



GOVERNMENT OF
With Parliament of WESTERN AUSTRALIA

CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

PERMIT DETAILS

Area Permit Number: CPS 9526/1
File Number: DWERVT9232
Duration of Permit: From 14 April 2022 to 14 April 2024

PERMIT HOLDER

Town of Cambridge

LAND ON WHICH CLEARING IS TO BE DONE

Lot 720 on Plan 21069, Floreat

AUTHORISED ACTIVITY

The permit holder must not clear more than 2.91 hectares of native vegetation within the area cross-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; and

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

3. Directional clearing

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

4. Fauna Management

- (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 ahead of the clearing activity or translocated into adjacent *native vegetation*.

5. Weed Management – Chemical

The permit holder must only undertake spot spraying of Roundup Biactive solution during the driest period of the year, between October to March.

6. 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	<ul style="list-style-type: none"> (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 direction that the clearing occurred, (e) the size of the area cleared (in hectares); (f) actions taken to avoid, minimise, and reduce the impacts and extent of clearing in accordance with condition 1;

No.	Relevant matter	Specifications
		<p>(g) actions taken to minimise the risk of the introduction and spread of <i>weeds</i> and <i>dieback</i> in accordance with condition 2</p> <p>(h) fauna management actions taken in accordance with condition 4; and</p> <p>(i) the date that chemical weed control occurred in accordance with condition 5.</p>

7. Reporting

The permit holder must provide to the *CEO* the records required under condition 6 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 <i>Environmental Protection Act 1986</i> .
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.
dieback	means the effect of <i>Phytophthora</i> species on native vegetation.
department	means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3.
EP Act	<i>Environmental Protection Act 1986</i> (WA)
native vegetation	has the meaning given under section 3(1) and section 51A of the EP Act.
weeds	means any plant – <ul style="list-style-type: none"> (a) that is a declared pest under section 22 of the <i>Biosecurity and Agriculture Management Act 2007</i>; 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

A handwritten signature in black ink, appearing to be 'Mathew Gannaway', written over a horizontal line.

Mathew Gannaway
MANAGER
NATIVE VEGETATION REGULATION

*Officer delegated under Section 20
of the Environmental Protection Act 1986*

21 March 2022

SCHEDULE 1

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

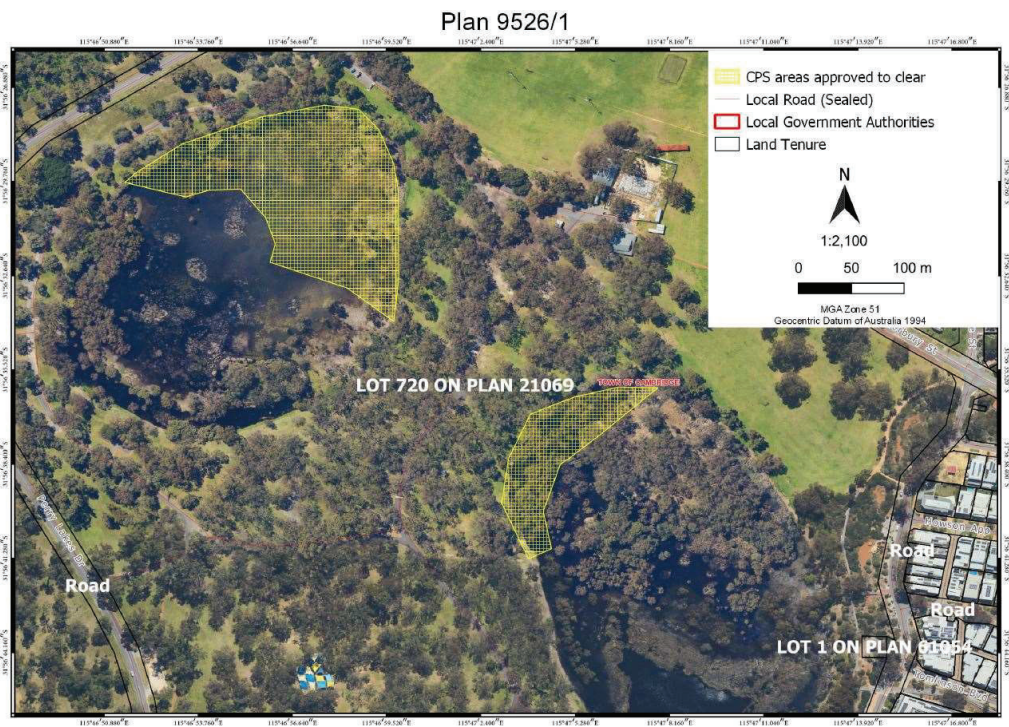


Figure 1: Map of the boundary of the area within which clearing may occur



Clearing Permit Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9526/1
Permit type:	Area permit
Applicant name:	Town of Cambridge
Application received:	16 December 2022
Application area:	2.91 hectares of native vegetation
Purpose of clearing:	Typha thinning
Method of clearing:	Chemical/Mechanical
Property:	Lot 720 on Plan 21069
Location (LGA area/s):	Floreat
Localities (suburb/s):	Town of Cambridge

1.2. Description of clearing activities

This application is for the targeted removal of robust herbaceous reeds, commonly known as Typha and may include two species: *Typha domingensis* and *T. orientalis*, occurring in two adjacent water bodies forming Perry Lakes (See Section 1.5, Figure 1).

