City of Wanneroo

Management and Clearing of *Typha orientalis* and *Typha domingensis*

Native Vegetation Clearing Permit Application Supporting Documentation

1. Introduction

The City of Wanneroo is proposing to undertake the clearing of *Typha orientalis and Typha domegensis* within various areas throughout the City. The proposed clearing will facilitate the management of *T. orientalis* and *T. domingensis* to maintain the quality and aesthetics of lakes, streams and earthen infrastructure at various locations within the City of Wanneroo. Land ownership and zoning within the project area is detailed in Table 1 below.

Table 1: Land ownership and zoning within clearing areas.

Lot Number	Address	Land Owner	MRS Zoning	Reserve Purpose
LAKE JOONDALUP				
Reserve Number 31048	1109 Ocean Reef Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Recreation and Conservation of Flora and Fauna
Lot 137 on Plan 10027	5 Banyandah Boulevard, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
Lot 139 on Plan 9815	349 Scenic Drive, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
Lot 501 on Deposited Plan 73317	349 Scenic Drive, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
Lot 39 on Deposited Plan 32924	275 Scenic Drive, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Recreation and Community Purposes
Lot 40 on Deposited Plan 32924	245 Scenic Drive, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
Lot 41 on Deposited Plan 32924	215 Scenic Drive, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
Lot 800 on Deposited Plan 76721	100 Ariti Avenue, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Drainage and Public Recreation
	Ariti Avenue, Wanneroo 6065		Road Reserve	Road
LAKE ADAMS				
Lot 11524 on Deposited Plan 26917	50K Neaves Road, Mariginiup 6078	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
DA VINCI PARK				

Lot 705 on Deposited Plan 4781	11 Da Vinci Drive, Tapping 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation and Drainage
SOLANA PARK				
Lot 8001 on Deposited Plan 68139	19 Solaia Loop, Woodvale 6026	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
PANZANO PARK				
Lot 3000 on Deposited Plan 69603	2 Panzano Court, Woodvale 6026	Crown Land – City of Wanneroo Managed	Parks and Recreation	Recreation
BADGERUP RESERVE				
Lot 12421 on Deposited Plan 20358	279L Badgerup Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Lot 2384 on Deposited Plan 133172	255L Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Lot 2385 on Deposited Plan 133173	257 Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Lot 740 on Deposited Plan 245969	259 Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Lot 300 on Deposited Plan 301991	299 Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Lot 2451 on Deposited Plan 133174	297L Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Lot 774 on Deposited Plan 246224	229 Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
Proposed Road	279L Badgerup Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Road Reserve	Road
LITTLE BADGERUP RESERVE				
Lot 11921 on Deposited Plan 18933	215 Badgerup Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation

Lot 300 on Deposited Plan 106721	193 Badgerup Road, Wanneroo 6065	Crown Land – City of Wanneroo Management	Parks and Recreation	Waterway
Lot 672 on Deposited Plan 245973	349 Benmuni Road, Wanneroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Conservation and Passive Recreation
WARRADALE PARK				
Lot 13968 on Deposited Plan 23449	31 Warradale Terrace, Landsdale 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Recreation and Parklands
Lot 8014 on Deposited Plan 409474	31 Warradale Terrace, Landsdale 6065	Crown Land – City of Wanneroo	Parks and Recreation	Public Recreation
KINGSWAY REGIONAL SPORTING COMPLEX NORTH/SOUTH LAKE				
Lot 555 on Deposited Plan 64232	100 Kingsway, Madeley 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Recreation
MARANGAROO GOLF COURSE				
Lot 11139 on Deposited Plan 217410	8 Aylesford Drive, Marangaroo 6065	Crown Land – City of Wanneroo Managed	Parks and Recreation	Public Recreation
NYUNDA PARK				
Lot 1 on Deposited Plan 62246	40 Ariti Avenue, Wanneroo 6065	Freehold – City of Wanneroo Managed	Parks and Recreation	N/A

2. Background

In a study conducted by Keighery and McCabe in 2015, *Typha orientalis* was found to be native to Western Australia (Keighery, 2016). This was due to the early collection of *T. orientalis* in 1839, the lack of historical listings as a weed within WA and the use of it as a major food source by Indigenous Australians (Keighery, 2016). As a result of the reclassification of *T. orientalis* as a naturalised species in Western Australia, a clearing permit is now required for the clearing *T. orientalis*. The City of Wanneroo has previously undertaken the control and removal of *T. orientalis* in many reserves within the City, due to the invasive and competitive nature of the species.

The City undertakes the management and removal of *T. orientalis* and *Typha domingensis* within various areas of the City, including conservation reserves, irrigation lakes, wetlands within public open spaces and other infrastructure. This clearing permit will enable the City to successfully manage *Typha* to prevent it from dominating sites and reducing the biodiversity of wetland areas.

Both *T. orientalis* and *T. domingensis* provide a number of valuable functions within wetlands including providing shelter, nesting sites and is also a food source for some fauna species (Department of Conservation and Land Management, 2003). As a result, the City will undertake the strategic removal of *Typha* within wetlands to ensure there are no detrimental impacts to the quality of the wetlands. In conservation reserves in particular, the City will revegetate areas cleared of *Typha* with other, less invasive native wetland species to replace the biological functions the *Typha* provides to the wetlands.

In order for the City to continue the management and removal of *T. orientalis* and *T. domingesis* (hereafter collectively referred to as *Typha*), the City submits this supporting documentation to assist the Department of Water and Environmental Regulation's (DWER) assessment of the City's clearing permit application.

3. Scope

The purpose of this document is to provide an assessment against the *Environmental Protection Act 1986* – Ten Clearing Principles to determine whether the clearing of *Typha* is likely to have a significant impact on the environment. The clearing of *Typha* is proposed within several areas within the City of Wanneroo boundary, an area totalling 41.63 hectares (Attachment A – Clearing Plans and Attachment B – Shapefiles). Within these areas, only *Typha* will be cleared.

4. Proposed *Typha* Management Sites

The proposed clearing areas are located within the following sites:

1. Lake Joondalup (various sites), Wanneroo;
2. Lake Adams, Mariginiup;
3. Da Vinci Park, Tapping;
4. Solana Park, Woodvale;
5. Panzano Park, Woodvale;
6. Lake Badgerup Reserve, Wanneroo;
7. Little Badgerup Reserve, Wanneroo;
8. Warradale Park, Landsdale;
9. Kingsway Regional Sporting Complex North and South Lakes, Madeley;
10. Marangaroo Golf Course, Marangaroo; and
11. Nyunda Park, Wanneroo.

In addition to the above locations, the City also proposes to undertake *Typha* removal along the Woodvale Dual Use Path (the Path), a path that runs from Woodvale Drive in the north to Whitfords Avenue in the south. The Path falls within lots managed by a number of entities, including the Department of Biodiversity, Conservation and Attractions (DBCA) and developers. The City has determined that land managed by DBCA will fall under the exemptions under Part 5 of the *Environmental Protection Act 1986* (WA), specifically Schedule 6, Clause 3. DBCA have provided the City with the authority to access DBCA managed land

in order to control and clear *Typha* to create a buffer to City of Wanneroo managed land (see Letters of Authority). Additionally, the City has determined that the land managed by developers also fall under an exemption – Schedule 6, Clause 9. The estates have been required to develop Environmental Management Plans and Wetland Management Plans, and under these plans, the management of *Typha* is required.

Site assessments and desktop surveys were undertaken for each site to determine the flora and fauna species present at each site.

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (Attachment D) for each of the proposed clearing areas. An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E) was also generated for each site by the City as supporting documentation for the below clearing principle assessments.

The following summarises flora and fauna identified at each site; and the identified impacts and the level of variance against the ten clearing principles.

4.1 Lake Joondalup, Wanneroo

4.1.1 Proposed clearing areas

Lake Joondalup is part of a chain of wetlands within the Yellagonga Regional Park, which lies approximately 20km north of Perth (City of Wanneroo and City of Joondalup, 2015). Lake Joondalup is considered to be a wetland of national significance (Department of Conservation and Land Management, 2003). Lake Joondalup is classified as a Conservation wetland (City of Wanneroo, 2018). As part of general maintenance and capital works projects of Lake Joondalup, the City is aiming to reduce the percentage cover of *Typha* to increase native species richness within the wetland (City of Wanneroo and City of Joondalup, 2015). Therefore, the City requires a clearing permit in order to control and reduce *Typha* across a number of sites along the eastern side of Lake Joondalup. The total area of the proposed clearing areas at Lake Joondalup is 9.00 ha (Attachment A 1a-1g and Attachment B 1a-1g), within which only *Typha* will be cleared.

The sites included within the proposed clearing areas are:

1. Ottawa Rehabilitation site (Figure 1);
2. Rotary Park Rehabilitation site (Figure 2);
3. Church Street Drain and Rehabilitation site (Figure 2);
4. Wanneroo Recreation Centre Rehabilitation site (Figure 3);
5. Frogs Hollow (Figure 3);
6. Turtle Nesting Site (Figure 3); and
7. Ariti Drain (Figure 4).

Figure 1: Proposed clearing of *Typha* within 2.61 ha within the Ottawa Rehabilitation site at Lake Joondalup, Wanneroo.

Figure 2: Proposed clearing of *Typha* within 1.33 ha within Rotary Park Rehabilitation site and 0.83 ha within Church Street Drain and Rehabilitation site at Lake Joondalup, Wanneroo.

Figure 3: Proposed clearing of *Typha* within 1.81 ha within Wanneroo Recreation Centre Rehabilitation site, 1.10 ha within Frogs Hollow and 0.18 ha within Turtle Nesting site at Lake Joondalup, Wanneroo.

Figure 4: Proposed clearing of *Typha* within 1.15 ha within Ariti Drain at Lake Joondalup, Wanneroo.

