Our ref: AU213002646.001 BMR Rapids Landing Clearing Permit Application

[redacted]

Date: 12 April 2022

Department of Water and Environmental Regulation
Locked Bag 10
Joondalup DC WA 6919

Dear Sir / Madam,

Clearing permit application: Rapids Landing residential estate drainage infrastructure

On behalf of Balwyn Margaret River Pty Ltd, please find attached a purpose permit clearing application to facilitate the installation of drainage infrastructure ("the site") along the Darch Brook tributary for the Rapids Landing's approved subdivision area in Margaret River. The proposed clearing area is approximately 0.19 hectares (ha) in size, containing approximately 0.1 ha of native vegetation. It extends from the intersection of Pimelia Drive and McCormick Crescent to the southern boundary of Lot 9014 (Deposited Plan 413998) (Figure A).

Background

The site overlaps the southern extent of an expired clearing permit application (CPS 7067/1), granted to Balwyn Margaret River Pty Ltd on 30 June 2016 to clear up to 0.65 ha of native vegetation. The purpose of this clearing permit was to create a Recreation / Interface Zone to form part of the Rapids Landing residential estate, in accordance with the approved Foreshore Management Plan, Rapids Landing Estate, Margaret River, Western Australia (FMP) (Coffey 2011)[1] (Appendix A). Clearing works were undertaken during a two-year period.

The subdivision area adjacent to the clearing permit CPS 7067/1 was approved by the Western Australian Planning Commission on 22 March 2018 (No. 156129). The expiry date for the subdivisional approval is 22 March 2024, as it was granted a two-year extension for endorsement of diagram or plan of survey due to the COVID-19 pandemic. Residential development has been undertaken to the north, including installation of walkways, lawn and rock pitching within and adjacent to the site. Due to slow lot sales within the subdivisional area, the southern extent of the Recreation / Interface Zone was not fully developed under the (now expired) clearing permit CPS 7067/1. The proposed clearing area is situated within an Active Open Space area in the subdivision plan and landscaping plans have been developed that show the location of drainage infrastructure (William James Landscape Architect 2022)[2]. The landscape plans were approved by the Shire of Augusta-Margaret River on 14 March 2022 and are provided as Appendix B.

[1] Coffey Environments. 2011. Foreshore Management Plan, Rapids Landing Estate Margaret River, Western Australia. Prepared for Balwyn Margaret River Pty Ltd.

[2] William James Landscape Architect. 2022. Landscape Works Rapids Landing Stages 7 and 10. Prepared for Balwyn Margaret River Pty Ltd.

Balwyn Margaret River Pty Ltd intends to commence development of the subdivision's southern area. Installation of drainage infrastructure near the Darch Brook tributary will require vegetation clearing to be undertaken prior to works commencing. The placement of drainage infrastructure is in line with the approved Foreshore Management Plan, which recommended that that stormwater infrastructure be located within previously cleared and degraded areas (within the Recreation / Interface Zone where possible) (Coffey 2011). Approximately two-thirds of the native vegetation to be cleared is in good condition, and the remaining native vegetation is degraded (Ecosystem Solutions 2022)[3].

A flora and fauna significance assessment (Ecosystem Solutions 2022) was undertaken for the site in March 2022. This assessment identified the presence and distribution of flora and fauna on site and assessed its vegetation values. Conservation significant flora, vegetation and fauna species were assessed, including an assessment against the Commonwealth's significant impact guidelines for black cockatoos and western ringtail possum (Appendix C).

In addition, Balwyn Margaret River Pty Ltd is committed to engaging a qualified fauna specialist prior to and for the duration of clearing activities to inspect the vegetation for evidence of recent use by fauna species. Should occupation of the vegetation by fauna species be confirmed, the vegetation will only be cleared after a repeat inspection undertaken by a qualified fauna specialist confirms that they are no longer occupied.

Supporting the above purpose permit clearing application, the following figures and documents have been provided:

- Figures A to D
- Appendix A: Foreshore Management Plan, Rapids Landing Estate, Margaret River, Western Australia (Coffey Environments 2011)
- Appendix B: Landscape works Rapids Landing Stages 7 and 10 (William James Landscape Architect 2022)
- Appendix C: Flora and Fauna Significance Assessment (Ecosystem Solutions 2022)
- Appendix D: Application for a Clearing Permit (Purpose Permit)
- Appendix E: Certificate of Title
- Shapefile data.

Landholder context

The site is located within Lot 9014 (Deposited Plan 413998), which is owned by Balwyn Margaret River Pty Ltd, under the Certificate of Title Volume 2959 / Folio 570. The landowner is the proponent of the clearing permit application.

A copy of the Certificate of Title is provided in Appendix E.

Proposed clearing area

Figure A shows the spatial extent of the 0.1 ha of native vegetation subject to this clearing permit application and Figure B illustrates the Vegetation Community A identified by the survey by Ecosystem Solutions (2022) (Appendix C).

A summary of the purpose permit clearing application is provided below in Table 1.

Table 1: Clearing proposal summary

Location	Lot 9014 on Deposited Plan 413998
Clearing area	Up to 0.1 ha of native vegetation within a 0.19 ha footprint.
Timing	Clearing is proposed to occur as one action within 2022–2023.

[3] Ecosystem Solutions. 2022. Flora and Fauna Significance Assessment Rapids Landing South, Margaret River. Prepared for RPS AAP Consulting Pty Ltd.

Clearing method	The native vegetation will be cleared mechanically
Purpose of clearing	To facilitate the installation of drainage infrastructure in the Rapids Landing residential development.
Vegetation proposed to be cleared	• Approximately 0.030 ha of Vegetation Community A is in Degraded condition (Figures B and C) • Approximately 0.067 ha of Vegetation Community A is in Good condition (Figures B and C)

Vegetation and flora

The flora and fauna significance assessment (Ecosystem Solutions 2022) was undertaken in accordance with the Environmental Protection Authority's (EPA) Technical Guidance: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a)[4] and the Technical Guidance: Sampling methods for Terrestrial vertebrate fauna (EPA 2016b)[5].

The findings of this report relevant to the areas proposed to be permanently lost through clearing are summarised as follows:

- No Threatened flora species listed under the *Biodiversity Conservation Act 2016* (BC Act), or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), were recorded. No Department of Biodiversity, Conservation and Attractions (DBCA) listed Priority flora species were recorded.
- One vegetation community was described and mapped within the site: Vegetation Community A – *Taxandria linearifolia* and *Agonis flexuosa* tall closed scrub over *Taxandria linearifolia* shrubland over **Juncus microcephalus*, *Lepidosperma tetraquetrum* and *Juncus pallidus* sedgeland.
- Vegetation condition of the site was classified as Completely Degraded (59.4%), with smaller areas of Good (19.10%) and Degraded (21.23%) vegetation. The vegetation in Good condition was found along the eastern edge of the site, on the other edge of the riparian vegetation in the Darch Brook tributary. The vegetation in Degraded condition was found in a wetland area to the south. A constructed dam is located 30 m south of the site.
- The recorded vegetation community does not have the characteristics of any Threatened Ecological Communities (TECs), as listed under the BC Act or the EPBC Act, or DBCA listed Priority Ecological Communities (PECs).

Significant fauna and fauna habitat

Black cockatoos

The Revised Draft Referral Guideline for the Three Threatened Black Cockatoo Species (Department of the Environment and Energy 2017)[6] provides updated information and requirements on habitat quality, survey expectations, standards for mitigating impacts and significant impacts for black cockatoo species.

In addition to the information contained in the earlier 2012 guidance, the revised draft referral guideline identifies that the following actions are likely to result in significant impacts to black cockatoo species:

1. Clearing of known nesting tree[7] or breeding habitat

[4] Environmental Protection Authority. 2016a. Technical Guidance: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment, EPA, Western Australia.

[5] Environmental Protection Authority. 2016b. Technical Guidance: Ter Sampling methods for Terrestrial vertebrate fauna, EPA, Western Australia.

[6] Department of the Environment and Energy. 2017. Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) *Calyptorhynchus latirostris* Baudin's Cockatoo (Vulnerable) *Calyptorhynchus baudinii* Forest Red-tailed Black Cockatoo (Vulnerable) *Calyptorhynchus banksii naso*. Canberra, Australian Capital Territory.

[7] Any existing tree in which breeding has been recorded or suspected.

2. Complete clearance of roost sites that are close to high quality foraging habitat and water resources in non-breeding areas
3. Clearing very high to high quality foraging habitat.

The habitat within the site was not suitable for black cockatoos, as such no dawn surveys were undertaken (Ecosystem Solutions 2022). No trees were present, therefore no hollows suitable for nesting or roosting were present. No evidence of black cockatoo foraging, nesting or roosting was observed by Ecosystem Solutions during the two dusk/nocturnal surveys.

The removal of up to 0.1 ha of native vegetation is not at variance with any of the high-risk factors for significant impacts where referral is recommended in the EPBC Act Referral Guidelines (Commonwealth of Australia 2012)[8]. This conclusion is shared by the Ecosystem Solutions (2022) significant impact assessment (Appendix C).

Western ringtail possum

The flora and fauna significance assessment (Ecosystem Solutions 2022) identified *Agonis flexuosa* (peppermint) tall closed scrub and *Lepidosperma tetraquetrum* sedgeland in Vegetation Community A. *Agonis flexuosa* (peppermint) trees are the key component of western ringtail possum habitat (Department of the Environment, Water, Heritage and the Arts [DEWHA] 2009a)[9] and areas with an understory of *Lepidosperma gladiatum* (sword sedge) and *Lepidosperma* sp. are important habitat areas for this species in southern Swan Coastal Plan (DEWHA 2009b)[10]

No western ringtail possums or dreys in the vegetation canopy were observed by Ecosystem Solutions (2022) during the two dusk/nocturnal surveys.

The significant impact guideline for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia (DEWHA 2009a) identifies three important areas for the western ringtail possum:

1. Core habitat includes vegetation remnants inhabited by local western ringtail possum populations and contain sites necessary for breeding and dispersal (DEWHA 2009b).
2. Primary corridors provide connectivity between areas of core habitat and allow populations to remain connected in the landscape (DEWHA 2009b).
3. Supporting habitat includes vegetation patches that buffer key local populations from threats, as well as providing foraging, breeding and dispersal opportunities (DEWHA 2009b).

Informed by the above important area descriptions, and also noting that Rapids Landing is not situated on the southern Swan Coastal Plain nor would the surrounding vegetation be considered core habitat, the *Agonis flexuosa* scrub and *Lepidosperma tetraquetrum* sedgeland have the most affinity with the supporting habitat description. In respect to supporting habitat, the DEWHA (2009a) identifies that there is a real chance or possibility of a significant impact on the western ringtail possum if the action will result in one or more of the following:

- Clearing in a remnant habitat patch that is greater than 0.5 ha in size
- Clearing of more than 50% of a remnant habitat patch that is between 0.2 and 0.5 ha in size
- Fragmentation of existing habitat linkages.

Up to 0.1 ha of potential western ringtail possum habitat will be cleared, which does not trigger a southern Swan Coastal Plain threshold. This action will not be undertaken within the southern Swan Coastal Plain and is considered to have a low risk of impacting western ringtail possums within the site as no western ringtail

[8] Commonwealth of Australia. 2012. EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo. Canberra, Australian Capital Territory.

[9] Department of the Environment, Water, Heritage and the Arts. 2009a. Significant impact guideline for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia. Canberra: Australian Capital Territory.

[10] Department of the Environment, Water, Heritage and the Arts. 2009b. Background Paper to EPBC Act Policy Statement 3.10 – Nationally Threatened Species and Ecological Communities, Significant impact guideline for the vulnerable western ringtail possum (*Pseudocheirus occidentalis*) in the southern Swan Coastal Plain, Western Australia. Canberra: Australian Capital Territory.

possums or observable signs (i.e. dreys, droppings) were observed by Ecosystem Solutions (2022) and approximately one-third of the native vegetation proposed to be cleared is in a degraded condition. Better quality habitat located adjacent to the clearing area, associated with the Darch Brook tributary, will remain. This conclusion is shared by the Ecosystem Solutions (2022) significant impact assessment (Appendix C).

In addition, Balwyn Margaret River Pty Ltd is committed to engaging a qualified fauna specialist prior to and for the duration of clearing activities to inspect the vegetation for evidence of recent use by fauna species. Should occupation of the vegetation by fauna species be confirmed, the vegetation will only be cleared after a repeat inspection undertaken by a qualified fauna specialist confirms that they are no longer occupied.

Quenda

The flora and fauna significance assessment (Ecosystem Solutions 2022) identified the quenda (*Isoodon fusciventer*) as a conservation significant fauna species with potential to occur within the site. This is listed as a Priority 4 species by the DBCA.

The quenda are ground-dwelling marsupials located in the south-west of Western Australia (DBCA 2018)[11]. They typically inhabit dense understory, such as those found in swamps or banksia and jarrah woodlands. Nest sites are indentations in the ground, located beneath shrubs and covered with leaves, dry grasses and other soft materials.

Ecosystem Solutions (2022) observed a quenda tunnel to the south of the site's eastern boundary. The location of this observation was mapped by Ecosystem Solutions (Appendix C).

Given the larger areas of more similar or better quality habitat adjacent to the site, it is considered unlikely that the clearing activity would result in a significant impact to this species.

Assessment against the 10 clearing principles

Table 2 below provides an assessment of the proposed clearing activities against the 10 clearing principles as outlined in Schedule 5 of the EP Act to determine whether the proposed clearing is at variance to the principles.

Table 2: Assessment of the proposed clearing against the 10 clearing principles

Principle	Assessment	Outcome
(a) Native vegetation should not be cleared if it comprises a high level of biological diversity	The Threatened Species Scientific Committee for the Australia Government has identified a number of areas as Biodiversity Hotspots for priority action (Department of Environment Regulation [DER] 2014)[12]. The Busselton-Augusta region, which includes the clearing area, has been identified as a biodiversity hot spot. Up to 0.1 ha of native vegetation will require clearing to facilitate the installation of drainage infrastructure along the Darch Brook tributary for Rapids Landing. Approximately 0.067 ha (69%) is in Good condition, while approximately 0.030 ha (31%) is in Degraded condition. No TECs listed under the BC Act or the EPBC Act were recorded within the site. No DBCA listed PECs were recorded within the site. Approximately two-thirds of the native vegetation to be cleared is in a Good condition, the remaining native vegetation is in a Degraded condition. No Threatened flora species listed under the BC Act or any species protected under the EPBC Act were recorded within the site. No DBCA listed Priority species were recorded within the site. Consequently, the biodiversity values associated with the native vegetation proposed to be cleared is considered to be low.	The proposal is not likely to be at variance with the principle

[11] Department of Biodiversity, Conservation and Attractions. 2018. Fauna Notes Living with Quenda. Accessed on 21 March 2022, https://www.dpaw.wa.gov.au/images/documents/plants-animals/animals/living-with-wildlife/quenda_fauna_note_2018.pdf

[12] Department of Environment Regulation. 2014. A guide to the assessment of applications to clear native vegetation Under Part V Division 2 of the *Environmental Protection Act 1986*.

Principle	Assessment	Outcome
(b) Native vegetation should not be cleared if it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia	Habitat within the site was not suitable for black cockatoos as no trees were present, and therefore no hollows for nesting or roosting, and no evidence of black cockatoo foraging, nesting or roosting was observed (Ecosystem Solutions 2022). The canopy of the vegetation was thoroughly inspected, and no western ringtail possums or dreys were observed. A quenda tunnel was recorded to the south of the site's eastern boundary. Up to 0.1 ha of potential western ringtail possum habitat will be cleared. Given the larger areas of more similar or better quality habitat adjacent to the clearing area, it is unlikely that western ringtail possum or quenda are solely reliant on the site for food resources or habitat.	The proposal is not likely to be at variance with the principle
(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora	No Threatened flora species listed under the BC Act or any species protected under the EPBC Act or DBCA listed priority species were recorded within the site.	The proposal is not at variance with the principle
(d) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community	No TECs listed under the BC Act or the EPBC Act were recorded within the site. No DBCA listed PECs were recorded within the site.	The proposal is not at variance with the principle
(e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared	The native vegetation within the site was broadly mapped as Cowaramup valleys (Cw1) vegetation complex (Landgate 2022). This vegetation complex has approximately 28.09% of its pre-European extent remaining in the South West Forest region (Government of Western Australia 2019)[13]. The National Objectives and Targets for Biodiversity Conservation 2001-2005 and the EPA recognise that 30% or more of the pre-clearing extent of each ecological community is needed to adequately protect Australia's biodiversity (Department of Environmental Regulation [DER] 2014)[14]. Vegetation proposed to be cleared includes one vegetation complex marginally below this 30% threshold, Cowaramup valleys (Cw1) at 28.09%. Given that approximately one-third of the vegetation proposed to be cleared is in a Degraded condition, and larger areas of more similar or better quality habitat are adjacent to the clearing area, it is not considered to be of conservation significance.	The proposal is not likely to be at variance with the principle
(f) Native vegetation should not be cleared if it is growing in or in association with a watercourse or wetland	The site is adjacent to a watercourse, the Darch Brook tributary, which DBCA mapped as a floodplain (Figure D). Darch Brook is a tributary of Margaret River. The watercourse has not been listed as a significant watercourse or wetland (DER 2014; Landgate 2022). The site's northern vegetation is located along the outer edge of the riparian vegetation within the Darch Brook tributary and the site's southern vegetation is located in a wetland area (Ecosystem Solutions 2022). Noting the relatively small extent of the proposed clearing and that approximately one-third of the native vegetation is in a Degraded condition, the proposed clearing is not likely to have a significant impact on the larger extent of riparian habitat associated with the Darch Brook tributary.	The proposal is at variance with the principle

[13] Government of Western Australia. 2019. 2018 South West Vegetation Complex Statistics. Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth, https://catalogue.data.wa.gov.au/dataset/dbca (accessed 4 March 2022).

[14] Department of Environmental Regulation. 2014. A Guide to the Assessment of Applications to Clear Native Vegetation – Under Part V Division 2 of the Environmental Protection Act 1986.

Principle	Assessment	Outcome
(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation	Land degradation can be caused or exacerbated by uncontrolled run-off and wind or water erosion. The underlying soils of the site are mapped as Cowaramup wet vales Phase, which is described as small, broad U-shaped drainage depressions with swampy floors. Gravelly duplex (Forest Grove) soils on side slopes and poorly drained alluvial soils on valley floor (Landgate 2022). These soils were mapped by the Department of Primary Industries and Regional Development as having high subsurface acidification risk, a high to medium waterlogging and wind erosion risk, a medium phosphorus export risk and a low flood, water erosion and salinity risk (Landgate 2022). Stormwater run-off within the Recreation/Interface Zone will be managed through appropriate drainage and erosion management measures in accordance with relevant guidelines. Areas cleared for the drainage infrastructure will be stabilised through the planned landscaping works (Appendix B), largely with stone batters, and planting of massed rushes and sedges (*Baumea juncea, Juncus pallidus, Juncus pauciflora* and *Juncus subsecundus*) to the south. Given the relatively small size of the clearing area and the planned landscaping works, the proposed clearing is unlikely to increase the waterlogging, wind erosion and phosphorus export risk to an extent that would result in appreciable land degradation.	The proposal is not likely to be at variance with the principle.
(h) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area	The site does not contain land held or managed for conservation. The closest conservation area is the Wooditjup National Park, located approximately 1.6 km east-northeast of the site. Given the distance to this conservation area, the proposed clearing is unlikely to impact upon its environmental values.	The proposal is not at variance with the principle.
(i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water	The site does not intersect a watercourse. Given there is approximately 12–20 m of dense vegetation between the area proposed for clearing and Darch Brook tributary watercourse, it is unlikely that the proposed clearing would significantly alter the quality of surface or ground waters within the project area. Furthermore, water quality within the site will be managed in accordance with FMP and relevant guidelines.	The proposal is not likely at variance with the principle.
(j) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding	The site is located well outside the Margaret River 100 year flood plain mapping (Landgate 2022). Its underlying soils have a medium to high waterlogging risk and a low flood, water erosion and salinity risk. The site's elevation is approximately 80 m AHD and gently slopes towards the Darch Brook tributary. Only fringe vegetation will be removed from the site. Consequently, the clearing of native vegetation will not cause, or exacerbate the incidence or intensity of flooding due to increased run-off in localised areas.	The proposal is not likely to be at variance with the principle.

Concluding remarks

The native vegetation proposed to be cleared is found on historically impacted land along the Darch Brook tributary. Up to 0.1 ha of native vegetation, within a 0.19 ha proposed clearing area, will require clearing to facilitate the installation of drainage infrastructure along the Darch Brook tributary for Rapids Landing. Approximately 0.067 ha (69%) is in Good condition, while approximately 0.030 ha (31%) is in Degraded condition.

To address the low likelihood that conservation significant fauna species are present within the proposed sewer extension immediately prior to the proposed clearing works commencing, Balwyn Margaret River Pty Ltd is committed to undertake pre-clearing inspections for fauna species with clearing works commencing immediately after fauna species have been confirmed not to be present.

We trust this information is sufficient for your purposes, however, should you require further details or clarification, please do not hesitate to contact the undersigned.