The applicant has proposed to implement the methods below:

- Thinning of Typha using Handheld brush cutters.
- Cutting Typha in the dry season, below the winter waterline and,
- Returning in three weeks to apply Roundup Biactive, to Typha stubble using knapsack sprayers, or vehicle mounted spray lines or via wiping.

The applicant proposes the removal of Typha will form part of the management plan for Perry Lakes. Typha patches will be reduced to create smaller patches that are more easily controlled. The removed Typha is to be replaced with a mix of native sedge species (Town of Cambridge 2021).

1.3. Decision on application

Decision:	Granted
Decision date:	21 March 2022
Decision area:	2.91 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 21 days and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix A), relevant datasets (see Appendix D.1), supporting information provided by the applicant, 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, 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 foraging habitat for Endangered *Botaurus poiciloptilus* (Australasian bittern) and the Priority 4 *Ixobrychus dubius* (Australian little bittern).
- Potential removal/disturbance of nesting habitat for Priority 4 *Oxyura australis* (Blue billed duck).
- Potential incidental short-term impacts in the form of land degradation of wind and water erosion.
- Potential incidental short-term impacts to adjacent fauna and flora resulting from the use of Glyphosate Bi-active (Glyphosate).

It is not expected that the removal of Typha in order to maintain the functionality of the wetlands will result in significant impacts to environmental values within the application area. Given the degraded nature of the wetland where Typha is required to be removed, it is considered unlikely that trees or any flora of conservation significance would be located in or adjacent to the works.

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 of clearing.
- Take hygiene steps to minimise the risk of the introduction and spread of weeds and dieback.
- Pre-clearing site inspections prior to works commencing and ongoing during works for any fauna that may be present. If found and are not able to escape into adjacent habitat, the City of Cambridge is to cease works until the identified fauna has been translocated.
- Undertake slow, progressive one directional clearing to allow terrestrial and avian fauna to move into adjacent habitat ahead of the clearing activity.
- Undertake spot spraying of Roundup Biactive solution during the driest period of the year when the water level is at its lowest.

1.5. Site map

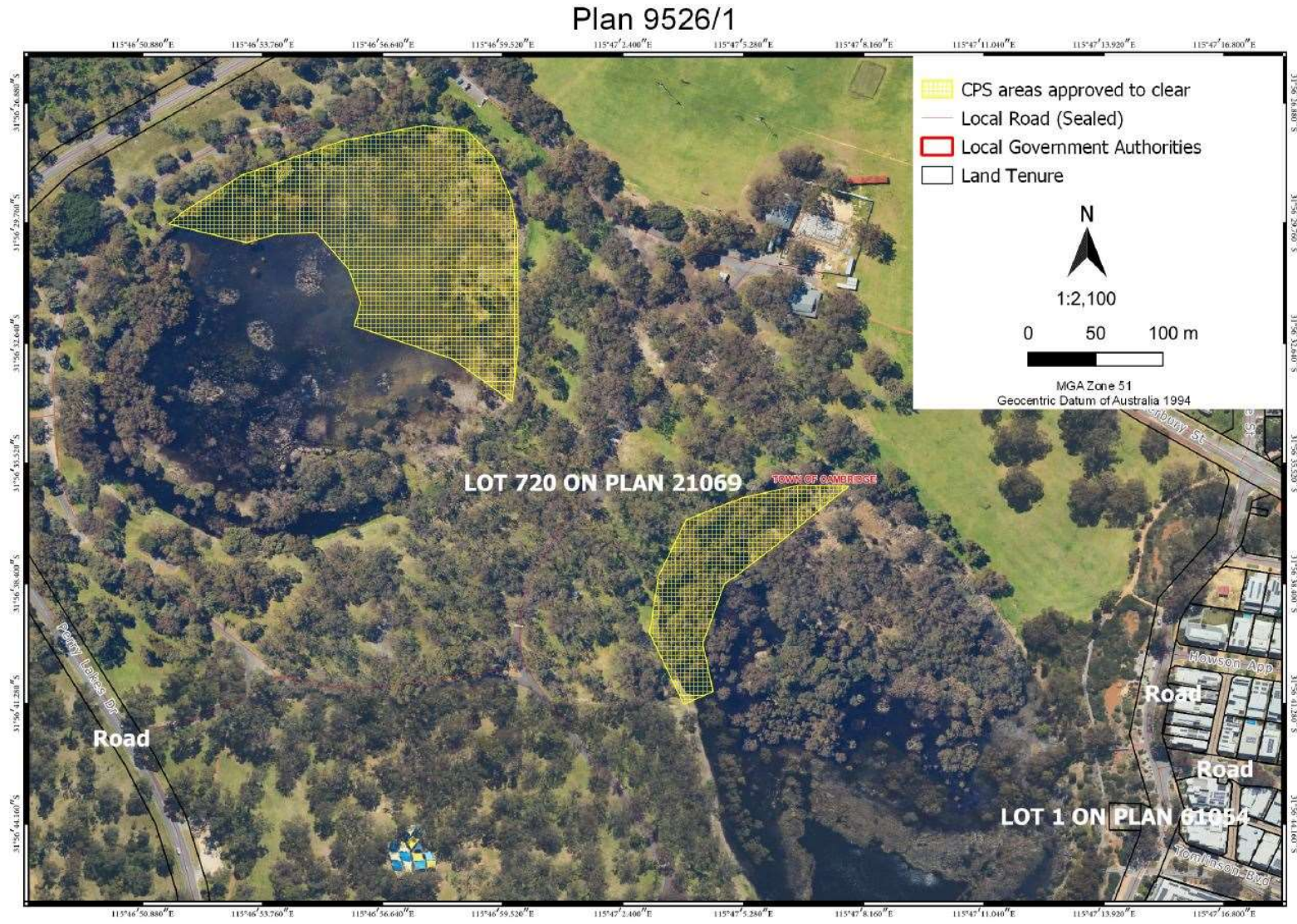


Figure 1 Map of the application area

The area crosshatched yellow indicates the area 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 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)
- *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, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

