

TECHNICAL MEMORANDUM

Foreshore Implementation Works Summary

PROJECT NUMBER	EP19-140(02)	DOC. NUMBER	EP19-140(02)—002 KK
PROJECT	Meadowbrooke Lifestyle Estate	CLIENT	Preston Green Pty Ltd (in liquidation)
AUTHOR	KK	REVIEWER	KK
VERSION	001	DATE	September 2020

1 OVERVIEW

Emerge Associates have been engaged by Preston Green Pty Ltd (in liquidation) (receivers and managers appointed) to provide environmental due diligence advice to support future development of Lot 201 on Plan 400906 (33 Turner Street), Boyanup and herein referred to as ‘the site’. The site is located within the Boyanup townsite in the Shire of Capel. Historically the site has been partially developed as a lifestyle village (Meadowbrooke Lifestyle Estate) for people aged over 55 years, with a number of park homes established within the site since 2016.

As part of this, EmERGE Associates were asked to review the *Foreshore Management Plan* (Bio Diverse Solutions 2018) prepared for the site, and if possible, work with the Shire of Capel to review and confirm the foreshore management plan works that need to be implemented as part of future development by a new owner/developer.

This technical memorandum has been prepared to summarise the discussions between the Shire of Capel and EmERGE Associates on the 5th September 2020, and reflect a revised approach to implementing the *Foreshore Management Plan* (Bio Diverse Solutions 2018).

2 MANAGEMENT PLAN

The *Foreshore Management Plan* (Bio Diverse Solutions 2018) is not clear on the specific requirements for each management zone and does not capture the work undertaken by the previous proponent. While it is acknowledged that minimal works have been undertaken previously, some weed control as well as fencing works have been implemented, and in discussion with the Shire, it has been agreed that the works required, when compared to the *Foreshore Management Plan* (Bio Diverse Solutions 2018), will be modified. The intent of the *Foreshore Management Plan* (Bio Diverse Solutions 2018) should however still be achieved.

2.1 Key management zones

The *Foreshore Management Plan* (Bio Diverse Solutions 2018) identified four zones that required treatment/consideration as part of implementing the required works. These four zones are collectively referred to as the ‘foreshore area’. A summary of the key management zones, the intent of each zone and key components of works to be undertaken have been summarised in **Table 1**. An outline of the location of each of the zones is provided in **Plate 1** further below.

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Table 1: Summary of management zones and key components of works

Management Zone	Size (ha) (approx.)	Description	Management requirements	
			Intent	Key components of works
Riparian	1.13	This zone directly follows the Preston River and contains mainly remnant riparian vegetation. There are areas of major weed outbreaks, large fallen timbers and a range of foreshore profiles from a steep drop-off to gently sloping banks.	To beautify and increase biodiversity through planting of native species in the top of bank area.	<ul style="list-style-type: none"> To be focused on improving biodiversity within the top of bank area (approx. 8500 m²). No works are required on the banks. Remove non-native trees. Undertake weed control. Undertake planting of native groundcovers, understorey and mid-storey species.
Outfall	0.01	This is where the creek (described below) and associated stormwater from the site flows into the Preston River. It is highly eroded and eroding and contains mainly exotic trees and plants.	To stabilise the eroding banks with native species.	<ul style="list-style-type: none"> Undertake site preparation works (in consultation with the Shire), which may include removal of fallen trees, removal of non-native trees etc. Undertake planting native groundcovers, understorey and mid-storey species using sandbag technique. This will also support control of weeds.
Creek	0.63	This creek runs along the whole western boundary of the site and is the main receiving waterbody for stormwater from the development. There is a mix of remnant riparian trees, weed species trees and kikuyu grass. It is damp most of the year and can flow strongly during storm events. It includes the ornamental garden where many moisture-loving ornamental exotic tree and plant species are growing	To remove non-native trees and replace with native trees, but support ongoing fuel load management (through mowing/slashing or similar of grasses).	<ul style="list-style-type: none"> Removing all non-native trees, particularly poplars. Replanting with native riparian tree species. Spacing of trees to enable ongoing management of grass fuels.
Floodplain	1.39	This is between the riparian zone and the development boundary and is mainly cleared, grassed land except for a small orchard historically installed by a previous owner.	To increase shade and provide a useable space for the community.	<ul style="list-style-type: none"> Retain existing orchard. Retain existing grass areas. Plant shade trees (<i>Agonis flexuosa</i>) and garden areas at base of trees (to provide amenity and help protect trees during mowing). Planting to achieve low threat in accordance with requirements of the bushfire management plan (Bio Diverse Solutions 2015). This includes trees (with garden beds under trees to be no more than 0.25 ha in size) to be spaced 20 m from buildings, riparian, creek and outfall zones and other trees.

