimes thinly lined with down (Birdlife Australia, 2020). Considering the small size of the water bodies and associated Typha stands included in the proposed clearing, it is unlikely these areas are utilised as breeding sites by Blue billed duck. Better quality breeding habitat occurs within the local area.

Noting the area being impacted, the proposed clearing area tends to hold or is adjacent to water. Due to the density of Typha and presence of water, a range of native fauna species may be present at the time of the clearing activity. In addition, *Isoodon fusciventer* (quenda, southwestern brown bandicoot), has been recorded approximately 400 meters from the proposed clearing. However, impacts on this species are likely to be minimal. Undertaking clearing in a slow progressive manner towards adjacent vegetation or towards the outer edge of the waterway will mitigate any potential impacts to fauna. Scheduling works when the waterway is ai tis lowest will also decrease the likelihood of fauna being present at the time of clearing.

It is noted that the trees present within the area will not be cleared, such as *Melaleuca viminea* (Refer to Figures 5 and 11). Terrestrial fauna that may utilise *Melaleuca viminea* for habitat will not likely be impacted.

According to available datasets, a number of shore bird and wetland species (see Appendix A.4) are recorded in the local area that may overfly or wade through the application area. It is unlikely the proposed clearing will impact these species as Typha does not form a critical component of their habitat.

The adjacent vegetation is susceptible to weed invasion and dieback in which the clearing process may exacerbate, thereby reducing habitat quality.

Conclusion

Based on the above assessment, stands of *Typha* may provide breeding habitat and a source of nest building material for the Priority 4 *Oxyura australis (*Blue billed duck). These areas may also provide foraging habitat for several migratory and wetland bird species that are known to occur in the local area. The proposed clearing is minimal compared to the amount of available habitat within the local area, and is not likely to significantly impact conservation significant fauna species.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- Pre-clearing site inspections prior to works commencing and ongoing during works for any fauna that may be present.
- Undertake slow, progressive one directional clearing to allow terrestrial and avian fauna to move into adjacent habitat ahead of the clearing activity.
- Taking steps to minimise the risk of the introduction and spread of weeds and dieback.

3.2.3. Biological values (threatened ecological community) - Clearing Principles (d)

Assessment

The Subtropical and Temperate Coastal Saltmarsh is mapped as occurring within the application area. The Subtropical and Temperate Coastal Saltmarsh is characterised as a Priority 3 priority ecological community (PEC) by the Department of Biodiversity, Conservation and Attractions and listed as a Vulnerable Threatened Ecological Community (TEC) under the EPBC Act. The community consists mainly of salt-tolerant vegetation (halophytes) including grasses, herbs, reeds, sedges and shrubs. Succulent herbs and grasses generally dominate, and vegetation is generally <0.5m tall with the exception of some reeds and sedges, however *Typha* is not a component of this vegetation unit (DBCA, 2019). According to images provided in support of the application (see Appendix D), the Subtropical and Temperate Coastal Saltmarsh TEC is not located within the application. Further inland the vegetation of the reserve changes to *Melaleuca rhaphiophylla* and *Eucalyptus rudis* open woodland. Given that *Typha* is known to colonise and dominate ecosystems, the proposed clearing will be beneficial to the TEC that occurs adjacent to the application area.

It is noted that the area proposed to clear comprises of several species of weed including kikuyu grass (*Cenchrus clandestinus*), and buffalo grass (*Stenotaphrum secundatum*) and surrounding area containing arum lily (*Zantedeschia aethiopica* – *Declared pest*) (refer to Appendix D, Figures 3, 7, 8, 15 and 18).

Weeds and dieback have the potential to out-compete native flora and vegetation and reduce the biodiversity of an area. Potential impacts to biodiversity as a result of the introduction and spread of weeds and dieback may be minimised by the implementation of a weed and dieback management condition.