The applicant has proposed methods of Typha removal planned to reduce the risk of soil erosion, deterioration in the quality of surface or underground water and impact to adjacent fauna and flora. Methods include:

- Thinning of Typha by hand using brush cutters.
- Typha patches will be thinned to create smaller patches that are more easily controlled to contain the spread of Typha from dominating the lakebed and allow for establishment of new native sedges.
- Three weeks after slashing the regrowth will be treated using Roundup Bioactive (3670 grams per litre) at 13 Millilitres per litre of water, as specified on Florabase (Western Australian Herbarium 1998-).
- Roundup Biactive will be applied either via knapsack sprayers, by hand using vehicle mounted spray lines or via wiping. The application method will be determined based on site conditions and care will be taken to avoid any potential run-off or spray drift.

The above Typha control methods form part of further planned works to improve the ecology of Perry Lakes, this includes:

- The diversion of stormwater from the Herdsman Main Drain to Perry lakes to restore lake water levels which have declined with ground water abstraction and a drying climate.
- Extensive weed control and revegetation of the lake beds and fringing vegetation including, the planting of over 80,000 native reeds and rushes and 5,000 native wetland buffer plants on the lake edges.

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, 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 (Biodiversity) - Clearing Principle (a)

Assessment

According to available datasets, none of the 33 conservation significant flora or conservation significant fungi recorded within the local area have been found within the application area. Also none of the above species are known to occur in wetland habitats or stands of Typha (Western Australian Herbarium, 1998-). As the proposed clearing will

only target Typha, it is unlikely any conservation significant flora will be negatively impacted during removal, due to the nature of the clearing.

Typha 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 is to reduce the rate of spread of Typha and replant cleared areas with other native reed and sedge species. Dense stands of Typha will be controlled by cutting the stalks below the water line and treating the regrowth three weeks after slashing, using Roundup Biactive, as specified on Florabase (Western Australian Herbarium 1998-).

Glyphosate is a general herbicide and has the potential to impact adjacent fauna and flora. The short-term and long-term impact on aquatic wildlife from Glyphosate use is not entirely clear (DBCA, 2019). The applicant has advised clearing will take place in the summer dry season. Also, the proposed use of a knapsack spray unit, will allow a more targeted application of Glyphosate, directing the spray to Typha stubble. Potential impacts to fauna habitat will be discussed in the section 3.2.2 below.

Conclusion

Based on the above assessment, the proposed clearing is unlikely to result in a significant loss in biodiversity or impact significant populations of threatened and priority flora. Suitable habitat for species listed in Appendix A.3 is unlikely to be significantly impacted by the proposed clearing.

Conditions

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

- Undertake spraying of Glyphosate during the driest period of the year when the water level is at its lowest and during calm conditions.

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

Assessment

According to available databases, *Calyptorhynchus latirostris* (Carnaby's cockatoo) and *Calyptorhynchus banksii naso* (forest red-tailed black cockatoo), has been recorded within the application area. Black cockatoo's do not utilise Typha or other sedges as foraging, nesting, or roosting habitat. Given that the proposed clearing will only involve the clearing of Typha, it is unlikely to impact on the habitat of black cockatoos. Due to the density of Typha and presence of water, a range of other native fauna species may be present at the time of the clearing activity.

Blue-billed duck (*Oxyura australis*)

This species is the only wetland bird species to be recorded in the application area. Blue billed duck can breed from August to March, mostly between October to January (DBCA 2021). Breeding habitat is typically secluded densely vegetated situations, with the nest constructed in Typha beds or other vegetation, in permanent water. Nests are usually constructed from dead Typha leaves and sometimes thinly lined with down (Birdlife Australia 2022a). The records for Blue billed duck associated with Perry Lakes may utilise the lakes as foraging habitat, however as the lakes are no longer permanent the application area is unlikely to be suitable breeding habitat for this species. Control of Typha at Perry lakes is part of further planned works, to improve the ecology of the lakes. These works also include management measures intended to restore permeant water to the lakes (refer to section 3.1).

The Priority 4 *Ixobrychus dubius* (Little bittern)

This species has been recorded within 0.4 kilometres of the application area and has similar habitat requirements to the Australasian bittern, mainly where tall rushes, reeds, Typha, shrub thickets or other dense cover is inundated by at least 30 centimetres of water. It can be found in extensive swamps, but often inhabits small patches of dense wetland vegetation such as Typha along drains or in small urban lakes (Bird life Australia 2022b). Little bittern can occur as a migrant in south-west Australia from late August to early April, breeding in the north of the state in winter (Bird life Australia 2020b). Little bittern may visit wetlands on the Swan Coastal Plain, and there is a possibility of the species occurring within the application area, but the probability is low (DBCA 2021).

Australasian bittern (*Botaurus poiciloptilus*)

This species favours permanent freshwater wetlands with tall, dense vegetation, particularly *Eleocharis* spp. (Spike rushes) and Typhus (DBCA 2018). The species is known to breed in Spring-Summer, with egg laying known to occur in September to December (DBCA 2021). The application area is outside the current range of Australasian bittern,

however it may potentially visit areas outside of its current range. It is not considered to be resident or breeding at those sites (DBCA 2021).