Within the Rotary Park Rehabilitation Site and the Ariti Drain and Rehabilitation site, the proposed clearing extended into land managed by the Department of Biodiversity, Conservation and Attractions (DBCA). DBCA have provided the City with permission and access to a number of lots managed by DBCA for the City to remove *Typha* (see Letters of Authority).

4.1.2 Flora and vegetation

There is a diverse range of flora and fauna found within the boundaries of the clearing area. A site visit of the proposed clearing areas at Lake Joondalup was undertaken on 5 June 2020 and photographs were taken of the proposed clearing areas (Attachment C 1a-1g).

In addition to the site visit conducted on 5 June 2020, a previous flora surveys undertaken by Natural Area Consulting Management Services (2017) and Eco Logical (2016) were also consulted to provide information on vegetation present at each site. The vegetation identified in the assessments is collated in the table below (Table 2).

Table 2: Flora and weed species identified within the proposed clearing areas at Lake Joondalup, Wanneroo.

Remnant vegetation species	Weed Species
Acacia hugelii	*Arctotheca calendula*
Acacia pulchella	*Arundo donax*
Acacia saligna	*Asparagus asparagoides*
Alexgeorgia nitens	*Avena barbata*
Allocasuarina fraseriana	*Avena fatua*
Anthropodum capillipes	*Brassica tournefortii*
Banksia attenuata	*Briza maxima*
Banksia ilicifolia	*Bromus diandrus*
Banksia littoralis	*Cenchrus clandestinus*
Banksia menziesii	*Centranthus macrosiphon*
Baumea articulata	*Conyza* sp.
Baumea preissii	*Cynodon dactylon*

Bossiaea eriocarpa	*Cyperus* sp.
Burchardia umbellata	*Ehrhata calycina*
Caesia micrantha	*Eragrostis curvula*
Caladenia flava	*Euphorbia peplus*
Caladenia latifolia	*Euphorbia terracina*
Conostephium pendulum	*Ficus carica*
Conostylis candicans	*Freesia alba x leichtlinii*
Corynotheca micrantha	*Gazania linearis*
Crassula colorata	*Homalanthus populifolius*
Dianella revoluta	*Hordeum leporinum*
Diuris longifolia	*Hypochaeris glabra*
Drosera erythrorhiza	*Ipomoea cairica*
Drosera macrantha	*Lachenalia reflexa*
Eriosremon spicatus	*Lactuca serriola*
Eucalyptus marginata	*Lagurus ovatus*
Eucalyptus rudis	*Lupinus angustifolius*
Gompholobium tomentosum	*Lupinus consentinii*
Hardenbergia comptoniana	*Moraea flaccida*
Hibberta hypercoides	*Olea europaea*
Hibbertia racemosa	*Oxalis pes-caprae*
Hypocalymma robustum	*Paspalum diatatum*
Isotropis cunefolia	*Ricinus communis*
Jacksonia furcellata	*Romulea rosea*
Juncus pallidus	*Ursinia anthemoides*
Lagenifera huegelii	*Schinus terebinthifolius*
Lepidosperma longitudinale	*Solanum nigrum*
Leucopogon propinquus	*Stenotaphrus secundatus*
Loxocarya flexuosa	*Tribulus terrestris*
Macrozamia riedlei	*Trifolium* sp.
Melaleuca raphiophylla	*Vicia* sp.
Mesomelaena pseudostygia	*Washingtonia filifera*
Olearia axillaris	*Zantedeschia aethiopica*
Opercularia hispidula	[redacted]
Opercularia vaginata	
Phylanthus calycinus	
Pterostylis vittata	
Regaelia cilata	
Solanum symonii	
Sowerbaea laxiflora	
Thysanotus patersonii	
Typha orientalis/domingensis	
Viminaria juncea	
Xanthorrhoea preisii	
Xanthosia huegelii	

There is a significant amount of remnant vegetation within the proposed clearing boundaries of the sites at Lake Joondalup. There is a high biodiversity value along the length of Lake Joondalup, which will be increased with the control and clearing of invasive *Typha* species. The majority of proposed clearing areas are currently maintained by the City, with some areas managed by the Department of Biodiversity, Conservation and Attractions (DBCA). The City has obtained approval from DBCA to access these lots to undertake *Typha* management as they are adjacent to City managed land. The weeds listed within Table 2 is not an exhaustive list of weeds currently present in the proposed clearing boundaries, the listed weeds are considered to be the most dominant present within Lake Joondalup.

4.1.3 Fauna

During the aforementioned vegetation survey, avian fauna species were present within the proposed clearing area. Historical data collected by the City demonstrates there is a diverse range of fauna species present within the proposed clearing area (Table 3).

Table 3: Fauna species present within the proposed clearing area at Lake Joondalup, Wanneroo.

Avian species	Mammalian species	Reptile Species	Invertebrate Species
Accipiter cirrhocephalus	*Chalinolobus gouldii*	*Chelodina oblonga*	*Austracantha minax*
Anas superciliosa	*Macropus fulinginosus*	*Limnodynastes dorsalis*	*Apis mellifera*
Anhinger melanogaster	*Vulpes vulpes*	*Litoria adelaidensis*	*Diplacodes haematodes*
Anthochaera caranculata		*Litoria moorei*	*Nephila edulis*
Ardea alba		*Notechis scutatus*	*Orthetrum caledonicum*
Ardea novaehollindae		*Pseudonaja affinis*	*Vanessa kershawi*
Ardea pacifica		*Tiliqua rugosa*	
Barnardius zonarius			
Biziura lobata			
Cacatua roseicapilla			
Cacatua tenuirostris			
Calyptorhynchus latirostris			
Calyptorhynchus banksii naso			
Circus approximans			
Coracina novaehollindae			
Corvus coronoides			
Craticus tibicen			
Cracticus torquatus			
Cygnus atratus			
Dacelo novaeguineae			
Elanus axillaris			
Falco longipennis			
Gallirallus philippensis			
Grallina cyanoleuca			
Himantopus himantopus			
Hirundo neoxena			
Nycticorax caledonicus			
Pelicanus conspicillatus			
Pernis ptilorhynchus			
Phalacrocorax melanileucos			
Platalea flavipes			
Podargus strigoides			
Rhipidura leucophrys			
Sericornis frontalis maculatus			
Streptopelia chinensis			
Streptopelia senegalensis			
Tachybaptus novaehollindiae			

Tadorna tadornoides	[redacted]
Threskornis molucca	
Trichoglossus haematodus	
Tribonyx ventralis	
Zosterops lateralis	

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within any of the seven selected clearing site areas (Attachment E 1a-1g). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 1a-1g).

WALGA's EPCR did identify the all seven selected clearing areas as being located within a Carnaby's cockatoo (*Calyptorhynchus latirostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds. The EPCR for the Rotary Park Rehabilitation site (Attachment 1b) and Ariti Drain and Rehabilitation site (Attachment 1g) also identified the areas contained remnant vegetation requiring investigation for Carnaby's cockatoo feeding habitat. *Typha* is not listed as a food source for Carnaby's cockatoos (Department of Environment and Conservation, 2011).

Additionally, WALGA's EPCR identified all seven selected clearing areas as potential Quenda (*Isoodon obesulus fusciventer*) habitat, indicating the species is likely to occur in these areas.

4.1.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 1a-1g) for each of the proposed clearing sites along Lake Joondalup, the impacts listed in the report are categorised in the following sections 4.1.4.1 to 4.1.4.7, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 1a-1g) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following sections summarise the identified environmental impacts and the level of variance against the clearing principles.

4.1.4.1 Ottawa Revegetation Site

Table 4: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified that the vegetation within the clearing boundary consists of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed

		clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the proposed clearing area is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species. The proposed clearing area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise of habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the proposed clearing area, *Typha* will be the target species and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase the biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Lake Joondalup. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are six other wetlands located within 5km of the proposed clearing area: Mariginiup Lake (2285m),

		Jandabup Lake (3599m), Little Mariginiup Lake (3831m), Walluburnup Swamp (4130m), Beenyup Swamp (4166m) and Lake Adams (4903m). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF299 and within the Yellagonga Regional Park. The proposed clearing site is also nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF164 (1122m) and BF469 (1412m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. It is also located within Lake Joondalup Nature Reserve: R: 31048 Nature Reserve Class A. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands sites. Lake Joondalup is a Conservation Wetland. The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing area occurs within the Perth Groundwater Area (RIWI Act area).

		The proposed clearing area is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem. The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 100. Clearing of only *Typha* within 2.61 hectares, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.1.4.2 Rotary Park Rehabilitation Site

Table 5: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the clearing boundary area consists of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species.

		The proposed clearing area within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the clearing area, *Typha* will be the target species to be cleared and remnant native vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase the biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Lake Joondalup. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are five other wetlands located nearby the proposed clearing area: Mariginiup Lake (3067m), Walluburnup Swamp (3385m), Beenyup Swamp (3420m), Jandabup Lake (3817m) and Little Mariginiup Lake (4657m). Due to the specific clearing of *Typha* to allow the increase in other native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils.

cleared if the clearing of the vegetation is likely to cause appreciable land degradation.		The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karakatta Sand Yellow Phase (211Sp_Ky), with low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. The proposed clearing area also consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF299 and within the Yellagonga Regional Park. The proposed clearing site is also nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF164 (2115m) and BF469 (2285m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands site. Lake Joondalup is a Conservation Wetland. The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem. The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity.