Conclusion

Based on the above assessment, the proposed clearing will not result in significant impact to the Subtropical and Temperate Coastal Saltmarsh TEC. Given the nature of the clearing, *Typha* removal will be beneficial to the maintenance of species composition and structure of this of the reserve.

Due to the presence of weed species, there is a risk for spreading weeds further and potentially introduce or spread dieback.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit:

- Taking steps to minimise the risk of the introduction and spread of weeds.

3.2.4. Environmental values (land and water resources) - Clearing Principles (f and i)

Assessment

The proposed clearing is for the purpose of controlling the occurrence of *Typha* due to its invasive nature and adverse impacts on wetlands in the absence of management. Given the proposed clearing will target *Typha* or areas were *Typha* infestation is anticipated, the proposed clearing is not likely to result in any long-term impact to the ecological values of the riparian vegetation communities and associated wetlands within the application area.

The removal of *Typha* has the potential to increase sedimentation and turbidity in wetlands within the application area, thereby possibly impacting surface water quality. However, due to the small scale of the clearing it is not likely to cause long-term deterioration in the quality of surface or underground water.

Conclusion

The proposed clearing will not significantly impact riparian vegetation and is expected to enhance riparian and wetland habitats, within the application area. *Typha* removal methods provided by the applicant are considered sufficient to prevent appreciable land degradation. The small scale of the clearing is unlikely to result in the deterioration in the quality of surface or underground water.

Conditions

Nil management conditions required for this environmental value.

3.3. Relevant planning instruments and other matters

Within Australia, the regulation of pesticides is undertaken by the Australian Pesticides and Veterinary Medicine Authority. There are legal penalties in place for using pesticides outside of label directions. The applicant is advised to ensure that pesticides used during this clearing activities complies with all legal requirements concerning the use of these pesticides.

No known Aboriginal sites of significance have been mapped within the application area. It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

End

Appendix A. Site characteristics

A.1. Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to DWER at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix B.

Characteristic	Details
Local context	The application area forms two (2) parts of native vegetation within Carey Street Road Reserve (PIN 11438916) and Lot 79 on Deposited Plan 222226 (Crown Reserve 6334) managed by the City of Busselton. The application area is located within the Vasse wetland system and in the intensive land use zone of Western Australia. The proposed clearing area is subject to inundation. Spatial data indicate the local area, defined as 10 kilometre (km) radius from the centre of the area proposed to be cleared, retains approximately 38.62 per cent of the original native vegetation cover.
Ecological linkage	The areas proposed to be cleared are located within Environmental Sensitive Areas (ESAs) which are high value wetlands listed under the Directory of Important Wetlands in Australia (Geomorphic Wetlands - Swan Coastal Plain) and forming part of consanguineous wetlands suites.
Conservation areas	The proposed areas to clear are located adjacent to several conservation reserves legislated by the Department of Biodiversity, Conservation and Attractions (DBCA): • Class A reserve number 50017 • Class C reserve number 41568 • Class C reserve number 6334 • Class C reserve number 49385 • Class C reserve number 35490
Vegetation description	Photographs supplied by the applicant indicate the vegetation within the proposed clearing area consists of *Typha orientalis* and other non-native species blocking the drainage system and impeding on the water to flow through the drain. Representative photos and mapping are available in Appendix DD. Two Heddle vegetation complexes are mapped within the application area: • Quindalup Complex - Coastal dune complex consisting mainly of two alliances - the strand and fore-dune alliance and the mobile and stable dune alliance. Local variations include the low closed forest of *Melaleuca lanceolata* (Rottnest Teatree) - *Callitris preissii* (Rottnest Island Pine), the closed scrub of *Acacia rostellifera* (Summer-scented Wattle) and the low closed *Agonis flexuosa* (Peppermint) forest of Geographe Bay. • Vasse Complex - Mixture of the closed scrub of *Melaleuca sp.* fringing woodland of *Eucalyptus rudis* (Flooded Gum) - *Melaleuca sp.* and open forest of *Eucalyptus gomphocephala* (Tuart) - *Eucalyptus marginata* (Jarrah) - *Corymbia calophylla* (Marri). Will include areas dominated by *Tecticornia* and *Sarcocornia species* (Samphire) near Mandurah and south of the Capel River. (Government of Western Australia, 2018b taken from Heddle et al., 1980 and Webb et al., 2016) The extent of the mapped remnant native vegetation in the local area represents approximately 14.85 percent of its original extent (Government of Western Australia 2019).
Vegetation condition	Photographs supplied by the applicant indicate the vegetation within the proposed clearing area is in good to degraded (Keighery, 1994) condition.