Black bittern (*Ixobrychus flavicollis australis*)

This Priority 3 species is also recorded in the local area. In spring, this species builds a nest on branches overhanging water. Habitat includes terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangrove (Birdlife Australia 2020c). Given that Black bittern are not dependent on *Typha* habitat for breeding, it is unlikely this species will be impacted significant by the proposed clearing.

Australian painted snipe (*Rostratula australis*)

Australian painted snipe is native to Western Australia and usually found in permanent or temporary shallow inland wetlands, either freshwater or brackish, (DAWE 2003). As perry lakes falls within the above habitat types, this species may range through the application area. However, considering the only record for Australian painted snipe in the local area is for a single individual at Herdsman Lake, dated 2012, it is unlikely this species is still present, within the local area.

Other wetland or shore bird species, recorded in the local area, that may range through the application area and utilise the area as feeding habitat include: the migratory species *Plegadis falcinellus* (Glossy ibis), *Tringa glareola* (Wood sandpiper), *Tringa nebularia* (Green shank), *Calidris ruficollis* (Red-necked stint), *Limosa lapponica* (Bar-tailed godwit), *Limosa limosa* (Black-tailed godwit), *Calidris acuminata* (Sharp-tailed sandpiper), *Actitis hypoleucos* (Common Sandpiper), *Tringa stagnatilis* (Marsh sandpiper), *Pluvialis fulva* (Pacific golden plover), *Numenius phaeopus* (Whimbrel), the Critically Endangered *Calidris tenuirostris* (Great knot) , *Calidris ferruginea* (Curlew sandpiper), and *Numenius madagascariensis* (eastern curlew), the Endangered, *Calidris canutus* (*Red knot*), *Charadrius mongolus* (*Lesser Sand Plover*), and the Priority 4 *Thinornis rubricollis* (hooded plover). These species do not depend exclusively on foraging in habitats prone to *Typha* infestation, however, may be present at the time of clearing.

Conclusion

Based on the above assessment, stands of *Typha* comprising the application area may provide breeding habitat and a source of nest building material for Blue billed duck. There is a low probability that Australasian bittern, Little bittern and Black bittern may temporarily utilise the wetland as foraging habitat. The remaining wetland species in the local area are not likely to be significantly impacted by the proposed clearing.

Conditions

To address the above impacts, the following management measures will be required as conditions on the clearing permit, in areas comprising permanent water and dense stands of *Typha*:

- Pre-clearing site inspections prior to works commencing and ongoing during works for any fauna that may be present. If found and are not able to escape into adjacent habitat, the Town of Cambridge is to cease works until the identified fauna has left the clearing area.
- Undertake slow, progressive one directional clearing to allow terrestrial and avian fauna to move into adjacent habitat ahead of the clearing activity.

3.2.3. Environmental value:(land and water resources) - Clearing Principles (f, g 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 above, the proposed clearing is not likely to result in any long-term impact to the ecological values of the wetland within the application area.

Considering the nature of the proposed clearing activities, the most likely land degradation impacts anticipated to result from the proposed clearing would be wind and surface water erosion of the exposed ground. However, the applicant is only proposing to clear small areas at a time (Town of Cambridge 2021), also the soil types within the application area have a low risk of wind erosion.

The removal of *Typha* has the potential to increase sedimentation and turbidity in wetlands within the application area, thereby possibly impacting surface water quality. Due to the small scale of the clearing, it is not likely to cause long-term deterioration in the quality of surface water. The applicant is also proposing to plant native sedges and rushes in the area of clearing, further reducing the risk of land erosion and subsequent loss in water quality.

According to available data sets, Perry Lakes is situated in an area that represents a high risk of encountering acid sulphate soils. Advice from Contaminated Sites (DWER 2022a) determined the methods proposed to be used by the Town of Cambridge to control and thin Typha represents methods with low to no risk of acid sulphate soil disturbance.

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

The DBCA (2021) advised that the use of Glyphosate can be contentious near human populations and that the short-term and long-term impact on aquatic wildlife from Glyphosate use is not entirely clear. 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 their use of Glyphosate and any other pesticides during clearing activities complies with all legal requirements concerning the use of these pesticides. Furthermore, applying Glyphosate when the wind is calm and directing the spray carefully to each individual stalk will mitigate potential risk to adjacent vegetation and fauna.

The application area falls within the Perth Groundwater Area, as proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI Act). Advice on the above matter was sought on the 18 January 2022. The water licencing Branch determined that a water licence or permit would not be required to undertake the clearing proposed (DWER 2022b).

A portion at the western end of the application area has been mapped as a place of aboriginal heritage (see Figure 2). 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 not damaged through the clearing process.