Yours sincerely,
for RPS AAP Consulting Pty Ltd

[redacted]

enc: Figures
Appendix A: Foreshore Management Plan, Rapids Landing Estate, Margaret River, Western Australia
Appendix B: Landscape works Rapids Landing Stages 7 and 10
Appendix C: Flora and fauna significance assessment
Appendix D: Application for a clearing permit (purpose permit)
Appendix E: Certificate of title
att: Shapefile data

Figures

Figure A

Site location

GDA 1994 MGA Zone 50

0 12.5 25 50 m

Job Number: EP2646.001
Date: 04.04.22
Scale: 1:1,000 @ A3
Created by: RL
Source: Cadastre - Landgate, 2021 Orthophoto - Landgate, 2020

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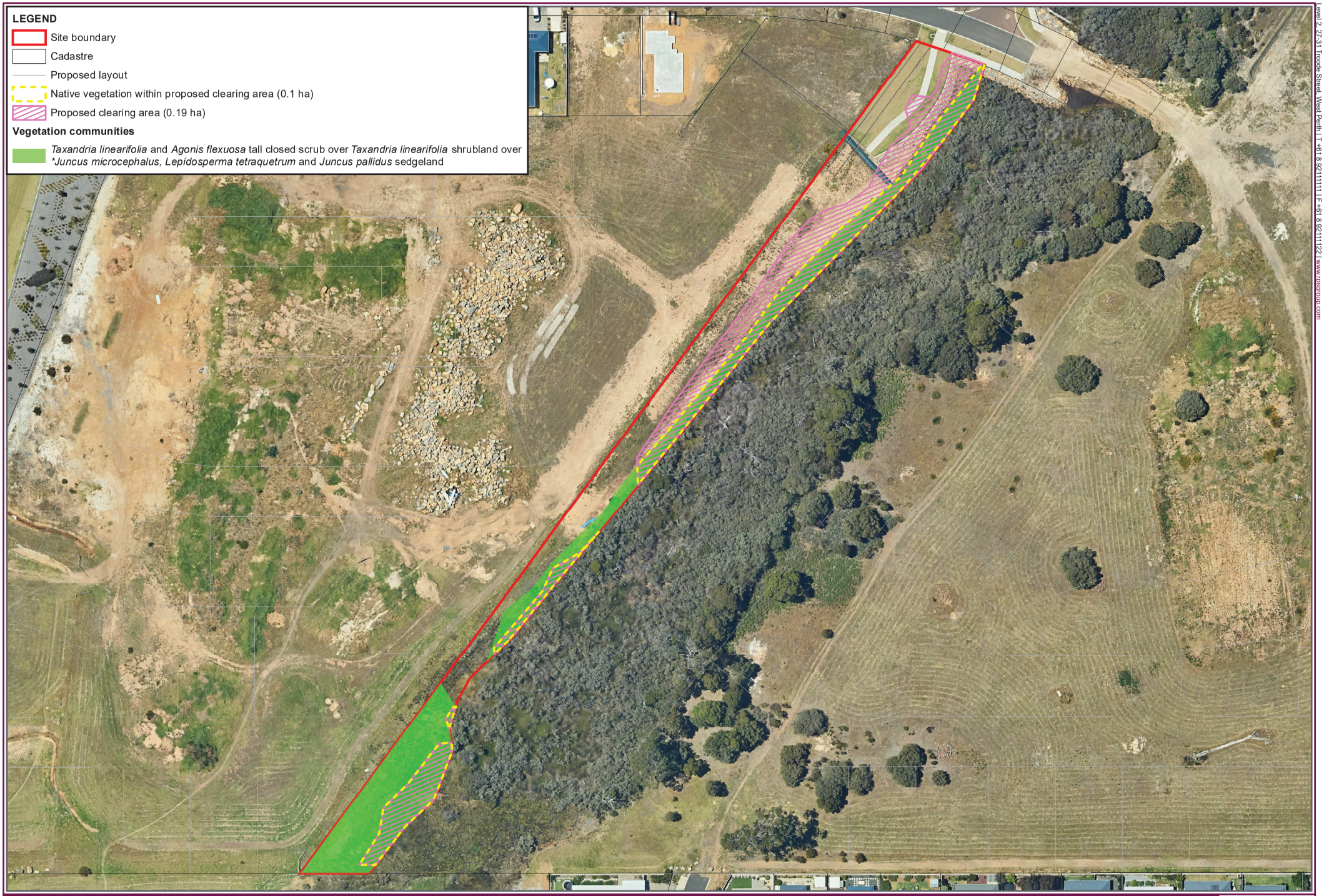

Figure B

Vegetation communities

Margaret River Coastal Grid MRCG94

0 12.5 25 50 m

Job Number: EP2646.001
Date: 04.04.22
Scale: 1:1,000 @ A3
Created by: RL

Source: Cadastre - Landgate, 2021 Orthophoto - Landgate, 2020 Veg Communities - Ecosystems Solutions, 04.03.22

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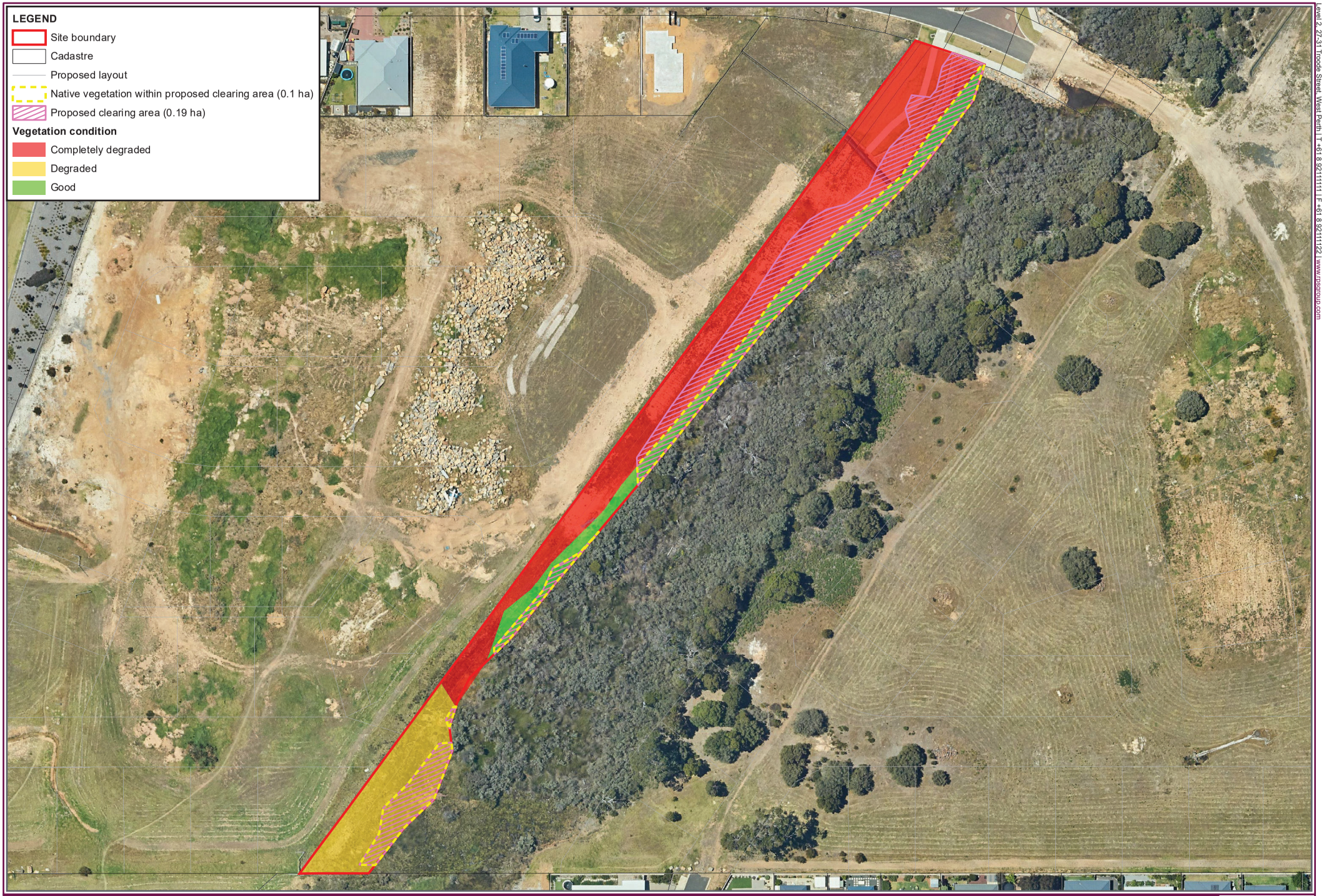

Figure C

Vegetation condition

Margaret River Coastal Grid MRCG94

0 12.5 25 50 m

Job Number: EP2646.001
Date: 04.04.22
Scale: 1:1,000 @ A3
Created by: RL

Source: Cadastre - Landgate, 2021 Orthophoto - Landgate, 2020 Veg Condition - Ecosystems Solutions, 04.03.22

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Figure D

DBCA wetland mapping

Margaret River Coastal Grid MRCG94

0 12.5 25 50 m

Job Number: EP2646.001
Date: 04.04.22
Scale: 1:1,000 @ A3
Created by: RL

Source: Cadastre - Landgate, 2021 Orthophoto - Landgate, 2020 Veg Condition - Ecosystems Solutions, 04.03.22

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Appendix A
Foreshore Management Plan, Rapids Landing Estate, Margaret River, Western Australia

coffey environments
SPECIALISTS IN ENVIRONMENTAL,
SOCIAL AND SAFETY PERFORMANCE

FORESHORE MANAGEMENT PLAN, RAPIDS LANDING ESTATE MARGARET RIVER, WESTERN AUSTRALIA

Prepared for:

Balwyn Margaret River Pty Ltd
Lester Group
PO Box 1110
Nedlands WA 6909

Report Date: 14 January 2011
Project Ref: ED2010_33, V1

[redacted]

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ABBREVIATIONS

AMRSC	Augusta Margaret River Shire Council
BMR	Balwyn Margaret River Pty Ltd
DEC	Department of Environment and Conservation
DIA	Department of Indigenous Affairs
DoW	Department of Water
DRF	Declared Rare Flora
DUP	Dual Use Path
EPBC	Environment Protection and Biodiversity Conservation
FMP	Foreshore Management Plan
ODP	Outline Development Plan
POS	Public Open Space
SMP	Sediment Management Plan
WAPC	Western Australian Planning Commission
DUP	Dual Use Path

1 INTRODUCTION

Coffey Environments Australia have been commissioned by RPS to prepare a Foreshore Management Plan (FMP) for a defined foreshore management area comprising of a section of Darch Brook, a tributary of Darch Brook and associated buffers for the Rapids Landing Development, located in Margaret River, Western Australia.

1.1 Site Description

Lot 27 Bussell Highway is located approximately 1.5km south of the Margaret River town site and is bounded by Riverslea and Margaret Fields Estate to the north, Darch Brook to the east, Bussell Highway to the west and Brookfield residential development to the south (Figure 1). The total proposed development site is approximately 82.5ha in area and comprises predominantly pasture-cleared land with scattered trees. The Darch Brook flows in a northerly direction along the eastern boundary of the site with a tributary entering the site from the southern boundary and flowing directly into the Darch Brook. Two other tributaries of the Darch Brook enter the site from the western boundary on the Bussell Highway and join shortly before exiting the site at the northern boundary.

This FMP applies to the Foreshore Management area as outlined in Figure 2 and Appendix A.

1.2 Background

The land is owned by Balwyn Margaret River Pty Ltd (BMR), a subsidiary of Lester Group Ltd. The site is currently zoned 'Development' in the Shire of Augusta-Margaret River's Town Planning Scheme No. 17 and included within Overall Planning Area No.6. The Western Australian Planning Commission (WAPC) granted subdivision approval in January 2007 (WAPC Ref. 132030). Condition 16 of the subdivision approval requires: *Public Open Space and drainage areas being developed in accordance with an approved management plan.* This condition is to be cleared by the Augusta-Margaret River Shire Council (AMRSC).

Coffey Environments has previously prepared a Creekline Rehabilitation Management Plan for Stage 1B Rapids Landing. Coffey Environments managed the on-going monitoring of the rehabilitation works including the establishment of quadrats and photo monitoring points and reporting to the AMRSC and the Department of Water (DoW) to clear the FMP condition.

Based on monitoring results and discussions with the AMRSC Coffey Environments believe that the rehabilitation of the creekline associated with Stage 1, Rapids Landing (from Bussell Highway to the existing dam) has been implemented successfully to date, resulting in a significant increase in the number of local native plants and an improvement in the biodiversity within the riparian environment.

Sedimentation was a key management issue for the Stage 1 development. Public concerns about high Suspended Solids and Turbidity in the Margaret River caused the Department of Environment and Conservation (DEC) to issue two field notices to Lester Group in July 2008 which required the implementation of improved sediment management controls across the site. This issue is addressed comprehensively in this FMP to ensure appropriate management and prevention of further issues in this regard.

1.3 Scope of Work

The following scope of work was approved by BMR on 15 July 2010:

- Liaison with the project engineer to discuss the management of public open space (POS) areas adjacent to the foreshore reserve; in particular the management of stormwater into the Darch Brook and its tributary;
- Liaison with the landscape architect to identify key landscaping and recreational areas, landscaping treatment of stormwater drainage and/or basin areas within (if proposed) or at the interface with the foreshore reserve;
- Discussions with the DoW in Bunbury and the AMRSC to agree on the specifications of the plan and the proposed approach;
- A one day site visit will be conducted to identify the site characteristics, to collate details on native and exotic vegetation characteristics, assess the condition of the foreshore and identify areas requiring rehabilitation, weed control and/or river restoration works;
- The FMP will provide a description of key environmental and management factors pertinent to the foreshore area. This will include an investigation of:
    - Background material on relevant catchment plans and water resource plans;
    - The study area, including tenure, historical and surrounding land use;
    - The natural environment including climate, soils, landform, geology, riparian vegetation, fauna and current foreshore condition;
    - Management measures including protection of the foreshore reserve from construction activities, weed management, revegetation, river restoration, fauna/flora and feral/domestic animals and mosquito management, fire management, stormwater management, foreshore reserve interaction with adjacent landscaping and recreational areas. (Liaison with the project engineer and landscape architect); and ecological linkages to adjacent foreshore areas;
    - Schedule and implementation of works;
    - Monitoring and maintenance of rehabilitated area; and
    - Summary of management commitments and responsibilities.

2 EXISTING ENVIRONMENT

2.1 Geology, Soil and Landform

Granitic gneisses of the Leeuwin Block form the bedrock of the area and can be weathered to depths of 40m. A mixture of gravels, laterites, silty sands and clayey silty sands overlies the bedrock (Tille and Lantzke, 1990).

The site is located in the Land Systems of the Margaret River Plateau and is classified as the Cowaramup Upland Land System. This land system is characterised by undulating to rolling hills that have formed where the main waterways of the region (i.e. Margaret River and Darch Brook) have incised into the Margaret River Plateau. The Plateau is formed on the laterised granitic and gneissic basement rock of the Leeuwin Block.

The two land units within the Cowaramup Upland Land System are:

- The valley of the Darch Brook that occupies the eastern portion of the site and the tributaries in the north western portion comprises the Cowaramup Wet Vales Land Unit (Cvw): small, broad U-shaped drainage depressions with swampy floors. Gravelly duplex (Forest Grove) soils on side slopes and poorly drained alluvial soils on the valley floor; and
- The ridge that occupies the central portion of the site comprises of the Cowaramup Flats (C): Flats (0-2% gradient) with and yellow-brown, gravely duplex (Forest Grove) and pale grey mottled (Mungite) soils.

Forest Grove soils consist of yellowish brown sandy topsoil with a high gravel content overlying brownish yellow clay subsoil. These soils are better drained than the Mungite soils.

Mungite soils are characterised by greyed, mottled and impermeable clay subsoil. The topsoil is a greyish brown sandy loam. These soils are poorly drained in winter and often retain moisture in the summer (Tille and Lantzke, 1990).

2.2 Climate

The Margaret River region experiences a Mediterranean climate of cold wet winters and hot dry summers. Air temperatures mean daily maximums vary from 23^{O}C in summer to 16.3^{O}C in winter, with mean daily minimum temperatures varying from 17.2^{O}C in summer to 11.1^{O}C in winter.

The average annual rainfall varies between 850-1200mm, with rainfall occurring mostly during the winter months. The mean daily evaporation for the area ranges from 6.1mm/day in summer to 1.4mm/day in winter.

During the summer months the prevailing wind blows from the east to south-east in the morning and from the south-west in the afternoon. Winter is characterised by the north-westerly storm winds interspersed with calmer periods. These storms are related to the passage of the low-pressure systems that affect the southwest portion of Western Australia due to the northerly location of the anticyclone system (ATA Environmental, 2004).

2.2 Hydrology

Darch Brook is the primary tributary of the Margaret River which flows approximately 1km to the north of the site. Darch Brook consists of an almost flat, waterlogged and seasonally inundated area

approximately 80-100m adjacent to the proposed subdivision. The Brook flows in a northerly direction to join with Margaret River at a slope of approximately 1:120.

A tributary of Darch Brook dissects the south-eastern corner of the site. The tributary consists of a relatively flat waterlogged seasonally inundated channel flowing in north-easterly direction into Darch Brook. The confluence of this tributary and Darch Brook occurs approximately 400m north of the southern site boundary (Figure 2).

2.4 Vegetation and Flora

Lot 27 Bussell Highway is located in the Warren Bioregion (Thackway and Cresswell, 1995) and comprises vegetation characteristic of Cowaramup (C1) Vegetation Complex in the upland areas, and the Cowaramup (Cw1) and Wilyabrup (W1) Vegetation Complexes in the valleys (Mattiske and Havel, 1998).

According to Mattiske and Havel (1998), the Vegetation Complexes on Lot 27 Bussell Highway can be summarised as follows:

- Cowaramup (C1) is comprised of an Open to Tall Open Forest of Jarrah (*Eucalyptus marginata* spp*. marginata*)-Marri (*Corymbia calophylla*)-Bull Banksia (*Banksia grandis*) on lateritic uplands in the hyperhumid zone;
- Wilyabrup (W1) is comprised of a Tall Open Forest of Karri (*Eucalyptus diversicolor*)- Marri (*Corymbia calophylla*)- *Allocasuaina decussata*- Peppermint (*Agonis flexuosa)* on deeply incised valleys of the hyperhumid zone; and
- Cowaramup (Cw1) is comprised of a mixture of Open Forest of *Eucalyptus diversicolor-Corymbia calophylla* and woodland of Jarrah (*Eucalyptus marginata subsp. marginata*)-*Corymbia calophylla* on slopes.

A vegetation and flora survey of Lot 27 Bussell Highway was conducted in 2004 by ATA Environmental as part of the Technical Appendices to the Outline Development Plan (ODP) for the proposed subdivision (ATA Environmental 2004). Appendix B comprises a list of species recorded from the 2004 survey of the site and species observed within the foreshore reserve in October 2010 (site walkover and observations only).

The foreshore along the southwestern tributary has become degraded through past land use, particularly through historical unrestricted stock access to the creekline (Plates 1-4). The creek is currently fenced however stock would have had access to the creekline in recent past. Many weeds are present including Kikuyu (*Pennisetum clandestinum)*, Couch (*Cynodon dactylon*), Bullrush (*Typha orientalis*) and Blackberry (*Rubus anglocandicans*). Native vegetation occurs directly along the creekline, characterised by shrubland to open heath of *Agonis linearifolia, Agonis flexuosa* and *Mirbelia dilatata* over scattered stands of *Juncus pallidus* (Figure 3, Plate 5). Vegetation directly along the creekline was observed to be in good condition in 2004 and 2010 however native vegetation ceases immediately after the bank of the creekline where annual grasses dominate. The foreshore of the southwestern tributary consists of a few large shrubs with an understorey consisting entirely of weeds, mainly annual grasses (Plate 1).

The Darch Brook along the eastern boundary of Lot 27 Bussell Highway consists of five different vegetation types in varying condition (Plates 6-11). The north-eastern boundary of the site is in Very Good to Excellent condition characterised by a closed heath of *Agonis linearifolia, A.juniperina*, *Leptospermum erubescens* and *Melaleuca hamulosa* (Plate 11). South and west of this vegetation

community the vegetation along the creekline of Darch Brook is in Good condition characterised by a previously cleared area that has naturally regenerated to comprise an Open to Closed heath of *Agonis linearifolia* and *A .juniperina* over *Juncus pallidus* with *Leptospermum erubescens* and *Melaleuca hamulosa* and open areas of grasses and Bracken fern. The confluence of Darch Brook and the tributary feature scattered Marri (*Corymbia calophylla)* and Blackbutt (*Eucalyptus patens*) over an Open to Closed Heath of *Agonis linearifolia* and *A. juniperina* over *Juncus pallidus* with *Lepidosperma erubescens* and *Melaleuca hamulosa* (Plate 12). However this confluence is particularly degraded outside of the main alignment (a community of Marri and Blackbutt (*Eucalyptus patens*) over a cleared understory of pasture grasses (Plates 13-15)).

An area of Marri (*Corymbia calophylla*) open forest with occasional Jarrah (*E. marginata* ssp. *marginata*) over a midstratum dominated by Peppermint (*Agonis flexuosa*) over an open understorey with scattered Balga (*Xanthorrhoea preissii*), *Trymalium floribundum* and *Hibbertia hypericoides* and patches of Bracken fern (*Pteridium esculentum*) occurs in the northwestern corner of the foreshore area (Plates 16-19). This vegetation was mapped in 2004 as Good condition (ATA Environmental 2004). The 2010 site walkover noted this area to be in Good to Very Good condition. Directly east of this woodland an area of dense *Mirabelia- dilatata* shrubland over dense stands of bracken fern occurs (in Good condition)

2.3 Vegetation Condition

The condition of the vegetation was assessed as part of the ATA Environmental Vegetation and Flora Survey in 2004 using the scale of Keighery published in Bush Forever (Government of WA, 2000). Vegetation condition is mapped in Figure 3 and discussed in detail above.