Characteristic	Details
	The full Keighery (1994) condition rating scale is provided in Appendix C. Representative photos are available in Appendix D.
Climate and landform	The application area is located within the Vasse wetland system. The annual mean rainfall for the area is estimated to be 708.8 millimetres with an annual mean maximum temperature around 22.8 degree Celsius and an annual mean minimum temperature of 11.3 degree Celsius (BoM, 2021).
Soil description	The soil is mapped as Vasse system (211Va) which is described as: • low lying depressions which are often underwater in winter and saline in summer • poorly drained estuarine flats of the Swan coastal plain • tidal flat soil • saline wet soil and pale deep sand with samphire, sedges and paperbark woodland.
Land degradation risk	The mapped soil types have low risks for compaction risk, water repellence risk and wind erosion. The mapped soil types have high risks for subsurface acidification, waterlogging risk, flood risk, salinity risk and phosphorous export risk. The full analysis of land degradation risk and potential impacts is available in Appendix B6.
Waterbodies	The desktop assessment and aerial imagery indicated that the proposed areas to clear are located within the Vasse-Wonnerup Wetland System.
Hydrogeography	The proposed areas to clear are located within the Busselton-Capel Groundwater Area, proclaimed under the RIWI Act. No Public Drinking Water Source Areas intersect the application area.
Flora	No records of threatened or priority flora occur within the proposed clearing areas. According to available databases, 36 flora taxa of conservation significance have been recorded within the local area (10 km buffer). From those, none are found on the same soil type than the area proposed to be cleared. The nearest records of threatened and priority flora are *Leucopogon* sp. Busselton (D. Cooper 243) (P2; 0.52 km north west) and *Chorizema carinatum* (P3; 1.22 km north west). Noting the vegetation condition and the small extent of clearing proposed, the vegetation within the application area is not likely to comprise significant habitat for this species or other conservation significant flora recorded within the local area. The clearing proposed is not likely to impact the conservation status of conservation significant flora within the local area.
Ecological communities	The proposed areas to clear are located within Priority 3 PEC Subtropical and Temperate Coastal Saltmarsh ecological community.
Fauna	According to available datasets, there are 559 fauna species of conservation significance have been recorded within the local area, comprising 144 birds, 79 reptiles, 94 mammals, 206 invertebrates, 29 fish and 6 amphibians. The nearest records of conservation significant fauna species are: • *Oxyura australis* (Blue-billed duck – Priority 4) – Located at approximately at 0.002km • *Hydroprogne caspia* (Caspian Tern – Migratory bird) - Located at approximately at 0.108km • *Tringa nebularia* (Common greenshank, greenshank – Migratory bird) - Located at approximately at 0.108km • *Tringa stagnatilis* (Marsh sandpiper, little greenshank – Migratory bird) - Located at approximately at 0.108km and • *Pseudocheirus occidentalis* (Western ringtail possum, ngwayir – Critically Endangered) – Located approximately at 0.110km