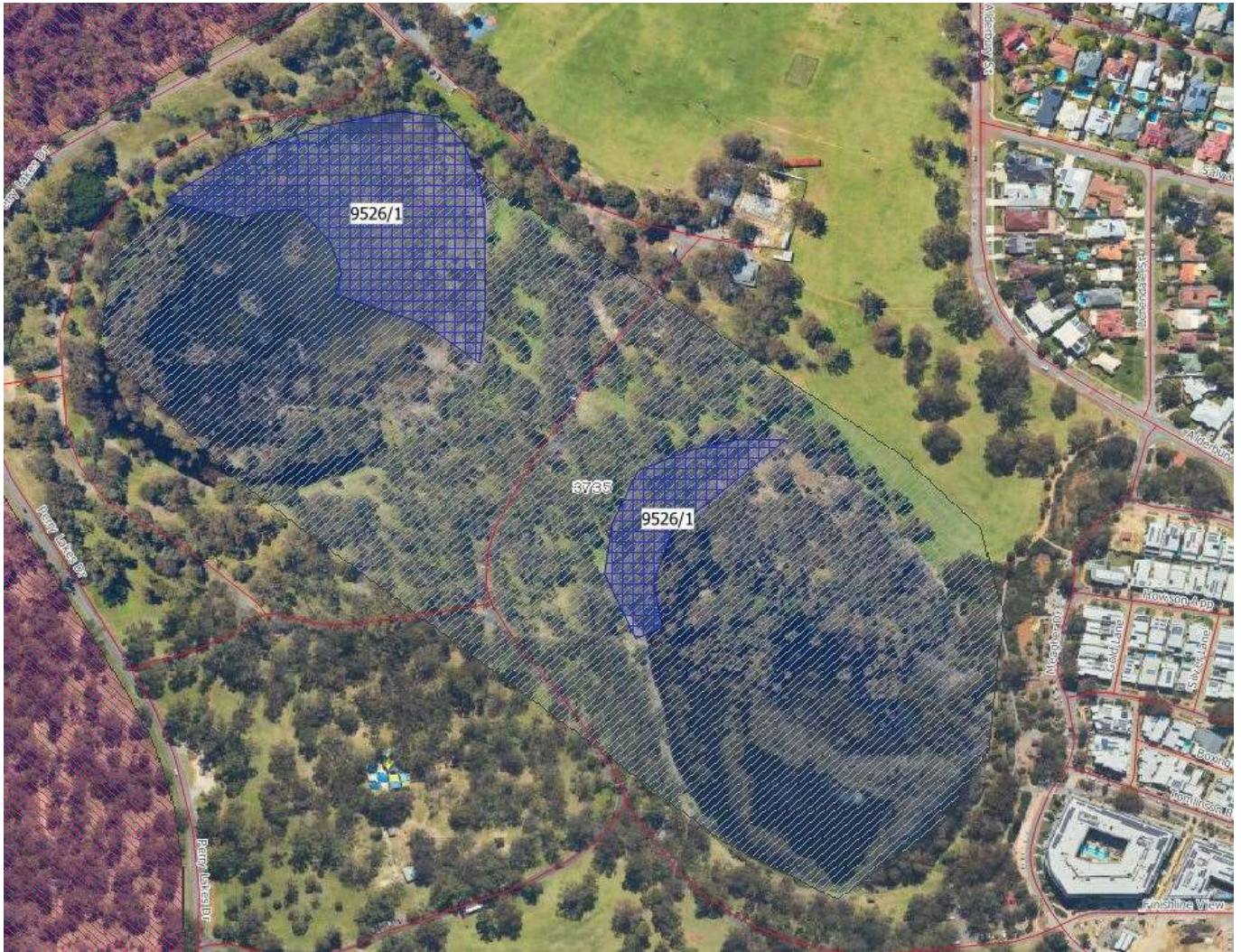


Figure Light blue and pink hashed areas indicate an Aboriginal heritage site where recorded as a camp and hunting place.

End

Appendix A. Site characteristics

A.1. Site characteristics

Characteristic	Details
Local context	<p>The proposed clearing comprises two adjacent water bodies forming Perry Lakes in the municipality of the Town of Cambridge. Clearing will be restricted to the removal of Typha from the fringing vegetation of the above lakes.</p> <p>The application area occurs within the Perth metropolitan area situated between remnant native vegetation comprising Bold Park reserve directly west and Alderbury Reserve to the east, an area of cleared parkland utilised as sports grounds.</p> <p>Spatial data indicates the local area (10-kilometre radius from the centre of the area proposed to be cleared) retains approximately 11 per cent of the original native vegetation cover.</p>
Ecological linkage	The proposed clearing does not include any significant portion of an ecological linkage.
Conservation areas	<p>The application area is within a Bush Forever Site and adjoins Bold Park Reserve to the west. Additional conservation areas in the local area include:</p> <ul style="list-style-type: none"> • Kings park, 3.8 kilometres to the south east • Herdsman Lake, 2.1 kilometres north east
Vegetation description	<p>According to available data sets the vegetation in the application area is mapped as:</p> <ul style="list-style-type: none"> • Cottesloe Complex-Central and South, which is described as: Mosaic of woodland of <i>Eucalyptus gomphocephala</i> (Tuart) and open forest of <i>Eucalyptus gomphocephala</i> (Tuart) - <i>Eucalyptus marginata</i> (Jarrah) - <i>Corymbia calophylla</i> (Marri); closed heath on the Limestone outcrops. (Shepherd et al, 2001). • Karrakatta Complex-Central and South, which is described as Predominantly open forest of <i>Eucalyptus gomphocephala</i> (Tuart) - <i>Eucalyptus marginata</i> (Jarrah) - <i>Corymbia calophylla</i> (Marri) and woodland of <i>Eucalyptus marginata</i> (Jarrah) - <i>Banksia</i> species. <i>Agonis flexuosa</i> (Peppermint) is co-dominant south of the Capel River (Shepherd et al, 2001). <p>Swan Coastal Plain vegetation complexes as described and mapped by Heddle et al. (1980) as updated by Webb et al. (2016).</p> <p>The mapped vegetation within the local area retains approximately 9.7 per cent of the original extent (Government of Western Australia, 2019).</p>
Vegetation condition	<p>The applicant has not provided information regarding the condition of the native vegetation within the application area. A study of the aerial imagery of the area indicates vegetation is in a good (Keighery 1994) to completely degraded (Keighery 1994) condition.</p> <p>The full Keighery (1994) condition rating scale is provided in Appendix C.</p>
Climate	<p>The climate is classified as Mediterranean, with dry, hot summers and cool, wet winters.</p> <ul style="list-style-type: none"> • average rainfall is 762.1 mm pa, with the majority falling between May and August. • average maximum temperature ranges from 18.0 degrees centigrade in winter to 32 degrees centigrade in summer. • the highest recorded maximum being 46.7 degrees centigrade • average minimum temperatures range from 8.0 degrees centigrade in winter to 17.5 degrees centigrade in summer. • the lowest recorded minimum being -1.3 degrees centigrade (BOM 2021).