Foreshore areas in the eastern portion of the Lot have been classified as Good and Very Good to Excellent in the undisturbed dense heath vegetation of the Darch Brook. Localised areas of riparian vegetation that were partially cleared approximately four years ago are naturally regenerating in this area. However foreshore areas along the southwestern tributary and areas directly adjacent to Darch Brook (mapped as vegetation community CcEp in Figure 3) are Degraded and require intensive weed control and revegetation.

2.4 Conservation Significant Vegetation & Flora

As part of the Environmental Appraisal undertaken by ATA Environmental 2004 for the ODP for Lot 27, Bussell Highway, a search for the presence of significant flora was undertaken. This included searches of the following databases:

- DEC's 'Threatened (Declared Rare) Flora' database;
- 'Western Australian Herbarium Specimen' database for Priority species opportunistically collected in the area of interest; and
- DEC's 'Declared Rare and Priority Flora List' which contain species that are Declared Rare (Conservation code R or X for those presumed to be extinct) poorly known (Conservation codes 1, 2, 3) or require monitoring (Conservation Code 4).

The search identified four Declared Rare Flora (DRF) and fourteen Priority plant species that have been previously recorded within the proximity of the site but not on the site itself. None of the species of significant flora were identified from the site during either the July and October 2004 survey or during a site walkover in October 2010.

2.5 Fauna

ATA Environmental (2004) conducted a desktop review of fauna likely to occur in the area using the following sources:

- A search of DEC's Threatened and Priority species to identify potential scheduled and threatened species within the region;
- A review of the Western Australian Museum database to identify potential vertebrate fauna within the area; and
- A search of the Commonwealth Department of Environment and Heritage on-line database of fauna of national environmental significance to identify species potentially occurring within the area that are protected under the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999.*

The database searches were undertaken for a 10km radius surrounding the site. Bird, reptile, amphibian and mammal species expected to occur within the site are listed in Appendix C. A total of 178 species that may potentially occur on the site were identified from the searches. This included 95 bird, 15 amphibian, 38 reptile and 30 mammal species (three introduced or feral) that may be present. It was considered that due to micro-habitat requirements not all of these species will be present.

Twelve threatened species of fauna and eight migratory species of birds potentially occurring within the area were highlighted as having national significance under the *EPBC Act 1999.*

An on-site reconnaissance fauna survey was conducted as part of the Environmental Appraisal undertaken by ATA Environmental in 2004. The survey included night spotlighting for the Western Ringtail Possum (*Pseudocheirus occidentalis*) and day time searches for Baudin's Black Cockatoo (*Calyptorhynchus baudinii*). The survey found that in terms of fauna habitat, the site was extremely degraded except along the Darch Brook where potential fauna habitat was in Very Good condition. The survey concluded that the site was not considered a significant habitat site for either the Western Ringtail Possums (none were observed) or the Baudin's Black Cockatoo and that the development of the site should not result in any impact on listed species of National Environmental Significance under the *EPBC Act*.

2.6 Aboriginal Heritage

A review of the Department of Indigenous Affairs (DIA) Aboriginal Sites Register was undertaken in July 2004 (ATA Environmental 2004). One site, Rosa Brook Road (Site ID 4494) is registered as being located within 10km of the site however the exact location of this site remains uncertain (McDonald Hales, 2000). Another site, WCMO2-Watercourse (Waugly Site) (Site ID 21038) is located on-site and is the northern-most watercourse that enters the site along the western boundary (through a culvert under Bussell Highway) and exits the property along the northern boundary. This watercourse is a tributary to the Darch Brook.

An Aboriginal Heritage Survey of the site that comprised of archaeological surveying and ethnographic consultation was undertaken in July 2004 by Paul Greenfield (Archaeologist), Wayne Webb (Bibbulman/Wardandi representative) and Brad Goode (Consulting Anthropologist).

The Aboriginal people in the South West regard the Margaret River (Site ID 4495) as a mythological site. Research previously undertaken by Goode on the Yarragadee Aquifer, highlighted the fact that nearly all tributaries are seen as part of the larger river and are therefore afforded the same

ethnographic significance as the main river itself (Goode, 2003). These watercourses are protected in the foreshore areas which range from a minimum 30m buffers to 150m buffers along the Darch Brook.

Darch Brook, which flows into the Margaret River, and its associated wetlands, are therefore recognised as being both important and significant to the local Aboriginal people (Greenfield and Webb, 2004). Ethnographic consultation undertaken on-site with the Aboriginal Elders confirmed that the Darch Brook should be afforded protection through being registered as an Aboriginal Site on the DIA's Aboriginal Sites Register.

2.7 Foreshore Creekline Reserve

The purpose of the Foreshore Creekline Reserve on the site is to ensure the protection and conservation of the watercourses and the ecosystem that they support. The Foreshore Creekline Reserve that is the focus of this Management Plan ranges in width from 40m, extending up to 130m at the mid-north end of Darch Brook. The Foreshore Creekline Reserve encompasses the riparian zone, comprising the broad flat channel vegetated with scattered riparian native fringing vegetation as well as a buffer of adjacent woodland and pasture areas (refer to Appendix A).

The Foreshore Management Plan Area encompasses both the Foreshore Reserve, the south western tributary of Darch brook and an additional foreshore area (comprising open forest and cleared pasture areas) providing additional buffer area between residential areas and Darch Brook (Refer to Appendix A)

It is proposed that the Foreshore Management Area will also incorporate areas of recreational and landscape functions as well as stormwater bio-retention systems.

An assessment of the foreshore condition of the Darch Brook and all the tributaries in the proposed development area was undertaken by ATA Environmental in December 2006 (ATA Environmental 2007) using the Pen-Scott method of riparian zone assessment (Figure 4). This system provides a graded description of the creekline foreshore that runs from pristine (A grade) through to a ditch (D grade). The creekline foreshore assessment provides a useful gauge of the current condition of the streamline and provides a prioritised plan of action to address degradation. A summary of the grades of the Pen-Scott system follows is summarised in Appendix D (Pen and Scott, 1995):

The Darch Brook channel is in good condition (A2/A3) with a diversity of riparian species and little disturbance. Areas adjoining the Brook which have been cleared in the recent past are degraded (B2), but are naturally regenerating (Refer to Figure 4).

The southwestern tributary entering from the southern boundary is fairly degraded and heavily weed infested, particularly along the margins (ranging from B2 in some areas to D2 in highly disturbed sections). Native species generally dominate the main tributary however the foreshore margins are dominated by pasture grasses and weeds.

3 MANAGEMENT OBJECTIVES

The primary aim of management for the foreshore Management Area is to conserve and rehabilitate the natural riparian environment while allowing access for the community for recreational use and to appreciate the natural area within the residential development. The objectives of the Plan are to:

- Provide a long-term strategy for the management of existing vegetation and implementation of rehabilitation plans;
- Increase community awareness and understanding of the value of foreshores and the issues associated with their management;
- Protect and conserve the natural values of the foreshore including vegetation, fauna habitats and water quality; and
- Promote the foreshore as a conservation, recreation and education resource and enhance access for the use and enjoyment of the community.

4 CONSULTATION

Consultation was undertaken with the DoW and with the AMRSC in October 2010. Any specific requirements outlined have been addressed in the FMP (Refer to Table 1 below).

Table 1: Summary of Requirements as Raised by DoW and AMRSC

Requirements	Agency	Addressed
Regional Open Space Boundary	Department of Water	N/A
1:100 Year Flood Extent	Department of Water	Will be addressed in the detailed design (drainage).
Conservation or Resource Enhancement Category Wetlands Values	Department of Water	N/A
ASS Management of Works within Foreshore Area	Department of Water	N/A
Identify Restoration, Revegetation Works – Species, Densities and Zones	Department of Water	Section 5.1.3; Section 5.1.4; Appendix E
Weed Management Program	Department of Water AMRSC	Section 5.1.2
Bank Stability Works/Erosion Control	Department of Water AMRSC	Section 2.7; Section 5.1.4
Stormwater Management Interface (No stormwater or sewer infrastructure permitted with Darch Brook Foreshore Protection Area)	Department of Water	Section 5.2
Fencing/Retaining Walls	Department of Water	Section 5.5.1
Parking	Department of Water	Section 5.5.1
Sign Posting	Department of Water	Section 5.5.1
Crossovers	Department of Water	Section 5.5.1; Figure 6
Pedestrian Access	Department of Water AMRSC	Section 5.5.1; Figure 6
Community Recreational and Social Nodes/Infrastructure	Department of Water	Section 5.5.1; Figure 6

Requirements	Agency	Addressed
	AMRSC	
Identify Sites of Cultural, Archaeological or Religious Significance	Department of Water	Section 2.6; Section 5.1.4
Commitments Regarding Future Reserve Tenure and Maintenance	Department of Water AMRSC	Section 5.6; Section 5.7
Fire Protection Measures	Department of Water	Section 5.4
Program of Works (List of works, commencement and completion times, monitoring of success of plantings and replanting works)	Department of Water	Section 6; Table 3
Bonding of Outstanding Works at the Subdivision Condition Clearance Stage	Department of Water	TBA
Subdivision Construction Phase Protection Controls and measures	Department of Water AMRSC	Section 5.3

5 MANAGEMENT ISSUES AND RECOMMENDATIONS

The following sections detail the appropriate management strategies required to protect and restore the riparian environment. The section also addresses proposed landscaping and recreational opportunities to enhance the community's interaction with the foreshore area.

5.1 Conservation Management

The conservation values of the foreshore management area relate to the water quality, primarily of Darch Brook, and Margaret River) and biodiversity values. Conservation of water quality values can be managed by:

- Protecting the creekline from erosion;
- Slowing the flow of water through the reserve; and
- Removing nutrients and trapping sediments (James 2006).

These actions are addressed through rehabilitation, stormwater management and river restoration.

Protection and enhancement of biodiversity values may be managed by:

- Removing weed species and replacing with locally endemic native species;
- Provision of habitat (through revegetation and provision of woody debris);
- Control of access (by stock and people); and
- Control of feral animals.

5.1.1 Management Zones

The foreshore management area has been divided into three management zones (Figure 5) based on foreshore condition. These management zones vary in:

- The management objectives of the zones;
- The species and density of planting for revegetation;
- The requirement for river restoration works;
- The intensity of weed control to be undertaken; and
- Access for recreational purposes.

Management Zone 1 – Conservation Zone

The Darch Brook Riparian Zone (northern and mid section)

Open forest at the northern end of the foreshore management area.

The management objective of Zone 1 is to protect the existing environment and improve its ecological function through control of weeds and limiting access. Zone 1 contains vegetation that is in Good to Excellent condition and will require very little management. The ecological function of this zone will improve by minimising disturbance to encourage natural regenerative processes to improve water quality.

Revegetation and restoration works are not required in this zone however future monitoring of bank stability is recommended.

Management Zone 2 – Rehabilitation/Restoration Zone

The southwestern tributary riparian zone

The confluence of the southwest tributary with Darch Brook

The Darch Brook Riparian Zone (southern section)

The management objective of Zone 2 is to restore the natural environment and improve its ecological function. Areas within Zone 2 vary in condition and consequently the restoration/rehabilitation works required also varies accordingly. Areas in Good condition with native vegetation cover only require weed control. Other areas heavily infested with weeds require weed removal and revegetation with native species. Several areas are likely to require dense plantings of fringing vegetation. Fringing vegetation plays an important role in maintenance of a biologically balanced and healthy waterway. The restoration of the riparian vegetation through weed control and revegetation will significantly improve biodiversity values, as well as providing bank stability, sediment and nutrient retention and improving water quality.

River restoration works could potentially be required zone 2 (Refer to Section 5.1.4).

Management Zone 3 – Recreational/Interface Zone

The interface between the riparian zone and the subdivision lots

The higher areas in the foreshore management area between the riparian environment and the proposed subdivision are very degraded. These areas consist of cleared pasture with scattered trees and shrubs. The management objective in these interface areas is to provide recreational areas, dual use paths and facilities and stormwater detention treatment. (Refer to Figure 6 for approximate locations of recreational areas and pedestrian access).

These areas will be comprised of landscaped areas using local native trees and shrubs to create a parkland cleared environment. Local native sedges will be planted densely in several localised bio-retention swales with amended subsoils to attenuate flows, remove nutrients and other contaminants. Weed control will be minimal in these areas as the exotic grasses (mainly Kikuyu) can be controlled by mowing in these recreational areas.

To ensure the construction activities associated with the proposed development do not extend into the foreshore or POS area, the limit of development should be clearly delineated with stakes and flagging tape prior to and during earth working activities on the site.

A dual use walkway is recommended between management zone 3 and the riparian zone to assist in preventing spread of weeds/grasses into the riparian zone.

5.1.2 Weed Management

Management Objectives

To eradicate declared weeds, control major weed species and thereby assist in re-establishing the native flora and vegetation of the foreshore management area.

Management Strategy

Extensive weed control is required to combat the heavy infestation of weeds to allow for natural regeneration of native species, prevent competition for nutrients and moisture, and to assist in revegetation success.

The foreshore management area has historically been exposed to ongoing sources of weed infestation. Weeds within the foreshore management area vary in distribution and density. Major weeds that dominate the understorey are the exotic grasses including Kikuyu (*Pennisetum clandestinem)*, Couch *(Cynodon dactylon)*, Paspalum (*Paspalum dilatatum*) and Oat grass (*Avena barbata*). A full list of the plant species found in the foreshore management area associated with Stage 1 is provided in Appendix A.

Two declared weeds Blackberry (*Rubus anglocandicans*) and Arum lily (*Zantedeschia aethiopica*) were recorded during the 2010 site visit. These species is listed as P1 and P4 under the *Agriculture and Related Resources Protection Act 1976* for the AMRSC, where:

- **P1** Prohibits movement of plants or seeds within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder; and
- **P4** Prevent the spread of infestation from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set on all plants.

Only scattered Arum lilys were present. However several large infestations of Blackberry were observed in the southwestern tributary and the southern end of Darch Brook. In addition a large area of *Typha orientalis* (Bulrush) was present in the southwestern tributary.

A suitably qualified and experienced weed contractor will implement a weed control program using appropriate weed control methods. The following strategies for weed control are recommended:

Management Zone 1: Zone 1 contains vegetation that is in Good to Excellent condition although weeds are present in low densities. It is recommended that hand removal or spot spraying (using frog friendly herbicides) are used in this zone to control weeds.

Management Zone 2: Large areas of Blackberry and Bulrush occur in Zone 2 as well as areas of annual pasture grasses that require removal and replacement with dense plantings of native vegetation. Intensive weed control will be required in this zone in accordance with weed control methods outlined below.

Management Zone 3: Zone 3 is nearly entirely dominated by an understorey of weeds (mostly annual grasses). Although initial weed removal will be required (weeds will be removed where native vegetation planting is proposed), weed control in the long term is likely to be minimal as the exotic grasses (mainly Kikuyu) can be controlled by mowing in recreational areas.

Weed Control Methods

The following methods for weed control are recommended:

- Some areas within Management Zones 2 and 3 could be scalped to remove existing weeds. Slashing and spraying may be effective, although it is probable that repeated effort will be required to control the weeds. Note that scalping within the riparian zone is not recommended due to the possibility of contributing to erosion and increasing sediment movement;
- Spray exotic grasses in early Autumn, preferably after some rain and subsequent growth of grasses. Most of the foreshore area in Management Zones 2 and 3 contain sparse or scattered native vegetation. These areas dominated by exotic grasses can be sprayed with Glyphosate Bi-active. Spray only in open areas dominated by exotic grasses and avoid spraying near any native vegetation. Areas of native vegetation, notably sedges invaded with exotic grasses could be raked out as outlined in Table 1. The use of Glyphosate Bi-active is preferred as it is a frog-friendly herbicide;
- It is recommended to leave strips of exotic grasses (10m intervals) unsprayed to reduce the potential for erosion of the stream channel and bank. These areas can be designated for weed control in the second year and subsequent in-fill planting with native vegetation;
- Grass-selective and wetland (frog) friendly herbicides should be used to eradicate and control most of the weeds present without harming the creek or affecting native plant species. This would need to be undertaken in late spring/summer when water levels are low and weed species are in active growth phase;
- Other options include:
    - Hand removal;
    - Dense plantings of native vegetation to crowd out weed species (addressed in Section 5.1.3); and
    - Mulching with native prunings/woodchips (particularly in management zone 3) to smother weeds.
- Care should be taken not to spray over open water or disturb the natural vegetation unnecessarily as this will encourage further weed invasion. In and around the foreshore management area, herbicide use will be in accordance with Water Note No. 22 – Herbicide Use in Wetlands (Water and Rivers Commission, 2001);
- Weed control methods need to be implemented prior to tube stock planting and throughout the following months to minimise competition for water and nutrients with native species. Weed growth should be monitored monthly after rehabilitation has commenced and appropriate control methods implemented as necessary. The requirement and frequency for weed growth monitoring should be assessed after the initial 12 months post planting;
- Burning for the purpose of weed control or fire management should be avoided. Burning on a regular basis favours weeds over natives, resulting in a diminished native vegetation cover and seed bank;

- Weed control should take place for at least two years. In the second year spraying weedy areas and the remaining strips of exotic grasses in preparation for the second stage of the revegetation plan;
- The appropriate methods to eradicate and control major weed species found within the foreshore area are outlined below in Table 1. A full list of weed species recorded in the proposed foreshore management area are provided in Appendix A; and
- The most up to date information regarding herbicides and application rates should be sought from the Department of Agriculture and Food Western Australia and the Environmental Weeds Action Network prior to implementing weed control programs.

Table 2: Weed Control Measures

Genus	Species	Common Name	Control Measures
Avena	*barbata*	Oat Grass	Use Glyphosate Bi-active for broad acre application
Cynodon	*dactylon*	Couch grass	Use Glyphosate Bi-active for broad acre application
Holcus	*lanatus*	Yorkshire Fog	Use Glyphosate Bi-active for broad acre application
Isolepsis	*prolifera*	Budding club rush	Difficult to dig out. No specific information on herbicide control. Suggest slashing in spring and treat regrowth with Glyphosate Bi-active. 1 part to 20 parts water in summer. Repeat treatment may be necessary.
Paspalum	*dilatatum*	Paspalum	Use Glyphosate Bi-active for broad acre application
Pennisetum	*clandestinum*	Kikuyu grass	In wetland situations try raking the kikuyu out of the rushes and roll kikuyu back out of the rushes with a small amount of digging. Remove as much of the kikuyu thatch as possible. Cover the remaining kikuyu in June/July with black plastic held down with rocks. Over winter the water level will rise and drown the kikuyu. In summer remove the black plastic, control any live kikuyu runners and seed or plant with natives. (The timing may not work for all projects). Or spray with Glyphosate Bi-active for broad acre application

Genus	Species	Common Name	Control Measures
Rubus	*anglocandicans*	Blackberry	Declared Weed. Brush cut brambles, remove mother root and treat regrowth with Glyph. 360 December to April. Follow up treatment will be necessary.
Solanum	*nigrum*	Blackberry nightshade	Very few plants, hand weed, dispose of any seed properly.
Typha	*orientalis*	Bullrush	Cut stems below water level in summer, plants should then rot. Repeated cutting in summer will kill plants. Wait until water has receded before application of herbicide. Wipe leaves with Gyphosate Bi-active in the summer months.
Zantedeschia	*aethiopica*	Arum lily	Declared Weed. Apply herbicide June - October (best results when flowering). Glyphosate can be used at 1:100 but results are only fair.

- *Source: Adapted from Scheltema and Harris, 1995*
- *Note: All chemicals should be used in accordance with the manufacturer's directions. No herbicides should ever be used over running water.*

Monitoring and Maintenance

The weed management contractor will report to BMR's consultant landscape architect at a minimum of every three months on the status of the weed control program, in particular on the success (or failure) of any control methods used and the requirement for additional weed control. Ideally, small infestations of major weeds would be targeted to prevent massive infestation as it is often more effective to control the source of weed invasion before major infestation occurs.

The amount of weed growth will be kept to a minimum within the infiltration basins and drainage swales.

Prior to the AMRSC assuming responsibility for the management of the foreshore management area, BMR will need to demonstrate that the 'completion criteria' for the rehabilitation works have been achieved. These are as follows:

- A maximum of five weeds per m^2 with a maximum of 5% cover; and
- No bulbous, declared or woody weeds and rhizomatous grass species in the foreshore management area.

An annual progress report will be submitted to the AMRSC and will include a discussion of the success of weed control measures.

As ongoing weed control will be required within the Foreshore management area it is recommended that a community run Rapids weed action group is established with support and guidance of the AMRSC. Prior to vesting of the FMP with the AMRSC a weed fact sheet will be prepared showing photos and details of the major weeds to be targeted by the action group.

The rehabilitation timeline and responsibility for implementation are detailed in Section 6.0

Management Recommendations

M1 Implement ongoing weed control for at least the first two years within the Foreshore Management Area according to Section 5.1.2 of the FMP, including strip spraying to prevent erosion.

M2 Maintenance of recreational areas in the Foreshore management area to include mowing/slashing of grass in parkland cleared areas.

M3 Weed contractor to report to BMR's consultant landscape architect at a minimum of every three months.

M4 A progress report regarding the success of weed control measures will be submitted to AMRSC annually until the Foreshore Management Area is vested with the Shire.

M5 Development of a weed fact sheet for future community use

5.1.3 Revegetation and Rehabilitation

Objectives

- To rehabilitate the degraded areas of the Foreshore Management Area to assist in erosion control, biodiversity enhancement, water quality improvement and aesthetics/recreation; and
- Maintain the structural diversity of the plant species in the wetland area to exclude undesirable/weed species and promote the number of predator fauna species present for mosquito control.

