Foreshore Reserve Lot 200 Turner Street Boyanup

Foreshore Management Plan

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Bio Diverse Solutions

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DOCUMENT CONTROL

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APPENDICES

1. Foreshore Management Checklist

Foreshore Management Item	Deliverable	Notes
Aboriginal Sites and Heritage		
Aboriginal sites are protected by legislation	Check of DIA database	Preston River a registered DIA site, See Appendix G.
Drainage Hydrology		
Foreshore area ceded with WAPC (lot 200) no drainage in subject site.	No stormwater infrastructure in the foreshore area.	Detailed engineering design for adjacent development lot 201.
Erosion		
Processes of erosion and accretion need to be determined, methods of reducing identified.	Methods in revegetation to reduce erosion in bare areas.	Detailed landscaping and engineering design to include detail on roads and infrastructure.
Fauna habitat		
Measures should be taken to maintain or enhance native fauna habitats.	Existing native vegetation to be retained to increase diversity of the areas. Fauna habitat retained and increased through revegetation strategies.	Native Vegetation to be retained. Long term Monitoring Plan Section 16.
Fire Management		
Provision should be made to minimise the likelihood of wildfires and provide access in times of fire.	Detailed Bushfire Management Plan prepared by Bio Diverse Solutions. Aligned to AS3959 and Planning for Bushfire Protection Edition 2 2010.Unimpeded access around foreshore areas.	Refer to Detailed Bushfire Management Plan (2014) Bio Diverse Solutions.
Flooding		
All facilities located outside of floodway.	No infrastructure located within floodway or foreshore area.	Stormwater Section 13
Foreshore Vegetation		
Enhancement and management of native vegetation	Increase biodiversity and native vegetation in foreshore area. Weed management & revegetation	Monitoring Plan Section 16.
Land tenure		
Foreshore consolidated into one reserve and vested with one agency.	Foreshore area ceded with WAPC and will be the responsibility of the Shire of Capel.	Foreshore Master Plan Appendix F.
Landscape		
Natural landscape features should be protected and “linked” with surrounding areas	Revegetation of foreshore areas increases bush corridors and ecological linkages.	Revegetation Plan Appendix E & Foreshore Master Plan Appendix F.

Mosquitoes		
Mosquito Control Measures should ensure wetland areas are protected	No standing water bodies, seasonal in Winter, spring receding in floodway's.	Monitoring Plan Section 14.
Management of disease vectors and nuisance insects	Monitoring during and post development	Monitoring Plan Section 14.
Nutrient Export		
Measures taken to minimise export into the waterway.	Deep sewer for effluent disposal, all storm water treated on site.	Geotechnical and Soil Testing Report.
Public Access & Recreation		
Access restricted to defined nodes in order to protect important flora and fauna habitats in Preston River.	Public Access along foreshore paths	River Ramble DUP, See Foreshore Master Plan Appendix F.
Reserve Boundaries		
Reserve should be physically defined.	Foreshore area defined, ceded with WAPC.	See Mapping Appendix A.
Soil Types		
Suitable for vegetation establishment and identify any nutrient leaching problems	Revegetation species aligned to soil types present and existing revegetation strategies in adjacent foreshore areas.	Geotechnical and Soil Testing Report. Section 5.
Stormwater Disposal		
As per Stormwater Management Manual 2009 (DoW)	All stormwater infrastructure located outside of the foreshore (lot 200). Refer to detailed Engineering and Stormwater Management.	Refer to detailed engineering designs for Meadowbrook Estate.
Utility Services		
Corridors for utility Services defined	Refer to detailed engineering designs, no infrastructure requirement within foreshore area.	Refer to detailed engineering designs.
Water Features		
Where proposed an assessment of water quality is required.	Nil Proposed.	
Water Quality		
Measures to ensure ongoing satisfactory water quality should be developed.	Water quality will be improved through increased vegetation cover.	Revegetation Plan Appendix E.
Weed and Feral Animal Control		
Environmentally safe and cost effective measures for weed species and feral animals	Weed Management Plan for control and spread of weeds.	Section 8.

1.1. Introduction

Preston Green Pty Ltd commissioned Bio Diverse Solutions (Environmental Consultants) to prepare a Foreshore Management Plan of Lot 200 adjacent to Meadowbrooke Estate (now Lot 201, formerly Lot 888) Turner Street, Boyanup within the Shire of Capel. The Foreshore Management Plan (FMP) was a condition of the successful rezoning of the site (previous owners) and a current commitment from Preston Green Pty Ltd (current owners) to undertake as part of a Development Approval being lodged in 2014.

Other reports/documents which have been prepared which relate to this project include:

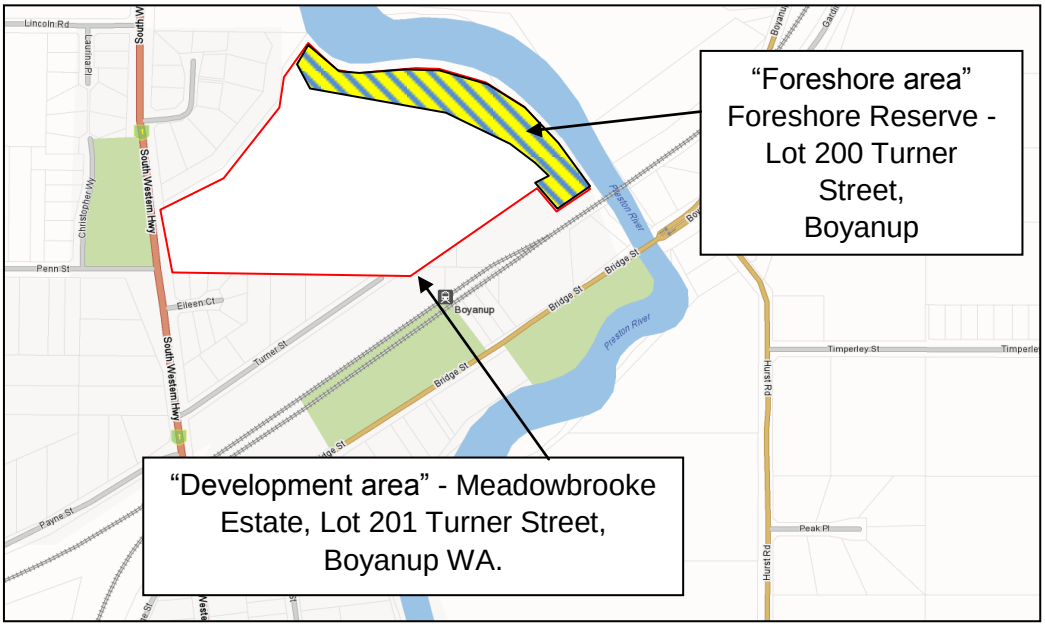
- Bushfire Management Plan (Bio Diverse Solutions, 2014)
- Engineering and stormwater designs (MPM Development Consultants);
- Preston River Flood Study Meadowbrooke Estate Boyanup, Hyd$_2$o, 2014;
- Structure Plan/Rezoning documentation; and
- Shire of Capel TPS 7.

These reports should be consulted individually as required.

1.2. Site details

The foreshore (Lot 200) reserve ("the foreshore area") adjacent to Meadowbrooke Estate, Lot 201 Turner Street Boyanup ("the development site") is located approximately 20km south east of Bunbury along the Preston River in the locality of Boyanup (approximately 700m north of Boyanup town site) in the municipality of the Shire of Capel. The foreshore area is 2.1293ha in size and the development site of Meadowbrooke Estate is 9.0568 ha. Please refer to Figure 1 below - Locality map and Location mapping Appendix A.

Figure 1 – Subject site locality



1.3. Development proposal

It is proposed that Meadowbrooke Estate will be developed to create a lifestyle village designated under the *Caravan Parks and Camping Grounds Act 1995.* The land is currently zoned Special Use Zone under Shire of Capel TPS 7. This report will support a Development Approval process with the Shire of Capel. Please refer to Concept Plan Appendix B.

As part of the previous rezoning of the property to Special Use under TPS 7, there was a requirement from the Shire of Capel for the proponent to prepare and implement a Foreshore Management Plan. This FMP report is to for-fill this requirement and has been prepared in consultation with the Department of Water (DoW), Capel Land Care District Committee (Capel LCDC) and the Shire of Capel (SoC).

This FMP relates to foreshore area of the Preston River (Lot 200) presently designated with the Western Australian Planning Commission (WAPC) along the boundary of Meadowbrooke Estate, Lot 201 Turner Street, Boyanup. This report does not address any other environmental concerns outside the foreshore/impact area of the ceded foreshore reserve of lot 200. Refer to Landgate cadastre as provided by SoC, Appendix A, (Landgate, 2014).

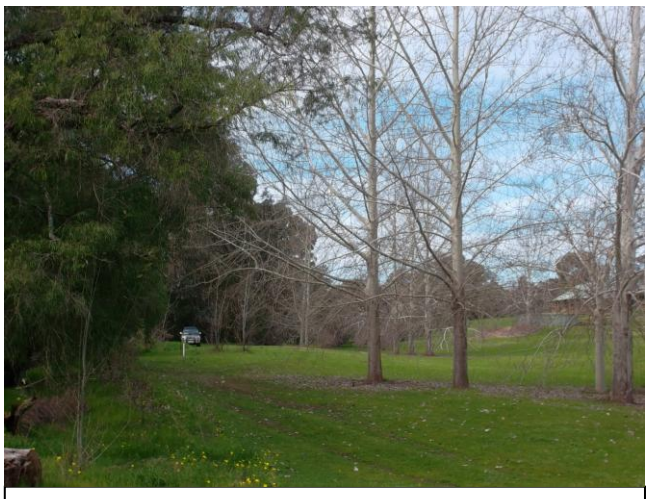
1.4. History and current site land use

The foreshore area was historically part of Meadowbrooke Estate, Lot 201 Turner Street (formerly lot 888), Boyanup. In the rezoning process a portion of the foreshore (now Lot 200) was relinquished back to the state WAPC, with final designation going to the Shire of Capel. An easement in gross also occurs over lot 200 with the designation with the "Shire of Capel" and Public at Large" for the purpose of "Public Access" (Landgate, 2014) for the purpose of the "Preston River Ramble Walk".

Meadowbrooke Estate has previously been used as a function centre and cabin/chalet accommodation. The grounds of Meadowbrooke Estate are predominantly cleared paddock/grasslands which is maintained through landscaping, mowing and slashing. Management of the foreshore area has been minimal with some weed management along the Preston River foreshore by the Capel LCDC (*Pers comms*. R. McPherson, 2014).

Adjacent to the foreshore area is Unallocated Crown Land (UCL) to the north, Reserve 8333 (north) along the foreshore of the Preston River, Railway Reserve to the south and Reserve 44252 to the north west (Landgate, 2014). Further to the north, private rural land use abuts the foreshore area with pasture and paddocks for grazing. The Preston River flows from the south east to the north west of the subject site. Please refer to Photographs 1 and 2 below.

Photograph 1 – View of the Preston River flowing to the north west from the banks.



Photograph 2 – View of the foreshore area (subject site) Lot 200.

1.5. Aims and objectives

The purpose of this FMP is to provide a mechanism for coordinating and implementing management and protection of the foreshore area (lot 200) along the Preston River based on site characteristics, the impact of surrounding development of Meadowbrooke Estate on the foreshore and the environmental significance of the study area.