		Given targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The 0.09 ha of the proposed clearing area is within the DAFWA Land Quality flood risk category 0 and 1.24 ha is within category 100. Clearing of *Typha* within 1.33 hectares, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.1.4.3 Lake Joondalup – Church Street Drain and Rehabilitation Site

Table 6: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the clearing boundary area consisted of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species. The application area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna the

		proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the proposed clearing area, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Lake Joondalup, a Conservation wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are five other wetlands located within 5km of the proposed clearing area: Mariginiup Lake (3029m), Walluburnup Swamp (3337m), Beenyup Swamp (3371m), Jandabup Lake (3692m) and Little Mariginiup Swamp (4624m). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	0.42 ha of the proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel.

		The soil within the proposed clearing site consists of Karakatta Sand Yellow Phase (211Sp_Ky), with low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. The soil within the proposed clearing site also consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF299 and within the Yellagonga Regional Park. The proposed clearing site is also nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF164 (2220m) and BF471 (2276m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands site. Lake Joondalup is a Conservation Wetland. The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem. The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, which will allow for the increase in density of native riparian and wetland flora, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
Principle (j) Native vegetation should not be cleared if the clearing of		The 0.45 ha of the proposed clearing area is within the DAFWA Land Quality flood risk category 0 and 0.38 ha is within category 100.

the vegetation is likely to cause or exacerbate the incidence or intensity of flooding.		Clearing of *Typha* within 0.83 hectares is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.1.4.4 Lake Joondalup – Wanneroo Recreation Centre Rehabilitation Site

Table 7: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the clearing boundary area consisted of a diverse range of species. Given the purpose of the clearing is to remove only *Typha,* an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species. The application area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified.

		Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific clearing of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the proposed clearing area, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Lake Joondalup. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are six other wetland located nearby the proposed clearing area: Walluburnup Swamp (2963m), Beenyup Swamp (2999m), Mariginiup Lake (3217m), Jandabup Lake (3792m), Little Mariginiup Lake (4815m) and Badgerup Lake (4930m). Due to the specific clearing of Typha to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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	**Red**	The proposed clearing area is located within Bush Forever site BF299 and within Yellagonga Regional Park. The proposed clearing area located nearby a total of 10 Bush Forever sites, which are located within 5km of the

any adjacent or nearby conservation area.		proposed clearing site. The two closest Bush Forever Sites are BF407 (2095m) and BF471 (2323m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be removed. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands site. Lake Joondalup is a Conservation Wetland. The proposed clearing area is within the Perth and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Quality flood risk category 100. Clearing of Typha within 1.81 hectares, which will allow for the increase in density and native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.1.4.5 Lake Joondalup – Frogs Hollow Site

Table 8: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the clearing boundary area consisted of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species. The application area is within a Regional Ecological Linkage and also contains a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the proposed clearing area, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease

has been significantly cleared.		competition between *Typha* and native species within the clearing area and increase biodiversity values of the wetland. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, it is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Lake Joondalup. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase and improve the condition of the wetland. There are six other wetlands located within 5km of the proposed clearing area: Walluburnup Swamp (2816m), Beenyup Swamp (2852m), Mariginiup Lake (3353m), Jandabup Lake (3789m), Badgerup Lake (4791m) and Little Mariginiup Lake (4954m). Due to the specific clearing of Typha to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is between less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific of the clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF299 and within Yellagonga Regional Park. The proposed clearing area located nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF407 (2003m) and BF471 (2300m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species.

		The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands site. Lake Joondalup is a Conservation Wetland. The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem and within a Terrestrial Water Dependent Ecosystem: Riparian vegetation, known groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 100. Clearing of *Typha* within 1.10 hectares, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.1.4.6 Lake Joondalup – Turtle Nesting Site

Table 9: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the application area consisted of a diverse range of species.

high level of biological diversity		Given the purpose of the clearing is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species. The proposed clearing area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the proposed clearing area, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).

Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within lake Joondalup. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are five other wetland located within 5km of the proposed clearing area: Walluburnup Swamp (2786m), Beenyup Swamp (2822m), Mariginiup Lake (3419m), Jandabup Lake (3749m) and Badgerup Lake (4744m). Due to specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is between less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF299, and within the Yellagonga Regional Park. The proposed clearing area located nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF407 (1987m) and BF471 (2251m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing area, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands site. Lake Joondalup is a Conservation Wetland. The proposed clearing area within Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area).

		The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem and within a Terrestrial Water Dependent Ecosystem: Riparian vegetation, known groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within DAFWA Land Quality flood risk category 100. Clearing of *Typha* within 0.18 hectares, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.1.4.7 Lake Joondalup – Ariti Rehabilitation Site

Table 10: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the application area consisted of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).

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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however, previous surveys indicate the area supports a diverse range of fauna species. The proposed clearing area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the proposed clearing area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the proposed clearing area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a significant wetland – Lake Joondalup. Within the proposed clearing area, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within lake Joondalup. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are five other wetland located within 5km of the proposed clearing area: Walluburnup Swamp (2326m), Beenyup Swamp (2364m), Mariginiup Lake (3661m), Jandabup Lake (3735m) and Badgerup Lake (4389m).

		Due to specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is between less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood Sand Phase (211SpW_Sp) with irregular banks of karst depressions, some limestone outcrop and shallow brown sands. The soil within the proposed area also consists of Spearwood wet, lake Phase (211SpW_LAKE). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF299, and within the Yellagonga Regional Park. The proposed clearing area located nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF407 (1661m) and BF471 (2238m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing area, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1738. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Joondalup, a Directory of Important Wetlands site. Lake Joondalup is a Conservation Wetland. The proposed clearing area within Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Saline wetland, known groundwater dependent ecosystem and within a Terrestrial Water

		Dependent Ecosystem: Riparian vegetation, known groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The 0.78 ha of the proposed clearing area is within DAFWA Land Quality flood risk category 100 and 0.37 ha is within category 0. Clearing of *Typha* within 1.15 hectares, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.2 Lake Adams, Mariginiup

4.2.1 Proposed clearing area

Lake Adams is located in Mariginiup and forms a part of a complex of wetlands along the Swan Coastal Plain (City of Wanneroo, 2015). Lake Adams is a Conservation Category wetland (City of Wanneroo, 2015). The management and removal of *Typha* within this wetland will enable the increase of native riparian and wetland vegetation and increase the biodiversity values of Lake Adams. One section of Lake Adams is proposed to be cleared of *Typha* (Figure 5) (Attachment A 2 and Attachment B 2), with a total clearing area of 0.03 hectares. Within this area, only *Typha* will be cleared.

Figure 5: Proposed clearing of *Typha* within 0.03 ha within Lake Adams, Mariginiup.

4.2.2 Flora and vegetation

Only four native species are present within the clearing area in addition to *Typha*. A site visit of the proposed clearing area was conducted on 6 December 2019 and photographs were taken of the proposed clearing area (Attachment C 2).

Within the proposed clearing area, *Typha* is the dominant vegetation species. In addition to *Typha* there is also native vegetation and another weed species found within the clearing area. These species were identified in a vegetation assessment undertaken on 6 December 2019. The species present are identified in Table 11.

Table 11: Flora and weed species identified within the proposed clearing area at Lake Adams, Mariginiup.

Remnant Vegetation Species	Weed Species
Baumea articulata	*Cyperus tenuiflorus*
Baumea juncea	
Centella asiatica	
Hypocalymma angustifolium	
Typha orientalis/domingensis	

Within the clearing area, there are few remnant species, however, outside of the clearing boundary, the park consists of a diverse range of species. In order to maintain and enhance the biodiversity values of Lake Adams, the control and removal of *Typha* is required. The weeds listed in Table 11 is not an exhaustive list of weeds, the listed weeds are considered to be the most dominant within the clearing area.

4.2.3 Fauna

During the aforementioned vegetation assessment, no fauna were documented within the extent of the proposed clearing areas.

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 2). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 2).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.2.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 2), the impacts listed in the report are categorised in Table 12, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 2) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 12: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 06/12/2019 identified the vegetation within the proposed clearing area consisted of few native species, including *Baumea articulata, Baumea juncea, Centella asiatica* and *Hypocalymma angustifolium. Typha* is also present in the proposed clearing area. Given the purpose of the clearing is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection no avian species were observed within the proposed clearing areas. The application area does not contain any Ecological Linkages. Considering the vegetation to be cleared is exclusively *Typha* and does not contain habitat trees for significant fauna the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Orange**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within a small wetland in conservation reserve. The area to be cleared contains only a small amount of remnant vegetation, which will not be included in the clearing. The native vegetation is not significant as a remnant of native vegetation within a cleared area.

		Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Lake Adams. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are four other wetland located nearby the proposed clearing area: Little Mariginiup Lake (1330m), Mariginiup Lake (1727m), Jandabup Lake (3283m) and Lake Joondalup (4121m). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Bassendean, Jandakot Phase (212Bs_Ja) which is Jandakot low dunes with slopes less than 10% and generally more that 5m relief and grey sand over pale yellow sands generally underlain by humic and iron podzols. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, it is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located nearby a total of 24 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF147 (1231m) and BF443 (1473m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1727. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas. The proposed clearing is not likely to be at variance to principle (h).
Principle (i) Native vegetation should not be cleared if the clearing of the vegetation is likely to	**Orange**	The proposed clearing area is located in Lake Adams, a Conservation wetland.

cause deterioration in the quality of surface or underground water.		The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Wanneroo Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Wetland, high potential groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of only *Typha* within 0.03 ha, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.3 Da Vinci Park, Tapping

4.3.1 Proposed clearing area

Da Vinci Park lake is located in Tapping. The wetland is classified as a Resource Enhancement wetland (City of Wanneroo, 2015). As part of the general maintenance of Da Vinci Park, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 0.23 hectares (Attachment A 3 and Attachment B 3), within which only *Typha* will be removed.

Figure 6: Proposed clearing of *Typha* within 0.23 ha within Da Vinci Park lake, Tapping.