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Plate 1: Management zones associated with implementing the Foreshore Management Plan (Bio Diverse Solutions 2018), as provided by the Shire of Capel

2.2 Required foreshore works

A summary of the works required to implement the foreshore management plan have been outlined in **Table 2**, with further detail on each component of work provided in the following sections.

Table 2: Summary of foreshore management implementation and maintenance requirements

Management zone	Weed and tree removal		Revegetation			Grazing control	Disease control	Fencing	Monitoring and maintenance
	Weed control	Non-native tree removal	Planting of native species	Planting of native trees	Garden areas				
Riparian	X	X	X	-	-	X	X	-	X
Outfall	X (site preparation)	X	X (sandbag technique)	-	-	X	X	-	X
Creek	-	X	-	X	-	X	X	-	X
Floodplain	-	-	-	X	X	X	X	-	X

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2.2.1 Site preparation

Site preparation works will be mostly restricted to the outfall zone, and may include removal of fallen dead material and/or non-native trees. The requirement for these works should be determined in consultation with the Shire of Capel and be based on minimising erosion and maximising success of the sandbagging technique.

2.2.2 Weed control and non-native tree removal

Weed control may be via manual removal or through the use of a selected herbicide or a combination of both. All herbicide application will be as per the manufacture's recommendations, Material Safety Data Sheet (MSDS) and any guidelines prepared by the Shire of Capel. It is important to note that the selected herbicide used within any wet areas of the site (i.e. riparian zone, creek) must not contain a surfactant.

Weed control will need to be undertaken prior to any revegetation works using appropriate timing and methodology. If weeds are identified they will be treated using the following approach:

- Non-native trees/large woody weeds for removal will be confirmed with the Shire of Capel. Non-native trees/large woody weeds will be poisoned and/or manually removed from site (a combination of both may be required depending upon the species);
- Small weeds will be sprayed by a licensed contractor or landholder.

Follow-up spraying will be undertaken within 6 months of the first treatment and repeated as necessary until the completion criteria have been satisfied.

A list of weeds that may be present within the management zones has been provided in **Table 3**. This list is not exhaustive, and other weeds may be identified at the time of implementation and/or as part of maintenance and should be managed.

Table 3: Weed species that may be present within the management zones

Woody weeds	General weeds	Herbs
Poplar (<i>Populus sp</i>)	Kikuyu (<i>Pennisetum clandestinum</i>)	Spear thistle (<i>Cirsium vulgare</i>)
Silver Birch (<i>Betula pendula</i>)	African Love Grass (<i>Eragrostis curvulata</i>)	Night shade (<i>Solanum nigrum</i>)
Golden wattle (<i>Acacia longifolia</i>)	Blowfly grass (<i>Briza maxima</i>)	Fleabane (<i>Conyza spp</i>)
Blackberry (<i>Rubus ulmifolius</i>)	Flat weed (<i>Hypochaeris spp</i>)	Dolichos Pea (<i>Dipogon lignosus</i>)
Ink weed (<i>Phytolacca octandra</i>)	Hare's-tail Grass (<i>Lagurus ovatus</i>)	Watsonia (<i>Watsonia meriana</i>)

No weed control is to be undertaken within the outfall zone. This is to minimise further destabilisation of the eroding banks. It is envisaged that the sandbags (discussed below) will be placed directly over the weeds, which will assist in weed control in this zone, but maintain the root mass while planting becomes established.