The objectives of this plan are to:

- Provide the Developer guidance on remnant vegetation to be protected during the Development process of Meadowbrooke Estate;
- Provide a framework for implementing further revegetation works and weed management across the allocated section of the Preston River adjacent to Meadowbrooke Estate;
- Increase catchment health for downstream wetlands through revegetation and foreshore protection;
- Assist the future landowner (SoC) with managing the foreshore area;
- Provide protection to the Preston River foreshore and increase future biodiversity values to the foreshore area; and
- Increase community involvement along the section of Preston River foreshore.

1.6. Stakeholder and community consultation

Community consultation has not occurred for the preparation of this plan. Stakeholder engagement included informal discussions with the following representatives:

- Capel LCDC;
- Shire of Capel (SoC);
- Department of Fire and Emergency Services (DFES); and
- Department of Water (DoW).

An initial site walk over was held with MPM Development Consultants, Bio Diverse Solutions, SoC and DoW on the 12th August 2014.

1.7. Alignment to Legislation, Policy and Guidelines

In assessing the survey area, Bio Diverse Solutions has prepared this report aligned to the following legislation, please refer to Table 1.

Table 1–Government Legislation Applicable to the Proposal

Legislation	Responsible Government Agency	Aspect
Biosecurity and Agriculture Management Act 2007 (BAM Act)	Department of Agriculture, Western Australia	Weeds and feral pest animals
Conservation and Land Management Act 1984	Department of Parks and Wildlife	Wetlands/Flora and fauna / habitat /weeds / pests / diseases
Environmental Protection Act 1986 (Part IV)	Office of the Environmental Protection Authority	Assessment and Management Environmental Impact
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Department of Environmental Regulation	Clearing of native vegetation
Local Government Act 1995	Shire of Capel	Town planning approvals
Soil and Land Conservation Act 1945	Department of Agriculture and Food	Protection of soil resources
Wildlife Conservation Act 1950	Department of Parks and Wildlife	Protection of indigenous wildlife
The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).	The Commonwealth Department of Environment.	Protection of Vulnerable and Threatened species of national significance
Aboriginal Heritage Act 1972 (AH Act)	Department of Indigenous Affairs	Protection of aboriginal heritage sites

2. Regional Open Space boundary

The newly ceded foreshore adjacent to Meadowbrooke Estate will form part of the Shire of Capel's future Regional Open Space. Refer to Figure 2 outlining the foreshore reserve.

Figure 2 – Foreshore area Lot 200 Turner Street, Boyanup

Information supplied by the Shire of Capel (C.Burwood, SoC 2014) regarding the foreshore area in question:

- *The foreshore (Lot 200) area consists of a combination of ownership being the Western Australian Planning Commission, UCL (Lands Department)and reserve for public recreation (reserve 44252) (vested to the Shire of Capel through the Lands Department);*
- *The Shire has an easement over the existing path in the WAPC lot and a licence over the paths within the UCL .The easement and licence provides a four metre wide management area measured 2 metres either side of the centreline of the path.*
- *The Shire has a Management Order over Reserve 8333 which adjoins the northern end of the management plan area and which has been the subject of rehabilitation and management by the Capel Land Care District Committee.*

Please refer to the copy of the Landgate query undertaken by the SoC, Appendix A.

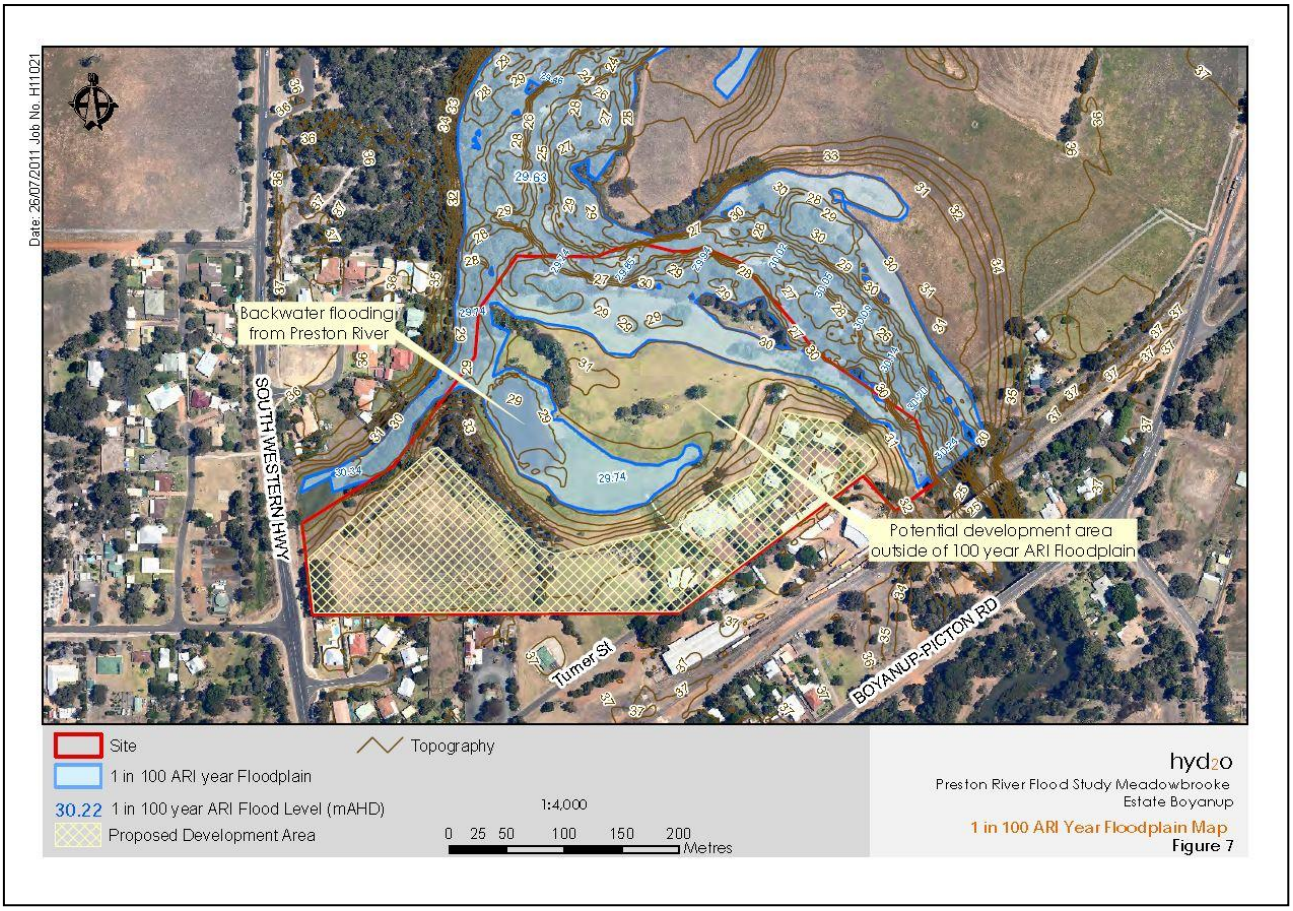
3. 1:100 year ARI

Hyd_2o was commissioned to undertake a flood study of the section of the Preston River. The report considered the impact on flood levels of the flow from the local catchment and the tributary near the north western boundary of the site which flows to the Preston River. No prior records exist from the DoW on peak estimates or flood levels for Boyanup.

Hyd_2o floodplain mapping is shown in Figure 3, which indicates the flooding potential in relation to existing surface levels based on LiD AR data and the proposed development area of Meadowbrooke Estate (Hyd_2o, 2014).

The flooding potential of the Preston River is essentially in the ceded foreshore area which this report focuses on. For more detail on the analysis and the modelling please refer to the Hyd_2o report in full.

Figure 3 – 100 year Flood Mapping Hyd_2o, 2014



4. Preston River Values

The Preston River is located within the southern area of the Leschenault Catchment and has a total catchment area of 957.8 square kilometres. The Preston River is approximately 98km long, extending 61km inland from the coast. The Preston River is one of the six major rivers in the south west region. The Preston River ranges from a saline – brackish waterway in its lower reaches at the southern end of the Leschenault Estuary to a freshwater permanently flowing waterway in the higher rainfall areas on the Darling Scarp. (Derrington, 2007)

The majority of the river catchment has been cleared for agriculture although some remnant forest vegetation exists at the headwaters. The towns of Donnybrook and Boyanup are on the shores of the Preston River. The major tributaries of the river include the Ferguson River and Joshua Creek. Minor tributaries include Thomson Brook, Crooked Brook, Charley Creek, Waterfall Gully, Mininup Brook, Millbrook and Gavin Gully. The Glen Mervyn Dam is along the Preston River.

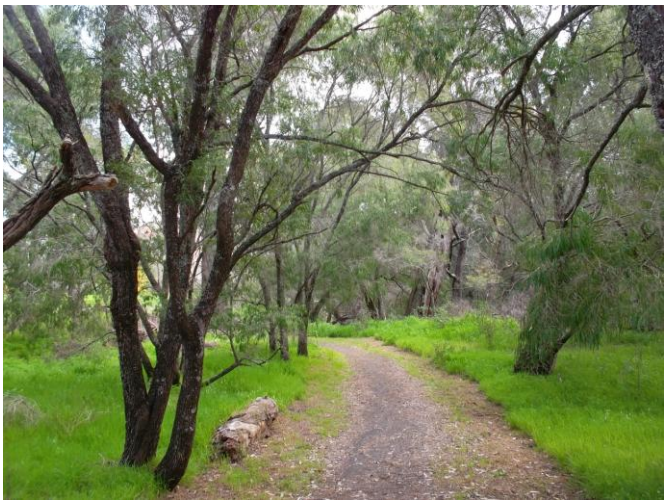
The river basin is monitored routinely as a result of eutrophication problems within the Leschenault Inlet. The water quality is fresh in many places and generally low in nutrients although some areas are slightly enriched with nitrogen.

A tributary from the west merges along the northern boundary of the foreshore area. The main central channel area is sparsely covered with sedges with minimal floristic diversity. Tree Canopy cover is good in the riverbank areas of the Preston River with weed control historically undertaken by the Capel LCDC. Please refer to Photographs 3 and 4 below, and 5 to 8 over the page.

Photograph 3 – View of main edge of bank, minimal understorey species but good tree canopy cover. River Ramble walk in foreground.

Photograph 4 – View of Preston River and river banks.

Photograph 5 – View of fringing in-tact vegetation.



Photograph 6 – View of Preston River Walk trail

4.1. Conservation Values

A search of the Geomorphic Wetlands Swan Coastal Plain Dataset was undertaken revealing 4 Geomorphic Wetlands within the survey area. Geomorphic wetlands are assigned 3 Conservation Management Categories, please refer to Table 2.

Table 2 – Wetland Management Categories

Management Category	General Description	Management Objectives
Conservation	Wetlands which support a high level of attributes and functions.	Highest priority wetlands. Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including: • reservation in national parks, crown reserves and State owned land, • protection under Environmental • Protection Policies, and • wetland covenanting by landowners. No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.
Resource Enhancement	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	Priority wetlands. Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland function, structure and biodiversity. Protection is recommended through a number of mechanisms.
Multiple Use	Wetlands with few remaining important attributes and functions	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.