4.3.2 Flora and vegetation

In addition to *Typha*, there are four other remnant native species within the proposed clearing area. Within the proposed clearing area, *Typha* is the dominant vegetation species. A site visit of the proposed clearing area was conducted on 5 June 2020 and photographs of the site were taken (Attachment C 3). The species present are identified in Table 13.

Table 13: Flora and weed species identified within the proposed clearing area at Da Vinci Park lake, Tapping.

Remnant Vegetation Species	Weed Species
Allocasaurina fraseriana	*Cyperus tenuiflorus*
Eucalyptus rudis	*Ehrhata* sp.
Melaleuca raphiophylla	[redacted]
Melaleuca preissiana	
Typha orientalis/domingensis	

The proposed clearing area consists of few native flora species around the edge of the lake. The remnant vegetation has a low biodiversity value, consisting of three species, with various weed species present. The control and removal of *Typha* will enhance the biodiversity value of the wetland. The list of weeds is not an exhaustive list, the weed species listed are considered to be the most dominant within the clearing area.

4.3.3 Fauna

During the aforementioned vegetation survey, no avian fauna species were present within the proposed clearing area. Historical data collected by the City shows there are a number of fauna species present within the proposed clearing area (Table 14).

Table 14: Fauna species recorded within the proposed clearing area at Da Vinci Park lake, Tapping.

Avian Species	Reptile Species
Anas superciliosa	*Chelodina obtusa*
Anthochaera caranculata	*Tiliqua rugosa*
Calyptorhynchus latirostris	[redacted]
Corvus coronoides	
Dacelo novaeguineae	
Fulica atra	
Grallina cyanoleuca	
Hieraaetus morphnoides	
Phylidonyris albifrons	
Porphyrio melanotus	
Tadorna tadornoides	
Threskiornis moluccus	
Trichoglossus haematodus	

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 3). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 3).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.3.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 3), the impacts listed in the report are categorised in Table 15, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 3) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 15: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 05/06/2020 identified the vegetation within the proposed clearing area consisted of few native species, including *Allocasaurina fraserinana*, *Eucalyptus rudis* and *Melaleuca raphiophylla*. *Typha* is also present in the proposed clearing area. Given the purpose of the clearing permit is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection no avian species were observed within the proposed clearing areas. The application area is does not contain any Ecological Linkages. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).

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.	**Orange**	A desktop study identified Threatened Ecological Communities (TECs) within 5 km, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within a small wetland in conservation reserve. The area to be cleared contains only a small amount of remnant vegetation, which will not be included in the clearing. The native vegetation is not significant as a remnant of native vegetation within a cleared area. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is within Da Vinci Lake, a Resource Enhancement wetland. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are five other wetland located nearby the proposed clearing area: Mariginiup Lake (634m), Little Mariginiup Lake (1497m), Lake Adams (1968m), Lake Joondalup (2182m) and Jandabup Lake (3100m). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karrakatta Sand Yellow Phase (211Sp_Ky) which consists of low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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	**Red**	The proposed clearing area is located nearby a total of 16 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF147 (534m) and BF443 (1216m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha*

any adjacent or nearby conservation area.		will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Wanneroo Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Wetland, moderate potential groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of only *Typha* within 0.23 ha, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.4 Solana Park, Woodvale

4.4.1 Proposed clearing area

Solana Park is located in Woodvale and is directly adjacent to Yellagonga Regional Park. There is currently a clearing permit for this reserve, however, as this is due to expire in December 2022 it has been included in this permit application. As part of the general maintenance of Solana Park, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 0.54 hectares (Attachment A 4 and Attachment B 4), within which only *Typha* will be cleared.

Figure 7: Proposed clearing of 0.63 ha of *Typha* within Solana Park, Woodvale.

4.4.2 Flora and vegetation

Within the clearing area of Solana Park, there are only four remnant native species along with *Typha*. A site visit of the proposed clearing area was undertaken on 9 June 2020 and photographs were taken of the proposed clearing area (Attachment C 4). The vegetation identified in the assessment is collated in Table 16.

Table 16: Flora species identified within the proposed clearing area at Solana Park, Woodvale.

Remnant Vegetation Species	Weed Species
Baumea articulata	*Cyperus tenuiflorus*
Eucalyptus rudis	*Ehrhata* sp.
Ficinia nodosa	*Hypochaeris glabra*
Melaleuca raphiophylla	
Typha orientalis/domingensis	

Within Solana Park, a revegetation area has been established through the City's Capital Works Program. In order to maintain and enhance the biodiversity values of the area, the control and removal of *Typha* is required. The weeds listed in Table 16 is not an exhaustive list of weeds, the listed weeds are considered to be the most dominant within the clearing area.

4.4.1 Fauna

During the aforementioned vegetation survey, no fauna were documented within the extent of the proposed clearing areas.

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 4). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 4).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.4.2 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 4), the impacts listed in the report are categorised in Table 17, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 4) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 17: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance

Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 09/06/2020 identified the vegetation within the proposed clearing area consisted of few native species, including *Baumea articulata*, *Eucalyptus rudis*, *Ficinia nodosa* and *Melaleuca raphiophylla*. *Typha* is also present in the proposed clearing area. Given the purpose of the clearing permit is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection no avian species were observed within the proposed clearing areas. The proposed clearing area is within a Regional Ecological Linkage. The proposed clearing area is also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Orange**	A desktop study identified Threatened Ecological Communities (TECs) within 5 km, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within a small wetland in conservation reserve. The area to be cleared contains only a small amount of remnant vegetation, which will not be included in the clearing. The native vegetation is not significant as a remnant of native vegetation within a cleared area. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, the proposed clearing is not likely to be at variance to principle (e).

Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Orange**	The proposed clearing area is within Solana Park, a wetland within Yellagonga Regional Park which is a Conservation wetland. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are six other wetland located nearby the proposed clearing area: Walluburnup Swamp (1157m), Lake Goollelal (1062m), Beenyup Swamp (1428m), Lake Joondalup (1916m), Badgerup Lake (3155m) and Lake Gnangara (4793m). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karrakatta Sand Yellow Phase (211Sp_Ky) which consists of low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is within Bush Forever site BF299 and within Yellagonga Regional Park. The proposed clearing area is located nearby a total of 16 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF39 (2046m) and BF327 (2087m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Wetland, moderate potential groundwater dependent ecosystem.

		The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of only *Typha* within 0.63 ha, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.5 Panzano Park, Woodvale

4.5.1 Proposed clearing area

Panzano Park is located in Woodvale and is directly adjacent to Yellagonga Regional Park. As part of the general maintenance of Panzano Park, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 0.09 hectares (Attachment A 5 and Attachment B 5), within which only *Typha* will be removed.

Figure 8: Proposed clearing of *Typha* within 0.09 ha within Panzano Park, Woodvale.

4.5.2 Flora and vegetation

Within the clearing area of Panzano Park, there are only four remnant native species along with *Typha*. A site visit of the proposed clearing area was undertaken on 27 March 2019 and photographs were taken of the proposed clearing area (Attachment C 5). The vegetation identified in the assessment is collated in Table 18. Within the proposed clearing area, *Typha* is the dominant species.

Table 18: Flora species recorded within the proposed clearing area at Panzano Park, Woodvale.

Remnant Vegetation Species	Weed Species
Baumea articulata	*Cyperus tenuiflorus*
Eucalyptus rudis	*Ehrhata* sp.
Ficinia nodosa	*Hypochaeris glabra*
Melaleuca raphiophylla	
Typha orientalis/domingensis	

Within the clearing area, there are few remnant species, however, outside of the clearing boundary, the park consists of a range of species. In order to maintain and enhance the biodiversity values of Panzano Park, the control and removal of *Typha* is required. The weeds

listed in Table 18 is not an exhaustive list of weeds, the listed weeds are considered to be the most dominant within the clearing area.

4.5.3 Fauna

During the aforementioned vegetation survey, no fauna were documented within the extent of the proposed clearing areas.

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 5). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 5).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.5.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 5), the impacts listed in the report are categorised in Table 19, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 5) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 19: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 27/03/2019 identified the vegetation within the proposed clearing area consisted of few native species, including *Baumea articulata*, *Eucalyptus rudis*, *Ficinia nodosa* and *Melaleuca raphiophylla*. *Typha* is also present in the proposed clearing area. Given the purpose of the clearing permit is to remove only *Typha*, an invasive species, from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
Principle (b) – Native vegetation should not be cleared if it comprises the whole or a part of, or is	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat.

necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia		During the site inspection no avian species were observed within the proposed clearing areas. The proposed clearing area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and the clearing does not consist of habitat trees for significant fauna the proposed clearing is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Orange**	A desktop study identified Threatened Ecological Communities (TECs) within 5 km, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Red**	The proposed clearing area is located within a small wetland in a conservation reserve. The area to be cleared contains remnant vegetation, which will not be included in the clearing. The native vegetation is not significant as a remnant of native vegetation within a cleared area. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Orange**	The proposed clearing area is within Panzano Park, within a Conservation wetland. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are five other wetland located nearby the proposed clearing area: Walluburnup Swamp (516m), Beenyup Swamp (829m), Lake Joondalup (1104m), Lake Goollelal (1991m) and Badgerup Lake (3236m). Due to the specific clearing of *Typha* to allow the increase in native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).

Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The 0.09 ha of the proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karrakatta Sand Yellow Phase (211Sp_Ky) which consists of low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. The soil within the proposed clearing site also consists of Spearwood wet, swamp Phase (211SpW_SWAMP): Swamp. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is within Bush Forever site BF299 and within Yellagonga Regional Park. The proposed clearing area is also located nearby a total of nine Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF327 (2162m) and BF407 (2301m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Wetland, moderate potential groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
Principle (j) Native vegetation should not be cleared if the clearing of the vegetation is likely to		The proposed clearing area is within the DAFWA Land Quality flood risk category 0.

cause or exacerbate the incidence or intensity of flooding.		Clearing of only *Typha* within 0.09 ha, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.6 Lake Badgerup Reserve, Wanneroo

4.6.1 Proposed clearing area

Lake Badgerup is located with Badgerup Reserve in Wanneroo. It is classified as a Conservation Wetland (City of Wanneroo, 2015). As part of the general maintenance of Lake Badgerup, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 21.59 hectares (Attachment A 6 and Attachment B 6), within which only *Typha* will be removed.