Characteristic	Details
	The proposed area to clear provides suitable habitats for several fauna species of conservation significance including: • Oxyura australis (Blue-billed duck) • Hydroprogne caspia (Caspian Tern) • Tringa nebularia (Common greenshank, greenshank) • Tringa stagnatilis (Marsh sandpiper, little greenshank) • Pseudocheirus occidentalis (Western ringtail possum, ngwayir) • Pandion cristatus (Osprey, eastern osprey) • Falco peregrinus (Peregrine falcon) • Actitis hypoleucos (Common Sandpiper) • Thalasseus bergii (Crested tern) • *Isoodon fusciventer* (Quenda, southwestern brown bandicoot) • *Plegadis falcinellus* (Glossy ibis) The vegetation within the application area is located within the known distribution range for all three black cockatoo species (Commonwealth of Australia, 2012) and within areas suitable for Carnaby's cockatoo and Red-tailed black cockatoo breeding and foraging. One black cockatoos roost site (Located approximately 3.55 Km from the proposed clearing) and nil black cockatoos breeding sites have been recorded within the local area. Noting the degraded condition of the vegetation, the above fauna species are unlikely to occur within the application area. The vegetation within the application area provides suitable habitat for Western ringtail possum and records have been identified nearby the area. It is noted that the trees present within the area will not be cleared, such as *Melaleuca viminea* (Refer to Figures 5 and 11). Therefore, the clearing proposed is not foreseen to have a significant impact on Western ringtail possum species (*Pseudocheirus occidentalis).*

A.2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
IBRA bioregion*					
Swan Coastal Plain	1,501,221.93	579,813.47	38.62	222,916.97	14.85
Vegetation complex					
Vasse Complex	15,691.63	4,926.97	31.40	2,294.43	14.62
Quindalup	54,573.87	33,011.64	60.49	5,994.64	10.98
Local area					
10 kilometers (km) radius	18,668	2,281.77	12.22	-	-

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

A.3. Flora analysis table

With consideration for the site characteristics set out above and relevant datasets (see Appendix 0), impacts to the following conservation significant flora required further consideration.

Species name	Conservation status	Suitable habitat features ? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Leucopogon sp. Busselton (D. Cooper 243)	P2	N	N	N	0.52	3	N/A
Chorizema carinatum	P3	N	N	N	1.22	1	N/A
Acacia flagelliformis	P4	N	N	N	1.68	5	N/A
Franklandia triaristata	P4	N	N	N	1.68	2	N/A
Johnsonia inconspicua	P3	N	N	N	1.68	1	N/A
Lambertia orbifolia subsp. Scott River Plains (L.W. Sage 684)	T	N	N	N	1.68	1	N/A
Banksia nivea subsp. uliginosa	T	N	N	N	1.68	2	N/A
Caladenia procera	T	N	N	N	1.68	17	N/A
Grevillea elongata	T	N	N	N	1.68	1	N/A
Lambertia echinata subsp. occidentalis	T	N	N	N	1.68	1	N/A
Verticordia densiflora var. pedunculata	T	N	N	N	1.68	2	N/A
Verticordia plumosa var. vassensis	T	N	N	N	1.68	24	N/A
Gastrolobium sp. Yoongarillup (S. Dilkes s.n. 1/9/1969)	P1	N	N	N	1.68	1	N/A
Puccinellia vassica	P1	N	N	N	1.68	1	N/A
Amperea micrantha	P2	N	N	N	1.68	1	N/A
Grevillea brachystylis subsp. brachystylis	P3	N	N	N	1.68	15	N/A
Grevillea bronwenae	P3	N	N	N	1.68	4	N/A
Isopogon formosus subsp. dasylepis	P3	N	N	N	1.68	12	N/A
Loxocarya magna	P3	N	N	N	1.68	2	N/A
Synaphea hians	P3	N	N	N	1.68	10	N/A
Synaphea petiolaris subsp. simplex	P3	N	N	N	1.68	1	N/A
Ornduffia submersa	P4	N	N	N	1.68	4	N/A
Chamelaucium roycei	T	Y	N	N	2.00	8	N/A
Hakea oldfieldii	P3	Y	N	N	2.00	1	N/A
Lasiopetalum laxiflorum	P3	N	N	N	2.00	1	N/A
Pultenaea pinifolia	P3	N	N	N	2.00	1	N/A
Chamelaucium erythrochlorum	P4	N	N	N	2.00	4	N/A
Thysanotus glaucus	P4	N	N	N	2.00	1	N/A
Austrostipa bronwenae	T	N	N	N	2.35	3	N/A
Jacksonia gracillima	P3	N	N	N	2.40	4	N/A
Caladenia huegelii	T	N	N	N	2.69	1	N/A
Pimelea ciliata subsp. longituba	P3	N	N	N	3.15	2	N/A
Calystegia sepium subsp. roseata	P2	Y	N	N	3.71	2	N/A