Characteristic	Details	
Soil description and landform	The soil is mapped as (Schoknecht et al. 2013): <ul style="list-style-type: none"> • Spearwood wet, lake Phase:Lake • EnvGeol Cps Phase: peaty clay - dark grey and black, soft, variable organic content, some quartz sand in places, of lacustrine origin 	
Land degradation risk	There is a moderate amount of variability in the land degradation risk, between the two soils occurring within the application area. The EnvGeol CPs Phase, soil unit was found to be of high land degradation risk, as over 70 per cent of the mapped soil unit is susceptible to water logging and, subsurface acidification. Spearwood wet, lake Phase. Was found to have over 70 per cent of the mapped soil unit susceptible to waterlogging and phosphorus export risk. See the table in C.4 for a full analysis of soil risks.	
Waterbodies	The application Comprises two portions of Perry Lakes, classified as perennial wetland swamp. Significant water bodies within the local area include: <ul style="list-style-type: none"> • Herdsman Lake, perennial wetland swamp, 2.4 kilometres northwest • Lake Monger, perennial lake, 4.3 kilometres northwest • Lake Claremont, perennial lake, 2.8 Kilometres south • The Swan River Estuary 4.9 kilometres south 	
Hydrogeography	Perry Lakes, area not classified as a floodplain area. The application area falls within a RIWI ground water area (DWER-034).	
Flora	The local area includes two Threatened flora; <i>Caladenia huegelii</i> and <i>Grevillea thelemanniana</i> . The local area also included 33 Priority flora and four species of conservation significant fungi; <i>Amanita drummondii</i> P3, <i>A. fibrillosipes</i> P3, <i>A. preissii</i> P3 and <i>A. wadjukiorum</i> P3. The nearest conservation significant flora species to the proposed clearing is Priority 3 <i>Beyeria cinerea</i> subsp. <i>cinerea</i> . The Priority 1; <i>Lepidium pseudohyssopifolium</i> , is known to be associated with wetland habitats and could possibly occur adjacent to Typha stands. The remaining species recorded in the local area include; <i>Acacia benthamii</i> P2, <i>Acacia horridula</i> P3, <i>Adiantum capillus-veneris</i> P2, , <i>Angianthus micropodioides</i> P3, <i>Austrostipa mundula</i> P3, <i>Baeckea</i> sp. Limestone (N. Gibson & M.N. Lyons P1PP4P25) P1, <i>Bossiaea modesta</i> P2, <i>Byblis gigantea</i> P3, <i>Calectasia grandiflora</i> P2, <i>Calothamnus graniticus</i> subsp. <i>leptophyllus</i> P4, <i>Calothamnus macrocarpus</i> P2, <i>Chamelaucium floriferum</i> subsp. <i>diffusum</i> P2, <i>Conostylis bracteata</i> P3, <i>Dicrastylis micrantha</i> P3, <i>Dodonaea hackettiana</i> P4, <i>Eucalyptus educta</i> P2, <i>Eucalyptus x mundijongensis</i> P1, <i>Fabronia hampeana</i> P2, <i>Grevillea manglesii</i> subsp. <i>ornithopoda</i> P2, <i>Hibbertia leptotheca</i> P3, <i>Hypolaena robusta</i> P4, <i>Jacksonia sericea</i> P4, <i>Lasiopetalum glutinosum</i> subsp. <i>glutinosum</i> P3, <i>Lasiopetalum membranaceum</i> P3, P1, <i>Melaleuca viminalis</i> P2, <i>Poranthera moorokatta</i> P2, <i>Schoenus capillifolius</i> P3, <i>Stylidium maritimum</i> P3, <i>Thelymitra variegata</i> P2, <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> P4.	
Ecological communities	The threatened ecological community, Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region, Endangered under the EPBC Act, is recorded within the application area. The clearing of Typha is not representative of this community.	
Fauna	A total of 73 conservation significant fauna are recorded in the local area. The nearest record is for <i>Calyptorhynchus latirostris</i> (Carnaby's cockatoo) within the application area Black cockatoo habitat within the local area includes: <ul style="list-style-type: none"> • Three white tailed black cockatoo breeding site occur within the loca area the nearest occurs 0.26 kilometres north of the application area. • A total of 56 black cockatoo roosts sites. The nearest is 0.34 kilometres south-east of the application area. • Approximately 80 percent of all remnant vegetation in the local area, is mapped as cockatoo feeding habitat. <p>Species recorded in the local area not associated with freshwater habitats area included in the table below.</p> <table border="1" style="width: 100%;"> <tr> <td>Locally extinct species:</td> </tr> </table>	Locally extinct species:
Locally extinct species:		