(DPaW, 2014)

The mapped geomorphic wetlands within the survey area included:
(Unique Feature Identifier (UFI)/Conservation Category/Location):

- UFI 14501/Resource Enhancement/north – Preston River
- UFI 1583/ Multiple Use /north in foreshore area (lot 200) and the Preston River
- UFI 1582/ Multiple Use /south of foreshore area (lot 200) in development area; and
- UFI 1589/Multiple Use/over development area

A mapped copy of the DPAW Geomorphic wetlands is provided in Appendix C.

The current values currently associated with the Preston River include:

- Biodiversity - Remnant riparian vegetation (refer to Section 6 for more detail); CCW Wetlands, water bird habitat and sporadic bird use through the river habitat; habitat for amphibians, insects and small mammals.
- Social – Landscape amenity, Walk trail, POS/ROS, linkages to the river walk and town centre;
- Cultural – Preston River is a listed aboriginal heritage site; and.
- Adjacent values – Old rail reserve and heritage trail, proximity to Boyanup town centre.

The local community accesses the foreshore area via the “River Ramble” walk trail which encourages people to access the river and enjoy the amenity of the Preston River. There is existing infrastructure associated with the walk, refer to Photographs 7 to 8 below.

Photograph 7 – View of the start of the River Ramble to the south west of the foreshore area.

Photograph 8 – View of walk trail and bench seating along the trail.

5. Geology and Hydrogeology of the area

Department of Water (DoW) Hydrogeology Map Series (DoW 2001) places the site within the Phanerozoic time period*, Qpgs: Guildford formation - alluvial sand. clay and gravel with minor estuarine and shallow marine lenses Sand member. Aquifer - Surficial aquifer - karstic or unconsolidated, extensive or local major to minor groundwater resources.*

A geological survey was undertaken by Douglas Partners for Preston Green Pty Ltd on the development site (lot 201) as part of the engineering designs and planning process. The findings were that the ground conditions across the site generally consist of clayey sand or sandy clay with varying proportions of silt and gravel.

The results of the geological survey on Lot 201 Turner Street are summarised as:

- ***Topsoil*** *– dark grey-brown, fine to medium grained silty sand topsoil with some rootlets to depths of between 0.1 m and 0.2 m below existing surface level at all test locations.*
- ***Clayey Sand/Clayey Silty Sand/Clayey Gravelly Sand/Silty Sand*** *– generally medium dense, dark grey-brown, orange-brown and red-brown, fine to medium grained clayey sand with varying amounts of silt and gravel, to depths of between 1.0 m and 3.0 m in the eastern site, except at TP01 where it was absent, and at TP10 to a depth of 0.8 m.*
- ***Sandy Clay/Sandy Silty Clay*** *– generally firm to stiff, medium to high plasticity, orange-brown mottled blue-grey sandy clay with varying silt and gravel content. This material was encountered underlying the predominantly sand layer described above in the eastern site and at TP10 from depths of between 0.8 m to 2.5 m to the termination depth of those test pits. It was encountered directly underlying the topsoil in the western site and at TP01 to depths of between 0.6 m and 2.2m.*
- ***Clay –*** *hard, orange-brown mottled blue-grey and red-brown mottled blue-grey, high plasticity clay, encountered underlying the sandy clay from depths of between 0.6 m and 1.1 m to test termination depths at test locations TP11 and TP12, which is the western part of the site*.

(Douglas Partners, 2014)

Test pit 4 (TP04) was located closest to the foreshore reserve and recorded: A Horizon: Topsoil (0-0.15m) dark grey brown, fine to medium grained silty sand, moist; B -Horizon: Clayey silty sand (0.15 to 3m) dry becoming moist at 2.3m. Test pit 07 was located to the south of the foreshore reserve (northern end) and recorded: A Horizon: Topsoil (0-0.1m) dark grey brown, fine to medium grained silty sand, moist; B -Horizon: Clayey silty sand (0.15 to 3m) dry becoming moist at 2.3m. Both test pits were located within 25m of the foreshore reserve. Refer to the Douglas Partners report for more detail.

Detailed soil testing has not been undertaken on the foreshore reserve, it is anticipated that the soil conditions encountered at Test pit 04 and 07 (both similar in nature) would be the likely soils across the foreshore area, with the soils possibly becoming more sandy in nature closer to the riverbank.

Further soil testing may be warranted prior to the revegetation program to test for pH and other soil conditions to assist with final plant/species selection.

5.1. Groundwater conditions

Douglas Partners reported perched groundwater encountered between 0.7 to 2.4m below ground level (BGL) with all test pits encountering groundwater in the lower areas of the site due east of the existing lake in lot 201. No water was encountered at the closest test pit to the foreshore reserve at Test pit 04 or test pit 07.

5.2. ASS - management of works within foreshore area

Acid Sulfate Soils (ASS) are naturally occurring soils containing iron sulphides. These soils are typically benign within an anaerobic environment. However, when they become oxidised through disturbance, acidification of soil and groundwater can occur. The resulting sulphuric acid can also break heavy metal bonds, releasing metals such as aluminium, iron and arsenic into the groundwater and environment.

A desktop assessment aimed at determining the potential for ASS within the project site revealed there was a “High to Moderate Risk” of ASS occurring along the Preston River and “Moderate to Low Risk” adjacent and in the foreshore area (WA Atlas 2014).

The river area has been altered from flooding events, farming practises, weed invasions access and recreational activities. Onsite inspection of the foreshore area revealed there was no evidence of sulphate scarring or deaths to the ecosystem. Detailed engineering design was not available at time of reporting, however there is no development or excavation in the foreshore area as this will be revegetated or landscaped. As not greater than 100m^2 will be excavated and therefore the risk of disturbing ASS in the foreshore (lot 200) is low, it is therefore recommended that there is no requirement for ASS management within the foreshore area.

6. Remnant Vegetation values

The subject lies within the Swan Interim Bio-geographic Regional Area (IBRA bioregion). Hearn *et al* (2002) describe the Swan IBRA region as: "*low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils.*" The area is located within the *SWA1- Dandaragan Plateau. The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.* (Hearn *et al*., 2002).

The vegetation has been mapped on a broad scale by JS Beard (Shepherd *et al* 2002) in the 1970's, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett 2010).

A search of JS Beard's vegetation classification database for the general area places the site within 2 broad Vegetation Associations for the site:

1. **System Association: Pinjarra**
- Vegetation Association number: 968
- Vegetation Description: Medium woodland; jarrah, marri & wandoo

2. **System Association: Pinjarra**
- Vegetation Association number: 1182
- Vegetation Description: Medium woodland; *Eucalyptus rudis* & *Melaleuca rhaphiophylla*

This vegetation within the paddock areas of the foreshore has been extensively grazed/mowed and is considered to be in a "*Completely Degraded condition: The structure of the vegetation is no longer intact and the area is completely or almost completely without native species*" (Keighrey, 1994). Species in this cover class included mainly weeds and introduced plants, forming open grassland/herblands and manicured lawns. Refer to Vegetation Mapping Appendix D.

The majority of the riverbank area along the Preston River area has some understorey (native sedges) and intact tree canopy and the vegetation was in *"Good Condition": Vegetation structure significantly altered by very obvious signs of multiple disturbance* (Keighrey, 1994). The trees formed a continuous canopy, however the understory was very weed infested and little to no mid storey species. There was indications of recruitment of trees in the midstorey, however minimal diversity of species. These areas formed a Medium to Low Open forest/Woodland of *E.rudis* and *Agonis flexuosa*, refer to Refer to Vegetation Mapping Appendix D.

In 1999 the section of the Preston River was assessed as being in a "C2" Foreshore Condition Grading. Definitions of the Foreshore Condition Grading (Pen & Scott, 1995) is shown in Table 3.

Table 3 – Foreshore Condition Assessment Grading (Pen & Scott 1995)

Category	Description
A Grade	"Pristine", "Near Pristine" and "Slightly Disturbed": Where the foreshore has healthy native bush, similar to that which you would see in nature reserves, state forests or national parks.
B Grade	"Degraded" including "Weed infested", "Heavily weed infested" and "Weed Dominated": Where the bush along the stream has been invaded by weeds, mainly grasses, and looks like typical roadside bush.
C Grade	"Erosion Prone", "Soil Exposed" and "Eroded": Where the foreshore supports only trees over weeds or pasture, or just plain pasture and bank erosion and subsidence may be occurring, but only in a few spots.
D Grade	"Ditch-eroding", "Ditch-freely eroding" and "Drain-weed dominated": Where the stream is little more than an eroding ditch or a weed infested drain.

Site inspection on the Flora species which were identified within the foreshore area is shown in Table 4.

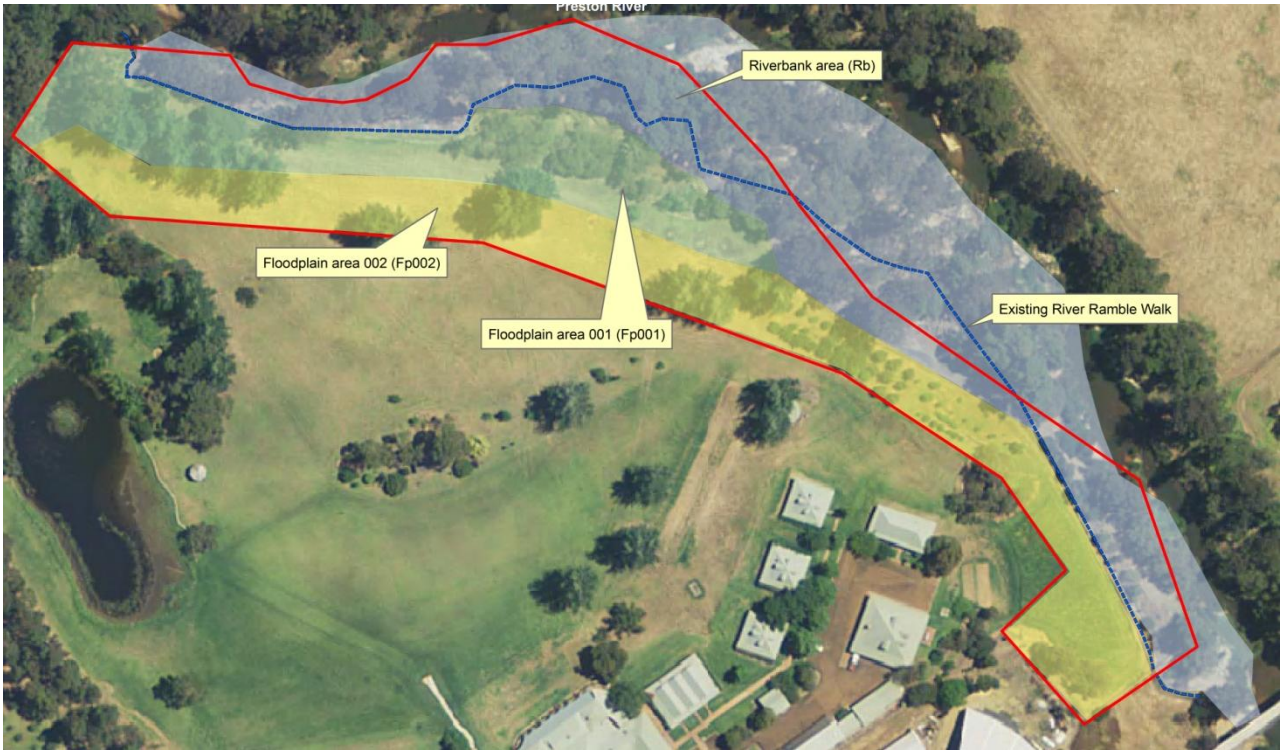
Table 4 – Flora species recorded on site