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2.2.3 Revegetation

Local endemic plants that are well adapted to the natural environment and can survive on little water and nutrients should be used as much as possible. These plants will act as a natural stabiliser of soils and provide habitat for local fauna species. A general planting list has been provided in **Table 4** (other species can be used, based on discussion with the Shire of Capel).

Planting should commence after the season's first major rains, typically early winter, 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.

2.2.3.1 *Planting of native spaces*

General planting approach

Planting within the riparian and outfall zones is limited to groundcovers and understorey species.

The proposed planting program should be undertaken to maximise achievement of the completion criteria outlined in **Section 2.3.1**. This could include planting up to 4 stems per square metre (m²) as part of the initial year of planting, to minimise requirement for planting in following years.

Planting should be undertaken in an irregular manner to reflect natural variation for location and density of species.

Plants are to be sourced from an accredited nursery supplier and should be dieback free.

Sandbag technique

Within the outfall zone, planting should be undertaken using the sandbagging technique. This technique involves:

1. Fill the jute bag (600 mm X 350 mm) with sand (preferably locally sourced, or an appropriate river sand) and tied off using jute string.
2. Sand bag should be laid directly over any existing weeds and parallel to the bank. Sandbags to be placed / stacked on an angle parallel to the flow at an average of two bags per square metre. Sandbag height (which may include stacking multiple bags) to be determined in consultation with the Shire of Capel.
3. Cut two slits in to the top of the bag and plant seeding firmly in each. Two stems to be planted per sandbag to achieve 4 stems per square metre. Species suitable for use as part of sandbagging have been outlined in **Table 4** (other species can be used, based on discussion with the Shire of Capel).
4. Seedling will grow through bottom of the bag, with the bag rotting away over time. The bag provides protection for the plant root system during winter and times of high water flow.

The Shire of Capel can be consulted for further information on implementation of this technique.

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2.2.3.2 Planting of native trees

General planting approach

Planting within the creek and floodplain zones is limited to mostly native tree planting and is outlined below. Within the floodplain zone, garden bed planting is required around the base of the planted trees. A general planting list has been provided in **Table 4** (other species can be used, based on discussion with the Shire of Capel).

Plants are to be sourced from an accredited nursery supplier and should be dieback free (mulch should also be dieback free). Where possible, plant stock should be grown from local provenance seed or cuttings.

Creek zone

Following removal of existing non-native trees, native tree species are to be planted to achieve one plant per 5 m². This is to facilitate ongoing mowing/slashing of grass fuels present within the creek zone, to assist in minimising fuel loads from a bushfire perspective.

Floodplain zone

Within the floodplain zone, additional planting of shade trees is required to improve the amenity and useability of the current open space area. This includes

- Existing grassed areas to be maintained (except where garden areas proposed under trees). This area will continue to be regularly mowed.
- Existing orchard area within the south-eastern portion of the zone to be retained.
- Additional trees (*Agonis flexuosa*, or as agreed with the Shire of Capel) to be planted based on the following approach (the exact number of trees to be determined in consultation with the Shire of Capel):
 - Tree locations to be randomised where possible.
 - Tree stems to be planted 20 m apart, and more than 20 m from other trees/revegetation areas and buildings.
- Garden areas to be planted under the trees. Garden should be minimum 2 m radius area around each tree and is to be planted with native species (determined in consultation with Shire of Capel) with area to be mulched. Species should be tolerant of shade, with planting to assist in minimising damage to trees from mowing.

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Table 4: General species list for revegetation within management zones (Biodiverse Solutions 2018)