Revegetation and Rehabilitation Strategy

Management Zone 1: Zone 1 contains vegetation that is in Good to Excellent condition. No revegetation is required in this area.

Management Zone 2: Dense plantings will be required in this zone following the removal of weeds. Due to the degraded and modified nature of the remnant vegetation in this management zone, the majority of the foreshore will require all levels of the stratum to be restored including trees, shrubs, sedges, rushes and groundcovers. Planting is the appropriate technique for embankment and in-stream vegetation, where direct seeding is difficult due to excessive weed competition. The planting of dense riparian vegetation along the foreshore will serve to dissipate the energy of the water reducing the erosive capacity of the flow, improve water quality and enhance ecological values.

Management Zone 3: Some revegetation will be required in this area. Areas and densities of planting will be determined following landscape design of the foreshore management area.

Figure 5 outlines the management zones for the rehabilitation works for the retained wetland area. An indicative list of plant species suitable for rehabilitation works (and planting densities) is given in Appendix E.

Planting Specifications

Details of planting include the following:

- Rushes and sedges should be planted in seasonally wet areas in winter to ensure that roots have the chance to establish before the onset of the first summer;
- Individual species will be planted irregularly to reflect the distribution found in natural areas and to restrict use of vegetation as a mosquito corridor;
- Seedlings should be grown in soil that is free of weeds so that additional weed species are not introduced to the foreshore;
- Seedlings should only be planted after initial rainfall has thoroughly moistened the soil;
- No fertiliser will be used at the time of planting;
- It will not be necessary to water the plants on planting provided the planting precedes good rainfall;
- Where possible plant species used in revegetation works will be of local provenance, defined as propagated from plants in the immediate geographic area from areas that closely match the physical environment and the plant community types of the area to be planted where practical;
- All rehabilitation works for the wetland will be conducted in accordance with EPA Guidance Statement No.6 Rehabilitation of Terrestrial Ecosystems (EPA 2006) where practicable; and
- Species, location and density of plantings will be according to Appendix E.

Appendix E lists the suite of species recommended for planting in the foreshore management area. These species have been selected on the basis that they are local native species already growing at the site or in nearby similar environments. They are also the native species likely to be available commercially from a plant nursery.

Monitoring and Maintenance

Monitoring of planted tubestock survival rates will commence during spring then monthly during the first summer (i.e. December, January, and February), and then bi-annually during the following year.

An annual progress report detailing the rehabilitation work undertaken during the relevant reporting period, and the success of the rehabilitation work to date will be submitted to the AMRSC prior to the AMRSC assuming responsibility for the management of the foreshore management area. The proponent will need to demonstrate that the completion criteria for the rehabilitation works have been achieved. The completion criteria include:

- 80% survival of stated plant numbers.

To monitor progress towards the completion criteria, it is recommended that the following methods are used:

- Photo-points are sites where a series of photos are taken regularly, from the same location at set intervals and using a standardised method; the photograph is taken in the same direction each sampling time, at an estimated height and facing southwards to prevent glare (Hussey, 2002). Photographs are a convenient method of recording landscape change over time,

and give you an overall impression of the success or otherwise of the project's activities. They are cheap, effective and require no specialist equipment;

- Permanent quadrats are recommended to be established in the foreshore management area to monitor the success rate of weed control measures and revegetation. The location of the quadrats would be marked through either installation of star pickets or by using an existing feature such as a tree as a marker. GPS co-ordinates would be taken of each of the quadrats to ensure that the same locations are monitored at every sampling period; and
- Visual Inspections.

The AMRSC will assess the completion of the performance criteria at the end of the two year period.

If the performance criteria are not met then remedial action will be undertaken by BMR as required until criteria are achieved to the satisfaction of the AMRSC, prior to the handover of management responsibility.

Management Recommendations

M6 Implement the revegetation plan over the next two years in accordance with the management strategies and planting specifications as outlined in the FMP and Figure 5 and using local native species and plant densities as outlined in Appendix E.

M7 Undertake in-fill planting in the second year using local native species and densities as outlined in Appendix E.

M8 Monitoring of planted tubestock survival rates will commence during spring then monthly during the first summer (i.e. December, January, and February), and then bi-annually during the following year.

M9 A progress report regarding the progress and success of rehabilitation works will be submitted to AMRSC annually until the Foreshore management area is handed over to the Shire.

5.1.4 River Restoration

Management Objectives

To restore the degraded areas of the Foreshore management area to assist in erosion control, biodiversity enhancement, water quality improvement and aesthetics/recreation.

Management Strategy

In a developing a restoration plan, the causes of instability need to be understood in order to select appropriate management strategies. Erosion and sedimentation are naturally occurring riverine processes, but these processes can be accelerated when a channel becomes unstable. The primary cause of accelerated erosion and sedimentation is clearing of vegetation.

As outlined in Section 2.7 the current state of the foreshore associated with Darch Brook and the southwestern tributary is in varied condition and therefore different management strategies apply (Refer to Section 5.1):

Management Zone 1: The foreshore condition in this management zone is Pristine-Near Pristine (A2/A3). It is recommended that this area should be left undisturbed.

Management Zone 2: The southern section of Darch Brook, although mapped as Pristine-Near Pristine (A2/A3) could be prone to erosion on the western bank in areas where vegetation is absent and high flow events are likely to occur (Plate 6). Given the near pristine condition of the Darch Brook within the Foreshore Management Area it is recommended that restoration works are avoided where possible. The southwestern tributary and the confluence of this tributary with Darch Brook is in a degraded state and heavily infested with weeds in some areas (B1/B2) however only minor evidence of erosion is present (Plate 3). It is recommended that revegetation works and dense plantings will stabilise the area. The planting of dense riparian vegetation along the foreshore will serve to dissipate the energy of the water reducing the erosive capacity of the flow, improve water quality and enhance ecological values. However future monitoring of the creekline is recommended to ensure that no further erosion control or restoration is required.

Management Zone 3: No restoration works are considered necessary in this zone.

Figure 5 outlines the management zones for the rehabilitation works.

Given the Aboriginal Heritage significance of Darch Brook (Refer to Section 2.6) it is recommended that local Aboriginal groups are notified prior to any restoration works to Darch Brook.

Management Recommendations

M10 Monitoring for erosion will occur on an annual basis (post-winter flows) or after significant rainfall events. Photo-points are recommended at erosion prone areas. A restoration plan will be developed in the event that there is evidence of further erosion.

M11 Local Aboriginal Groups are to be notified prior to any restoration works to Darch Brook.

5.1.5 Native Vertebrate Fauna

Management Objectives

To maintain and enhance fauna habitat of the foreshore management area.

Management Strategy

The rehabilitation of degraded areas with native species should encourage fauna species that may not currently be present in the area. The re-introduction of native plant species during revegetation works will provide new habitat for fauna species (in particular birds). Management strategies to enhance faunal values of the foreshore management area are as follows:

- Management of the disturbances that lead to the deterioration of the bushland such as weed control, fire and uncontrolled access (addressed in Section 5.1.2, 5.4 and 5.5 respectively);
- Creation of habitat for fauna through revegetation (addressed in Section 5.1.3);
- Control of feral animals and domestic pets (addressed in Section 5.1.6);
- Install signage along Dual Use Paths to raise awareness about the importance of dog control (addressed in Section 5.5); and
- Manage waste and rubbish (addressed in 5.5).

Feedback from the Stage 1 Rehabilitation works was that more nectar producing species should be used. Nectar producing species favourable to mammals and birds have been highlighted in Appendix E.

Management Recommendations

M12 Use nectar producing species (Appendix E) for Foreshore Rehabilitation works.

M13 Provision of hollows.

5.1.6 Domestic and Feral Animals

Management Objectives

To control domestic and feral animals within the Foreshore management area.

Management Strategy

The abundance of feral fauna has the potential to increase as a result of the proposed development, in particular populations of house mice, rats, foxes, and feral cats. Feral animals and domestic pets can impact on native fauna through the killing of animals, causing distress, interfering with breeding, or by maiming. Feral and domestic animals can predate on or out-compete native species. Rabbits can lead to the degradation of habitat through grazing of vegetation and seedlings, disturbance to plant root systems and dispersal of weed species.

There is little that can be done to completely eradicate populations of these feral animals, however control measures will minimise their numbers and increase the likelihood of native species survival.

Threats to native wildlife and vegetation can be mitigated through the following measures:

- Consider the control of rabbits if numbers increase and damage to revegetation is evident e.g. fumigate active warrens and close old warrens;
- The AMRSC may implement cat curfews, encourage the restriction of cat movement outside property boundaries during daylight hours, de-sexing, micro-chipping or advise prospective purchasers that cats are not permitted in the adjoining housing estate;
- Maintenance of fences will help prevent access to wandering dogs;
- Community education with simple practices such as keeping cats indoors at night and walking dogs on a leash at all times; and
- Due to the likely presence of both rabbits (and kangaroos) on the site, newly established seedlings will require protection from grazing. This can be achieved through the use of individual tree guards on seedlings. However, tree guards should not be placed on the sedges and rushes as riparian species planted in the channel bed or lower slopes which could be washed away with rising water levels.

M14 Monitor damage to revegetation works by rabbits and implement control as required.

M15 Install community awareness signs that highlight the impact of pets such as cats and dogs on fauna in the natural environment.

M16 Install tree guards on native seedlings planted on the creek banks and higher slopes of the creek channel.

5.2 Stormwater Management

Management Objectives

To maintain/improve the water quality of the southwest tributary, Darch Brook and receiving waters.

Management Strategy

The following management strategies will be employed to achieve water quality objectives:

- Retain small rainfall events at-source;
- Provide vegetated swales to contain runoff;
- Minimise cut and fill to reduce alterations in water balance; and
- Retain native vegetation and rehabilitate cleared/disturbed areas to provide water quality treatment for overland flow paths.

These strategies are discussed further below. Drainage design details are provided in Appendix F.

Stormwater drainage designs have been prepared for Stage 4 (refer to Appendix F) but are currently not available for Stage 5. Stormwater from the western side of Stage 4 will drain to the western edge of Stage 4 with a permanent drainage outlet system at H1 (Appendix F). Temporary drainage outlet systems will be located at H2 and H3 on the eastern edge of Stage 4 until further consideration is given to the drainage of Stage 5. Stormwater will flow through the drainage outlet pipe to stilling/treatment basins moving through a soil trench filled with amended soils (to allow slow drainage of the stilling basins and allow for bio filtration) and vegetation before entering the creekline at Stage 1. High flows will bypass the stilling/treatment basins and flow overland to the creekline. The sides and base of the basin will be rock pitched on geotextile material to protect basins from scouring.

General Principles of Drainage

The following principles should guide the design of drainage for the development:

- Install subsoil drainage to capture all stormwater and allow for adequate treatment before discharging into local creeks;
- Incorporation of gross pollutant traps to collect sediment and gross pollutants within the drainage system;
- Direct drainage outlets as far “upstream” on the existing creek lines as possible in order to maximise exposure of stormwater to vegetation in the foreshore and along the rehabilitated creek lines;
- Revegetation of the existing creek lines to increase nutrient stripping capacity. A ‘nutrient stripping buffer’ should be put between lawn areas and tributaries;
- Drainage flood routing design should be adequate to handle a 100 year storm event;
- Utilise all opportunities to avoid concentration of stormwater at the ultimate outlet from the development. i.e. use multiple headwalls and drainage sub-catchments;
- Utilise bio-retention swales where possible to reduce nitrogen levels in runoff;

- Lawn areas are to be kept to a minimum, particularly on steep slopes, to reduce the level of nutrients, pesticides, herbicides etc that can enter the creeks;
- Minimisation of mosquito breeding areas; and
- Avoid installation of drainage systems during winter, to reduce the likelihood of erosion and sediment runoff into creeklines.

Stormwater Design

DoW require that no stormwater/drainage infrastructure is to be located in the Foreshore Reserve of Darch Brook (Foreshore Reserve is not to be mistaken with the Foreshore Management Area, as defined in Appendix A).

While the detailed drainage design has not yet commenced for land adjoining the foreshore reserve, preliminary engineering investigations are suggesting that it is likely that some stormwater infrastructure would be required within the foreshore reserve, particularly in the south-east of the Darch Brook foreshore reserve. After ground truthing the site several areas have been located that would be ideal for POS/recreation/stormwater management adjacent to Darch Brook, subject to engineering design. These areas are previously cleared and disturbed, and would not have any impact on riparian vegetation.

Infrastructure within the Foreshore reserve areas would be kept to a minimum. Design of stormwater infrastructure would be similar to Stage 1 rapids landing (Refer to Appendix G for photos of Stage 1). Drainage bubble-ups, shaped vegetated swales and rock protected outlets would compensate flows and be located in areas considerate of the environment. Maintenance of these outlet locations would be similar to already accepted treatments by the Shire of Augusta/Margaret River on previous stages of the Rapids development (Management Zone 3, Figure 5 and Recommended recreational areas, Figure 6).

Subject to viewing detailed drainage design, preliminary discussions with DoW indicate that some infrastructure may be acceptable within the foreshore reserve.

Management Recommendation

M17 Where possible, adhere to the general principles of drainage as outlined in Section 5.2 during the design phase of development.

M18 Infrastructure within the Foreshore reserve areas will be kept to a minimum.

M19 Any stormwater outlets required would incorporate vegetated/landscaped detention areas as opposed to deep basins etc.

M20 Stormwater infrastructure will be located within previously cleared and degraded areas (within Management Zone 3 where possible).

M21 Infrastructure will be located within recreational areas.

M22 Consultation with DoW during detailed engineering design.

5.3 Construction Management

Management Objectives

To ensure that construction activities do not compromise the conservation values of the Foreshore management area.

5.3.1 Sediment Runoff

Sediment runoff is created due to inadequate stormwater management or heavy rainfall events which cause soils to be captured in water runoff and deposited into creeklines. This may lead to:

- Erosion of bed and banks;
- Generation of plumes of suspended sediment which may further impact down the river ecosystem;
- Damage to or death of riparian vegetation;
- Damage or death of aquatic invertebrates; and
- Degradation of water quality depending on the contaminants within the runoff.

A Sediment Management Plan (SMP) developed by Wood & Grieve Engineers (2008) will be implemented during the construction of the development.

Management recommendations (refer to M23-M35) are in place to ensure that sediment runoff is not created. However, in the event of extreme sediment runoff into the creeklines (due to unexpected circumstances) the SMP recommends the following:

- Utilise sediment socks/sausages, fences and curtains to direct and retain sediment on the construction site;
- Cleanup the affected area as soon as practical;
- Notify the DEC and DoW of the incident;
- Review the suspected cause of the incident;
- Inspect and maintain permanent drainage structures as appropriate; and
- Direct clean runoff around the disturbed areas.

Management Recommendations

M23 Avoid construction during winter months. Winter months are classified as the months from May until November.

M24 Minimise disturbance to vegetated areas and bunds, the less disturbance and exposure of soils, the less available sediment for transport.

M25 Utilise topsoils for bunding to detain, direct and store stormwater.

M26 Undertake bulk earthworks at the start of the development and stabilise with topsoil and seeded hydromulch.

M27 Install permanent stormwater treatment systems as soon as practical

M28 Install sediment capture fences at the perimeter of the site to detain all stormwater runoff. Refer to the Sediment Management Plan for guidance on fencing products and specifications.

M29 Any sediment which escapes the sediment capture fences/curtains will need to be removed from the rehabilitated areas by hand in order to protect the creekline.

M30 Weekly inspections of the creekline during construction to ensure if an unexpected sediment runoff event occurs, the contingency plan can be enacted.

M31 Monthly inspections of the creekline and perimeter sediment fences regardless if construction is occurring or not to ensure sediment is/will be contained on site.

M32 Implement contingency plan as required.

M33 Remove buildup of sediments from sediment capture fences as soon as accessible after runoff events.

M34 During and after storm events all sediment capture fences should be inspected for quality.

M35 Clean out gross pollutant traps on at least an annual basis.

5.3.2 Clearing/Construction

Management Recommendations

M36 Clearly delineate the foreshore management area with stakes and high visibility flagging tape prior to and during earth working activities on the site.

M37 Inductions for site contractors regarding protection of the environmental values of the site.

5.4 Fire Management

Frequent uncontrolled burning can degrade native vegetation by increasing the potential for weed invasion and eliminating certain species, thereby altering the diversity and structure of the vegetation. Native fauna may be injured or killed and their habitat lost through fire.

Early detection of fires and rapid attack will be vital in reducing the threat to neighbouring houses and the impact on native vegetation and fauna.

The principal priorities of fire control in descending order are:

- Preservation of life;
- Preservation of property; and
- Preservation of environment.

Fire prevention and management control is also required to maintain the current condition of the vegetation of the Foreshore management area and allow suitable access to fire fighting apparatus. The following guidelines will be implemented:

- Maintain boundary and internal tracks/multi-use pathways to a width of 3m, preferably sheeted with limestone roadbase, to provide access for fire fighting equipment along the Foreshore;
- Public Open Space consisting of lawn and street frontage between the Foreshore Management area and housing will serve as a substantial low fuel zone; and
- Maintain ongoing weed control to reduce fire hazard.

The location of pathways and gates to be used for emergency vehicle access will be detailed in the Landscape Management Plan (to be developed).

Management Recommendations

M38 Reduce fuel loads by controlling weeds and regular mowing/slashing of grass.

M39 Maintain boundary and internal tracks/multi-use pathways to a width of 3m, preferably sheeted with limestone roadbase, to provide access for fire fighting equipment along the Foreshore.

5.5 Recreation Management

5.5.1 Landscaping, Access and Facilities

Detailed landscape design for the foreshore management area will be undertaken prior to the development of adjacent lots. The interface treatment between the residential area and the foreshore management area will be defined further once the landscape designs have been completed.

Coffey Environments has recommended that any recreational areas are located within Management Zone 3 (Figure 5). Recommended locations for Recreational Areas, pedestrian walkways and creek crossings are provided in Figure 6. These locations have been selected to minimise impacts to the Foreshore management area. Where recreational areas are within 30m of Darch Brook (the reserve) DUP will be located between recreational areas and the creek, providing a management edge to protect the watercourse while allowing the community to appreciate the natural environment.

In preparing the landscape design the following items shall be taken into consideration:

- No clearing or landscape modification to occur within Management Zone 1 or 2;
- Limit access to Management Zone 1;
- Minimise the clearing of vegetation and landscape modification;
- Protect and enhance ecological linkages;
- Provide a buffer between Darch Brook and tributaries to buildings as required by the DEC (DoE, 2005);
- Hard edges (e.g. roads and pathways) adjoining foreshore reserves are recommended to control the spread of weeds, deter vandalism and enable public surveillance;
- If providing access points to or over the creek use natural materials (i.e. raised timber boardwalks), where possible to avoid excavation, erosion or degradation within the foreshore management area;
- Location of signage for: directing visitors to designated paths, providing educational information about the creek and wildlife, and for prohibiting access to revegetated areas (refer to Section 5.5.2. below);
- Connectivity with other public open space features and recreational facilities within the development;
- Location of facilities i.e. ablutions, barbeques, picnic tables, bike racks, water fountains and rubbish bins;

- Location of emergency and disabled access points; and
- Fencing where appropriate to assist with protecting rehabilitation work at the foreshore.

Management Recommendations

M40 Locate recreational areas within Management Zone 3.

M41 Consider for the points outlined in Section 5.5.1 when preparing the landscape design for the foreshore management area.

M42 Maintenance of the foreshore management area, including rubbish collection and any repairs to boardwalks, signage etc.

5.5.2 Community Awareness, Interpretation and Safety

Public awareness of the value of the foreshore management area environment should be promoted to the residents and the general public. Management issues affecting the foreshore management area need to be promoted through signage and educational material. Signage information will include:

- Directional information i.e. indicate the location of paths, facilities and points of interest;
- Interpretive information i.e. explanation of the natural environment and exclusion zone; and
- Public safety information i.e. warning in areas where potential hazards are known.

Signage is required to be installed at the time rehabilitation commences. The location of signage will be determined during the landscape design process. To be consistent with other signage within the development, signs shall consist of painted white posts of average waist high height with sturdy metal plaques. Public safety signs will be clearly visible and may need to be taller and of more notable design.

Educational material shall also be distributed to enhance the level of community awareness of the possible impacts they may cause to the creekline and Darch Brook ecosystem. Possible educational messages include:

- Minimising the use of fertilisers and pesticides on gardens;
- Appropriate disposal of household toxic products (i.e. paints and chemicals);
- Appropriate disposal of household wastes (i.e. garden waste and rubbish);
- Sensible use of detergents;
- Water-wise gardening; and
- Control of domestic pets.

Educational messages may be distributed through leaflets, newsletter articles, articles on the Shire's website, stormwater drain stencilling or any means practical to make the community aware.

Management Recommendations

M43 Provide signage within the foreshore management area to educate the public with consideration to points raised in Section 5.5 and 5.1.6 of this FMP.

M44 Signage shall be consistent with the appearance of other signage within the development.

M45 At the point of sale provide educational material to the community to enhance their level of awareness about the foreshore management area.

5.6 Vesting

The land is owned by BMR, a Lester Group Ltd Company. It is currently zoned 'Development' in the Shire of Augusta-Margaret River's Town Planning Scheme No. 17 and included within Overall Planning Area No. 6. The developer will have the responsibility for implementing appropriate management measures for a period of no longer than two years commencing from the completion of works to the satisfaction of the Shire unless otherwise negotiated. After this time it is anticipated that the weed control and revegetation program should be well established. Thereafter, the Shire of Augusta-Margaret River will assume responsibility for the on-going management and maintenance of the Foreshore management area.