Family	Species Name	Common Name
Asparagaceae	**Asparagus asparagoides*	Bridal creeper
	**Yucca spp*	
Asteraceae	**Arcotheca calendula*	Daisy
	**Hypochaeris glabra*	Smooth Catsear
	**Conyza bonariensis*	Fleabane
Ariaceae	**Zantedeschia aethiopica*	Arum Lily
Araliaceae	**Schefflera actinophylla*	Australian Ivy-Palm, Octopus Tree, Queensland Umbrella Tree
	**Hedera spp.*	Ivy
Cyperaceae	*Bolboschoenus caldwellii*	Marsh Club-rush
	Gahnia trifida	Coast Saw Sedge
Dennstaedtiaceae	*Pteridium esculentum*	Bracken fern
Fabaceae	*Acacia acuminata*	Jam
	Hardenbergia comptoniana	Native wisteria
Iridaceae	**Romulea rosea*	Guildford Grass
	**Moraea miniata*	Cape Tulip
	Patersonia occidentalis	Purple flag
	**Watsonia meriana* var. *bulbillifera*	Watsonia
Juncaceae	*Juncus pallidus*	Pale Rush
Myrtaceae	*Corymbia calophylla*	Marri
	Eucalyptus rudis	Flooded Gum
	Agonis flexuosa	Peppermint
	Melaleuca rhaphiophylla	Swamp paperbark
	Taxandria parviceps	Tea tree
Oxalidaceae	**Oxalis pes-capre*	Sour sob
	**Oxalis glabra*	Finger leaf oxalis
Papilionaceae	**Trifolium angustifolium*	Clover
Geraniaceae	*Pelargonium australe*	Wild geranium
Phytolaccaceae	**Phytolacca octandra*	Ink weed
Poaceae	**Avena fatua*	Wild oat
	**Briza maxima*	Blowfly grass
	**Ehrharta calycina*	Perennial Veldt Grass
	**Lagurus ovatus*	Hare's tale grass
	**Pennistetum clandestinum*	Kikuyu
	**Paspalum distichum*	Water couch
Salicaceae	*Populus tremula*	
Strelitziaceae	**Ravenala madagascariensis*	Travellers Palm
Solonaceae	**Solanum aviculare*	Kangaroo Apple
Zamiaceae	*Macrozamia riedlei*	Zamia Palm
Zingiberaceae	**Zingiber spp*	Ornamental ginger

** denotes weed species*

The subject site (lot 200) has been divided into two transitional zones, "Riverbank" (Rb) area and "Floodplain" (Fp) area (see Figure 4).

Figure 4 – Transitional zones of subject site



The “Riverbank” (Rb) area (see Figure 4) should be revegetated with midstorey and understorey species to encourage local diversity and restoration of river functions, this would bring this Foreshore Grading up to a “B” classification in the future. The “Floodplain” area (see Figure 4) has further been divided into two zones floodplain001 (Fp001) and Floodplain 002 (Fp002). The floodplain area, specifically Fp001 will need some intensive revegetation work to restore this area back to a “B” grade. There is little to no structure in tact with paddock grasses and fruit trees present. (See Photograph 2).

Preliminary discussions with the Shire of Capel have indicated there should be a landscaped area within the foreshore reserve. This could occur within the Fs002 as shown within figure 4. The Bushfire Management Plan (BMP), (Bio Diverse Solutions, 2014) also recommended to mitigate bushfire risks from the north west and from the River reserve, that this area should be low fuel or low threat vegetation, refer to Section 15 for more detail.

7. Remediation and revegetation works

The Preston River north west of lot 200 has been revegetated by the Capel Land Care District Committee (C.Burwood, SoC 2014, and *Pers comms*, C Derrington, 2014) in previous years. Plants were sourced from the local nursery Boyanup Botanical Nursery and planted by the Capel LCDC volunteers. Work was also undertaken by Green Corps in assisting building infrastructure on site. Please refer to Photographs 9 to 11 below.

Photograph 9 – View of signage form Green Corps work done in the Preston River foreshore.

Photograph 10 – View of signage along the River Ramble

A program and methodology for revegetation and remediation of the foreshore area is proposed in the following sections. This replicates the methodologies which have previously successfully been employed in adjacent river areas. Revegetation is to be carried out within the foreshore area as shown in Figure 4 and Revegetation Plan Appendix E.

7.1. Objectives

- To re-instate vegetation to protect the foreshore area along Preston River (lot 200) within the newly created foreshore area and adjacent river banks.
- Assist naturally regenerating vegetation on the Preston River banks and foreshore areas to return to a B-Grade Classification;
- To have Low threat vegetation buffer at the interface of the foreshore/development area to reduce fire risks to the lifestyle village residents and to allow for permeable visibility to the DUP for security and safety reasons;
- To establish and preserve existing vegetation and regeneration of denuded areas with local endemic with similar composition of adjacent foreshore areas;
- To reduce weed invasions and competition of weeds with native species; and
- To assist with on the ground implementation of the revegetation.

7.2. Strategies

The following strategies will continue to be employed on the site to reach successful revegetation of the creekline/foreshore area:

- To re-instate native vegetation along the banks and foreshore areas to continue the future biodiversity and river qualities of the area.
- Assist naturally rehabilitating areas to return to pre-disturbed state;
- To establish vegetation through revegetation and regeneration of denuded areas with local endemic species;
- To reduce weed invasions and competition of weeds with native species; and
- To assist with on the ground implementation of the revegetation.

7.3. Methodology

The revegetation methodology is proposed to be undertaken using the following steps:

1. The method of revegetation is to use the existing topsoil, with spraying for weed species two months prior to planting seedlings.
2. Top soils are to be imported where required to assist with seedling establishment.
3. Contouring and mounding (200mm) of slopes parallel to the banks or slopes is to occur prior to planting of seedlings.
4. If seeding required, seed will be collected at appropriate seasons from adjacent vegetation and dispersed over constructed soils if required for further revegetation.
5. Any weeds likely to significantly impact on the rehabilitation will be sprayed with Roundup or similar herbicide, or grubbed out, depending on the species involved.
6. Rehabilitation will be carried out promptly after soil disturbance.

7.4. Seed stock

Where practicable plant species used in revegetation works will be of local provenance, defined as propagated from plant in the immediate geographic area or from areas that closely match the physical environment and the plant community types of the area to be planted.

In acknowledgement that sourcing sufficient plant stock can be difficult, particularly wetland species, tubestock from species that are found in the wetland areas in this locality may be sourced from available nurseries that are accredited by the Nursery Industry Accreditation Scheme of Australia (NIASA) which will guarantee the quality of the supplied material. The final species selection will be subject to availability of seed previously sourced from adjacent to the site and/or from NIASA accredited nurseries sourcing dieback free seedling stock.

Different plant species have differing tolerances to ground water levels and as a result, may prefer inundated and lower slope environments over slightly drier areas. The preferred species for revegetation of the revegetation areas and listed in Table 5 and shown in Appendix E.

7.5. Methodology

Revegetation is proposed in Lot 200 in the floodplain area and along the UCL riverbank area of the Preston River. These areas have been identified in the Foreshore Management Plan in three Zones – Riverbank (Rb), Floodplain Zone 1 (Fp001) and Floodplain Zone 2 (Fp002). The foreshore zone is divided into two categories as there will be two separate planting strategies deployed in these areas. Fp001 will be full scale revegetation works to recreate Low Open Forest as found along the Preston River floodplain. Fs002 will be a Low fuel vegetation which will comply with AS3959-2009 definition of *Low Threat Vegetation* and meet the requirement of the SoC request to have visibility to the DUP from the development area for security and safety means. The revegetation areas, zone names and areas are shown below in Table 5.

Table 5 - Revegetation areas

Area and zone name	Zone id	Zone description	Total Area m^2
Riverbank	Rb	Below hydric soil line to water line, infill of understorey and midstorey species	15,116 m^2
Floodplain zone 1	Fp001	Above hydric line in flood zone, full revegetation of all structure.	5, 482 m^2
Floodplain zone 2	Fp002	Above hydric line in flood zone, low fuel zones, possible landscaped area (*TBC)	7, 534m^2
		Total	**28, 132m^2**

The following methodology is proposed, however dependant on the timing may be adapted as required to suit conditions.

Surface preparation
To ensure that native seed germination and seedling survival rates are maximised, weed removal through spraying, grubbing and selective removal (See Section 8 for more detail) and providing optimal soil condition for germination (scarification) and root development (ripping) will be undertaken. Contouring paralleled to any banks or slopes would be undertaken to depths of 200mm, along the banks spot holes/contouring for replanting will be required to a depth of 200mm and 200mm wide along steep banks.

Species selection and plant allocations
Where practicable plant species used in revegetation works will be of local provenance, defined as propagated from plant in the immediate geographic area or from areas that closely match the physical environment and the plant community types of the area to be planted. Seed collection over the site and in adjacent riverbank areas could be undertaken 12-18 months prior to revegetation commencing.

Different plant species have differing tolerances to ground water levels and as a result, may prefer inundated and lower slope environments over slightly drier areas. The preferred species for revegetation of the wetland areas and their associated buffers are listed in Table 6. The list has been compiled on the basis of the existing vegetation found in the adjacent riverbank areas that were surveyed in August 2014 by Bio Diverse Solutions and species that can be sourced from the vegetation types identified on site.
The species have been allocated as per the vegetation type, refer to Table 6 which outlines the vegetation type, zone id, plant species and growth form. Table 6 is a guide and final selection may be subject to budget, soil conditions, availability of stock and finals revegetation areas.

Species allocation/densities have been based on the following matrix:

- Eucalyptus Forest – Overstorey species 30%, Midstorey species 35%, Understorey species 35%.
- Eucalyptus Woodlands – Overstorey species 40%, Understorey species 70%
- Low threat vegetation – understorey species 100%

Densities

Trees	1 stem/10m^2	
Shrubs/herbs	1 stem/5m^2	
Understorey	2 stem/m2	
Sedges	4 Stem/1m^2	
Landscaping areas	1 stem/5m^2	2 stem/m2 depending on landscape design

The Riverbank zone (Rb) will not require densities as outlined below as this is mainly infill plantings and shall be re-assessed at time of implementation. The density listed above and in Table 6 is a guide to assist in recovery of the area to a B1 classification.