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.4. Fauna analysis table

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Oxyura australis (Blue-billed duck)	P4	Y	Y	0.002	50	N/A
Hydroprogne caspia (Caspian Tern)	MI	Y	Y	0.108	68	N/A
Tringa nebularia (Common greenshank, greenshank)	MI	Y	Y	0.108	134	N/A
Tringa stagnatilis (Marsh sandpiper, little greenshank)	MI	Y	Y	0.108	17	N/A
Pseudocheirus occidentalis (Western ringtail possum, ngwayir)	CR	Y	Y	0.010	6644	N/A
Pandion cristatus (Osprey, eastern osprey)	MI	Y	N	0.161	40	N/A
Falco peregrinus (Peregrine falcon)	OS	Y	N	0.205		
Calidris acuminata (Sharp-tailed sandpiper)	MI	N	N	0.274	41	N/A
Calidris ferruginea (Curlew Sandpiper)	CR	N	Y	0.274	19	N/A
Actitis hypoleucos (Common Sandpiper)	MI	Y	Y	0.384	46	N/A
Thalasseus bergii (Crested tern)	MI	Y	Y	0.384	67	N/A
Phascogale tapoatafa wambenger (South-western brush-tailed phascogale, wambenger)	CD	N	N	0.411	47	N/A
Isoodon fusciventer (Quenda, southwestern brown bandicoot)	P4	Y	Y	0.412	59	N/A
Calyptorhynchus sp. (white-tailed black cockatoo)	CR	N	N	0.503	20	N/A
Calyptorhynchus banksii naso (Forest red-tailed black cockatoo)	VU	N	N	0.505	7	N/A
Plegadis falcinellus (Glossy ibis)	MI	Y	Y	0.556	33	N/A

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.5. Ecological community analysis table

Community name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Subtropical and Temperate Coastal Saltmarsh	P3	Y	Y	Y	0	13	N/A
Eucalyptus rudis (flooded gum), Corymbia calophylla, Agonis flexuosa Closed Low Forest (near Busselton)	P1	N	Y	N	1.31	36	N/A
Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	P3	N	N	N	3.42	206	N/A
Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal	P3	N	N	N	5.88	14	N/A

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.6. Land degradation risk table

Risk categories	***Land Unit 1***
Wind erosion	M1: 10-30% of the map unit has a high to extreme hazard
Water erosion	L2: 3-10% of the map unit has a very high to extreme hazard
Salinity	L2: 3-10% of the map unit has a moderate or high hazard or is presently saline
Subsurface Acidification	M2: 30-50% of the map unit has a high susceptibility
Flood risk	L1: <3% of the map unit has a moderate to high hazard
Water logging	L2: 3-10% of the map unit has a moderate to very high to risk
Phosphorus export risk	L2: 3-10% of the map unit has a high to extreme hazard

Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The proposed clearing will target stands of *Typha*. This species is capable of aggressive invasions that can transform ecosystems unless it is actively managed (Western Australian Herbarium, 2019). Without management, *Typha* can develop quickly into a monoculture (Figure 9) and cover an entire water body. Given the application area, comprises predominantly of *Typha* and its tendency to colonise ecosystems, it is not anticipated that the proposed clearing will significantly impact biodiversity within the application area.	Not likely to be at variance	Yes *Refer to Section* 3.2.1, above.
Principle (b): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."* Assessment: The area proposed to be cleared may contain foraging, and, breeding, habitat for conservation significant fauna. Considering the mitigation measures proposed by the applicant (avoiding clearing any trees and only clearing *Typha*) and taking into account that the clearing proposed is to occur within pre-cleared drain systems and the relatively small size of the clearing (0.13 ha), it is not foreseen that the clearing activity will have a significant impact on conservation significant fauna.	Not likely to be at variance	Yes *Refer to Section* 3.2.2, above.
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The area proposed to be cleared is unlikely to contain habitat for flora species listed under the BC Act or EPBC Act.	Not likely to be at variance	No
Principle (d): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."* Assessment: According to available spatial data, the area proposed to be cleared is located within the Subtropical and Temperate Coastal Saltmarsh TEC.	May be at variance	Yes *Refer to Section* 3.2.3, above.
Environmental value: significant remnant vegetation and conservation areas		
Principle (e): *"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."* Assessment: The national objectives and targets for biodiversity conservation in Australia has a target to prevent clearance of ecological communities with an extent below 30 per cent of that present pre-European settlement, below which species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia, 2001). The extent of the mapped remanent native vegetation in the local area is below this threshold. Considering the targeted nature of *Typha* removal, the proposed clearing is not considered a signficant remnant of native vegetation in an area that has been extensively cleared.	Not at variance	No
Environmental value: land and water resources		

Assessment against the clearing principles	Variance level	Is further consideration required?
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: Typha forms a natural component of native wetland and watercourse, vegetation. Therefore, the proposed clearing is associated with a watercourse or wetland. However, Typha can dominate wetland ecosystems and reduce biodiversity. Given the nature of the proposed clearing it is unlikely to impact on- or off-site hydrology and water quality.	At variance	Yes *Refer to Section* 3.2.4, above.
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: The mapped soil types have high risks for subsurface acidification, waterlogging risk, flood risk, salinity risk and phosphorous export risk. Noting the extent and the purpose of clearing, land degradation risk remains low. Noting that the proposed clearing is to occur within the existing drain structure only, it is not anticipated that these works will have a significant impact on land degradation.	Not at variance	No
Principle (h): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."* Assessment: The proposed areas to clear are located adjacent to DBCA legislated tenure Class A and C reserves (Reserve numbers 41568, 50017. 35490, 49385, 50017 and 6334). Given the purpose of the proposed clearing is only targeted to the existing drains footprint and is to create and improve wetland habitats by the removal of native invasive plant species (*Typha* sp.), it is not likely to have an impact on the environmental values of the reserve.	Not at variance	No
Principle (i): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."* Assessment: The removal of *Typha* may increase water turbidity.	May be at variance	Yes *Refer to Section* 3.2.4, above.
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: The purpose of the clearing is to improve water flow and prevent flooding. Therefore, the proposed clearing will not contribute to flooding..	Not at variance	No

Appendix C. Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation's ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Measuring vegetation condition for the South West and Interzone Botanical Province (Keighery, 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.
Very good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix D. Photographs of the vegetation within the application area (City of Busselton, 2021)

Figure 2: Ford drain map showing indicative location of photographs taken.

Figure 3: Ford drain section 1: Inlet of the drain – Catchment area showing buffalo grass (*Stenotaphrum secundatum).*

Figure 4: Ford drain section 1 - Inlet of the drain – Catchment area

Figure 5: Ford drain section 1 - Tree and shrubs on the photos above will not be disturbed by the drain maintenance operation

Figure 6: Ford drain section 1 - Looking south from the crossover

Figure 7: Ford drain mid section 1 - Looking north to the crossover. Drain embankment taken over by buffalo grass *(Stenotaphrum secundatum).*

Figure 8: Ford drain mid section 1 – Thick matt of *Typha* in the drain with Kikuyu grass (*Cenchrus clandestinus*) on the edge.

Figure 9: Ford drain mid section 1 - Looking south. *Melaleuca vimina* in the distance. *Typha* overtaking over the drain and forming a monoculture.