5.7 Monitoring and Maintenance

5.7.1 Performance Monitoring

The proponent will implement monitoring procedures to assess the success of the rehabilitation works, weed control activities and water quality during the two year management period. This will identify areas requiring augmentation or remedial works early. Monitoring Commitments and performance criteria have been outlined in previous sections and summarised in Section 6.0.

5.7.2 Reporting and Subsequent Review of Plan

An annual progress report detailing the works undertaken and results will be submitted to the AMRSC by BMR until the management of the Foreshore management area is handed over to the Shire.

If the nominated performance criteria are not met then remedial action will be undertaken by BMR as required until criteria are achieved to the satisfaction of the AMRSC, prior to the handover of management responsibility.

Implementation of the FMP and achievement of its objectives will be reviewed by the AMRSC prior to management being handed over to the Shire, and thereafter every five years.

5.7.3 AMRSC Responsibilities

The AMRSC will continue to implement the FMP with weed control, monitoring of revegetation, replacement of unsuccessful plantings, monitoring and control of feral animals and fence maintenance as required.

The implementation of the management recommendations identified in this management plan will be an on-going process that should be flexible in responding to changes in the natural environment, the recreational demand and use of the foreshore and community values.

The implementation process and the adequacy of the management measures should be thoroughly reviewed on an annual basis for at least the initial six years, with more frequent monitoring of issues within the Foreshore management area in the intervening periods on an on-going basis to assess the effectiveness of measures and maintenance requirements. This will be the responsibility of the AMRSC after the initially two year management period by the developer.

Management Recommendation

M46 Management measures should be thoroughly reviewed on an annual basis until the Foreshore Management Area is vested with the Shire, with more frequent monitoring of issues within the Foreshore Reserve in the intervening periods on an on-going basis to assess the effectiveness of measures and maintenance requirements.

M47 As a minimum AMRSC responsibilities should include the following:

- Ongoing weed control ;
- Maintenance of signage and public facilities;
- Rubbish collection; and
- Maintenance of stormwater infrastructure.

6 IMPLEMENTATION AND RESPONSIBILITY OF MANAGEMENT AND MONITORING ACTIONS

Implementation of the FMP will be undertaken in conjunction with the landscape and drainage plans. Table 3 provides a summary of management commitments, outlines the timing of management for the implementation of the FMP and the person(s) responsibly for undertaking that commitment.

Table 3: Management Recommendations/Timing and Responsibilities for Implementation

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR- suggested persons to carry out tasks indicated)
Conservation Management				
Weed Management	**M1**	Implement ongoing weed control for at least the first two years within the Foreshore Management Area according to Section 5.1.2 of the FMP, including strip spraying to prevent erosion.	Summer pre-construction	Weed Contractor
	M2	Maintenance of recreational areas in the Foreshore management area to include mowing/slashing of grass in parkland cleared areas.	Quarterly following completion of landscaped areas.	Maintenance Contractor
	M3	Weed contractor to report to BMR's consultant landscape architect at a minimum of every three months.	Quarterly following first weed control event	Weed Contractor/ Landscape Architect
	M4	A progress report regarding the success of weed control measures will be submitted to AMRSC annually until the Foreshore Management Area is vested with the Shire.	Annually	Environmental Consultant
	M5	Development of a weed fact sheet for future community use	Prior to vesting with the AMRSC	Environmental Consultant

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR-suggested persons to carry out tasks indicated)
Rehabilitation	**M6**	Implement the revegetation plan over the next two years in accordance with the management strategies and planting specifications as outlined in the FMP and Figure 5 and using local native species and plant densities as outlined in Appendix E.	Autumn/Winter months following initial weed control	Landscape Architect/Landscape Contractor
	M7	Undertake in-fill planting in the second year using local native species and densities as outlined in Appendix E.	Autumn/Winter following initial year of planting	Landscape Architect/Landscape Contractor
	M8	Monitoring of planted tubestock survival rates will commence during spring then monthly during the first summer (i.e. December, January, and February), and then bi-annually during the following year.	Spring, then monthly during the first summer, then biannually during the following year.	Landscape Architect/Environmental Consultant
	M9	A progress report regarding the progress and success of rehabilitation works will be submitted to AMRSC annually until the Foreshore management area is handed over to the Shire.	Annually	Environmental Consultant
River Restoration	**M10**	Monitoring for erosion will occur on an annual basis (post-winter flows) and after significant rainfall events. Photo-points are recommended at erosion prone areas. A restoration plan will be developed in the event that there is evidence of further erosion.	Annually, post winter flows (Spring)	Landscape Architect/Environmental Consultant

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR- suggested persons to carry out tasks indicated)
	M11	Local Aboriginal Groups are to be notified prior to any restoration works to Darch Brook.	Prior to any restoration works	Developer
Native Vertebrate Fauna	**M12**	Use nectar producing species (Appendix E) for Foreshore Rehabilitation works.	During Rehabilitation works	Landscape Architect
	M13	Provision of hollows.	During Rehabilitation works	Landscape Architect
Domestic and Feral Animals	**M14**	Monitor damage to revegetation works by rabbits and implement control as required.	As required	Environmental Consultant
	M15	Install community awareness signs that highlight the impact of pets such as cats and dogs on fauna in the natural environment.	During Rehabilitation works	Landscape Architect
	M16	Install tree guards on native seedlings planted on the creek banks and higher slopes of the creek channel.	Following completion of landscaped areas.	Landscape Architect

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR-suggested persons to carry out tasks indicated)
Stormwater Management	**M17**	Where possible, adhere to the general principles of drainage as outlined in Section 5.2 during the design phase of development.	Design Phase	Drainage Engineers
	M18	Infrastructure within the Foreshore reserve areas will be kept to a minimum.	Design Phase	Drainage Engineers
	M19	Any stormwater outlets required would incorporate vegetated/landscaped detention areas as opposed to deep basins etc.	Design Phase	Drainage Engineers
	M20	Stormwater infrastructure will be located within previously cleared and degraded areas (where possible in management zone 3).	Design Phase	Drainage Engineers
	M21	Infrastructure will be located within recreational areas.	Design Phase	Drainage Engineers
	M22	Consultation with DoW during detailed engineering design.	Design Phase	Drainage Engineers
Construction Management	**M23**	Avoid construction during winter months. Winter months are classified as the months from May until November.	Construction Phase	Developer/Contractor
	M24	Minimise disturbance to vegetated areas and bunds, the less disturbance and exposure of soils, the less available sediment for transport.	Construction Phase	Developer/Contractor
	M25	Utilise of topsoils for bunding to detain, direct and store stormwater.	Construction Phase	Developer/Contractor

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR-suggested persons to carry out tasks indicated)
	M26	Undertake bulk earthworks at the start of the development and stabilise with topsoil and seeded hydromulch.	Construction Phase	Developer/Contractor
	M27	Install permanent stormwater treatment systems as soon as practical.	As soon as practical	Developer/Contractor
	M28	Install sediment capture fences at the perimeter of the site to detain all stormwater runoff. Refer to the Sediment Management Plan for guidance on fencing products and specifications.	Prior to construction	Developer/Contractor
	M29	Any sediment which escapes the sediment capture fences/curtains will need to be removed from the rehabilitated areas by hand in order to protect the creekline	Monthly during the construction Phase	Developer/Contractor
	M30	Weekly inspections of the creekline during construction to ensure if an unexpected sediment runoff event occurs, the contingency plan can be enacted	Construction Phase	Environmental Consultant
	M31	Monthly inspections of the creekline and perimeter sediment fences regardless if construction is occurring or not to ensure sediment is/will be contained on site.	Construction Phase	Environmental Consultant
	M32	Implement contingency plan as required.	Construction Phase	Developer/Contractor
	M33	Remove buildup of sediments from sediment capture fences as	Construction	Developer/Contractor

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR-suggested persons to carry out tasks indicated)
		soon as accessible after runoff events.	Phase	
	M34	During and after storm events all sediment capture fences should be inspected for quality.	Construction Phase	Developer/Contractor
	M35	Clean out gross pollutant traps on at least an annual basis.	Annually	Developer
	M36	Clearly delineate the foreshore management area with stakes and high visibility flagging tape prior to and during earth working activities on the site.	Prior to construction	Contractor
	M37	Inductions for site contractors regarding protection of the environmental values of the site.	Prior to construction	Contractor
Fire Management	**M38**	Reduce fuel loads by controlling weeds and regular mowing/slashing of grass	Quarterly following completion of landscaped areas.	Maintenance contractor/Landscape Architect
	M39	Maintain boundary and internal tracks/multi-use pathways to a width of 3m, preferably sheeted with limestone road base, to provide access for fire fighting equipment along the Foreshore.	Design Phase	Developer

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR-suggested persons to carry out tasks indicated)
Recreation Management				
Landscaping, Access and Facilities	**M40**	Locate recreational areas within Management Zone 3.	Design Phase	Developer/Landscape Architect
	M41	Consider for the points outlined in Section 5.5.1 when preparing the landscape design for the foreshore management area.	Design Phase	Developer/Landscape Architect
	M42	Maintenance of the foreshore management area, including rubbish collection and any repairs to boardwalks, signage etc.	Design Phase	Developer/Landscape Architect
Community Awareness, Interpretation and Safety	**M43**	Provide signage within the foreshore management area to educate the public with consideration to points raised in Section 5.5 and 5.1.6 of this FMP.	Following completion of landscaped areas.	Developer/Landscape Architect
	M44	Signage shall be consistent with the appearance of other signage within the development.	Following completion of landscaped areas.	Developer/Landscape Architect
	M45	At the point of sale provide educational material to the community to enhance their level of awareness about the foreshore management area.	Following completion of landscaped areas.	Developer

Issues	Number	Management Recommendation	Timing	Responsibility (Until vested with Shire the overall responsibility with BMR-suggested persons to carry out tasks indicated)
Monitoring and Maintenance (This has been addressed for each management issue. Any additional recommendations are outlined below)				
Monitoring and Maintenance	**M46**	Management measures should be thoroughly reviewed on an annual basis for at least the initial two years, with more frequent monitoring of issues within the Foreshore management area in the intervening periods on an on-going basis to assess the effectiveness of measures and maintenance requirements.	Annually until FMA vested with the Shire	Developer
Monitoring and Maintenance	**M47**	As a minimum AMRSC responsibilities should include the following: • Ongoing weed control ; • Maintenance of signage and public facilities; • Rubbish collection; and • Maintenance of stormwater infrastructure.	Once FMA is vested with the AMRSC	AMRSC

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8 DISCLAIMER

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Figures

Foreshore Management Plan
Rapids Landing Margaret River, WA

Drawn:	C. Reeves
Checked:	J. Wilshaw
Date:	16 Dec 2010
Projection:	MGA zn50
Scale:	1 : 250 000 at A4

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Balwyn Margaret River
FORESHORE MANAGEMENT PLAN
RAPIDS LANDING, MARGARET RIVER, WA

REGIONAL LOCATION

Figure 1

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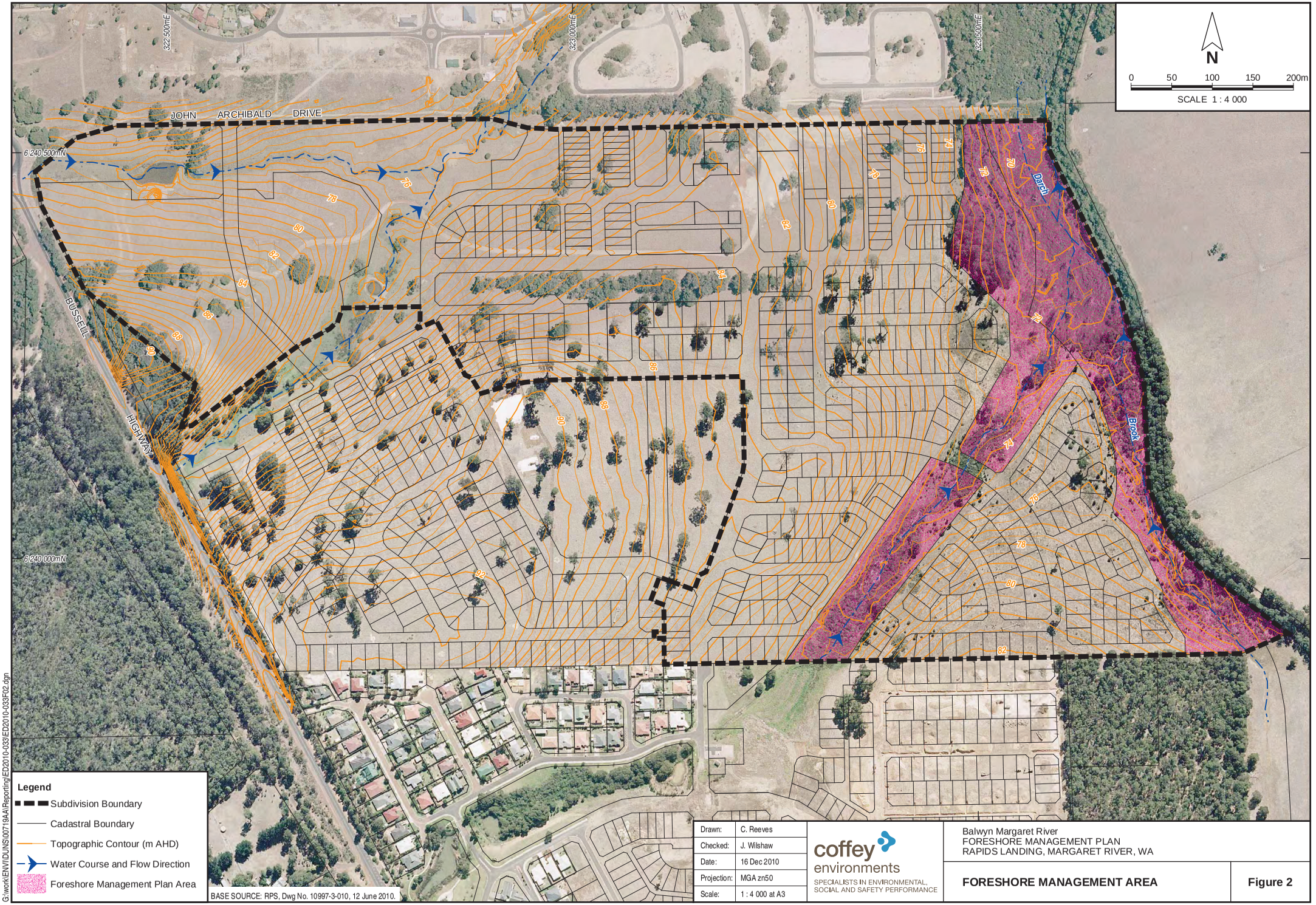

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RAPIDS LANDING, MARGARET RIVER, WA

FORESHORE MANAGEMENT AREA

Figure 2

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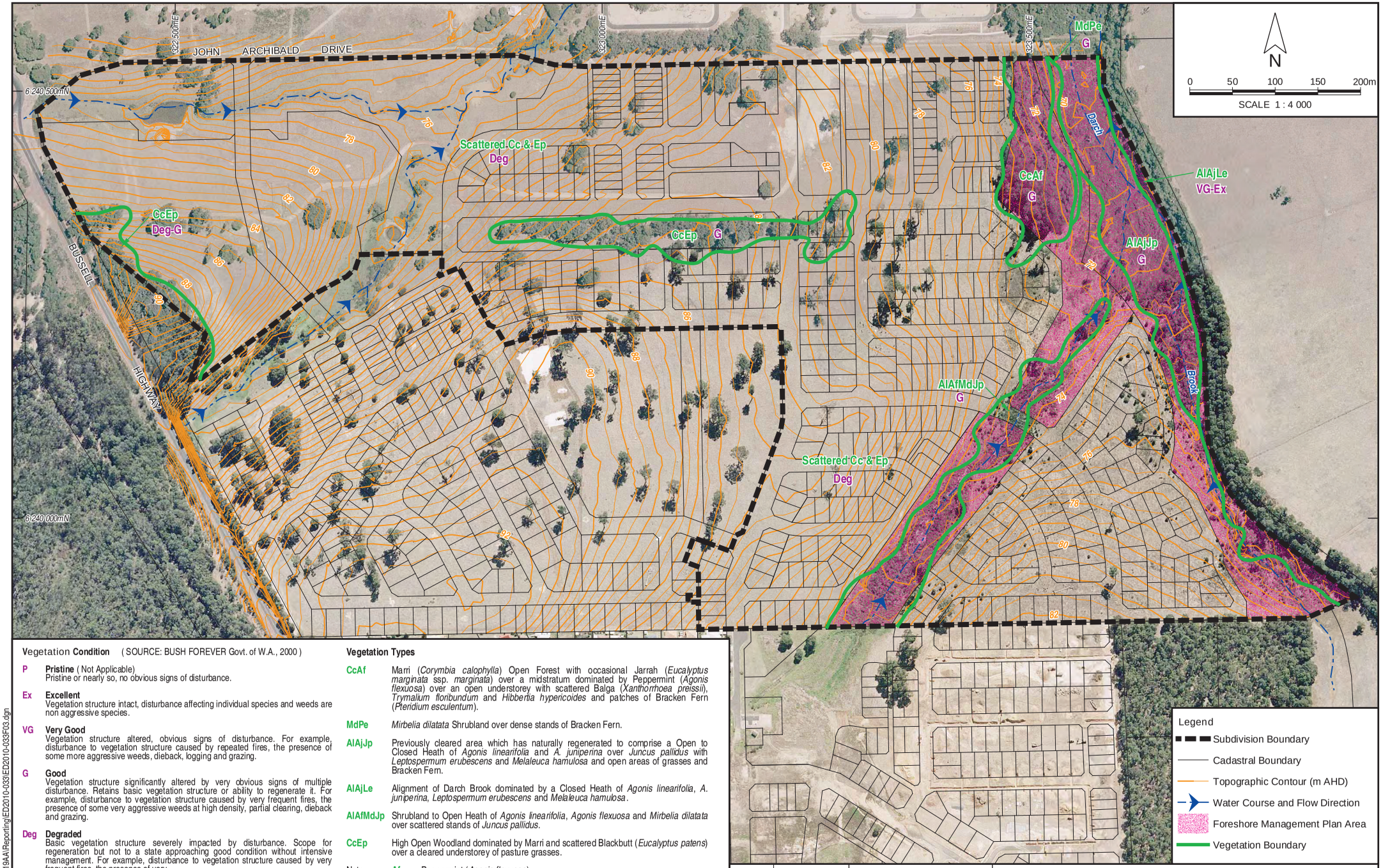

Vegetation **Condition** (SOURCE: BUSH FOREVER Govt. of W.A., 2000)

P **Pristine** (Not Applicable)
Pristine or nearly so, no obvious signs of disturbance.

Ex **Excellent**
Vegetation structure intact, disturbance affecting individual species and weeds are non aggressive species.

VG **Very Good**
Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.

G **Good**
Vegetation structure significantly altered by very obvious signs of multiple disturbance. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.

Deg **Degraded**
Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very
aggressive weeds, partial clearing, dieback and grazing.

CD **Completely Degraded** (Not Applicable)
The structure of the vegetation is no longer intact and the areas is completely or almost completely
without native species. These areas are often described as 'parkland cleared' with the flora composing weed or crop species with isolated native trees or shrubs.

Vegetation Types

CcAf Marri (*Corymbia calophylla*) Open Forest with occasional Jarrah (*Eucalyptus marginata* ssp. *marginata*) over a midstratum dominated by Peppermint (*Agonis flexuosa*) over an open understorey with scattered Balga (*Xanthorrhoea preissii*), *Trymalium floribundum* and *Hibbertia hypericoides* and patches of Bracken Fern (*Pteridium esculentum*).

MdPe *Mirbelia dilatata* Shrubland over dense stands of Bracken Fern.

AlAjJp Previously cleared area which has naturally regenerated to comprise a Open to Closed Heath of *Agonis linearifolia* and *A. juniperina* over *Juncus pallidus* with *Leptospermum erubescens* and *Melaleuca hamulosa* and open areas of grasses and Bracken Fern.

AlAjLe Alignment of Darch Brook dominated by a Closed Heath of *Agonis linearifolia*, *A. juniperina*, *Leptospermum erubescens* and *Melaleuca hamulosa*.

AlAfMdJp Shrubland to Open Heath of *Agonis linearifolia*, *Agonis flexuosa* and *Mirbelia dilatata* over scattered stands of *Juncus pallidus*.

CcEp High Open Woodland dominated by Marri and scattered Blackbutt (*Eucalyptus patens*) over a cleared understorey of pasture grasses.