Table 6 – Guide for Revegetation Species

Species	Common Name	Zone id	Density	Growth form
Corymbia callophylla	Marri	Rb, Fp001	1 stem/10m^2	Tree
Melaleuca rhaphiophylla	Swamp paperbark	Rb, Fp001	1 stem/10m^2	Tree
Eucalyptus rudis	Flooded gum	Rb, Fp001	1 stem/10m^2	Tree
Eucalyptus gomphocephala	Tuart	Rb, Fp001	1 stem/10m^2	Tree
Agonis flexuosa	Peppermint	Rb, Fp001	1 stem/10m^2	Shrub
Taxandria parviceps	Native tea tree	Rb, Fp001	1 stem/5m^2	Tree
Allocasuarina fraseriana	Casuarina	Fp, Fp001	1 stem/10m^2	Tree
Patersonia occidentalis	Purple Flag	Rb, Fp001	1 stem/5m^2	Herb
Adenanthos cuneatus	Coastal jug flower	Rb, Fp001, Fp002	1 stem/5m^2	Shrub
Astartea fascicularis		Rb, Fp001, Fp002	1 stem/5m^2	Shrub
Acacia acuminata	Jam	Rb, Fp001	1 stem/5m^2	Shrub/tree
Hardenbergia comptoniana	Native hardenbergia	Rb, Fp001	1 stem/5m^2	Herb
Kunzea recurva	Curved-leaf kunzea	Fp001, Fp002	1 stem/5m^2	Shrub
Xanthorrhoea platyphylla	Grass Tree	Rb, Fp001,	1 stem/5m^2	Shrub
Bolboschoenus caldwellii	Marsh club rush	Rb, Fp001, Fp002	4 Stem/1m^2	Sedge/rush
Gahnia trifida	Coast saw-sedge	Rb, Fp001, Fp002	4 Stem/1m^2	Sedge/rush
Hibbertia hypericoides	Cut leaf hibbertia	Fp001, Fp002	2 stem/m2	Herb
Hypocalymma angustifolium	White myrtle	Fp001,	1 stem/5m^2	Shrub
Melaleuca thymoides		Rb, Fp001,	1 stem/5m^2	Shrub
Melaleuca teretifolia	Banabar	Rb, Fp001,	1 stem/5m^2	Shrub
Baumea articulata	Jointed rush	Rb, Fp001, Fp002	4 Stem/1m^2	Sedge/rush
Baumea juncea	Bare twig rush	Rb, Fp001, Fp002	4 Stem/1m^2	Sedge/rush
Anigozanthos manglesii	Mangles kangaroo paw	Fp001, Fp002	4 Stem/1m^2	Sedge/rush
Hakea lissocarpha	Honey bush	Fp001	1 stem/5m^2	Shrub

The above table is a guide and will be refined when seed stock/seedling availability is defined.

Seedling Planting

Planting of seedlings will commence after the season's first major rains (typically May/June) when the soil is sufficiently wet to plant without the need for additional watering and to allow maximum root growth and plant establishment before summer. It is generally an optimum time after three continuous rain days observed in Autumn months. Individual species will be planted irregularly to reflect the distribution found in natural areas.

Infill planting will be carried out in subsequent winters as required. The quantities required for infill planting will be calculated through monitoring between plant installation in

subsequent winters and autumns with final numbers being based on percentage survival rates of initial planting.

Site and Plant Protection
Rabbit proof barriers may need to be installed around seedlings at time of planting, this will be subject to cost and recommendations from the Capel LCDC from pervious revegetation strategies adjacent to the site.

In the steep riverbank areas a technique of planting shrubs and sedges planted in sandbags has been applied in the adjacent riverbank and this could be replicated to ensure the longetivity and establishment of the plants in the steep banked areas (*Pers comm*., R. McPherson , 2014).

Completion Targets
The following completion targets will apply to the revegetation program

- The revegetation target of the FMP is to establish at least 1 plant / m2 throughout the Foreshore area.
- In all revegetation zones the target is less than 40% weed cover, and for all SoC First Schedule Pest Plants to be less than 5%.

Monitoring
The revegetation areas will be monitored and maintained for two years following installation to ensure progress towards the completion targets are met.
Four visits will be conducted to track progress and to initiate remedial action if required:

- First spring - to determine if there are any immediate losses as a result of transplant shock, weed competition, predation or weather related impacts
- First autumn - to determine mortality and survival rates over the first summer period
- Second spring – to assess the long-term success of the revegetation operation and determine the need for further remedial works
- Second autumn – to assess the long-term success of the revegetation operation and determine the need for further remedial works.

Timing of assessments may be adjusted to suit the weather conditions. The results of each monitoring assessment will be compared to determine growth and mortality rates, and provided a quantitative measure of progress.

Maintenance
Revegetation maintenance work will be carried out in response to monitoring to ensure completion targets are met for the duration of the works period. A schedule for revegetation, maintenance works and monitoring is shown in Table 9.

7.6. Implementation

Preliminary discussions have been held with Capel LCDC in regards to undertaking the revegetation. There is also opportunity for a local school to be involved (such as Childside and Boyanup School) in the planting process.

The benefits of using the local community in the planting process are that it will generate community involvement in the site and give ownership over the success of the revegetation project. This will assist the Shire of Capel in the future management of the site and give sound environmental outcomes for the project.

The use of community groups is subject to further consultation and refinement, a draft copy of this report has been emailed to the Capel LCDC for comment. If in the event the community is not involved then a suitably qualified contractor will be engaged by the responsible party implementing this FMP.

8. Weed Management Plan

The following Weed Management Plan is to apply to all aspects of site operations. All operations shall conform to this Weed Management Plan, and monitoring to occur post revegetation for any infestations. Weed management will primarily be undertaken through avoiding introducing new weeds to the foreshore reserve.

8.1. Aims of Weed Management Plan

The aims of the Weed Management at will be to:

- Maintain a weed free environment;
- Ensure all vehicles are clean on entry prior to any soil or vegetation movement;
- Site is to be secured to prevent trespassers illegally accessing, dumping rubbish and green waste;
- All weeds on site removed promptly on discovery;
- Remove weeds from least affected areas to the most affected areas (Bradley Method);
- Do not use weed affected soils for rehabilitation, but remove infected soils to waste disposal; and
- Regularly monitor the site for invasive species.

If weeds are discovered on site they will be treated using the following methodology:

- Large woody weeds will be burned, poisoned or removed from site and disposed to approved green waste;
- Small weeds will be sprayed by a licensed contractor or landholder; and
- Initial follow up spraying will be undertaken at 6 months and 18 months and repeated as necessary.

8.2. Program for weed control

The following program for weed management will be implemented prior to revegetation, revegetation activities, and post revegetation monitoring activities. Table 7 (over the page) is a guide for aggressive common species (adapted from Department of Agriculture and Food recommended techniques) and should be used as a guide to treat any infestations promptly. Further information for any species and recommended treatment not listed in Table 7 should be gained from the Department of Agriculture and Food.

Table 7 – Weed Management Program

Species		Treatment	Responsibility
Grasses			
Kikuyu	*Pennisetum clandestinum*	Control with herbicides whilst growing.	Spray/ Civil Contractor as required
African Love Grass	*Eragrostis curvulata*	Annual Spray during winter, small infestations all year round as required.	Spray/ Civil Contractor as required
Blowfly grass	*Briza maxima*	Hand weed or spraying. Cool burn in late winter to spring before flowering.	Spray/Civil Contractor as required
Flat weed	*Hypochaeris spp*	Annual Spray during winter, small infestations all year round as required.	Spray contractor and Civil contractor
Hare's-tail Grass	*Lagurus ovatus*	Prevent seed set for 2-3 years by the removal of the topsoil through civil works.	Spray and Civil
Woody Weeds			
Poplar	*Populus sp*	Cutting the suckers off and painting the cut ends with “tree and blackberry killer”, or removing trees and suckers completely by ripping	Contractor, machine
Golden wattle	*Acacia longifolia*	Fire not favourable at this site. Spraying (diesel) to lower trunk and/or injection on mature trees. Spraying or wiping on seedlings and juvenile trees.	Contractor, spray contractor, bobcat
Blackberry	*Rubus ulmifolius*	Mechanical control difficult. Annual summer applications of Grazon, 3 applications required, use Glyphosate in sensitive areas (i.e. creeklines).	Contractor, spray contractor, bobcat
Ink weed	*Phytolacca octandra*	Uproot heavy infestations and cut remaining plants 5cm below ground. Spraying is effective.	Spray and civil contractor
Herbs			
Spear thistle	*Cirsium vulgare*	Manual removal or selective spray control.	Spray contractor and civil contractor
Night shade	*Solanum nigrum*	Prevent seed set for several years. Hand remove plants before flowering and/or spray during the plant is growing in summer.	Spray contractor
Fleabane	*Conyza species*	Spray in late spring. Hand removal-remove taproot. Introduction of native species which provide shade.	Spray Contractor/Civil contractor
Dolichos Pea	*Dipogon lignosus*	Manual removal difficult. Burning not recommended. Spraying of Tordon until run-off in August annually.	Spray Contractor/Civil contractor

Ref: Wheeler (2002)

In the ornamental (north western portion of the site) there are numerous introduced plants such as perfumed roses that has been suggested are offered to people in the community, maybe the local school or Boyanup Garden Club. There are some mature exotic trees like a carob which wouldn’t do any harm to stay there (*Pers comm*., R.Mcpherson, 2014).

There are many weeds such as ivy, palms, wild roses, figs, fishbone ferns etc that need to be

removed, again these could be offered to the community or neighbours. Refer to Photographs 11 and 12 below.

Photograph 11 – View of palms and ornamentals within and adjacent to Lot 200 in north west. Photo R.McPherson

Photograph 12 – View of bamboo and ornamentals within and adjacent to Lot 200 in north west. Photo R.McPherson

8.3. Management and Control of weeds

Initial management will be undertaken by the current owners as part of the ongoing management of the property. The annual spraying and weed management shall continue for a period of up to 2 years post revegetation implementation New landowners (SoC) may be required to continue the weed management program to ensure there is successful revegetation implementation and to restrict the movement or further establishment of weeds.

Refer to Table 9 for long term management actions and timeframes.

Briefing information to site personnel during revegetation/planting will include but not be limited to:

- Maintain a weed free working environment through clean vehicles on entry to the site;
- Ensure weeds are not moved into weed-free areas through regular inspections of vehicles;
- Show personnel physical samples of weeds present on site;
- Regular inspections of undercarriage of machines;
- Techniques of topsoil management to be modified if weeds are present via removing infected topsoil's or spraying prior to soil disturbance; and
- Hand/mechanical removal of weeds to green waste.

9. Bank stability works/erosion control

The predominant soil type in the creekline is deep sands with adjacent sands over clay/rock. Loose sands during revegetation works can be subject to prevailing winds and water erosion. Mounding of the revegetation areas will assist with the runoff from the revegetated areas and brushing will reduce the affects of wind erosion. The mounding and contours will also assist in trapping water for seedling germination and growth. Mounding should occur along contours or in flat areas perpendicular to river flow direction.

Specific areas noted for stabilisation are within the Preston River banks (outside subject site), near an overhead power transmission line/power box (outside subject site) and at steep intervals along the river banks. These areas have high slopes into the creek area and are most subject to water erosion, flooding and scouring. Please refer to Appendix F - Foreshore Master Plan.

Stabilisation techniques may need to be applied such as mulching or geo-fabrics can be used wherever possible to ensure there is minimal erosion to the site. This will need to be monitored as time of implementation of this plan. As the revegetated banks recover this in time will lead to less erosion occurring. Refer to Photographs 13 and 14 below.