General species		Riparian and outfall zones (in addition to species from the general list, 'green' is sandbagging species)
<i>Acacia alata</i>	<i>Hovea trisperma</i>	<i>Acacia urophylla</i>
<i>Acacia dentifera</i>	<i>Hypocalymma angustifolium</i>	<i>Astartea fascicularis</i> (shrub)
<i>Acacia extensa</i>	<i>Hypocalymma robustum</i>	<i>Baumea articulata</i> (sedge/rush)
<i>Acacia pulchella</i>	<i>Jacksonia furcellata</i>	<i>Baumea juncea</i> (sedge/rush)
<i>Agonis flexuosa</i>	<i>Kennedia prostrata</i>	<i>Callistachys lanceolata</i>
<i>Allocasuarina fraseriana</i>	<i>Kunzea recurva</i>	<i>Carex appressa</i> (sedge/rush)
<i>Anigozanthos flavidus</i>	<i>Labichea punctata</i>	<i>Darwinia citriodora</i>
<i>Anigozanthos manglesii</i>	<i>Lepidosperma squamatum</i>	<i>Ficinia nodosa</i> (sedge/rush)
<i>Astartea fascicularis</i>	<i>Leucopogon capitellatus</i>	<i>Grevillea diversifolia</i> (shrub)
<i>Banksia grandis</i>	<i>Leucopogon propinquus</i>	<i>Ficinia nodosa</i> (sedge/rush)
<i>Bossiaea linophylla</i>	<i>Melaleuca raphiophylla</i>	<i>Juncus pallidus</i> (sedge/rush)
<i>Chorizema nanum</i>	<i>Melaleuca thymoides</i>	<i>Lepidosperma effusum</i>
<i>Clematis pubescens</i>	<i>Microlaena stipoides</i>	<i>Lepidosperma gladiatum</i> (sedge/rush)
<i>Corymbia calophylla</i>	<i>Orthrosanthus laxus</i>	<i>Lepidosperma tetraquetrum</i> (sedge/rush)
<i>Cyathochaeta avenacea</i>	<i>Patersonia occidentalis</i>	<i>Melaleuca lateritia</i> (shrub)
<i>Dodonea viscosa</i>	<i>Patersonia umbrosa</i>	<i>Hakea lasianthoides</i>
<i>Eucalyptus rudis</i>	<i>Persoonia longifolia</i>	<i>Taxandria linearifolia</i>
<i>Eucalyptus patens</i>	<i>Phyllanthus calycinus</i>	<i>Trymalium floribunda</i>
<i>Eucalyptus marginata</i>	<i>Pteridium esculentum</i>	
<i>Grevillea bipinnatifida</i>	<i>Taxandria parviceps</i>	
<i>Hakea lissocarpha</i>	<i>Xanthorrhoea preissii</i>	
<i>Hibbertia commutata</i>	<i>Xanthorrhoea brunonis</i>	
<i>Hibbertia hypericoides</i>	<i>Xanthorrhoea gracilis</i>	

2.2.4 Grazing control

Tree/plant guards may need to be installed around seedlings at time of planting to protect exposed tube stock from potential grazing by kangaroos and rabbits (and/or other species). Use of tree/plant guards is likely to reduce the planting requirements in subsequent years.

2.2.5 Disease control

The primary plant disease consideration relates to the management of *Phytophthora cinnamomi* (commonly known as dieback). Dieback is a soil borne fungal pathogen which spread through surface and sub-surface water flows and soil movement, and is a serious threat to the flora of the south west

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Western Australia. The movement of infested water and soil is a key mechanism in how this pathogen is spread.

Human activities have contributed significantly to the rapid and widespread distribution of the pathogen in southwest Western Australia (DPaW 2015). There is no practical large-scale cure for dieback and therefore prevention and containment are the primary options for management.

It is unknown whether this pathogen is present within the site and in nearby areas. However, precautionary measures should be incorporated during implementation activities to minimise the potential for dieback to be introduced. These include:

- Ensuring vehicles, tools, equipment and machinery used as part of implementation are free of mud and soil on entry and exit to the foreshore area. This can be achieved through the use of high-pressure cleaners, stiff brushes, use of disinfectant or Phytoclean (a fungicide) and collection of the residual soil.
- Ensuring plants, soil, gravel, sand, mulch and other materials used within the foreshore area are free of dieback.
- Minimise activities when soil is wet or muddy.

2.2.6 Fencing

No fencing works are required.

The previous proponent removed old fencing (as required by the *Foreshore Management Plan* (Bio Diverse Solutions 2018), and the Shire, in collaboration with Bunbury TAFE have installed other fencing in the foreshore area.