Figure 10: Ford drain section 1 - North of *Melaleuca viminea* showing relatively open section of the drain with some samphire growing close to drain.

Figure 11: Ford drain section 2 - *Melaleuca viminea* along the embankment. Branches overhanging the drain will need to be periodically pruned to allow access to the drain, but the tree will not be cleared and will remain as shown in the above photograph.

Figure 12: Ford drain section 2 - South of *Melaleuca viminea*. Drain more open and flowing correctly. Only minor works required by hand. Additional maintenance works may be required in future to maintain the drain in this current condition.

Figure 13: Ford drain section 2 - Outlet to Vasse Wetland

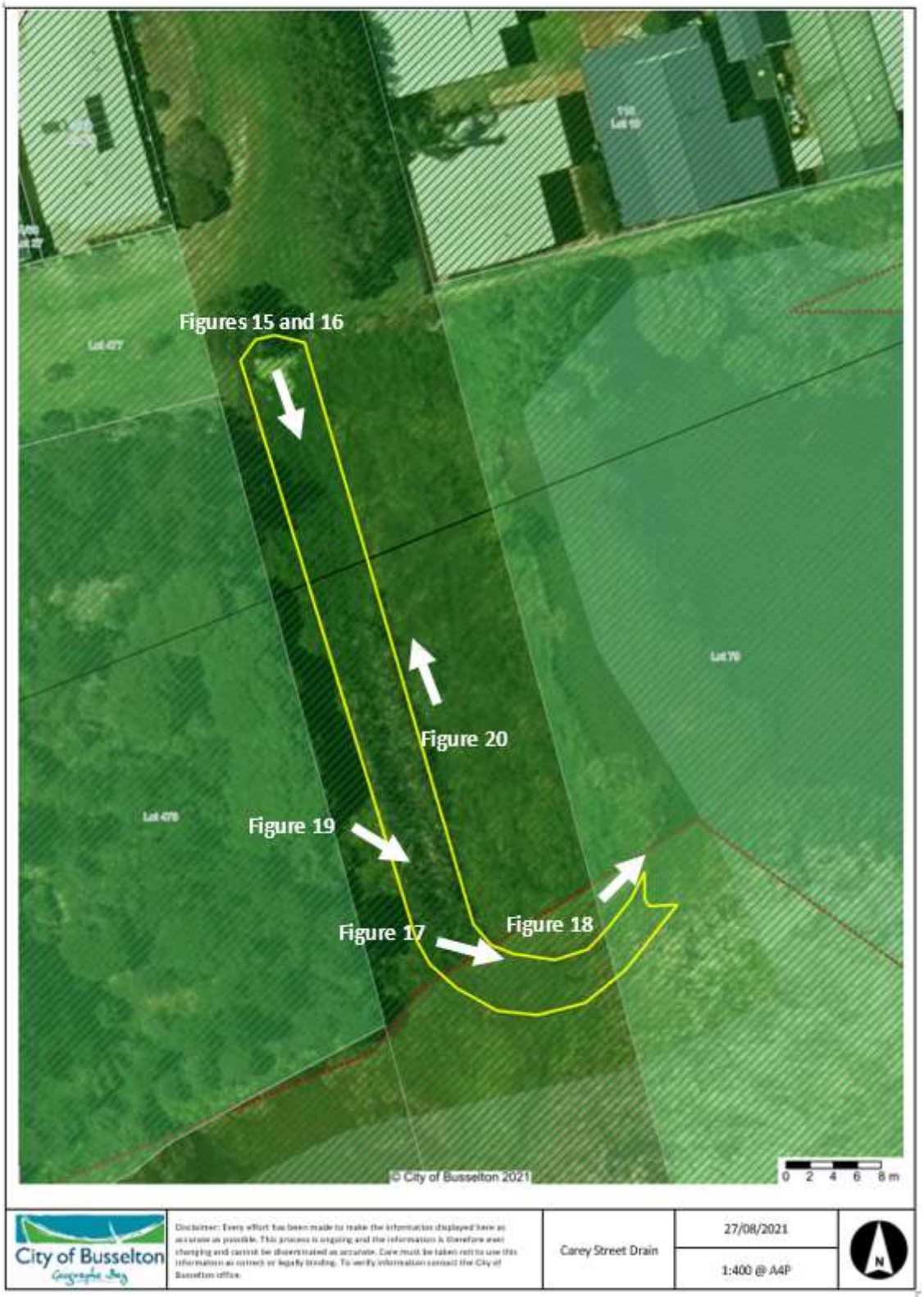

Figure 14: Carey Street drain showing indicative location of photographs taken.

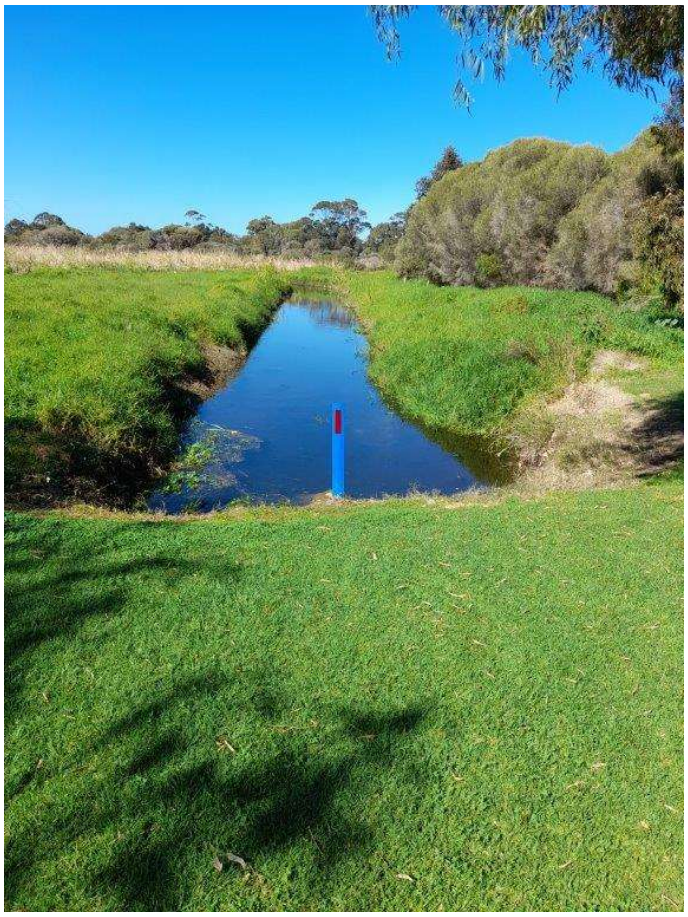

Figure 15: Carey Street drain – inlet from residential estate looking south. Area around the drain showing growth of *Stenotaphrum secundatum* (Buffalo grass). Other weed species present are *Cenchrus clandestinus* (Kikuyu grass).

Figure 16: Carey Street drain close up photograph.

Figure 17: Carey Street drain – Photos taken near the bend to the east.

Figure 18: Carey Street drain – Drain discharge to the wetland at southern end. Photograph showing arum lily (*Zantedeschia aethiopica*) growing on the embankment of the drain.

Figure 19: Carey Street drain - Wider view of the drain outlet towards the wetland

Figure 20: Carey Street drain - Looking back to the drain towards the residential area.

Appendix E. Sources of information

F.1. GIS databases

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

F.2. References

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Department of Water and Environmental Regulation (DWER) (2019). *Procedure: Native vegetation clearing permits*. Joondalup. Available from: https://dwer.wa.gov.au/sites/default/files/Procedure_Native_vegetation_clearing_permits_v1.PDF.

Department of Biodiversity, Conservation and Attractions (2019) Priority Ecological Communities for western Australia version 28, Species and Communities Program, available from:https://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities Accessed January 2022.

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