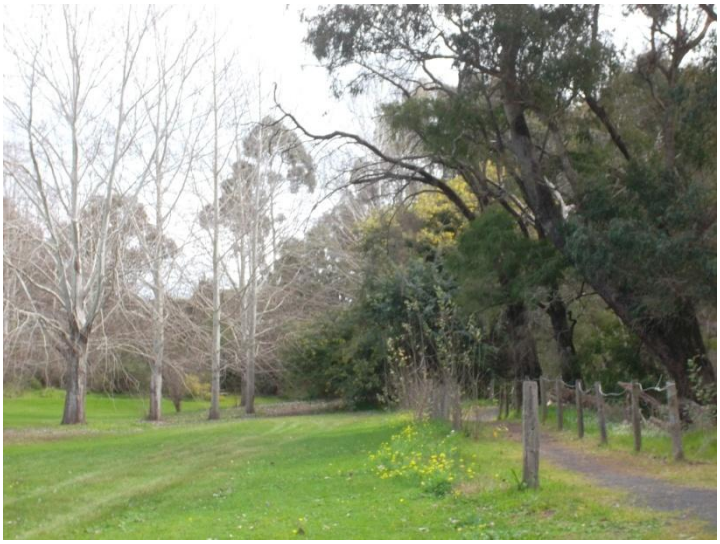
Photograph 13 – View of flood washout, 2014. Photo R.McPherson

Photograph 14 – View of silting along banks of river, north of subject site (lot 200). Photo R.McPherson.

10. Fencing/retaining walls

There is presently some fencing along the banks of the Preston River adjacent to the “River Ramble” walk. This has been introduced recently and is most likely to do with safety along the steep river banks (*Pers obs* K.Kinnear 2014). A Visitor Risk Assessment has not been undertaken of any existing infrastructure along the River Ramble, however may be warranted in the future to ensure visitor safety is maintained.

Old fencing is eminent along the previous boundary of Meadowbrooke Estate, the SoC has requested that this is removed, possibly some of the historical strainer posts may be retained for historical reasons (*Pers comms.* C.Burwood, SoC 2014). Refer to Photograph 15.



Photograph 15 – View of existing fencing along the river ramble walk.

Integration between the foreshore area and the development site has been discussed with Council staff (MPM, 2014) and agreed that integration between the two sites is preferred to fencing. A low level pine/rail fence may be considered to provide a line of demarcation. The low level pine/rail fence will allow for definition of the lifestyle village as private property while allowing for the visual amenity of the Preston River and local walkers along the River Ramble walk.

11. Access and infrastructure

Recreation activities need to be managed so that:

- Activities can be carried out in a safe environment;
- Disturbance to the natural environment is minimised; and
- Conflicts between incompatible recreational uses are minimised.

The objectives for recreation in the subject site are

- Provide an appropriate level of access whilst preserving the ecological values of the subject site;
- Facilitate appropriate recreational activities by providing suitable resources and infrastructure; and
- Provide a safe environment for passive recreation.

Access management is relevant to recreational use and management of the foreshore. As the two purposes are closely related, and as Dual Use Path (DUP) may be developed for management access will also be used for recreational use and vice versa, the two issues are dealt with together.

11.1. Access

Pedestrian access to recreational areas is of high importance to residents and visitors of the foreshore area; however this must be managed in such a way as to preserve the ecological integrity of the area. This will be achieved by facilitating appropriate access to recreational areas and restricting access that results in the degradation of natural areas. Issues and management of access in the area is explored below. Paths should comply with Australian Standards AS2156.2-2001 Walking Tracks – Infrastructure Design.

Disabled access should be provided wherever possible and should facilitate the independent use of people with a range of disabilities including physical disabilities, hearing and vision impairment. Disabled access should comply with the following Australian Standards:

- AS 1428.1-2001 Design for Access and Mobility – General Requirements for Access – New Building Work;
- AS 1428.2-1992 Design for Access and Mobility – Enhanced and Additional Requirements – Buildings and Facilities;
- AS 1428.3-1992 : Design for access and mobility – Requirements for children and adolescents with physical disabilities; and
- AS NZS 1428.4-2002 Design for Access and Mobility – Tactile Indicators.

Access along the foreshore area is proposed to be along the Existing River ramble walk and a new section/placement in the eastern portion of the site. Refer to Foreshore Master Plan Appendix F. The upgrading of the River Ramble to a Dual Use Path (DUP), concrete and stabilised will allow for access for all persons (mobility, age etc) and could provide a linking walk from the railway reserve (currently subject to landscape mater planning) to the Shire reserve in the north and back to South Western highway (into town). This linking access provides a passive recreation and could be funded through state government grants/initiatives.

There will be no access via the road network to the subject site. Access will be via pedestrian only.

11.2. Parking

Parking will not be a requirement of this foreshore area, parking is available to the east in the railway reserve currently managed by the SoC.

11.3. Community recreational nodes/infrastructure

Passive recreation activities such as walking, jogging etc is one of the primary recreational pursuits in the subject site and is currently facilitated by the River Ramble walk trail. Infrastructure existing to facilitate this activity is:

- Clearly defined paths suitable for walking
- Seating provided at strategic locations
- Car parking to the east in the railway reserve;
- Interpretive and regulatory signage

There is a potential for conflict with cyclists in the study area as these two groups share facilities. Measures to reduce conflict include:

- Physical separation in all areas apart from designated dual-use pathways
- Additional Dual Use Pathways should be built to Australian Standards incorporating appropriate width and line-of-sight.

Pedestrian Access should comply with the following Australian Standards:

- AS 2156.1-2001 Walking Tracks – Infrastructure Design
- AS 2156.2-2001 Walking Tracks – Classification and Signage

Seating within the study area is currently limited to park type benches. These are adequate for the setting/activity, some may need to be relocated if the River Ramble is realigned. Seating should be associated with the lookouts/views of the river. All new seating should be uniform with the existing seats and consistent with the surrounding environment.

11.4. Landscaping

A Landscaping Master Plan shall be prepared for the adjacent Meadowbrooke Estate, the interface of the foreshore area, recreation facilities and the access from the estate should be defined in this process. Preliminary discussions with the Shire of Capel have indicated there should be a landscaped area within the foreshore reserve. The landscape master plan for the adjacent development will be forwarded to the SoC for approval and comment prior to finalisation.

12. Sites of cultural, archaeological or religious significance

A search of the Department of Indigenous Affairs database revealed the Preston River is registered as an Aboriginal heritage site. Please refer to Appendix G for the report. An Archaeological survey has not been undertaken for this project to date and is not deemed necessary as no soil will be removed from within the area.

Social functions pertaining to the river are related to recreation and appreciation/amenity and will not affect any cultural sites. Recreation includes active recreation or passive types such as bird watching, walking and nature studies.

13. Stormwater management

The majority of the site is relatively free draining sandy soils and is a model site for water sensitive urban design to be applied. No stormwater infrastructure from the adjacent development area is proposed to be located within the foreshore reserve or affecting the foreshore area. Water management strategies should be aligned to current **Best Practise** and applied to this development, these include:

1. Maintain and where possible enhance water quality by:
Minimise waterborne sediment loading
Minimise export of pollutants to surface or ground water
Minimise post development flows across the site
Apply point source water management
Encourage prospective adjacent landowners not to use fertilisers on land

2. Encourage water conservation by nearby adjacent landowners:
Minimise the export and use of scheme water
Promote the use of rainwater
Promote ground water recharge
Reduce irrigation requirements

3. Management of the water regime by:
Prevent flood damage in existing and proposed revegetation areas
Prevent erosion of adjacent wetlands, waterways and slopes
Ensure pollutants do not enter into adjacent waterways

14. Midge and mosquito control

A Midge and Mosquito Management Plan is not required for the foreshore area, one will be developed for the adjacent development prior to construction, this will:

- Establish a Baseline Monitoring Programme for mosquitoes
- Implement an Ongoing Monitoring Programme for up to two years after practical completion for mosquitoes
- Keep record of public complaints of nuisance midges and mosquitoes and the number of disease notifications.

Measures that will be undertaken to control populations of mosquitoes and midges will include:

- Physical – physical modification or removal of source such as thick weeds (not native, endemic species) in the wetland area to prevent breeding
- Chemical – larvicides including both ground and aerial applications and adulticides, including fogging and residual surface adulticides will be used on an as needed basis for short term control;
- Cultural – encouragement of public to implement personal preventative measures.

To be effective, a mosquito control programme must utilise an integrated approach to management employing a combination of physical, chemical and cultural control methods and targeting both larva and adult mosquitoes.

In keeping with the requirements of the Department of Health (DoH), the chemical mosquito control programme will be implemented if the number of adult mosquitoes caught in a trap at a single location over a normal sampling period (12-18 hours) exceeds 50 individuals. Larviciding is the preferred method of mosquito control and will be undertaken using a mosquito growth regulator that is approved for use in wetland environments such as s-Methoprene (granules, liquid or briquette form) and Bti (*Bacillus thuringiensis* subspecies *israelensis*). These can be applied as an aqueous suspension for ground or aerial application by Ultra Low Volume (ULV) techniques or diluted with water. An alternative for use when there is a standing body of water present is ProLink XR Briquettes (150 days residual). The use of this larvicide is approved by the DoH as they are the ideal treatment for chronic breeding sites where access is difficult or where regular re-treatment would be impractical. ProLink XR Briquettes can be applied (at a rate of 1 Briquette/10-20 m2) prior to flooding when sites are dry. They can be used in storm drains, ditches, ornamental ponds, septic tanks, waste water ponds, construction sites, salt-marshes, semi-permanent and permanent freshwater larval habitats.

In addition to the use of larvicide to control mosquito larvae populations, the weed control, rehabilitation and the provision of landscaping buffers will provide protection from nuisance levels of midges and mosquitoes.

15. Fire protection measures

A detailed Bushfire Management Plan (BMP) has been prepared aligned to WAPC and DFES Planning for Bushfire Protection (Edition 2) 2010. Site specific information regarding protection of life and property has been identified in this document and should be referred to directly.

The main aspect of bushfire management affecting the foreshore area is to ensure that there is fire fighting access maintained at the perimeter of the foreshore area and this access is unimpeded in emergency situations. The DUP could be utilised for four wheel mounted fast attack units and is gated at the eastern end from the railway reserve. It is recommended that this remains in perpetuity to enable light units to access the river area in a bushfire emergency.

Revegetation is proposed in Lot 200 in the foreshore area, along the UCL area of the Preston River and in the development footprint, along the western boundary. These areas have been identified in the Foreshore Management Plan in three Zones – "Riverbank" (Rb), "Floodplain Zone 1" (Fp001) and "Floodplain Zone 2" (Fp002). The "Floodplain Zone" is divided into two categories as there will be two separate planting strategies deployed in these areas. Fp001 will be full scale revegetation works to recreate Low Open Forest as found along the Preston River banks. Fp002 will be Low fuel vegetation which will comply with AS3959-2009 definition of *Low Threat Vegetation* and/or the BPZ standards. There is a requirement to meet the request of the SoC to have visibility to the DUP from the development area for security and safety means. This will also assist in fire protection to nearby residents.

The revegetation in lot 200 buffer zone (Fp002) is proposed to be a "Low Fuel Zone" as defined by AS39592009, with low understorey species planting proposed this is reflected on the Bushfire Management Plan (Bio Diverse Solutions, 2014). The *Low Threat Vegetation* as defined by AS3959-2009 includes:

- Managed grasslands;
- Maintained lawns;
- Golf courses;
- Reserves and parklands;
- Botanical gardens;
- Vineyards, orchards,
- Cultivated ornamental gardens,
- Commercial nurseries; nature strips and wind breaks.