2.2.7 Footpaths and other infrastructure

The footpaths within the foreshore area are appropriate and no additional works are required.

2.3 Implementation

The implementation of the foreshore management works will be the responsibility of the developer/proponent. The developer/proponent will be responsible for the initial maintenance period (which is likely to be a minimum of three years, until the completion criteria have been achieved to the satisfaction of the Shire of Capel), and following handover, the management zones will come under the maintenance of the Shire of Capel.

2.3.1 Completion criteria

The completion targets that will need to be satisfied prior to handover for the various zones as outlined in **Table 5**, unless agreed otherwise with the Shire of Capel.

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Table 5: Completion criteria to be achieved with regard to weed control and revegetation/planting

Management zone	Weed cover	Revegetation/planting
Riparian (top of bank)	<ul style="list-style-type: none"> No non-native trees 20% weed cover, and for all declared and/or priority weed species, less than 5% weed cover. 	<ul style="list-style-type: none"> 2 stems per m²
Outfall	<ul style="list-style-type: none"> No non-native trees 20% weed cover, and for all declared and/or priority weed species, less than 5% weed cover. 	<ul style="list-style-type: none"> 4 stems per m²
Creek	<ul style="list-style-type: none"> No non-native trees 	<ul style="list-style-type: none"> 1 tree per 5 m²
Floodplain	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Based on satisfying Tree stems at least 20 m apart, and 20 m or more from buildings and revegetation areas. 'Garden areas' to achieve 3 plants per m².

2.3.2 Monitoring

All areas will be monitored by the proponent for three years following implementation of initial works to ensure progress towards the completion targets are met, unless agreed otherwise with the Shire of Capel. This should be based on two visits per year, one in spring and one in autumn. This is to assess:

- Losses as a result of transplant shock, weed competition, predation/grazing or weather-related impacts.
- Determine mortality and survival rates (particularly after summer)
- Determine remedial works to be undertaken in the following 6-12 months, including weed control, additional planting, predation/grazing control etc.

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 will provide a quantitative measure of progress. A monitoring report should be prepared and submitted to the Shire of Capel within 4 weeks of the monitoring event.

2.3.3 Maintenance

The proponent will be responsible for implementing and maintaining the outlined works for a minimum of three years, until the completion criteria have been satisfied. Following handover, the Shire of Capel will be responsible for the maintenance of the various zones, unless agreed otherwise. This will include regularly mowing grass areas within the creek and floodplain zones.

Infill planting will be carried out in subsequent winters as required until the completion criteria are achieved. The quantities required for infill planting will be calculated through monitoring between plant installations in subsequent autumns (for a period of 3 years post initial planting) based on satisfying the completion criteria.

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3 SUMMARY AND CLOSING

This technical memorandum has been prepared to outline the required foreshore management implementation works and is based on a conversation between Emerge Associates and the Shire of Capel on the 5th September 2020 and agreed modified requirements based on the *Foreshore Management Plan* (Bio Diverse Solutions 2018). It is based on achieving the management intent outlined in **Table 1**, and supporting ongoing bushfire management requirements as well as community enjoyment of the foreshore area.

The proponent will be required to consult with the Shire of Capel regarding the implementation and maintenance of the outlined works. Monitoring and maintenance of the outlined works is required for a minimum three years until the completion criteria is satisfied, or as agreed with the Shire of Capel.

4 REFERENCES

Bio Diverse Solutions 2015, *Bushfire Management Plan Meadowbrooke Estate, Lot 201 Turner Street Boyanup*, Albany.

Bio Diverse Solutions 2018, *Foreshore Management Plan Lot 200 Turner Street Boyanup*, Albany.

Dieback Working Group 2000, *Managing Phytophthora Dieback Guidelines for Local Government WA*.

Department of Parks and Wildlife (DPaW) 2015, *Corporate Policy Statement No. 3 - Management of Phytophthora Disease*, Perth. August 2015.

MPM Development Consultants 2015a, *Guide Development Plan and Application for Planning Consent - Meadowbrooke Lifestyle Estate, Revision A*, Bunbury.