Characteristic	Details
	<i>Leipoa ocellata</i> (malleefowl), <i>Macrotis lagotis</i> (Bilby), <i>Dasyornis longirostris</i> (western bristlebird), (<i>Notamacropus irma</i> , (Western brush wallaby).
	Species not associated with wetland habitats
	<i>Apus pacificus</i> (Fork-tailed swift), <i>Notamacropus irma</i> , (Western brush wallaby) <i>Falco peregrinus</i> , (Peregrine falcon) <i>Ninox connivers connives</i> , (Barking owl (southwest subpop.)) <i>Tyto novaehollandiae novaehollandia</i> (masked owl (southwest)) , <i>Phascogale tapoatafa</i> (wambenger south-western brush-tailed phascogale), <i>Hylaeus globuliferus</i> (woolybush bee), <i>Falco hypoleucos</i> (grey falcon), <i>Cacatua pastinator pastinator</i> (Muir's corella).
	Pelagic sea birds and shore birds of saline habitats
	<i>Thalasseus bergii</i> (Crested tern), <i>Hydroprogne caspia</i> (Caspian Tern), <i>Ardenna pacifica</i> (wedge-tailed shearwater), <i>Anous tenuirostris melanops</i> (Australian lesser noddy), <i>Phoebetria fusca</i> (sooty albatross), <i>Pluvialis squatarola</i> (Grey plover), <i>Thalassarche carteri</i> (Indian yellow-nosed albatross), <i>Charadrius leschenaultii</i> (Greater sand plover), <i>Thalassarche chrysostoma</i> (Grey-headed albatross), <i>Sternula nereis nereis</i> (fairy tern), <i>Ardenna carneipes</i> (flesh-footed shearwater), <i>Calidris alba</i> (sanderling), <i>Chlidonias leucopterus</i> (White-winged tern), <i>Calidris subminuta</i> (Long-toed Stint), <i>Phaethon rubricauda</i> (Red-tailed tropicbird).
	Habitat suitability analysis is provided in table A.2. A number of fauna species dependent on marine habitats have been omitted from the table as these species are highly unlikely to utilise the habitats within the application area.

A.2. 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]
<i>Calyptorhynchus latirostris</i> (Carnaby's cockatoo)	EN	N	N	0	2729	N/A
<i>Oxyura australis</i> (Blue-billed duck)	P4	Y	Y	0	576	N/A
<i>Calyptorhynchus banksii naso</i> (forest red-tailed black cockatoo)	VU	N	N	0.1	55	N/A
<i>Ixobrychus dubius</i> (Australian little bittern)	P4	Y	Y	0.4	3	N/A
<i>Neelaps calonotos</i> (black-striped snake, black-striped burrowing snake)	P3	N	N	0.8	58	N/A
<i>Idiosoma sigillatum</i> (Swan Coastal Plain shield-backed trapdoor spider)	P3	N	N	0.8	92	N/A
<i>Apus pacificus</i> (western whipbird)	P4	N	N	1.5	2	N/A
<i>Plegadis falcinellus</i> (Glossy ibis)	MI	Y	Y	1.9	155	N/A
<i>Tringa glareola</i> (Wood sandpiper)	MI	Y	Y	1.9	15	N/A
<i>Synemon gratiosa</i> (graceful sunmoth)	P4	N	N	2	6	N/A
Green shank (<i>Tringa nebularia</i>)	MI	Y	Y	2.2	152	N/A
<i>Australasian bittern</i> (<i>Botaurus poiciloptilus</i>)	EN	Y	Y	2.6	9	N/A
<i>Westralunio carteri</i> (Carter's freshwater mussel)	VU	Y	Y	2.9	3	N/A
<i>Dasyurus geoffroii</i> (Chuditch, western quoll)	VU	Y	Y	3.4	14	N/A
<i>Isodon fusciventer</i> (quenda, southwestern brown bandicoot)	P4	Y	Y	3.6	69	N/A
<i>Rostratula australis</i> (Australian painted snipe)	EN	N	N	3.8	1	N/A
<i>Hydromys chrysogaster</i> (Water-rat, rakali)	P4	Y	Y	4.2	22	N/A
<i>Setonix brachyurus</i> (Quokka)	VU	Y	Y	4.5	1	N/A
<i>Calyptorhynchus baudinii</i> (Baudin's cockatoo)	EN	N	N	4.6	1	N/A
<i>Euoplos inornatus</i> (inornate trapdoor spider (northern Jarrah Forest))	P3	N	N	5	1	N/A