Note: **Af** Peppermint (*Agonis flexuosa*)
Cc Marri (*Corymbia calophylla*)
Ep Blackbutt (*Eucalyptus patens*)

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Balwyn Margaret River
FORESHORE MANAGEMENT PLAN
RAPIDS LANDING, MARGARET RIVER, WA

VEGETATION TYPES AND CONDITION

Figure 3

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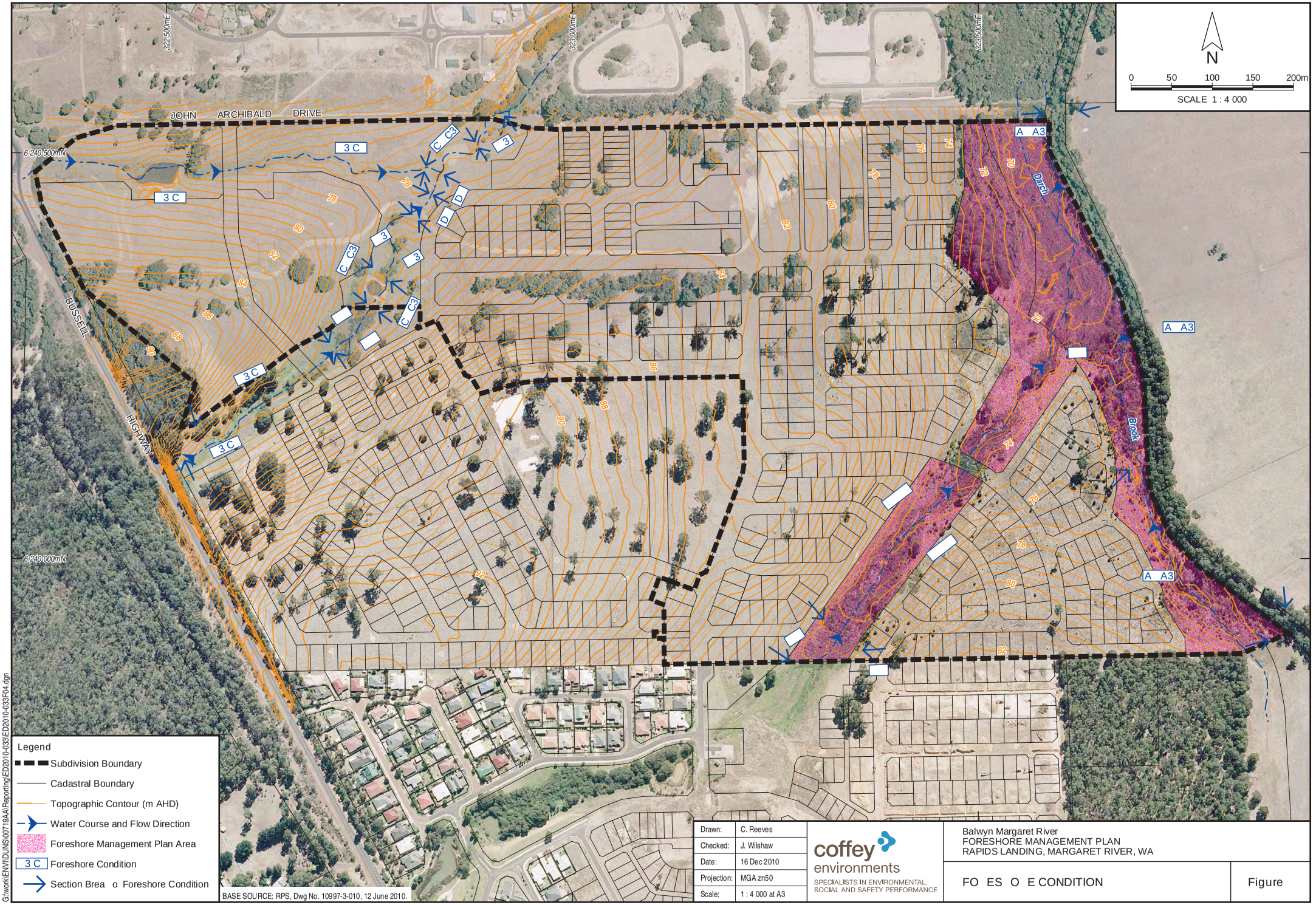
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Cadastral Boundary
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Water Course and Flow Direction
Foreshore Management Plan Area
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BASE SOURCE: RPS, Dwg No. 10997-3-010, 12 June 2010.
Drawn: C. Reeves
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Date: 16 Dec 2010
Projection: MGA zn50
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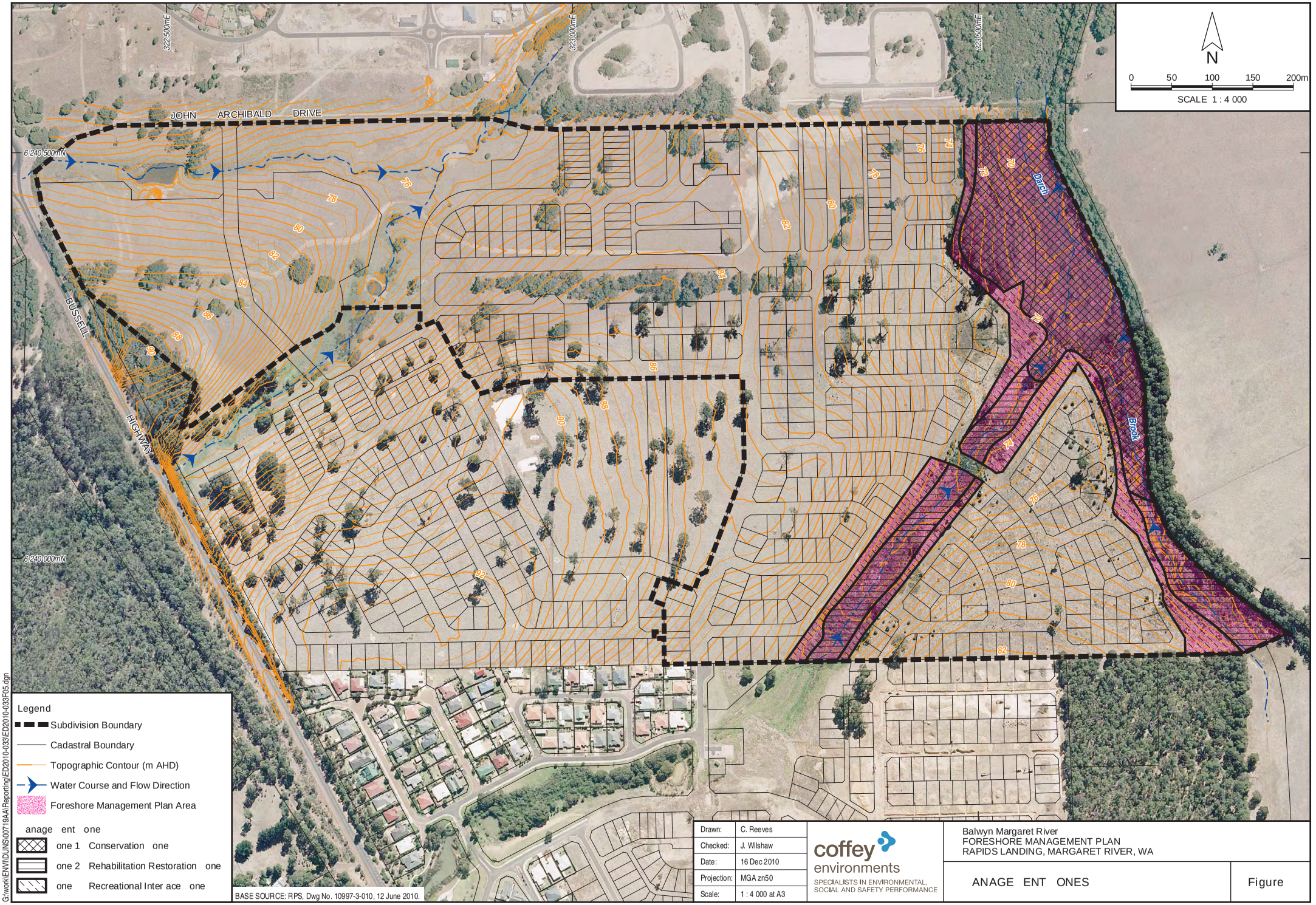
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Drawn: C. Reeves
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FORESHORE MANAGEMENT PLAN
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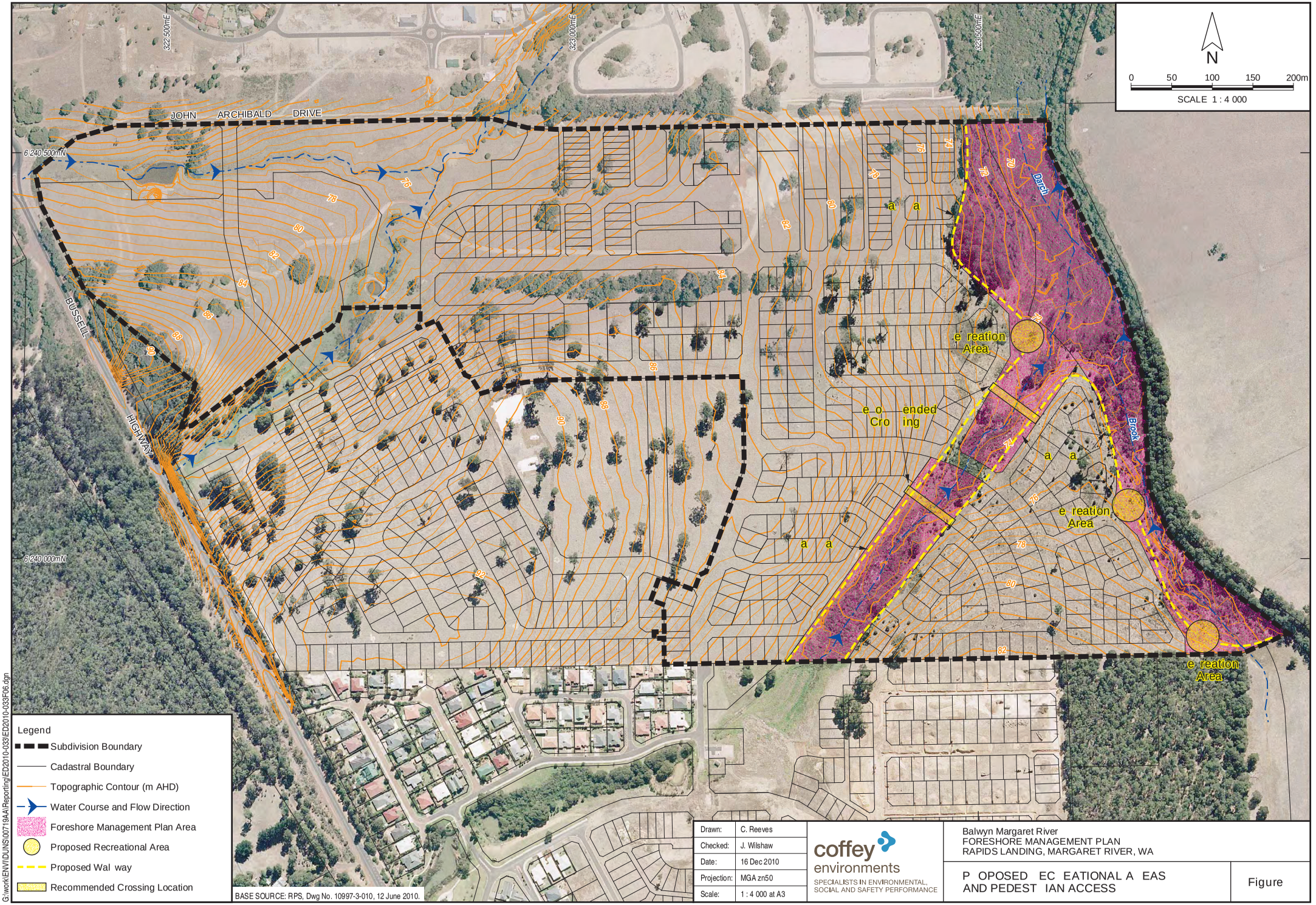
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Cadastral Boundary
Topographic Contour (m AHD)
Water Course and Flow Direction
Foreshore Management Plan Area
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Proposed Wal way
Recommended Crossing Location
BASE SOURCE: RPS, Dwg No. 10997-3-010, 12 June 2010.
Drawn: C. Reeves
Checked: J. Wilshaw
Date: 16 Dec 2010
Projection: MGA zn50
Scale: 1 : 4 000 at A3
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Plates

Foreshore Management Plan
Rapids Landing Margaret River, WA

Plate 1 South western Tributary

Plate 2 South western Tributary – woody debris

Plate 3 South western Tributary - erosion

Plate 4 South western Tributary – Blackberry Infestation

Plate 5 South western Tributary – showing the main channel.

Plate 6 Darch Brook

Plate 7 Darch Brook – Proposed Recreational Area

Plate 8 Darch Brook

Plate 9 Darch Brook - South

Plate 10 Darch Brook

Plate 11 Darch Brook – North

Plate 12 **Confluence of Darch Brook and the southwestern tributary**

Plate 13 **Confluence of Darch Brook and the southwestern tributary**

Plate 14 Confluence of Darch Brook and the southwestern tributary

Plate 15 Confluence of Darch Brook and the southwestern tributary – Proposed Recreational

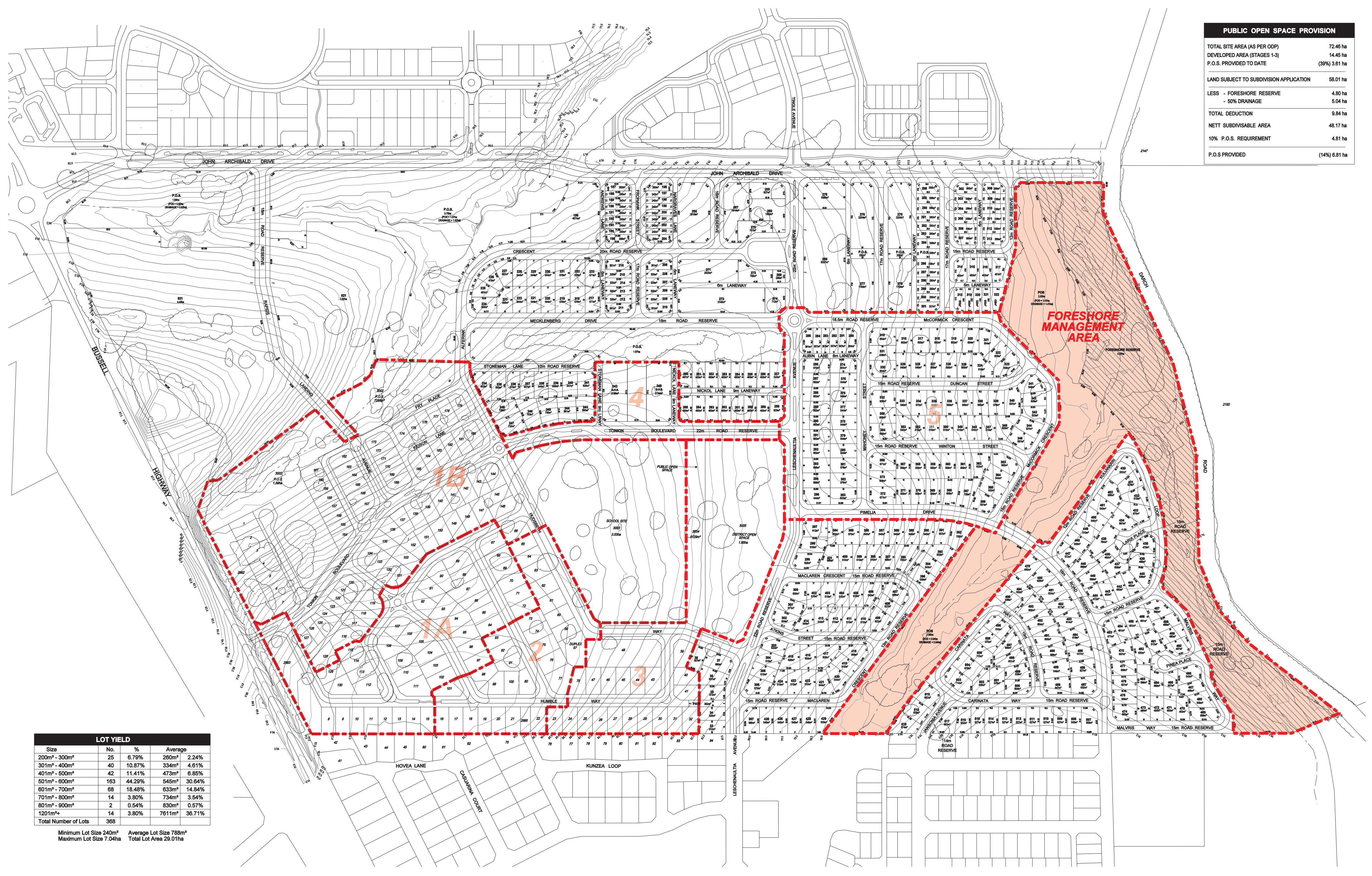
Plate 16 **Marri Open Forest**

Plate 17 **Marri Open Forest**

Plate 18 **Marri Open Forest**

Appendix A
Foreshore Reserve and Foreshore Management Area

Foreshore Management Plan
Rapids Landing Margaret River, WA



PUBLIC OPEN SPACE PROVISION

TOTAL SITE AREA (AS PER ODP)	72.46 ha
DEVELOPED AREA (STAGES 1-3)	14.45 ha
P.O.S. PROVIDED TO DATE	(39%) 3.61 ha
LAND SUBJECT TO SUBDIVISION APPLICATION	58.01 ha
LESS - FORESHORE RESERVE	4.80 ha
- 50% DRAINAGE	5.04 ha
TOTAL DEDUCTION	9.84 ha
NETT SUBDIVISABLE AREA	48.17 ha
10% P.O.S. REQUIREMENT	4.81 ha
P.O.S PROVIDED	(14%) 6.81 ha

LOT YIELD

Size	No.	%	Average	
200m² - 300m²	25	6.79%	260m²	2.24%
301m² - 400m²	40	10.87%	334m²	4.61%
401m² - 500m²	42	11.41%	473m²	6.85%
501m² - 600m²	163	44.29%	545m²	30.64%
601m² - 700m²	68	18.48%	633m²	14.84%
701m² - 800m²	14	3.80%	734m²	3.54%
801m² - 900m²	2	0.54%	830m²	0.57%
1201m²+	14	3.80%	7611m²	36.71%
Total Number of Lots	368			

Minimum Lot Size 240m² Average Lot Size 788m²
Maximum Lot Size 7.04ha Total Lot Area 29.01ha

PROPOSED PLAN OF SUBDIVISION

Revision	Date	Item
b	12/06/2010	Remove subject lots from stage 1 -3
a	03/12/2009	Update subplan with fugro precal(1/12/09)

LEGEND

- SUBDIVISION APPLICATION BOUNDARY
- WATERCOURSE
- FORESHORE RESERVE
- EXISTING VEGETATION

0 10 20 30 40 50 100 150 200m

NOTES

Base data supplied by Landgate / Fugro
Aerial Photography dated March 2007

Areas and dimensions shown are subject to final survey calculations.
All carriageways are shown for illustrative purposes only and are subject to detailed engineering design.

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BALWYN MARGARET RIVER PTY LTD.	:	CLIENT
1:4,000 @ A3; 1:2,000 @ A1	:	SCALE
21 June 2010	:	DATE
10997-z-012	:	PLAN No
A	:	REVISION
P.G	:	PLANNER
B.L	:	DRAWN

Property Description:

LOT 9004 BUSSELL HIGHWAY, MARGARET RIVER

RPS

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ABN 45 108 680 977
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Appendix B
Flora List

Foreshore Management Plan
Rapids Landing Margaret River, WA

Flora List-Lot 27, Bussell Highway, Margaret River
(ATA Environmental, 2004)

Family	Species
GYMNOSPERMS	*Macrozamia fraseri* (F2)
PTERIDOPHYTA	
DENNSTAEDTIACEAE	*Pteridium esculentum* (F2)
MONOCOTYLEDONS	
CYPERACEAE	*Baumea articulata* (F2)
	Gahnia trifida (F2)
	Lepidosperma tenue (F2)
	Lepidosperma tetraquetrum
	Mesomelaena tetragona
	**Isolepsis prolifera*
	**Cyperus eragrostis*
HAEMADORACEAE	*Anigozanthos viridis*
	Conostylis setigera (F2)
IRIDACEAE	**Romulea rosea*
	**Gladiolus undulatus*
JUNCACEAE	*Juncus pallidus* (F2)
POACEAE	**Avena barbata* (F2)
	**Avena fatua* (F2)
	**Briza maxima* (F2)
	**Briza minor* (F2)
	**Holcus lanatus* (F2)
	**Hordeum sp.*
	**Cynodon dactyon* (F2)
	**Lagurus ovatus*
	**Lolium perenne*
	**Neuranchne alopecuroidea*
	**Paspalum dilatatum*
	**Poa annua* (F2)
	**Pennisetum clandestinum* (F2)
	Desmocladus flexuosus
RESTIONACEAE	*Loxocarya cinerea*
XANTHORRHOEACEAE	*Xanthorrhoea preissii* (F2)
DICOTYEDONS	
ARALIACEAE	*Hydrocotyle sp.*
ASTERACEAE	**Hypochaeris glabra*
	**Sonchus oleraceus*
	**Taraxacum officinale*
DILLENIACEAE	*Hibbertia hypercoides*
ERICACEAE	*Astroloma ciliatum*
	Leucopogon verticillatus
FABACEAE	*Acacia divergens* (F2)
	Acacia mytifolia
	Hovea chorizemifolia
	Hovea trisperma (F2)
	Kennedia coccinea (F2)
	Mirbelia dilatata (F2)
	**Trifolium campestre* (F2)

Family	Species
	Viminea juncea
MYRTACEAE	*Agonis flexuosa* (F2)
	Agonis juniperina (F2)
	Agonis linearifolia
	Corymbia calophylla (F2)
	Eucalyptus marginata subsp. marginata (F2)
	Eucalyptus patens (F2)
	Kunzea ericifolia
	Leptospermum erubescens
	Melaleuca hamulosa (F2)
PROTEACEAE	*Hakea amplexicaulis*
	Hakea lissocarpha (F2)
RANUNCULACEAE	*Clematis pubescens* (F2)
RHAMNACEAE	*Trymalium floribundum* (F2)
ROSACEAE	**Rubus discolour* (F2)
MALVACEAE	*Lasiopetalum floribundum*
	Thomasia pauciflora
THYMELAEACEAE	*Pimelea rosea*

*denotes weed species
F2: Species Identified in the Foreshore Reserve for Stage 4 and 5, Rapids Landing 2010.