The standard in this area will be similar to the Building Protection Zone (BPZ) which is:

- Fuels maintained at 2 tonnes per hectare;
- All grasses to maintained to a maximum height of 50mm;
- Trees (crowns) are a minimum of 5 metres apart;
- Trees are low pruned at least to a height of 2 metres;
- No tall shrub or tree is located within 2 metres of a building;
- Shrubs in the BPZ have no dead material within the plant;
- Tall shrubs in the BPZ are not planted in clumps ;
- Shrubs to be less than 500m, generally low planting ground covers of <300mm and
- Trees in the building protection zone have no dead material within the plant's crown or on the bole;

15.1. Shire of Capel Fire Management Strategies

Fire management within the Shire of Capel is administered as per the procedures outlined in the Local Emergency Management Plan, documented by the Shire. The Boyanup Bushfire Brigade (BFB) is the closest emergency services and is less than 100m from entrance to Meadowbrooke Estate along Turner Road. The BFB services maintain 3.4 fire appliance vehicles/trucks and fast attack units, this is also backed up with a modern communication system for call outs as well as

communication on the fire ground. These are typical of bush fire brigades for fire fighting services within Western Australia.

The Boyanup BFB has the following:

- Fully equipped fire station;
- Volunteer trained members;
- A communications and call out system;
- Protective clothing issue to volunteers; and
- DFES approved fire appliances.

Response times can vary depending on commitments of volunteers, fire events current at time and priority of the fire services in the south west of Western Australia during summer periods. DFES recommends that homeowners take care to prepare their individual dwellings for fire season and take precautions against fire as per the ***'Bushfire Preparedness – Prepare. Act. Survive.'***

It is generally acknowledged that during large wildfire events, local resources may not be able to respond to every lot due to strategic deployments of services, priorities within the area or state and/or present commitments of volunteers and resources. It is therefore recommended that land owners implement strategies as recommended by DFES to protect life and property during the fire season.

16. Commitments regarding future maintenance

The following commitments have been made regarding future maintenance of the foreshore area, refer to Table 8.

Table 8 – Foreshore Reserve Maintenance

Responsibility	Tasks
Current Land Owners	• Continue to reduce weed infestations of the foreshore area, limit spread and further infestations occurring.
Shire of Capel	• Implement Foreshore Management Plan. • Ongoing maintenance of foreshore areas • Continue to reduce weed infestations of the foreshore area, limit spread and further infestations occurring. • Infill planting as required. • At the completion of revegetation stages implement maintenance procedures as per Shire policy.
Developer Meadowbrook Estate	• Commission and fund the Foreshore Management Plan document

Table 9 over the page outlines the long term responsibilities for the successful implementation of this Foreshore Management Plan.

16.1. Performance monitoring

The current land owner will implement monitoring procedures to assess the success of management strategies addressing rehabilitation works, weed control activities, water quality and feral animals during the three year management period. This will allow the identification of area requiring augmentation or remedial works to be identified early and appropriately planned. In addition, the monitoring will ensure that an adequate representation of species and plant diversity is achieved.

16.2. Rehabilitation performance criteria and reporting

The completion criteria for the revegetation works are:

1. A 90% survival rate of the planted seedlings within the designated areas. Should this rate not be met, infill planting will be required to raise the surviving plant numbers above 90% of the initial planting density.

2. The revegetation target of the FMP is to establish at least 1 plant / m2 throughout the foreshore area.

3. In all revegetation zones the target is less than 40% weed cover, and for all Shire of Capel First Schedule Pest Plants to be less than 5%.

16.3. Program of Works and Long-term Actions

The following actions outline the Environmental Objectives to be maintained and monitored during and post revegetation and at the implementation of this plan. Please refer to Table 9 below.

Table 9 – Long Term Management and Responsibilities

Management Objective(s)	*Management Aims*	*Management Action(s)*	*Responsibility*	*Performance Indicator*	*Indicator Measurements*	*Monitoring frequency*
Weed Management	Reduce the impact and spread of weeds which are currently on-site.	Remove all weeds through actions including: Hand/mechanical removal; Spot spraying of individual plants; and Slashing of weed species on site to 100mm excluding declared plants, large woody weeds, trees, and pampas grass Refer to Table 7 for species specific methodologies	SoC	Weed populations and re-invasions on site post construction.	The recurrence of weed populations is minimal; and New populations of weeds do not occur.	Undertaken 6, 12 and 18 monthly after construction.
Water Quality, nutrient and Stormwater Management	Treat water on site, reduce nutrients and hydrocarbons; Improve & maintain adjacent creek water quality parameters; Ensure stormwater is carried through stormwater treatment to avoid impacting natural environment; and Reduce the transportation of nutrients generated onsite into waterways and drains.	WSUD principles applied to site design (i.e. runoff, nutrient stripping, recycling, water harvesting) and design implement at construction phases; Ensure water quality controls and structures are in place and in correct working order; and Point source infiltration through construction of swales, rain gardens and detention basins.	Developer/ Contractor at adjacent development site (Lot 201)	Wetland vegetation in POS healthy/diverse; Only stormwater from >1:10 events flow off site; Infiltration basins, swales and living stream condition including water condition (appearance), vegetation condition and flow condition.	No unusual vegetation deaths, sludge or scum forming in and around the swales and detention basins. Water appears to be clean and clear; carrying only suspended natural vegetation from living stream or swales and not carrying any scum or foreign chemicals (i.e. hydrocarbons). Infiltration basins work effectively and may only become overloaded during extended periods of heavy (above average) rain.	Quarterly Monitoring of all stormwater structures.
Rehabilitation of degraded areas from any construction activities.	Rehabilitate degraded areas from construction activities such as trench construction or clearing of native vegetation areas.	Revegetate degraded areas with native plant species; Remove invasive weed species to prevent further degradation; and Prevent erosion through established vegetation and/or erosion control methods.	SoC	The area (m^2) of degraded vegetation (percent weed establishment); Poor native vegetation condition of degraded areas; and Erosion does not occur after heavy rains or high winds during dry periods.	The area (m^2) of degraded vegetation (weeds) has been reduced and continues to reduce in area; Native Vegetation continues to grow without assistance; Deaths in native vegetation natural; and Erosion is minimal during high rainfall months or during dry periods with high winds.	Quarterly Monitoring of any degraded areas post construction for a period of 2 years.
Revegetation of foreshore area	To achieve revegetation of native riparian species in foreshore area. Provide habitat for birds, amphibians and small mammals. Replanting of revegetation areas to accommodate from initial plant losses.	Employ revegetation techniques as per methods Section 6. Monitor revegetation areas for deaths or disease. Monitor weed infestations and treat. Planting or seed dispersal in areas which plant losses occur	SoC	Poor native vegetation condition of degraded areas; and Erosion does not occur after heavy rains or high winds during dry periods.	Native Vegetation continues to grow without assistance; Deaths in native vegetation natural; and Erosion is minimal during high rainfall months or during dry periods with high winds; and	Quarterly Monitoring of any degraded areas post construction for a period of 2 years.
Fire Management	Prevent Fire Hazards within adjacent Development.	Ensure fuel loads in adjacent uncleared areas are managed; Ensure water source is not disrupted; Access around Foreshore area is unimpeded	Contractor/ Developer, neighbours, SoC & DFES	Fire occurrence is minimal or none; and All structures are in good working order from regular checks.	Leaf litter including wood material and grasses poses minimal fire hazard; Regular hydrant inspections indicate they work to specified rates and connections correct for emergency use.	Yearly prior to summer period.

Management Objective(s)	*Management Aims*	*Management Action(s)*	*Stakeholders*	*Performance Indicator*	*Indicator Measurements*	*Monitoring frequency*
Generate and maintain Community involvement	To be informative to neighbours regarding the project; and Involve the Capel LCDC, local schools and community groups as appropriate.	Ensure neighbours are notified of the milestones of the construction period; and Give new landowners a copy of the Foreshore Management Plan as it applies to their property. Encourage community groups to be involved in the implementation of revegetation works.	Developer, Community liaison officer.	Complaints from adjacent residents; and Community groups are involved in the revegetation process.	Amount of complaints during construction actives. Community groups have a sense of belonging and involvement in the project.	Quarterly and informal checks.
Monitoring	Revegetation of foreshore and rehabilitation areas is monitored.	12 Month Maintenance Program is abided.	SoC	Revegetation is successful and there is few deaths of plants and weed invasions are minimal.	Regular maintenance patrols and reports by environmental officer	Quarterly and informal checks.
Fauna Management	Revegetated foreshore attracts native fauna whilst ensuring they do not become pest/nuisance fauna to residents.	Mature trees are conserved to attract native fauna and to be utilised as habitat; Areas of remnant vegetation are conserved to provide shelter and habitat for native fauna; and Household pets are managed as not to disturb or harm native fauna. Retain dead trees and logs for habitat refuge areas for small mammals and reptiles.	SoC	Fauna diversity; Signs of habitat use; and Fauna stay within foreshore and not in residential areas.	Complaints register from residents of nuisance fauna in property; and During maintenance visits, wildlife noticed in foreshore areas.	Informal checks
Mosquito and Pest Insect Management	The potential for mosquito and pest insects to become a health hazard is reduced.	Stagnant water bodies are reduced; The time water sits stagnant is reduced; Nutrients released into waterways are reduced; Vegetation surrounding stagnant water bodies is sufficient enough to act as a buffer and not act as a vector for insect movement; and Identify and indicate areas of high risk.	Adjacent Developer, Contractor	Quantity of mosquito & midges observed in creek and residential areas.	Register of comments made by residents.	Quarterly checks.

17. Conclusions

Preston Green Pty Ltd commissioned Bio Diverse Solutions (Environmental Consultants) to prepare a Foreshore Management Plan of Lot 200 adjacent to Meadowbrooke Estate (now Lot 201, formerly Lot 888) Turner Street, Boyanup within the Shire of Capel. The Foreshore Management Plan (FMP) was a condition of the successful rezoning of the site (previous owners) and a commitment from Preston Green Pty Ltd (current owners) to undertake as part of a Development Approval being lodged in 2014.

The foreshore area (Lot 200) of Preston River in the subject area is quite degraded from previously being contained within the private property of Meadowbrook Estate where there are introduced trees, ornamental plants and landscaped grassed areas. Revegetation is recommended to restore the river foreshore area, generate ecological linkages and enhance the amenity area. This report recommends that a comprehensive weed program is carried out when revegetation strategies occur.

Native endemic species are recommended for planting in the creek, a variety of species are noted, however this can be subject to availability and local nursery sources. Past revegetation strategies have proven successful in the north western adjacent areas of the Preston River and revegetation strategies are aligned to these methods.

The implementation of this plan will be the responsibility of the Shire of Capel. The implementation of the recommendations in this report will enhance the Preston River and downstream water bodies biodiversity values in the future and give social amenity to the site. The funding of the implementation of the foreshore report could be sourced through state and federal environmental/infrastructure sources and should be pursued by the Shire of Capel to assist the successful implementation and ongoing management of the reserve.

It is recommended that the adjacent landowners are given a copy of the Foreshore Management Plan to assist with future management of the foreshore area as it occurs adjacent to their property. This report also recommended the involvement to the local community, LCDC group and others to assist in the revegetation project and to also develop community ownership of the area.

18. References

Australian Geoscience Mapping (1984) Map series Si50-12 Bremer Bay, Geological Survey of Western Australia.

Burwood, C (2014) Informal correspondence provided to Bio Diverse Solutions during the preparation of this report. Shire of Capel WA.

Department of Water 1:250 000 Hydrogeology Map Series (2001) Mapping dataset, Government of Western Australia

Department of Water Public Drinking Water Supply Act (2001) Mapping dataset, Government of Western Australia.