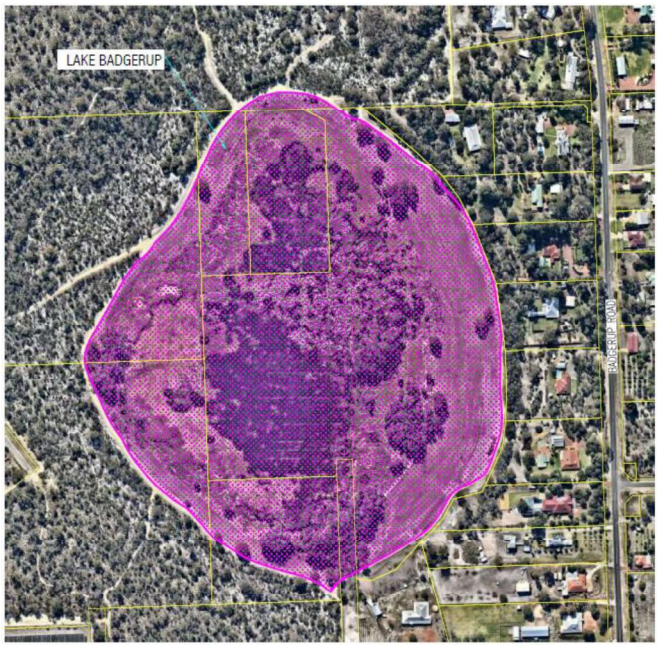

Figure 9: Proposed clearing of *Typha* within 21.59 ha within Lake Badgerup Reserve, Wanneroo.

4.6.2 Flora and vegetation

In addition to *Typha* there are five additional remnant native species within the proposed clearing area. Within the proposed clearing area, *Typha* is the dominant vegetation species. A site visit of the proposed clearing area was undertaken on 8 June 2020 and photographs of the site were taken (Attachment C 6). The species present are identified in Table 20.

Table 20: Flora species identified and recorded within the proposed clearing area at Lake Badgerup, Wanneroo.

Remnant Vegetation Species	Weed Species
Baumea articulata	*Acacia iteophylla*
Eucalyptus rudis	*Acacia longifolia*
Juncus pallidus	*Avena barbata*
Melaleuca preissiana	*Carduus pycnocephalus*
Melaleuca raphiophylla	*Carpobrotus edulis*
Typha orientalis/domingensis	*Cerastium glomeratum*

	Conyza sp.
	Cortaderia selloana
	Ehrhata calycina
	Ehrhata longiflora
	Hypochaeris glabra
	Hypochaeris radicata
	Lactuca serriola
	Onopordum acanthium
	Oxalis pes-caprae
	Pelargonium capitatum
	Solanum nigrum
	Sonchus oleraceus
	Ursinia anthemoides
	Various grass species
	Vicia sativa

Within the clearing area, there are few remnant species, however, outside of the clearing boundary, the park consists of a diverse range of species. In order to maintain and enhance the biodiversity values of Lake Badgerup reserve, the control and removal of *Typha* is required. The weeds listed in Table 18 is not an exhaustive list of weeds, the listed weeds are considered to be the most dominant within the clearing area.

4.6.3 Fauna

During the aforementioned vegetation assessment, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas. No other fauna were documented within the extent of the proposed clearing areas. Historical data and a report prepared for the City by Astron Environmental Services in 2017, demonstrate there is a diverse range of fauna species within Lake Badgerup (Table 21).

Table 21: Fauna species present within the proposed clearing areas at Lake Badgerup, Wanneroo.

Avian Species	Mammalian species	Reptile Species	Amphibian Species
Acanthiza chrysorrhoa	*Isoodon obesulus fusciventer*	*Crypotblepharus buchananii*	*Crinia glauerti*
Accipiter cirrhocephalus	*Macropus fulinginosus*	*Tiliqua rugosa*	
Anas superciliosa	*Oryctolagus cuniculus*		
Anhinger melanogaster	*Vulpes vulpes*		
Anthochaera caranculata			
Anthochaera lunulata			
Cacatua roseicapilla			
Cacatua tenuirostris			
Calyptorhynchus latirostris			
Chalcites basalis			
Circus approximans			
Colluricincla harmonica			
Coracina novaehollindae			
Corvus coronoides			
Craticus tibicen			

Cracticus torquatus	[redacted]
Dacelo novaeguineae	
Falco cenchroides	
Gerygone fusca	
Haliastur sphenurus	
Hamirostra isura	
Lichenostomus virescens	
Lichmera indistincta	
Malarus splendens	
Neophema elegens	
Pachycephela rufiventris	
Pardalotus striatus	
Petrochelidon ariel	
Petroica goodenovii	
Phaps chalcoptera	
Phylidonyris novaehollendiae	
Platycerus spurius	
Platycerus zonarius	
Rhipidura albiscapa	
Rhipidura leucophrys	
Threskornis spinicollis	
Trichoglossus haematodus	
Zosterops lateralis	

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 6). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 6).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer and also identified the selected area contains remnant vegetation requiring investigation for Carnaby's cockatoo feeding habitat. *Typha* is not listed as a food source for Carnaby's cockatoos (Department of Environment and Conservation, 2011). The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

Additionally, WALGA's EPCR identified the selected clearing area as potential Quenda (*Isoodon obesulus fusciventer*) habitat, indicating the species is likely to occur in this area.

4.6.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 6), the impacts listed in the report are categorised in Table 22, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 6) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 22: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 08/06/2020 identified that the vegetation within the application area consists of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the wetland area, which will provide the opportunity for native riparian vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the proposed clearing area is within an important birding area (Northern Swan Coastal Plain IBA) Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however previous surveys indicate the area supports a diverse range of fauna species. The proposed clearing area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be does not contain habitat trees for significant fauna and due to the specific clearing of *Typha* within the proposed clearing area the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified TECs within 5 kilometres, however none were mapped within the application area. Due to specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native	**Red**	Within the proposed clearing area, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition

vegetation in an area that has been significantly cleared.		between *Typha* and native species within the clearing area and increase biodiversity values of the wetland. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, it is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Red**	The proposed clearing area is located within Lake Badgerup, a Conservation wetland. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native species to grow within the wetland area and improve the condition of the wetland. There are six other wetlands located within 5km of the proposed clearing area: Gnangara Lake (1870m), Jandabup Lake (2753m), Walluburnup Swamp (3649m), Lake Goollelal (3763m), Lake Joondalup (3768m) and Beenyup Lake (3957m). The proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood wet, lake Phase (211SpW_LAKE) and depressions with free water in winter and humus podzols and peat. The soil within the proposed clearing area also consists of Karrakatta Sand Yellow Phase (211Sp_Ky), with low hilly to gently and undulating terrain and yellow sand over limestone. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, it is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF327 and is within 2997m of Yellagonga Regional Park. The proposed clearing site is also nearby a total of 11 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF463 (898m) and BF471 (1791m). The clearing of this area will not impact any environmental values of conservation areas, as there will be no removal of any remnant vegetation other than *Typha.* The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1757. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the

		clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Badgerup. The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area Public Drinking Water Source Area. The proposed clearing occurs within the Wanneroo Groundwater Area RIWI Act area. The site is within an Aquatic Water Dependent Ecosystem: Wetland, high potential groundwater dependent ecosystem. The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of only *Typha* within 21.59 hectares, which will allow for the increase in density of native riparian and wetland species, is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.7 Little Badgerup Lake, Gnangara

4.7.1 Proposed clearing area

Little Badgerup Lake is located within Badgerup Reserve in Wanneroo. It is classified as a Conservation Wetland (City of Wanneroo, 2015). As part of the general maintenance of Little Badgerup Lake, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 6.78 hectares (Attachment A 7 and Attachment B 7), within which only *Typha* will be removed.

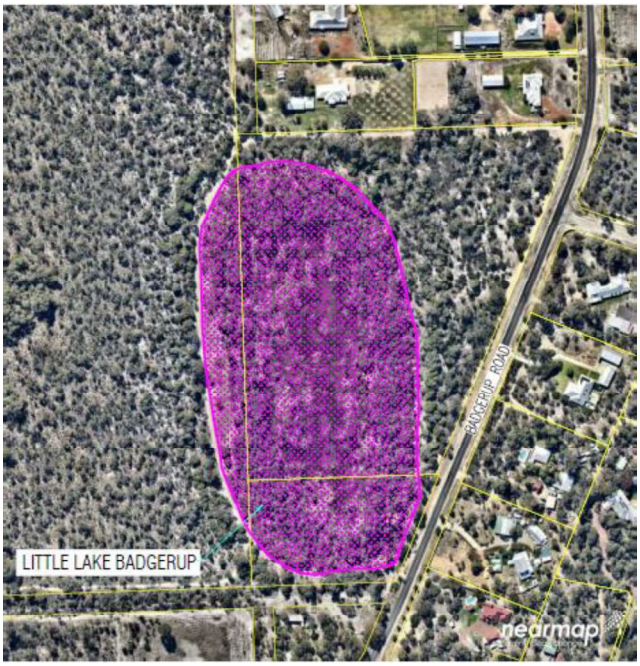

Figure 10: Proposed clearing of *Typha* within 6.78 ha within Little Lake Badgerup, Wanneroo.