Appendix C
Fauna Database Search Results

Foreshore Management Plan
Rapids Landing Margaret River, WA

PREDICTED BIRD SPECIES AT
LOT 27 BUSSELL HIGHWAY, MARGARET RIVER

E Represents species listed under the *Environment Protection and Biodiversity Conservation Act* 1999

EM Represents migratory bird species listed under the *Environment Protection and Biodiversity Conservation Act* 1999

S Represents species listed on the Department of Conservation and Land Management's Scheduled Fauna list

P Represents species listed on the Department of Conservation and Land Management's Priority Fauna list

I Introduced species

Species	
Casuariidae (Emus and Cassowaries)	
Emu	*Dromaius novaehollandiae*
Phasianidae (Pheasants and Quails)	
Brown Quail	*Coturnix ypsilophora*
Anatidae (Ducks, Geese and Swans)	
Australian Shelduck	*Tadorna tadornoides*
Pacific Black Duck	*Anas superciliosus*
Grey Teal	*Anas gibberifrons*
Australian Wood Duck	*Chenonetta jubata*
Ardeidae (Herons and Egrets)	
White-faced Heron	*Egretta novaehollandiae*
White-necked Heron	*Ardea pacifica*
Great Egret	*Egretta alba*
Nankeen Night Heron	*Nycticorax caledonicus*
Plataleidae (Ibis and Spoonbills)	
Australian White Ibis	*Threskiornis molucca*
Straw-necked Ibis	*Threskiornis spinicollis*
Accipitridae (Kites, Hawks and Eagles)	
Black-shouldered Kite	*Elanus notatus*
Square-tailed Kite	*Lophoictinia isura*
Whistling Kite	*Haliastur sphenurus*
Swamp Harrier	*Circus approximans*
Brown Goshawk	*Accipiter fasciatus*
Collared Sparrowhawk	*Accipiter cirrhocephalus*
Wedge-tailed Eagle	*Aquila audax*
Little Eagle	*Hieraaetus morphnoides*
Falconidae (Falcons)	
Peregrine Falcon	*Falco peregrinus* **S**
Australian Hobby	*Falco longipennis*
Brown Falcon	*Falco berigora*
Nankeen Kestrel	*Falco cenchroides*
Turnicidae (Button-quails)	
Painted Button-quail	*Turnix varia*
Rallidae (Crakes and Rails)	
Buff-banded Rail	*Rallus philippensis*
Columbidae (Pigeons and Doves)	
Common Bronzewing	*Phaps chalcoptera*
Brush Bronzewing	*Phaps elegans*

Species	
Cacatuidae (Cockatoos)	
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso* **P**
Short-billed Black-Cockatoo	*Calyptorhynchus latirostris* **S E**
Long-billed Black-Cockatoo	*Calyptorhynchus baudinii* **S E**
Galah	*Cacatua roseicapilla*
Psittacidae (Lorikeets and Parrots)	
Purple-crowned Lorikeet	*Glossopsitta porphyrocephala*
Red-capped Parrot	*Purpureicephalus spurius*
Western Rosella	*Platycercus icterotis*
Australian Ringneck	*Barnardius zonarius*
Elegant Parrot	*Neophema elegans*
Cuculidae (Cuckoos)	
Pallid Cuckoo	*Cuculus pallidus*
Fan-tailed Cuckoo	*Cuculus pyrrhophanus*
Horsfield's Bronze-Cuckoo	*Chrysococcyx basalis*
Shining Bronze-Cuckoo	*Chrysococcyx lucidus*
Strigidae (Hawk-owls)	
Barking Owl	*Ninox connivens* **P**
Southern Boobook Owl	*Ninox novaeseelandiae*
Tytonidae (Barn owls)	
Masked Owl	*Tyto novaehollandiae* **P**
Barn Owl	*Tyto alba*
Podargidae (Frogmouths)	
Tawny Frogmouth	*Podargus strigoides*
Aegothelidae (Owlet-nightjars)	
Australian Owlet-nightjar	*Aegotheles cristatus*
Halcyonidae (Forest kingfishers)	
Laughing Kookaburra	*Dacelo novaeguineae*
Sacred Kingfisher	*Todiramphus sanctus*
Meropidae (Bee-eaters)	
Rainbow Bee-eater	*Merops ornatus* **EM**
Climacteridae (Treecreepers)	
Rufous Treecreeper	*Climacteris rufa*
Maluridae (Fairy-wrens)	
Southern Emu-wren	*Stipiturus malachurus*
Splendid Fairy-wren	*Malurus splendens*
Red-winged Fairy-wren	*Malurus elegans*
Pardalotidae (Pardalotes)	
Spotted Pardalote	*Pardalotus punctatus*
Striated Pardalote	*Pardalotus striatus*
White-browed Scrubwren	*Sericornis frontalis*
Western Gerygone	*Gerygone fusca*
Weebill	*Smicrornis brevirostris*
Inland Thornbill	*Acanthiza apicalis*
Western Thornbill	*Acanthiza inornata*
Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
Meliphagidae (Honeyeaters)	
Red Wattlebird	*Anthochaera carunculata*
Western Wattlebird	*Anthochaera lunulata*
Singing Honeyeater	*Lichenostomus virescens*
White-naped Honeyeater	*Melithreptus lunatus*
Brown Honeyeater	*Lichmera indistincta*
New Holland Honeyeater	*Phylidonyris novaehollandiae*

Species	
White-cheeked Honeyeater	*Phylidonyris nigra*
Western Spinebill	*Acanthorhynchus superciliosus*
Petroicidae (Australian robins)	
Scarlet Robin	*Petroica multicolor*
Western Yellow Robin	*Eopsaltria griseogularis*
White-breasted Robin	*Eopsaltria georgiana*
Hooded Robin	*Melanodryas cucullata*
Neosittidae (Sittellas)	
Varied Sittella	*Daphoenositta chrysoptera*
Pachycephalidae (Whistlers)	
Golden Whistler	*Pachycephala pectoralis*
Rufous Whistler	*Pachycephala rufiventris*
Grey Shrike-thrush	*Colluricincla harmonica*
Dicruridae (Flycatchers)	
Magpie-lark	*Grallina cyanoleuca*
Grey Fantail	*Rhipidura fuliginosa*
Willie Wagtail	*Rhipidura leucophrys*
Restless Flycatcher	*Myiagra inquieta*
Campephagidae (Cuckoo-shrikes)	
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*
Artamidae (woodswallows)	
Black-faced Woodswallow	*Artamus cinereus*
Dusky Woodswallow	*Artamus cyanopterus*
Grey Butcherbird	*Cracticus torquatus*
Australian Magpie	*Gymnorhina tibicen*
Corvidae (Ravens and Crows)	
Grey Currawong	*Strepera versicolor*
Australian Raven	*Corvus coronoides*
Passeridae (Finches)	
Red-eared Firetail	*Stagonopleura occulata*
Dicaeidae (Mistletoebird)	
Mistletoebird	*Dicaeum hirundinaceum*
Hirundinidae (Swallows)	
Welcome Swallow	*Hirundo neoxena*
Tree Martin	*Hirundo nigricans*
Motacillidae (Pipits and true wagtails)	
Richard's Pipit	*Anthus novaeseelandiae*
Zosteropidae (White-eyes)	
Silvereye	*Zosterops lateralis*

PREDICTED AMPHIBIAN SPECIES AT
LOT 27 BUSSELL HIGHWAY, MARGARET RIVER

E Represents species listed under the *Environment Protection and Biodiversity Conservation Act* 1999

S Represents species listed on the Department of Conservation and Land Management's Scheduled Fauna list

Species
Hylidae
Litoria adelaidensis
Litoria moorei
Myobatrachidae
Crinia georgiana
Crinia glauerti
Crinia insignifera
Crinia pseudinsignifera
Geocrinia alba **S**
Geocrinia leai
Heleioporus albopunctatus
Heleioporus eyrei
Heleioporus inornatus
Heleioporus psammophilus
Limnodynastes dorsalis
Metacrinia nichollsi
Pseudophryne guentheri

PREDICTED REPTILE SPECIES AT
LOT 27 BUSSELL HIGHWAY, MARGARET RIVER

E Represents species listed under the *Environment Protection and Biodiversity Conservation Act* 1999

S Represents species listed on the Department of Conservation and Land Management's Scheduled Fauna list

Species	
Agamidae (Dragons)	
	Pogona minor
Boidae (Pythons)	
Carpet Python	*Morelia spilota imbricata* **S**
Elapidae (Elapid Snakes)	
Bardick	*Echiopsis curta*
	Elapognathus coronatus
	Hydrophis elegans
Western Tiger Snake	*Notechis scutatus*
Gould's Snake	*Parasuta gouldii*
	Parasuta nigriceps
	Pelamis platura
Dugite	*Pseudonaja affinis*
	Rhinoplocephalus bicolor
Gekkonidae (Geckoes)	
Marbled Gecko	*Christinus marmoratus*
Pygopodidae (Legless Lizards)	
	Aprasia pulchella
	Aprasia repens
Burton's Legless Lizard	*Lialis burtonis*
Scaly Foot	*Pygopus lepidopodus*
Scincidae (Skinks)	
	Acritoscincus trilineatum
	Cryptoblepharus plagiocephalus
	Ctenotus catenifer
	Ctenotus delli
	Ctenotus impar
	Ctenotus labillardieri
King Skink	*Egernia kingii*
	Egernia luctuosa
	Egernia napoleonis
	Egernia pulchra pulchra
	Glaphyromorphus gracilipes
	Hemiergis peronii tridactyla
	Lerista distinguenda
	Lerista elegans
	Lerista microtis microtis
	Menetia greyii
	Morethia lineoocellata
	Morethia obscura
Bobtail	*Tiliqua rugosa*
Typhlopidae (Blind Snakes)	
	Ramphotyphlops australis
Varanidae (Goannas)	
Southern Heath Monitor	*Varanus rosenbergi*

PREDICTED AND RECORDED MAMMAL SPECIES AT LOT 27 BUSSELL HIGHWAY, MARGARET RIVER

I Represents introduced or feral species

E Represents species listed under the *Environment Protection and Biodiversity Conservation Act* 1999

S Represents species listed on the Department of Conservation and Land Management's Scheduled Fauna list

P Represents species listed on the Department of Conservation and Land Management's Priority Fauna list

Species	
Burramyidae (Pygmy Possums)	
Western Pygmy Possum	*Cercartetus concinnus*
Canidae (Dingos, Dogs)	
Fox	*Vulpes vulpes* I
Dasyuridae (Dunnarts, Quoll, Mardo, Wambengers)	
Mardo	*Antechinus flavipes leucogaster*
Chuditch	*Dasyurus geoffroii* S
Southern Brush-tailed Phascogale	*Phascogale tapoatafa tapoatafa* P
Gilbert's Dunnart	*Sminthopsis gilberti*
Grey-bellied Dunnart	*Sminthopsis griseoventer griseoventer*
Equidae (Horses)	
Horse	*Equus caballus*
Felidae (Cat)	
Cat	*Felis catus* I
Leporidae (Rabbits and hares)	
Rabbit	*Oryctolagus cuniculus* I
Macropodidae (Wallabies, Kangaroos)	
	Macropus eugenii derbianus
Western Grey Kangaroo	*Macropus fuliginosus*
Western Brush Wallaby	*Macropus irma*
Quokka	*Setonix brachyurus* S
Muridae (Rodents)	
Water Rat	*Hydromys chrysogaster* P
House Mouse	*Mus musculus*
Bush Rat	*Rattus fuscipes*
Black Rat	*Rattus rattus*
Peramelidae (Bandicoots and Bilbies)	
Southern Brown Bandicoot	*Isoodon obesulus fusciventer* S4
Phalangeridae (Brushtail Possums, Cuscuses)	
Common Brushtail Possum	*Trichosurus vulpecula*
Potoroidae (Potoroos, Bettongs)	
Brush-tail Bettong / Woylie	*Bettongia penicillata ogilbyi*
Long-nosed Potoroo	*Potorous tridactylus*
Pseudocheiridae (Ringtail Possums)	
Western Ringtail Possum	*Pseudocheirus occidentalis* S
Tarsipedidae (Honey Possum)	
Honey Possum	*Tarsipes rostratus*
Tachyglossidae (Echidna)	
Echidna	*Tachyglossus aculeatus*
Vespertilionidae (Evening Bats)	
Gould's Wattled Bat	*Chalinolobus gouldii*
Chocolate Wattled Bat	*Chalinolobus morio*
Lesser Long-eared Bat	*Nyctophilus geoffroyi*
Greater Long-eared Bat	*Nyctophilus timoriensis timoriensis*
Southern Forest Bat	*Vespadelus regulus*

Appendix D
Pen Scott Method of Riparian Zone Assessment

Foreshore Management Plan
Rapids Landing Margaret River, WA

A Grade Foreshore

- *A1: Pristine* - The river embankment and/or channel are entirely vegetated with native species and there if no evidence of human presence, or livestock damage;
- *A2: Near Pristine* - Native vegetation dominates but introduces weeds are occasionally present in the understorey, though not to the extent that they displace native vegetation. Otherwise there is no human impact; and
- *A3 Slightly disturbed* - There are areas of localised human disturbance where the soil may be exposed and weed density is relatively heavy, such as along walking or vehicle tracks. Otherwise, native plants dominate and would quickly regenerate in disturbed areas should human activity decline.

B Grade Foreshore

- *B1: Degraded- Weed Infested* - Weeds have become a significant component of the understorey vegetation. Although native species remain dominant, a few have probably been replaced or are being replaced by weeds;
- *B2: Degraded-Heavily Weed Infested* - In the understorey, weeds are about as abundant as native species. The regeneration of some tree and large shrub species may have declined; and
- *B3: Degraded-Weed Dominated* - Weeds dominate the understorey, but many native species remain. Some tree and large shrub species may have declined or disappeared.

C Grade Foreshore

- *C1: Erosion Prone* - While trees remain, possibly with some large shrubs or grass trees, the understorey consists entirely of weeds, mainly annual grasses. Most of trees will be of only a few resilient of long-lived species and their regeneration will be mostly negligible. In this state, where the soil is supported by short-lived weeds, a small increase in physical disturbance will expose the soil and render the river valley vulnerable to serious erosion;
- *C2: Soil Exposed* - Here, the annual grasses and weeds have been removed through heavy livestock damage and grazing, or as a result of recreational activities. Low level soil erosion has begun, by the action of either wind or water; and
- *C3: Eroded* - Soil is being washed away from between tree roots, trees are being undermined and unsupported embankments are subsiding into the river valley.

D Grade Foreshore

- *D1: Ditch-Eroding* - Fringing vegetation no longer acts to control erosion. Some trees and shrubs remain and act to retard erosion in certain spots, but all are doomed to be undermined eventually;
- *D2: Ditch-Freely Eroding* - No significant fringing vegetation remains, and erosion is completely out of control. Undermined and subsided embankments are common, as are large sediment plumes along the river channel; and
- *D3: Weed Dominated* - The highly eroded river valley has been fenced off enabling colonisation by perennial weeds. The river has become a simple drain, similar if not identical to the typical major urban drain.

Appendix E
Revegetation Flora List

Foreshore Management Plan
Rapids Landing Margaret River, WA

Revegetation List for the Foreshore Reserve, Rapids Landing

Species	Location	Zone	High Nectar	Planting Density
Trees				
Corymbia calophylla	Channel slopes and banks	1,2	✔	1-2per 5m2 (Zone1)
Eucalyptus diversicolor	Bank	1,2		1-2 per 10m2 (Zone 1)
Eucalyptus marginata	Bank	1,2	✔	1-2 per 10m2 (Zone 1)
Eucalyptus patens	Bank	1,2		1-2per 5m2 (Zone1)
Agonis flexuosa	Bank	1,2		1-2per 5m2 (Zone1)
Agonis juniperina	Channel slopes and banks	1		1-2 per 10m2 (Zone 1)
Banksia grandis	Bank	2	✔	1-2 per 10m2 (Zone 1)
Banksia littoralis	Channel slopes and banks	1	✔	1-2 per 10m2 (Zone 1)
Shrubs				
Acacia alata	Bank	1		1-2per 5m2
Acacia divergens	Bank	1,2		1-2per 5m2
Acacia extensa	Bank	1		1-2per 5m2
Acacia myrtifolia	Bank	1		1-2per 5m2
Acacia pulchella	Bank	1		1-2per 5m2
Acacia saligna	Bank	1,2		1-2per 5m2 (Zone 1)
Acacia uliginosa	Bank	1		1-2per 5m2
Adenanthos obovatus	Bank	1	✔	1-2per 5m2
Agonis linearifolia	Channel slopes and banks	1		1-2per 5m2
Agonis parviceps	Bank	1		1-2per 5m2
Astartea fascicularis	Channel slopes and banks	1		1-2per 5m2
Banksia littoralis	Banks	1,2		1-2per 5m2
Beaufortia sparsa	Channel slopes and banks	1		1-2per 5m2
Boronia fastigiata	Channel slopes and banks	1		1-2per 5m2
Bossiaea linophylla	Bank	1,2		1-2per 5m2 (Zone 1)
Bossiaea ornata	Bank	1		1-2per 5m2
Callistachys lanceolata	Channel slopes and banks	1		1-2per 5m2
Calothamnus lateralis	Channel slopes and banks	1	✔	1-2per 5m2
Chorizema cordata	Bank	1,2		1-2per 5m2 (Zone 1)
Dampiera alata	Bank	1		1-2per 5m2
Dampiera linearis	Bank	1		1-2per 5m2
Eutaxia virgata	Bank	1		1-2per 5m2
Gompholobium capitatum	Bank	1		1-2per 5m2
Grevillea diversifolia	Bank	1	✔	1-2per 5m2
Grevillea manglesioides	Bank	1	✔	1-2per 5m2
Grevillea trifida	Bank	1	✔	1-2per 5m2

Species	Location	Zone	High Nectar	Planting Density
Hakea varia	Bank	1	✔	1-2per 5m2
Hakea amplexicaulis	Bank	1	✔	1-2per 5m2
Hakea lasianthoides	Bank	1	✔	1-2per 5m2
Hakea linearis	Bank	1	✔	1-2per 5m2
Hakea lissocarpha	Bank	1	✔	1-2per 5m2
Hakea ruscifolia	Bank	1	✔	1-2per 5m2
Hakea varia	Bank	1	✔	1-2per 5m2
Hibbertia cuneiformis	Bank	1		1-2per 5m2
Hibbertia hypercoides	Bank	1		1-2per 5m2
Hovea chorizemifolia	Bank	1		1-2per 5m2
Hovea elliptica	Bank	1,2		1-2per 5m2 (Zone 1)
Hypocalymma angustissima	Channel slopes and banks	1		1-2per 5m2
Hypocalymma cordifolium	Channel slopes and banks	1		1-2per 5m2
Hypocalymma robustum	Channel slopes and banks	1		1-2per 5m2
Kunzea ericifolia	Bank	1		1-2per 5m2
Kunzea recurva	Bank	1	✔	1-2per 5m2
Lechenaultia biloba	Bank	1		1-2per 5m2
Leucopogon australis	Bank	1		1-2per 5m2
Melaleuca hamulosa	Channel slopes and banks	1	✔	1-2per 5m2
Melaleuca incana	Channel slopes and banks	1		1-2per 5m2
Mirbelia dilatata	Bank	1		1-2per 5m2
Pimelea rosea	Bank	1		1-2per 5m2
Sollya heterophylla	Bank	1,2		1-2per 5m2 (Zone 1)
Tremandra stelligera	Bank	1		1-2per 5m2
Trymalium floribundum ssp. floribundum	Bank	1		1-2per 5m2
Trymalium floribundrum ssp. trifidum	Bank	1		1-2per 5m2
Viminaria juncea	Channel slopes and banks	1		1-2per 5m2
Climbers, Sedges, Herbs				
Anigozanthus flavidus	Bank	1,2	✔	1-2 per 10m2 (Zone 1)
Baumea articulata	Channel slopes	1		4 per m2
Baumea juncea	Channel slopes	1		4 per m2
Baumea vaginalis	Channel slopes	1		4 per m2
Centella asiatica	Channel slopes	1		clumped
Conostylis aculeata	Bank	1		1-2per 5m2
Dielsia stenostachya	Channel slopes	1		4 per m2
Gahnia trifida	Channel slopes	1		4 per m2
Hardenbergia comptoniana	Bank	1		1-2per 5m2
Juncus pallidus	Channel slopes	1		4 per m2

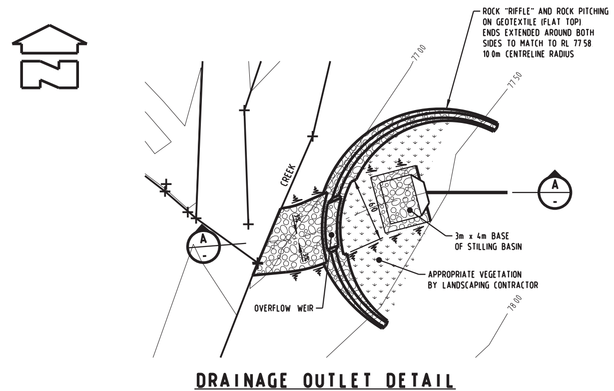
Species	Location	Zone	High Nectar	Planting Density
Juncus subsecundus	Channel slopes	1		4 per m2
Kennedia coccinea	Bank	1		1-2per 5m2
Kennedia prostrata	Bank	1		1-2per 5m2
Lobelia alata	Bank	1		1-2per 5m2
Lomandra pauciflora	Bank	1		1-2per 5m2
Lepidosperma effusum	Channel slopes	1		4 per m2
Lepidosperma squamatum	Channel slopes	1		4 per m2
Lepidosperma tetraquestrum	Channel slopes	1		4 per m2
Loxocarya cinerea	Channel slopes	1		4 per m2
Mesomelaena tetragona	Channel slopes	1		4 per m2
Patersonia occidentalis	Bank	1,2		1-2per 5m2
Patersonia umbrosa	Bank	1,2		1-2per 5m2
Scaevola microphylla	Bank	1,2		1-2per 5m2
Scaevola calliptera	Bank	1,2		1-2per 5m2

Source: ATA Environmental (2004), Cape to Cape Catchments Group (2003), Cape to Cape Catchments Group (2004).