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]
<i>Ixobrychus flavicollis australis</i> (Black bittern (southwest subpop.))	P2	Y	Y	5.3	4	N/A
<i>Calidris ruficollis</i> (Red-necked stint)	MI	Y	Y	5.7	127	N/A
<i>Limosa lapponica</i> (Bar-tailed godwit)	MI	Y	Y	6.	48	N/A
<i>Limosa limosa</i> (Black-tailed godwit)	MI	Y	Y	6	4	N/A
<i>Calidris tenuirostris</i> (Great knot)	CR	Y	Y	6	49	N/A
<i>Calidris ferruginea</i> (Curlew sandpiper)	CR	Y	Y	6	48	N/A
<i>Calidris canutus</i> (Red knot)	EN	Y	Y	6	22	N/A
<i>Myrmecobius fasciatus</i> (Numbat, walpurti)	EN	N	N	6.1	2	N/A
<i>Charadrius mongolus</i> (Lesser Sand Plover)	EN	Y	Y	6.1	1	N/A
<i>Calidris acuminata</i> (Sharp-tailed sandpiper)	MI	Y	Y	6.8	29	N/A
<i>Actitis hypoleucos</i> (Common Sandpiper)	MI	Y	Y	7	3	N/A
<i>Tringa stagnatilis</i> (Marsh sandpiper)	MI	Y	Y	7.3	4	N/A
<i>Lerista lineata</i> (Perth slider, lined skink)	P3	N	N	9.2	4	N/A
<i>Pluvialis fulva</i> (Pacific golden plover)	MI	Y	Y	9.2	7	N/A
<i>Numenius madagascariensis</i> (eastern curlew)	CR	Y	Y	9.2	4	N/A
<i>Thinornis rubricollis</i> (hooded plover)	P4	Y	Y	9.3	4	N/A
<i>Numenius phaeopus</i> (Whimbrel)	MI	Y	Y	9.7	3	N/A

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

A.3. Land degradation risk table

Risk categories	Spearwood wet, lake Phase	EnvGeol Cps Phase
Percentage of mapped soil unit		
Wind erosion	0	0
Water erosion	0	0
Salinity	0	0
Subsurface Acidification	0	>70
Flood risk	>70	0
Water logging	>70	>70
Phosphorus export risk	>70	0

Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
<p><u>Principle (a):</u> <i>“Native vegetation should not be cleared if it comprises a high level of biodiversity.”</i></p> <p><u>Assessment:</u></p> <p>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 fauna habitat or conservation significant assemblages of plants. The application area may contain suitable habitat and soils for a number of conservation significant fauna.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.1, above.</i>
<p><u>Principle (b):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>The area proposed to be cleared may contain foraging, and, breeding habitat for conservation significant fauna.</p>	May be at variance	Yes <i>Refer to Section 3.2.2, above.</i>
<p><u>Principle (c):</u> <i>“Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.”</i></p> <p><u>Assessment:</u></p> <p>The two threatened flora species recorded in the local area are not associated with the wetland habitat. Therefore, the proposed clearing is unlikely to impact threatened flora.</p>	Not at variance	No
<p><u>Principle (d):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>According to available spatial data, the area proposed to be cleared contains the TEC, Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region. The presence of Typha would indicate that soil hydrological conditions within the application area and species assemblages are not suitable for the above TEC. Therefore, the targeted removal of Typha is unlikely the impact the adjacent Banksia Woodland.</p>	Not likely to be at variance	No
Environmental value: significant remnant vegetation and conservation areas		
<p><u>Principle (e):</u> <i>“Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.”</i></p> <p><u>Assessment:</u></p> <p>The extent of the mapped remanent native vegetation in the local area represents 11 percent of its, original extent. This is inconsistent with the national objectives and targets for biodiversity conservation in Australia. 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). Considering the targeted nature of Typha removal, the proposed clearing is unlikely to further degrade any vegetation remnant of native vegetation in an area that has been extensively cleared.</p>	Not at variance	No

Assessment against the clearing principles	Variance level	Is further consideration required?
<p><u>Principle (h):</u> <i>“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.”</i></p> <p><u>Assessment:</u></p> <p>The application area is within a Bush Forever Site. Given the purpose of the proposed clearing is to improve wetland habitat of Perry Lakes (Town of Cambridge, 2021a), it is not likely to have an impact on the environmental values of the reserve or result in a significant residual impact.</p>	Not likely to be at variance	No <i>Refer to Section 3.2.3, above.</i>
Environmental value: land and water resources		
<p><u>Principle (f):</u> <i>“Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.”</i></p> <p><u>Assessment:</u></p> <p>Typha forms a natural component of native wetland and watercourse vegetation. Noting the nature of the clearing, the proposed clearing is within an environment associated with a wetland. Given the nature of the proposed clearing, it is unlikely to significantly impact the wetland.</p>	At variance	Yes <i>Refer to Section 3.2.4 above.</i>
<p><u>Principle (g):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.”</i></p> <p><u>Assessment:</u></p> <p>The mapped soils are generally not susceptible to wind/water erosion, nutrient export, or salinity. The soil unit Spearwood wet, lake Phase is recorded as having a high potential for Phosphorus export (above 70 percent of mapped soil unit). Typha control methods proposed by the applicant (Applicant 2021a) will include slashing the plants below the water line and chemical control, which is not likely to have an appreciable impact on land degradation. Perry Lakes is situated in an area that represents a high risk of encountering acid sulphate soils.</p>	Not likely to be at variance	Yes <i>Refer to Section 3.2.4 above</i>
<p><u>Principle (i):</u> <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.”</i></p> <p><u>Assessment:</u></p> <p>The removal of Typha may increase water turbidity in the short term. Surface water conditions are likely to return to normal fairly soon after clearing activities. The clearing will not significantly impact the wetland.</p>	May be at variance	No <i>Refer to Section 3.2.4, above.</i>
<p><u>Principle (j):</u> <i>“Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.”</i></p> <p><u>Assessment:</u></p> <p>The targeted removal of Typha is clearing is unlikely to contribute to waterlogging.</p>	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. Sources of information

D.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)

D.2. References

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Birdlife Australia (2022b) Australian Little Bittern Identification Guide: <https://www.birdlife.org.au/documents/AB-albguide.pdf>, accessed January 2022.

Birdlife Australia (2022c) <https://www.birdlife.org.au/bird-profile/black-bittern> accessed January 2022

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