4.7.2 Flora and vegetation

In addition to *Typha* there are five additional remnant native species within the proposed clearing area. Within the proposed clearing area, *Typha* is the dominant vegetation species. A site visit of the proposed clearing area was undertaken on 8 June 2020 and photographs of the site were taken (Attachment C 7). The species present are identified in Table 23.

Table 23: Flora species recorded within the proposed clearing area at Little Badgerup Lake, Wanneroo.

Remnant Vegetation Species	Weed Species
Baumea articulata	*Acacia iteophylla*
Eucalyptus rudis	*Acacia longifolia*
Juncus pallidus	*Avena barbata*
Melaleuca preissiana	*Carduus pycnocephalus*
Melaleuca raphiophylla	*Carpobrotus edulis*
	Cerastium glomeratum

	Conyza sp.
	Cortaderia selloana
	Ehrhata calycina
	Ehrhata longiflora
	Hypochaeris glabra
	Hypochaeris radicata
	Lactuca serriola
	Onopordum acanthium
	Oxalis pes-caprae
	Pelargonium capitatum
	Solanum nigrum
	Sonchus oleraceus
	Ursinia anthemoides
	Various grass species
	Vicia sativa

Within the clearing area, there are few remnant species, however, outside of the clearing boundary, the park consists of a range of species. In order to maintain and enhance the biodiversity values of Little Badgerup Lake, the control and removal of *Typha* is required. The weeds listed in Table 18 is not an exhaustive list of weeds, the listed weeds are considered to be the most dominant within the clearing area.

4.7.3 Fauna

During the aforementioned vegetation assessment, no fauna were documented within the extent of the proposed clearing areas. Historical data and a report prepared for the City by Astron Environmental Services in 2017, demonstrate there is a diverse range of fauna species within Lake Badgerup (Table 24).

Table 24: Fauna species present within the proposed clearing area at Little Badgerup Lake, Wanneroo.

Avian Species	Mammalian species	Reptile Species	Amphibian Species
Acanthiza chrysorrhoa	*Isoodon obesulus fusciventer*	*Crypotblepharus buchananii*	*Crinia glauerti*
Accipiter cirrhocephalus	*Macropus fulinginosus*	*Tiliqua rugosa*	
Anas superciliosa	*Oryctolagus cuniculus*		
Anhinger melanogaster	*Vulpes vulpes*		
Anthochaera caranculata			
Anthochaera lunulata			
Cacatua roseicapilla			
Cacatua tenuirostris			
Calyptorhynchus latirostris			
Chalcites basalis			
Circus approximans			
Colluricincla harmonica			
Coracina novaehollindae			
Corvus coronoides			
Craticus tibicen			
Cracticus torquatus			

Dacelo novaeguineae	[redacted]
Falco cenchroides	
Gerygone fusca	
Haliastur sphenurus	
Hamirostra isura	
Lichenostomus virescens	
Lichmera indistincta	
Malarus splendens	
Neophema elegens	
Pachycephela rufiventris	
Pardalotus striatus	
Petrochelidon ariel	
Petroica goodenovii	
Phaps chalcoptera	
Phylidonyris novaehollendiae	
Platycerus spurius	
Platycerus zonarius	
Rhipidura albiscapa	
Rhipidura leucophrys	
Threskornis spinicollis	
Trichoglossus haematodus	
Zosterops lateralis	

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 7). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 7).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer and also identified the selected area contains remnant vegetation requiring investigation for Carnaby's cockatoo feeding habitat. *Typha* is not listed as a food source for Carnaby's cockatoos (Department of Environment and Conservation, 2011). The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

Additionally, WALGA's EPCR identified the selected clearing area as potential Quenda (*Isoodon obesulus fusciventer*) habitat, indicating the species is likely to occur in this area.

4.7.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 7), the impacts listed in the report are categorised in Table 25, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 7) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 25: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 08/06/2020 identified that the vegetation within the application area consists of a diverse range of species. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the wetland area, which will provide the opportunity for native riparian vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the proposed clearing area is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and is potential Quenda habitat. During the site inspection, *Cacatua roseicapilla* and *Corvus coronoides* were observed within the proposed clearing areas, however previous surveys indicate the area supports a diverse range of fauna species. The proposed clearing area is within a Regional Ecological Linkage and also within a Gnangara Mound Ecological Linkage. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified TECs within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that	**Red**	The proposed clearing area is located in Lake Badgerup. Within the proposed clearing area, the remnant vegetation will not be cleared, *Typha* will be the target species to be cleared and remnant vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha*

has been significantly cleared.		and native species within the clearing area and increase biodiversity values of the wetland. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, it is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Orange**	The proposed clearing area is within a wetland within Badgerup Reserve, and is within a Conservation wetland. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian vegetation density to increase within the wetland area and improve the condition of the wetland. There are six other wetlands located within 5km of the proposed clearing area: Badgerup Lake (245m), Gnangara Lake (17174m), Jandabup Lake (3541m), Lake Goollelal (3458m), Walluburnup Swamp (3833m), Beenyup Swamp (4155m) and Lake Joondalup (4175m). Due to the specific clearing of *Typha* to allow the increase in native riparian species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Red**	The proposed clearing area is considered to be at a high to moderate risk of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood seasonal swamps Phase (211Sp_Ws) and depressions with free water in winter and humus podzols and peat. The soil within the proposed clearing area also consists of Karrakatta Sand Yellow Phase (211Sp_Ky) with low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, it is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area is located within Bush Forever site BF327. The proposed clearing site is also nearby a total of 11 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF463 (609m) and BF193 (1696m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will not be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1757. The clearing of *Typha* specifically will not have a negative impact on the

		environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is in Lake Badgerup. The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Wanneroo Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Wetland, high potential groundwater dependent ecosystem and a Terrestrial Water Dependent Ecosystem: Vegetation, moderate potential groundwater dependent ecosystem. The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of *Typha* within 6.78 hectares, which will allow for the increase in density of native riparian flora, is not likely to cause, or exacerbate the incidence or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha,* increase density of native riparian and wetland vegetation and improve the biodiversity values of the wetland.

4.8 Warradale Park, Landsdale

4.8.1 Proposed clearing area

Warradale Lake is located in Landsdale. As part of the general maintenance of Warradale Park, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 1.72 hectares (Attachment A 8 and Attachment B 8), within which only *Typha* will be removed.

Figure 11: Proposed clearing of *Typha* within 1.72 ha within Warradale Park, Landsdale.

4.8.2 Flora and vegetation

Warradale Park is located within a public open space and as such, the area has been planted with a number of native and non-native species. An aerial search (Landgate MapViewer Plus, 2020) and vegetation survey conducted on 24 June 2020, determined there were several remnant species also present within the clearing area and photographs of the area were taken (Attachment C 8). Within the proposed clearing area, *Typha* is the dominant vegetation species. The species present are identified in Table 26.

Table 26: Flora species recorded within the proposed clearing area at Warradale Lake, Landsdale.

Remnant Vegetation Species	Weed Species
Baumea articulata	*Cyperus tenuiflorus*
Ficinia nodosa	*Ehrhata sp.*
Melaleuca raphiophylla	*Melaleuca quinqenervia*
Typha orientalis/domingensis	Unidentified aquatic plant

4.8.3 Fauna

During the aforementioned vegetation survey, avian fauna species were present within the proposed clearing area. The species identified are collated in Table 27.

Table 27: Fauna species recorded within the proposed clearing area at Warradale Lake, Landsdale.

Avian species
Anas gracilis
Anas superciliosa
Chenonetta jubata
Fulica atra
Gallinula tenebrosa
Tadorna tadornoides

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 8). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 8).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.8.4 Clearing Principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 8), the impacts listed in the report are categorised in Table 28, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 8) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 28: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a	**Red**	Site inspections undertaken on 24/06/2020 identified the vegetation within the application area consisted of few native species, including *Baumea articulata*, *Ficinia nodosa* and *Melaleuca raphiophylla*.

high level of biological diversity		Given the purpose of the clearing to remove an invasive species from the wetland area, which will provide the opportunity for native vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection, a number of avian fauna species were identified (see Table 27). The application area does not contain any Ecological Linkages. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified TECs within 5 kilometres, however none were mapped within the application area. Due to specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within a consrtucted irrigation lake within the public open space. Within the clearing area, *Typha* will be the target species to be cleared and remnant native vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase the biodiversity values of the wetland. Due to the specific removal of *Typha* within the proposed clearing area and the insignificant amount of remnant vegetation within the site, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Orange**	The proposed clearing area is within Warradale Lake. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland.

		There are four other wetlands located within 5km of the clearing area: Gnangara Lake (731m), Badgerup Lake (2829m), Emu Lake (4400m) and Lake Goolellal (4565m). The proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Orange**	The proposed clearing area is considered have a high to moderate potential of containing acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood seasonal swamps Phase (211Sp_Ws) with depressions with free water in winter and humus podzols and peat. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing area located nearby 11 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF193 (514m) and BF196 (877m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within 4301m of Yellagonga Regional Park. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Orange**	The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Mirrabooka Groundwater Area and the Perth Groundwater Area (RIWI Act area). The site is within an Aquatic Water Dependent Ecosystem: Wetland, high potential groundwater dependent ecosystem. The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity.

		Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within DAFWA Land Quality flood risk category 0. Clearing of *Typha* within a 1.72 hectare area is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha*, enhance the condition of the wetland, allow for the maintenance of the wetland and allow for recruitment of native riparian and wetland vegetation.

4.9 Kingsway Regional Sporting Complex, Madeley

4.9.1 Proposed clearing area

Kingsway Regional Sporting Complex North and South Lakes were constructed in 2008 (Landgate MapViewer Plus, 2020). These wetlands form part of the drainage and irrigation system of the Complex. As part of the general maintenance of the Complex's two Lakes, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 0.74 hectares (Attachment A 9a and 9b, and Attachment B 9a and 9b), within which only *Typha* will be removed.