Department of Health WA "Movement of Nutrients from on-site waste water systems in soils" 2001.

Derrington, C. (2007) RAP for the Upper Preston River – East of the Donnybrook Townsite to Mumbellup. Prepared for the Leschenault Catchment Council.

Derrington C, (2014) Personal Communication to K.Kinnear during site assessment August 2014.

Hyd_2o (2014) Preston River Flood Study Meadowbrooke Estate Boyanup. Unpublished report prepared for

Land Capability Assessment for Local Rural Strategies, 1989, State Planning Commission Western Australia.

McPherson, R. Shire of Capel (2014). Personal Communication to K.Kinnear during phone conversation 18/9/2014 and email 10/10/2014.

Moore, G. (1998) *Soilguide. A handbook for understanding and managing agricultural soils'. Department of Agriculture, Western Australia*. Bulletin No. 4343.Kathryn Kinnear, Personal Observations during field assessment August 2010.

Keighrey, B. (1994) *Bushland Plant Survey, A Guide to Community Survey for the Community*, Wildflower Society of WA.

Sandiford, E.M. and Barrett, S. (2010). *Albany Regional Vegetation Survey, Extent Type and Status, A project funded by the Western Australian Planning Commission (EnviroPlanning "Integrating NRM into Land Use Planning" and State NRM Program), South Coast Natural Resource Management Inc. and City of Albany for the Department of Environment and Conservation.* Unpublished report. Department of Environment and Conservation, Western Australia.

Shepherd, D.P., Beeston, G.R. and Hopkins, A.J.M. (2002) *Native Vegetation in Western Australia, extent Type and Status, Technical Report 249*, Department of Agriculture WA

Western Australian Atlas database accessed November/October 2014 from: https://www2.landgate.wa.gov.au/bmvf/app/waatlas/

Appendices

Appendix A – Location mapping and Landgate extract

Appendix B – Development Guide Plan

Appendix C – DPaW Geomorphic Wetland Mapping

Appendix D – Vegetation Mapping

Appendix E – Revegetation plan

Appendix F – Foreshore Management Plan

Appendix G – Aboriginal Heritage Site report

Appendix A

Location mapping and Landgate extract

Legend

- Foreshore area - Lot 200
- Development area - Lot 201

1:3000 @ A3
GDA MGA 94
Zone 50

0 25 50 100 150 200 Meters

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Mob: 0447 555 516

CLIENT Lot 200 and 201
Turner Street
Boyanup WA

Location Mapping

STATUS	FILE	DATE
FINAL	MPM004	18/09/2014

LANDGATE COPY OF ORIGINAL NOT TO SCALE Tue Jul 1 10:42:01 2014 JOB 45054005

Landgate
www.landgate.wa.gov.au

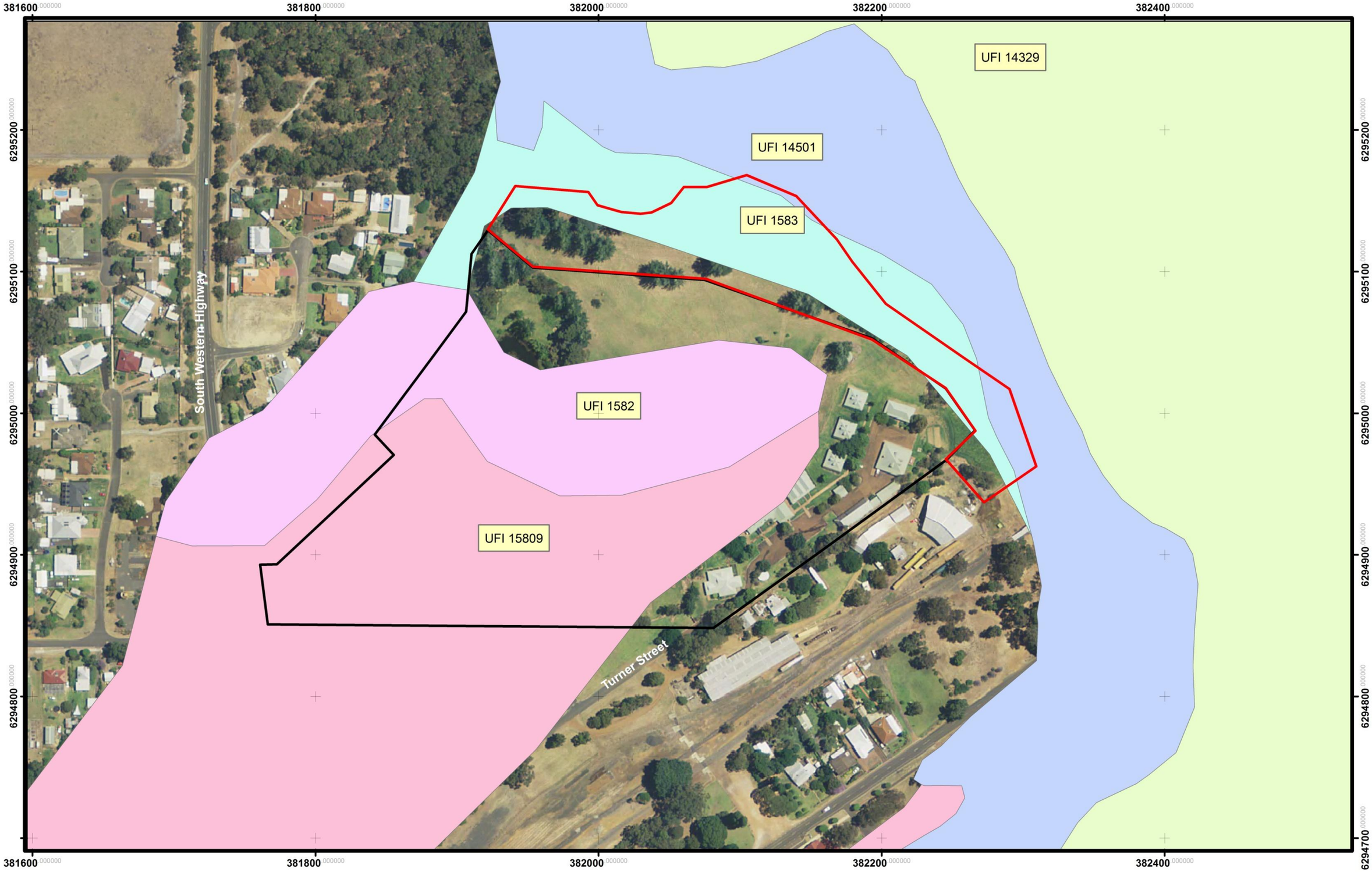
Appendix B

Development Guide Plan

BIO DIVERSE SOLUTIONS

Appendix C

DEC Geomorphic Wetlands Mapping



Legend

Foreshore area - Lot 200

Development area - Lot 201

DEC Geomorphic Wetlands

1:2, 500 @ A3
GDA MGA 94
Zone 50

0 25 50 100 150 200 Meters

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CLIENT **Lot 200 and 201 Turner Street Boyanup WA**

DEC Wetland Mapping

STATUS	FILE	DATE
FINAL	MPM004	18/09/2014

Appendix D

Vegetation Mapping

382000 000000 382200 000000 382400 000000

6295300 000000 6295200 000000 6295100 000000 6295000 000000

Introduced palms and ornamentals in adjacent UCL

Low Open Forest to Medium Woodland E.Rudis & A.flexuosa

Open woodland of E.rudis & A.flexuosa

Grasslands, cleared maintaned lawns and deciduous trees

Some non-endemic species from previous revegetation strategies

Fruit trees

382000 000000 382200 000000 382400 000000

Legend

- River Ramble
- Open Woodland of E.rudis and A. flexuosa,
- Low Open Forest E.rudis & A.parviceps
- Grasslands
- Foreshore area - Lot 200

1:1, 750 @ A3
GDA MGA 94
Zone 50

0 12.5 25 50 75 100 Meters

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CLIENT **Preston Green Pty Ltd**
Lot 201 Turner Street
Boyanup WA

Vegetation Mapping

STATUS	FILE	DATE
FINAL	MPM004	6/11/2014

Appendix E

Revegetation Plan

382000 000000
382200 000000
6295200 000000
6295100 000000
6295000 000000

Preston River

Riverbank area (Rb)
- Infill tree planting as required
- mostly understorey and midstorey species
- upto B1 classification standards
- 15116m2

Floodplain area 001 (Fp001)
- Full revegetation strategies
- Weed removal
- Overstorey, midstorey and understorey plantings
- Upto B1 classification standards
- 5482m2

Existing River Ramble Walk

Possible DUP extensions into lifestyle village

Floodplain area 002 (Fp002)
- Remove poplars, fruit trees and ornamentals
- Landscaping with grasses and low native shrubs
- Shrubs/herbs to be less than 0.5m
possible relocation of ornamentals and fruit trees
- 7534m2

Align new DUP to assist with weed control/reveg strategies & place within lot 200

Possible DUP extensions into lifestyle village

382000 000000
382200 000000

Legend

- New DUP
- Foreshore area - Lot 200
- River Ramble
- Reveg Fp001
- Reveg Fp002
- Reveg Rb

1:1, 250 @ A3
GDA MGA 94
Zone 50

0 12.5 25 50 75 100 Meters

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CLIENT **Lot 200 and 201 Turner Street Boyanup WA**

Revegetation mapping

STATUS	FILE	DATE
FINAL	MPM004	18/09/2014

Appendix F

Foreshore Master Plan

382000 000000

382200 000000

6295200 000000

6295100 000000

6295000 000000

6294900 000000

DUP to tie into existing footbridge

Remove old fencing Visitor Risk Assessment of pathway

Fp001 - Full revegetation 2m buffer to DUP

Upgrade River Ramble to DUP 2.5m stablised Within boundary of Lot 200

Remove ornamental plants

Rb - Reveg inplanting amongst existing veg

Fp002 - Partial revegetation 2m buffer to DUP low shrubs/landscaping for visibility

Rip and revegetate old path

Linking DUP & EAW into development link back onto Turner St

Fp001 - Full revegetation 2m buffer to DUP

Remove orchard species and any ornamental plants

Erosion/bank stability works as required

Possible new section of River Ramble as a DUP

New DUP along outside of access road link back onto Turner St

DUP gated, can be utlised for Fire Service Access

Remove plantation species and any ornamental plants

DUP to tie into adjacent reserve MP presently being developed by SoC

Carparking in railway reserve integrate in new Master Plan

Legend

- Foreshore area - Lot 200
- New DUP
- River Ramble
- Reveg Rb
- Reveg Fp002
- Reveg Fp001

1:2, 500 @ A3
GDA MGA 94
Zone 50

0 10 20 40 60 80 Meters

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CLIENT **Lot 200 Turner Street Boyanup WA**

FMP Master Plan

STATUS	FILE	DATE
FINAL	MPM004	18/09/2014

Appendix G

Aboriginal Heritage site report

List of Registered Aboriginal Sites with Map

Site ID	Site Name	File Restricted	Boundary Restricted	Restrictions	Status	Site Type	Knowledge Holders	Coordinates	Legacy ID
19795	Preston River	No	No	No Gender Restrictions	Registered Site	Mythological	*Registered Knowledge Holder names available from DAA	400159mE 6290621mN Zone 50 [Reliable]