Figure 12: Proposed clearing of *Typha* within 0.34 ha within Kingsway Lake North and within 0.40 ha within Kingsway Lake South, Madeley.

4.9.2 Flora and vegetation

As a result of clearing for construction, the majority of vegetation surrounding the Kingsway North and South Lakes have been planted as part of the landscaping. An aerial search (Landgate MapViewer Plus, 2020) and a vegetation survey conducted on 11 June 2020 determined there were both native and non-native planted species, as well as remnant native species emerging within the wetland (Attachment C 9a and 9b). Within the proposed clearing area, *Typha* is the dominant vegetation species. The species present are identified in Table 29.

Table 29: Flora species recorded within the proposed clearing area at Kingsway Regional Sporting Complex North and South Lakes, Madeley.

Remnant Vegetation Species	Weed Species
Baumea articulata	Unidentified aquatic plants
Centella asiatica	[redacted]
Ficinia nodosa	
Typha orientalis/domingensis	

The control and clearing of *Typha* within the Kingsway Lakes North and South will enhance the condition of the wetlands and allow for recruitment of native riparian and wetland species within the wetlands.

4.9.3 Fauna

During the aforementioned vegetation survey, avian fauna species were present within the proposed clearing area. The species identified are collated in Table 30.

Table 30: Fauna species recorded within the proposed clearing area at Kingsway Regional Sporting Complex North and South Lakes, Madeley.

Avian species
Anas gracilis
Anas superciliosa
Chenonetta jubata
Fulica atra
Gallinula tenebrosa
Tadorna tadornoides

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 9a and 9b). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 9a and 9b).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Possible / Confirmed' Breeding area buffer and also within a Carnaby's cockatoo 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.9.4 Clearing principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment D 9a and 9b), the impacts listed in the report are categorised in sections 4.9.4.1 and 4.9.4.2, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment E 9a and 9b) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following sections summarise the identified environmental impacts and the level of variance against the clearing principles.

4.9.4.1 North Lake

Table 31: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 11/06/2020 identified the vegetation within the application area consisted of few native species, including *Baumea articulata, Centella asiatica,* and *Ficinia nodosa*. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection, a number of avian species were identified (see Table 28). The application area does not contain any Ecological Linkages. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the application area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, it is not at variance to principle (c).
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	**Red**	A desktop study identified TECs within 5 kilometres, however none were mapped within the application area. Due to specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).

Threatened Ecological Community.		
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within a constructed irrigation lake within the public open space. Within the clearing area, *Typha* will be the target species to be cleared and remnant native vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase the biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, it is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Green**	The proposed clearing area is within Kingsway Lake North. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are six other wetlands located within 5km of the clearing area: Lake Goollelal (1191m), Badgerup Lake (3991m), Walluburnup Swamp (4091m), Gnangara Lake (4110m), Beenyup Swamp (4345m) and Lake Joondalup (4898m). Due to the specific clearing of *Typha* to allow the increase in other native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Green**	The proposed clearing area is considered have no risk of acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karakatta Sand Yellow Phase (211Sp_Ky) with low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, it is not likely to be at variance to principle (g).
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.	**Green**	The proposed clearing area is located nearby 13 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF328 (443m) and BF299 (1035m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within 4301m of Yellagonga Regional Park. The clearing of *Typha*

		specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Green**	The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to clear *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within DAFWA Land Quality flood risk category 0. Clearing of *Typha* within a 0.34 hectare area is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha*, enhance the condition of the wetland, allow for the maintenance of the wetland and allow for recruitment of native riparian and wetland vegetation.

4.9.4.2 South Lake

Table 32: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 11/06/2020 identified the vegetation within the application area consisted of few native species, including *Baumea articulata, Centella asiatica,* and *Ficinia nodosa*. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).

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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA) and Carnaby's cockatoo habitat. During the site inspection, a number of avian species were identified (see Table 28). The application area does not contain any Ecological Linkages. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified TECs within 5 kilometres, however none were mapped within the application area. Due to specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within a constructed irrigation lake within the public open space. Within the clearing area, *Typha* will be the target species to be cleared and remnant native vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase the biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, it is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Green**	The proposed clearing area is within Kingsway Lake North. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland. There are six other wetlands located within 5km of the clearing area: Lake Goollelal (1191m), Badgerup Lake (3991m), Walluburnup Swamp (4091m), Gnangara Lake (4110m), Beenyup Swamp (4345m) and Lake Joondalup (4898m). Due to the specific clearing of *Typha* to allow the increase in other native riparian and wetland species,

		the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Green**	The proposed clearing area is considered have no risk of acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karakatta Sand Yellow Phase (211Sp_Ky) with low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, the proposed clearing is not likely to be at variance to principle (g).
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.	**Green**	The proposed clearing area is located nearby 13 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF328 (443m) and BF299 (1035m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within 4301m of Yellagonga Regional Park. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Green**	The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The proposed clearing is therefore not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purposed of the clearing is to clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
Principle (j) Native vegetation should not be cleared if the clearing of the vegetation is likely to		The proposed clearing area is within DAFWA Land Quality flood risk category 0.

cause or exacerbate the incidence or intensity of flooding.		Clearing of *Typha* within a 0.40 hectare area is not likely to cause, or exacerbate the incidence, or intensity of flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha*, enhance the condition of the wetland, allow for the maintenance of the wetland and allow for recruitment of native riparian and wetland vegetation.

4.10 Marangaroo Golf Course

4.10.1 Proposed clearing area

Marangaroo Golf Course is located in Marangaroo, and contains one wetland within the south eastern area. The wetland was constructed in 2006 (Landgate MapViewer Plus, 2020). As part of the general maintenance of Marangaroo Golf Course wetland, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 0.27 hectares (Attachment A 10 and Attachment B 10), within which only *Typha* will be removed.

Figure 13: Proposed clearing of *Typha* within 0.27 ha within Marangaroo Golf Course, Marangaroo.

4.10.2 Flora and vegetation

The area the wetland was constructed in was cleared in 2006. An aerial search (Landgate MapViewer Plus, 2020) and a vegetation survey conducted on 11 June 2020 indicate are two remnant native species in addition to *Typha* (Attachment C 10). Within the proposed clearing area, *Typha* is the dominant vegetation species. The species present are identified in Table 27.

Table 33: Flora species recorded within the proposed clearing area at Marangaroo Golf Course lake, Marangaroo.

Remnant Vegetation Species	Weed Species
Baumea preissii	*Cyperus tenuiflorus*
Shoenoplectus tabernaemontani	Unidentified aquatic plants
Typha orientalis/domingensis	

4.10.3 Fauna

During the aforementioned vegetation survey, no fauna were documented within the extent of the proposed clearing areas.

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 10). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 10).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.10.4 Clearing principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment E 10), the impacts listed in the report are categorised in Table 34, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment D 10) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 34: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 11/06/2020 identified the vegetation within the clearing boundary area consists of *Baumea preissii* and *Shoenoplectus tabernaemontani*. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the riparian and wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not

		likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, no avian species were observed within the proposed clearing areas. The application area does not contain any Ecological Linkages. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the proposed clearing area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, the proposed clearing is not at variance to principle (c).
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.	**Red**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within Marangaroo Golf Course lake, a constructed irrigation lake within a public open space. Within the clearing area, *Typha* will be the target species to be cleared and remnant native vegetation will not be removed. The clearing of *Typha* within the proposed clearing area will decrease competition between *Typha* and native species within the clearing area and increase the biodiversity values of the wetland. As only *Typha* will be cleared and remnant vegetation will not be cleared, the proposed clearing is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Green**	The proposed clearing area is within Marangaroo Golf Course. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will enable native riparian and wetland vegetation density to increase within the wetland area and improve the condition of the wetland.

		There are two other wetlands located nearby the proposed clearing area: Lake Goollelal (1555m) and Emu Lake (4673m). Due to the specific clearing of *Typha* to allow the increase in other native riparian and wetland species, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Green**	The proposed clearing area is considered to have no risk of acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Karakatta Sand Yellow Phase (211Sp_Ky), with low hilly to gently undulating terrain and yellow sand over limestone at 1-2m. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, it is not likely to be at variance to principle (g).
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.	**Red**	The proposed clearing site is located nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF358 (304m) and BF202 (1070m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within an EPA Redbook Reserve, DPAW-025.1762. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing area is within 1466m of Yellagonga Regional Park. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Green**	The proposed clearing area is not within a Public Drinking Water Source Area. The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the purpose of the clearing is to

		clear only *Typha*, it is not considered the proposed clearing will increase groundwater salinity. Given the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).
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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of *Typha* within a 0.027 hectare, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha*, enhance the condition of the wetland, allow for the maintenance of the wetland and allow for recruitment of native riparian and wetland vegetation.

4.11 Nyunda Park

4.11.1 Proposed clearing area

Nyunda Park is located within Wanneroo. The lake was constructed between 1974 and 1977 (Landgate MapViewer Plus, 2020). As part of the general maintenance of Nyunda Park, the City requires a clearing permit to control and reduce *Typha*. The total area of the proposed clearing area is 0.54 hectares (Attachment A 11 and Attachment B 11), within which only *Typha* will be removed.

Figure 14: Proposed clearing of *Typha* within 0.54 ha within Nyunda Park, Wanneroo.

4.11.2 Flora and vegetation

The wetland within Nyunda Park is part of the drainage and irrigation system of Wanneroo. An aerial search (Landgate MapViewer Plus, 2020) and a vegetation survey conducted on 23 September 2020 determined there are no other remnant species within this wetland other than *Typha* (Attachment C 11).

Table 35: Flora species recorded within the proposed clearing area at Nyunda Park, Wanneroo.

Remnant Vegetation Species	Weed Species
Typha orientalis/domingensis	*Bromus diandrus*
[redacted]	*Cyperus tenuiflorus*
	Cenchrus clandestinus
	Ehrhata sp.
	Eragrostis curvula
	Unidentified aquatic plant

4.11.3 Fauna

During the aforementioned vegetation survey, avian fauna species were present within the proposed clearing area. The species identified are collated in Table 36.

Table 36: Fauna species recorded within the proposed clearing area at Nyunda Park, Wanneroo.

Avian species
Anas gracilis
Anas superciliosa
Chenonetta jubata
Fulica atra
Gallinula tenebrosa
Tadorna tadornoides

WALGA's Environmental Planning Considerations Report (EPCR) did not identify any instances of threatened or priority fauna species within the selected footprint (Attachment E 11). Protected fauna species were however identified within a 5km radius of the selected area (Attachment E 11).

WALGA's EPCR did identify the selected area as being located within a Carnaby's cockatoo (*Calyptorhynchus latorostris*) 'Possible / Confirmed' Breeding area buffer and also within a Carnaby's cockatoo 'Confirmed' roosting area buffer. The EPCR also identified the proposed clearing area was within or adjacent to a Key Biodiversity Area for birds.

4.11.4 Clearing principles

The City of Wanneroo generated a 'Desktop Assessment Report for Native Vegetation Clearing Application' using the WALGA Environmental Planning Tool (WALGA EPT) (Attachment E 11), the impacts listed in the report are categorised in Table 37, below.

An WALGA EPT 'Environmental Planning Considerations Report' (Attachment D 11) was also generated by the City as supporting documentation for the below clearing principle assessment.

The following table summarises the identified environmental impacts and the level of variance against the clearing principles.

Table 37: Assessment of the likely impacts against clearing principles and level of variance.

Clearing Principle	Impacts	Justification of Variance
Principle (a) – Native vegetation should not be cleared if it comprises a high level of biological diversity	**Red**	Site inspections undertaken on 23/09/2020 identified the vegetation within the clearing boundary area consists of only *Typha*. Given the purpose of the clearing is to remove only *Typha*, an invasive species from the riparian and

		wetland area, which will provide the opportunity for native riparian and wetland vegetation to spread, it is not likely to compromise the biodiversity of the proposed clearing area. The proposed clearing is not likely to be at variance to principle (a).
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 indigenous to Western Australia	**Red**	The desktop assessment identified the site is within an important birding area (Northern Swan Coastal Plain IBA), Carnaby's cockatoo habitat and potential Quenda habitat. During the site inspection, a number of avian species were observed within the proposed clearing area (see Table 36). The application area does not contain any Ecological Linkages. Considering the vegetation to be cleared within the proposed clearing area is exclusively *Typha* and does not contain habitat trees for significant fauna, the application area is unlikely to be at variance with principle (b).
Principle (c) – Native vegetation should not be cleared if it includes or is necessary for the continued existence of, rare flora.	**Green**	A desktop study identified there are no rare flora species within the application area, nor any rare flora species identified within 5km the application area. In the site assessment, no rare flora species were identified. Only common species were identified. Therefore, as the area does not comprise habitat supportive of rare flora, it is not at variance to principle (c).
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.	**Orange**	A desktop study identified Threatened Ecological Communities (TECs) within 5 kilometres, however none were mapped within the application area. Due to the specific removal of only *Typha* within the clearing area, the clearing is not considered to affect the TEC. The proposed clearing is not likely to be at variance to principle (d).
Principle (e) - Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been significantly cleared.	**Green**	The proposed clearing area is located within Nyunda Park lake, a constructed irrigation lake within a public open space. Within the clearing area, *Typha* will be the target species to be cleared. The clearing of *Typha* within the proposed clearing area will reduce the impact of *Typha* on the wetland and allow for efficient use for drainage within the area. As only *Typha* will be cleared it is not likely to be at variance to principle (e).
Principle (f) - Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or a wetland	**Green**	The proposed clearing area is within Nyunda Park. *Typha* is considered to be an invasive species within this wetland. The clearing of *Typha* will reduce the impact of *Typha* and improve the condition of the wetland. The proposed clearing area is within 378m of Lake Joondalup, a Directory of Important Wetland site. There are seven other wetlands located nearby the proposed clearing area: Lake Joondalup (493m),

		Walluburnup Swamp (2621m), Beenyup Swamp (2664m), Jandabup Swamp (3243m), Mariginiup Lake (3342m), Badgerup Lake (4047m) and Little Mariginiup Lake (4915m). Due to the specific clearing of *Typha*, the proposed clearing is not likely to be at variance to principle (f).
Principle (g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.	**Green**	The proposed clearing area is considered to have no risk of acid sulphate soils. The Groundwater Salinity (Total Dissolved Solids) at the proposed clearing site is less than 500mg. The hydrogeology of the proposed clearing site contains surficial sediments – shallow aquifers, sand and gravel. The soil within the proposed clearing site consists of Spearwood Sand Phase (211Sp_Sp), with irregular banks of karst depressions, some limestone outcrop and shallow brown sands. Due to the specific clearing of *Typha* using techniques that will not cause major damage to land within the proposed clearing area, it is not likely to be at variance to principle (g).
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.	**Green**	The proposed clearing site is located nearby a total of 10 Bush Forever sites, which are located within 5km of the proposed clearing site. The two closest Bush Forever Sites are BF299 (358m) and BF471 (1751m). The clearing of this area will not impact any environmental values of conservation areas, only *Typha* will be cleared from within the proposed clearing areas, no remnant vegetation will be cleared. The proposed clearing area is within 358m of Yellagonga Regional Park. The clearing of *Typha* specifically will not have a negative impact on the environmental values of the conservation areas; the clearing of *Typha* will allow for an increase in the density of native riparian and wetland species. The proposed clearing is not likely to be at variance to principle (h).
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.	**Green**	The proposed clearing area is within the Perth Coastal and Gwelup Underground Water Pollution Control Area (Public Drinking Water Source Area). The proposed clearing occurs within the Perth Groundwater Area (RIWI Act area). The proposed clearing is not likely to cause deterioration in surface water quality through sedimentation or eutrophication. Given the small size of the clearing, it is not considered the proposed clearing will increase groundwater salinity. Given the size of the clearing and the targeted clearing of *Typha*, it is not considered that the proposed clearing will cause deterioration in water quality. The proposed clearing is not likely to be at variance to principle (i).

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.		The proposed clearing area is within the DAFWA Land Quality flood risk category 0. Clearing of *Typha* within a 0.54 hectare, which will allow for the increase in density of native riparian and wetland flora, is not likely to cause, or exacerbate the incidence or intensity of, flooding. The proposed clearing is not likely to be at variance to principle (j).

***Red** – Likely to be at variance, **Orange** – May be at variance, **Green** – Not likely to be or not at variance

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing is unlikely to be at variance with any of the clearing principles due to the targeted nature of the clearing, focusing solely on the removal of *Typha.* The removal of an invasive species will reduce the likelihood of monocultures of *Typha*, enhance the condition of the wetland, allow for the maintenance of the wetland and allow for recruitment of native riparian and wetland vegetation.

5 Conclusion

The City of Wanneroo has assessed the proposed clearing against the 10 clearing principles and has found that the clearing of *Typha* within all proposed clearing areas is not likely to be at variance with any of the clearing principles. This is due to the clearing of only *Typha* within these clearing areas, which will allow for the condition of the wetlands to be enhanced, a reduction in the likelihood of *Typha* monocultures forming within the wetlands and allows for recruitment and increase in the species diversity of riparian and wetland vegetation, thus enhancing the biodiversity values of the wetlands.

6 References

Astron Environmental Services. (2017). Badgerup Reserve Flora and Fauna Survey September 2017. Prepared for the City of Wanneroo.

Beard, J.S. (1979). The Vegetation of the Perth Area, Western Australia. Map and Explanatory Memoir 1:250,000 Series. Vegetation Survey of Western Australia. Vegmap Publications, Perth.

City of Wanneroo. (2018). Local Biodiversity Plan 2018/19-2023/24. Available at https://www.wanneroo.wa.gov.au/consultations/downloads/5b03c45216c2d.pdf

City of Wanneroo and City of Joondalup. (2015). Yellagonga Integrated Catchment Management Plan 2015-2019. Available at https://www.wanneroo.wa.gov.au/downloads/file/1837/yellagonga_integrated_catchment_management_plan_2014-19_final_document

Department of Conservation and Land Management. (2003). Yellagonga Regional Park Management Plan 2003-2013. Available at https://www.dpaw.wa.gov.au/images/documents/parks/management-plans/decarchive/yellagonga_rp_mp.pdf

Department of Environment and Conservation (2011). Plants Used by Carnaby's Black Cockatoos. Available at https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/carnabys/Plants_used_by_Carnabys_black_cockatoo_20110415.pdf

Eco Logical (2016). Flora and Vegetation Survey of Northern Yellagonga Regional Park. Prepared for the City of Joondalup.

Keighery, G. 2016. *Typha orientalis* in Western Australia. *Bushland News.* 97, p. 3. Available at https://www.dpaw.wa.gov.au/images/documents/conservation-management/off-road-conservation/urban-nature/bushland-news/BushlandNews97.pdf

Natural Area Consulting Management Services (2018). Level 2 Flora and Vegetation Survey Yellagonga Site 5 and 6. Prepared for the City of Joondalup.

WALGA (2020) Environmental Planning Tool. Desktop Assessment Report for Native Vegetation Clearing Application Report.

WALGA (2020) Environmental Planning Tool. Environmental Considerations Report.