Appendix F
Drainage Plan

Foreshore Management Plan
Rapids Landing Margaret River, WA

REV.	DESCRIPTION	DRN	VER'D	APPROVED
A	ORIGINAL ISSUE			



DRAINAGE OUTLET DETAIL
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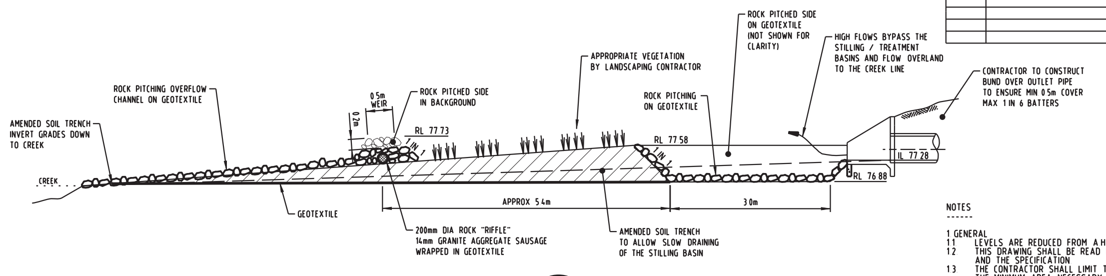


SECTION A-A
SCALE 1:50

NOTES

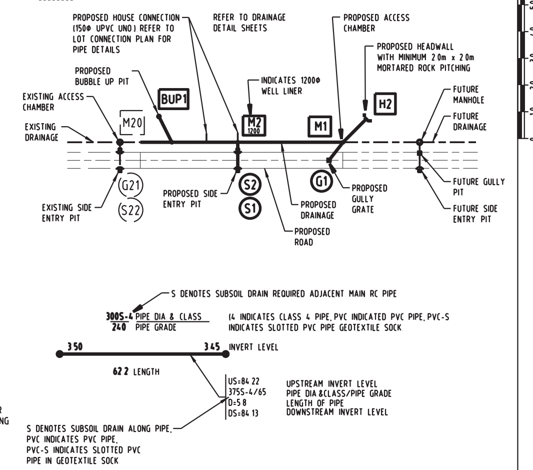
1 GENERAL
1.1 LEVELS ARE REDUCED FROM A.H.D DATUM
1.2 THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL 19049-BUS-4 DRAWINGS AND THE SPECIFICATION
1.3 THE CONTRACTOR SHALL LIMIT THE MOVEMENT OF EQUIPMENT AND PERSONNEL TO THE MINIMUM AREA NECESSARY AND PROTECT ALL FLAGGED VEGETATION ON SITE NOT SUBJECT TO DEVELOPMENT

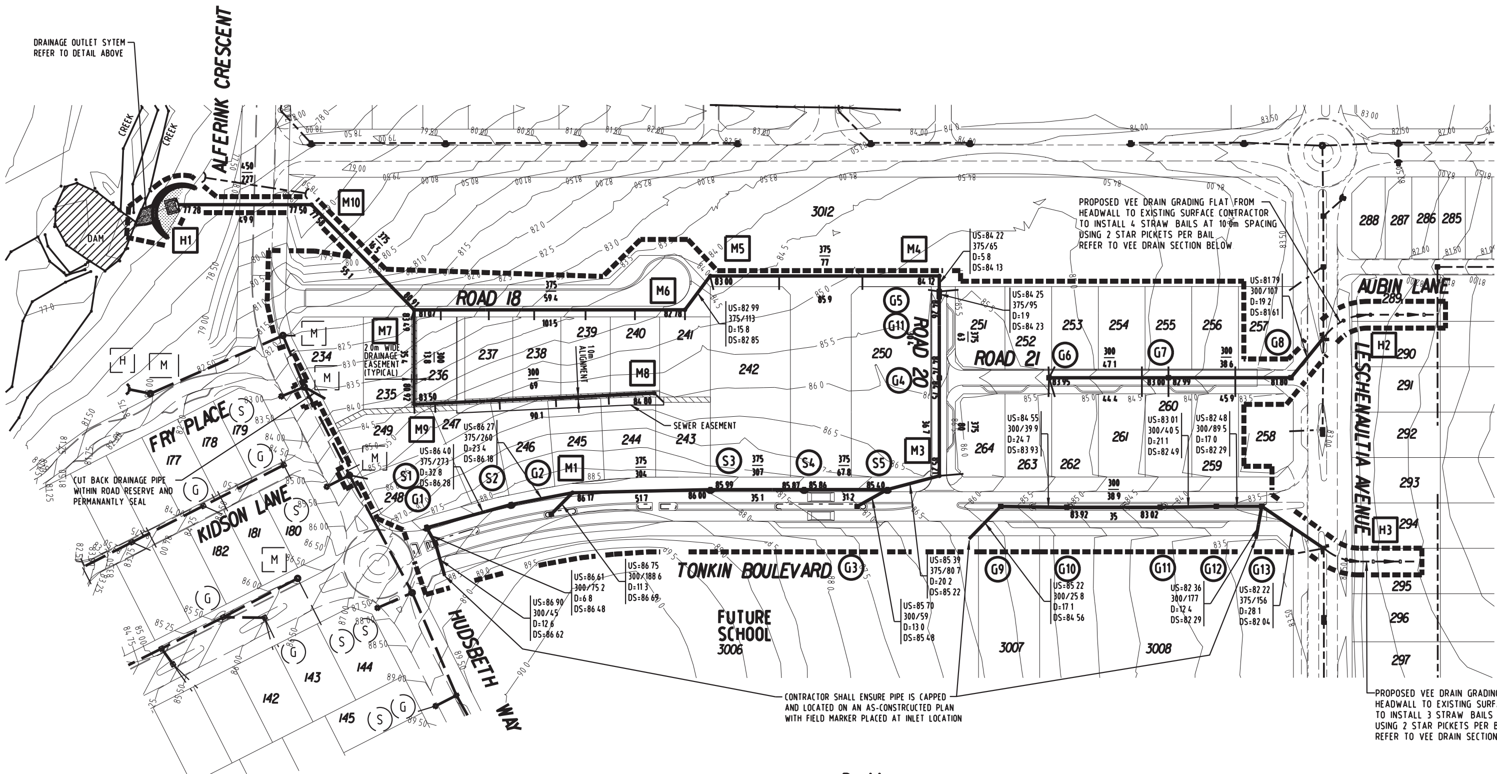
2 STORMWATER DRAINAGE
2.1 DRAINAGE PIPES SHALL BE R.R JOINTED REINFORCED CONCRETE CLASS 2 UNLESS OTHERWISE NOTED
2.2 PROPOSED STORMWATER DRAINAGE CONNECTIONS SHALL BE 150mm UPVC CLASS UNLESS OTHERWISE SHOWN. PVC SHALL BE GRADED AT MINIMUM 1 IN 100 GRADE AND SHALL HAVE MINIMUM 750mm COVER
2.3 PIPE ALIGNMENT SHALL BE AS INDICATED FROM THE ROAD RESERVE BOUNDARY
2.4 ACCESS CHAMBERS AND SIDE ENTRY PITS SHALL BE LOCATED AT THE POSITIONS SHOWN IRRESPECTIVE OF THE PIPE LENGTHS SHOWN
2.5 CONTRACTOR TO ENSURE LOW POINTS OCCUR AT SIDE ENTRY PITS
2.6 FOR CONSTRUCTION PURPOSES THE TENDERER SHALL MAKE THEIR OWN ASSESSMENT OF GROUND WATER AND ITS LIKELY AFFECT ON THE WORKS AND MAKE ALL DUE ALLOWANCE IN THE LUMP SUM TENDER

LEGEND

- STAGE BOUNDARY
- PROPOSED DRAINAGE WITH DRAINAGE PIT
- PROPOSED DRAINAGE WITH SIDE ENTRY PIT
- PROPOSED GRATED GULLY PIT
- FUTURE DRAINAGE
- EXISTING DRAINAGE
- FINISHED SURFACE CONTOURS

NOTATION





PLAN
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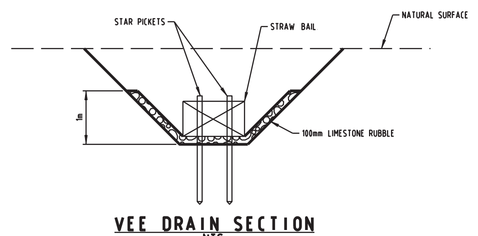

VEE DRAIN SECTION
NTS

SCALE BAR 1:1000 @ ORIGINAL SHEET SIZE A1

WOOD & GRIEVE ENGINEERS
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PERTH
MELBOURNE
SYDNEY
BRISBANE
ALBANY
BUSSELTON

CLIENT	BALWYN MARGARET RIVER PTY LTD
PROJECT	RAPIDS LANDING - STAGE 4
TITLE	DRAINAGE PLAN

DESIGNED P LOPRESTI	VERIFIED	08 /10 /10	WAPC No 132030	DATUM A H D
DRAWN P LOPRESTI	APPROVED FOR TENDER	/ /	DRAWING No 19049-BUS-4/R2	REV. A
APPROVED FOR CONSTRUCTION		/ /		

L:TECH/1900/49-4/B PL R2.GN

Appendix G
Stage 1 Rapids Landing Stormwater Infrastructure

Foreshore Management Plan
Rapids Landing Margaret River, WA

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

coffey environments
SPECIALISTS IN LIVING AND WORKING PLACES

Important information about your **Coffey** Environmental Report

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

72510 / 07-06

Appendix B
Landscape works Rapids Landing Stages 7 and 10

LANDSCAPE WORKS RAPIDS LANDING STAGES 7 AND 10

FOR

BALWYN MARGARET RIVER PTY LTD

PREPARED BY
WILLIAM JAMES LANDSCAPE ARCHITECT

REISSUED FOR AMRSC APPROVAL 9 MARCH 2022

SIGNED	DATE
Principal	
Contractor	
Superintendent	

CLIENT

BALWYN MARGARET RIVER PTY LTD

JOB

RAPIDS LANDING STAGES 7 AND 10

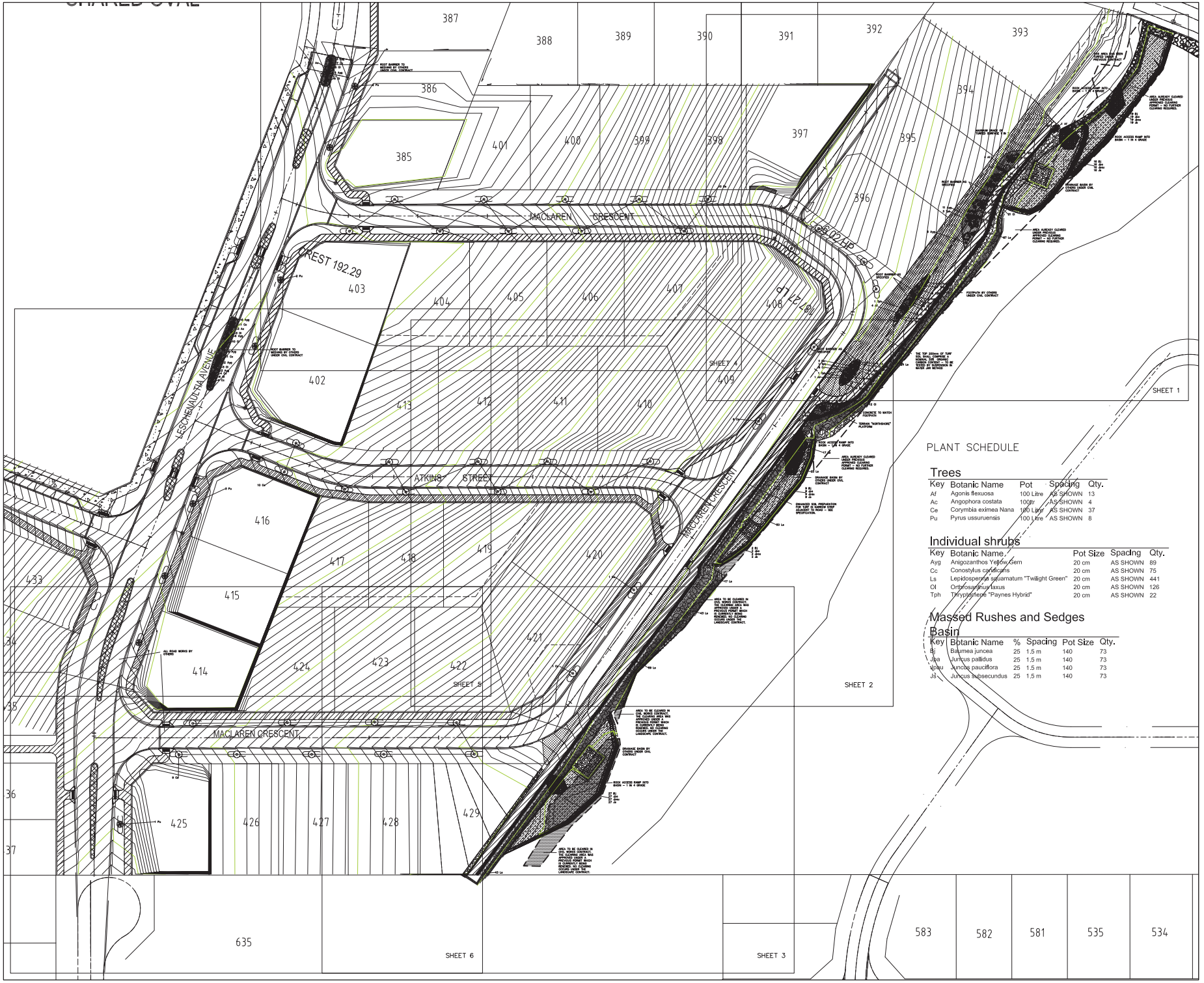
DRAWING

COVER SHEET

DRAWINGS INCLUDE

OVERALL SITE PLAN - DWG NO. 20/RL/T/01
LAYOUT SHEET 1 OF 6 - DWG NO. 20/RL/T/02
LAYOUT SHEET 2 OF 6 - DWG NO. 20/RL/T/03
LAYOUT SHEET 3 OF 6 - DWG NO. 20/RL/T/04
LAYOUT SHEET 4 OF 6 - DWG NO. 20/RL/T/05
LAYOUT SHEET 5 OF 6 - DWG NO. 20/RL/T/06
LAYOUT SHEET 6 OF 6 - DWG NO. 20/RL/T/07
DETAILS - DWG NO. 20/RL/T/08

WILLIAM JAMES LANDSCAPE ARCHITECT
196 ROSA GLEN ROAD, ROSA GLEN WA 6285
Phone 042 777 8087, email rglen185@gmail.com



QUARTZ STONE MULCH

CRACKED LATERITIC GRAVEL MULCH

ORGANIC MULCH

KIKUYU "VILLAGE GREEN" TURF

STONE BATTERS BY OTHERS

FINAL 100mm CONTOURS BY OTHERS

ROOT BARRIER BY OTHERS

SELECTED GRANITE BOULDERS

CONCRETE MOWING EDGE

ROOT BARRIER

NOTES:
STONE BASIN ACCESS RAMPS TO BE AS DIRECTED ON SITE.

THE 100mm CONTOURS ON THE DRAWINGS ARE FINAL LEVELS RESULTING FROM EARTHWORKS UNDER THE CIVIL CONTRACT.

SEE LAYOUT SHEETS 1 TO 6 FOR 1:200 PLANS.

PLANT SCHEDULE

Trees

Key	Botanic Name	Pot	Spacing	Qty.
Af	Agonis flexuosa	100 Litre	AS SHOWN	13
Ac	Angophora costata	100ltr	AS SHOWN	4
Ce	Corymbia eximea Nana	100 Litre	AS SHOWN	37
Pu	Pyrus ussuruensis	100 Litre	AS SHOWN	8

Individual shrubs

Key	Botanic Name	Pot Size	Spacing	Qty.
Ayg	Anigozanthos Yellow Gem	20 cm	AS SHOWN	89
Cc	Conostylus candicans	20 cm	AS SHOWN	75
Ls	Lepidosperma squamatum "Twilight Green"	20 cm	AS SHOWN	441
Ol	Orthrosanthus laxus	20 cm	AS SHOWN	126
Tph	Thryptomene "Paynes Hybrid"	20 cm	AS SHOWN	22

Massed Rushes and Sedges Basin

Key	Botanic Name	%	Spacing	Pot Size	Qty.
Bj	Baumea juncea	25	1.5 m	140	73
Jpa	Juncus pallidus	25	1.5 m	140	73
Jpau	Juncus pauciflora	25	1.5 m	140	73
Js	Juncus subsecundus	25	1.5 m	140	73

REISSUED FOR AMRSC APPROVAL 9 MARCH 2022

SIGNED	DATE
Principal	
Contractor	
Superintendent	

REV. B 9/3/22. NOTE ON CLEARING ALTERED
REV. A 9/3/22. NOTE ON CLEARING ALTERED

NOTE: THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE ENGINEERS DRAWINGS

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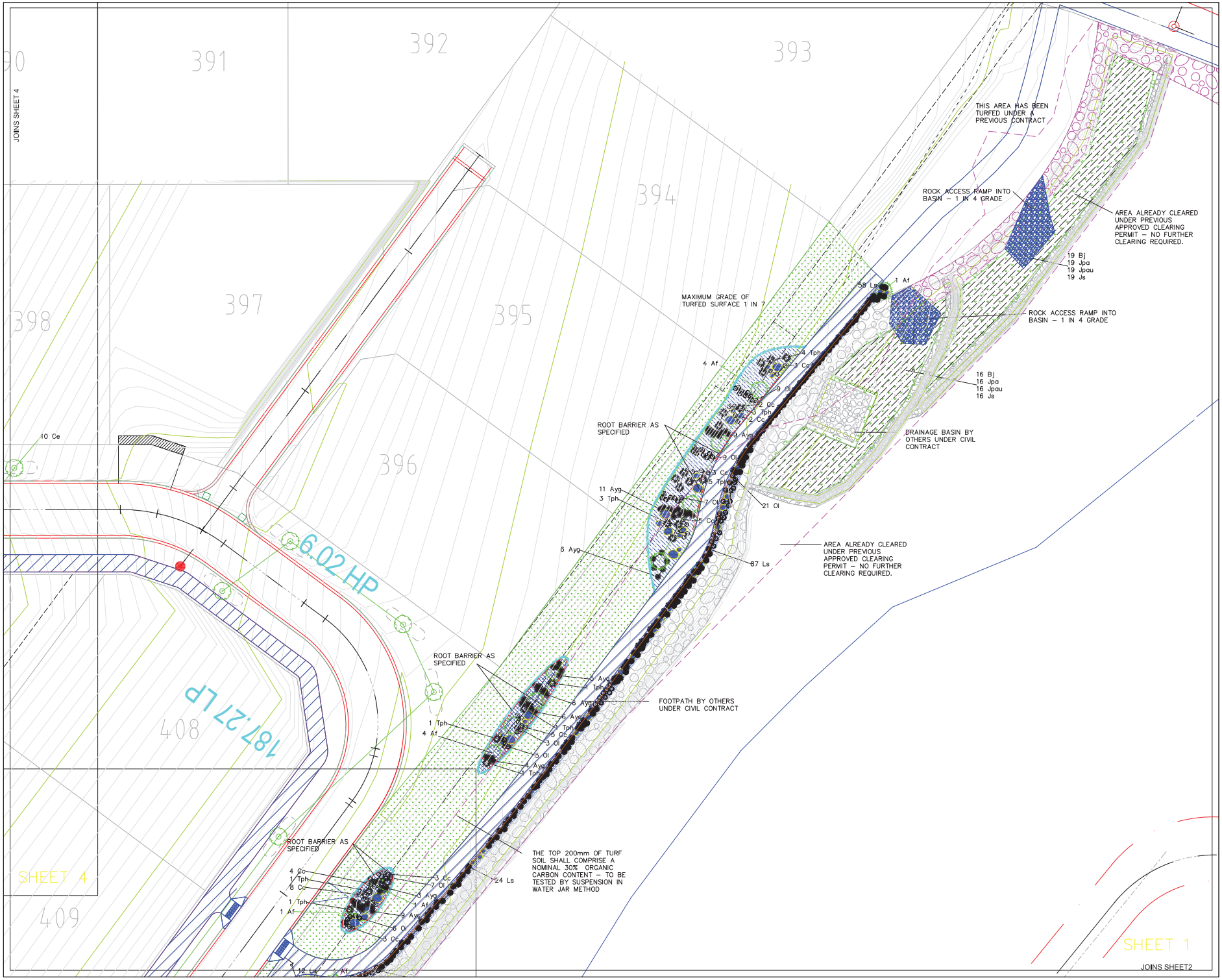
CLIENT: BALWYN MARGARET RIVER PTY LTD

JOB: RAPIDS LANDING STAGES 7 AND 10

DRAWING: OVERALL SITE PLAN

SCALE 1:500@A1	DRAWING NO.
DATE 24 JANUARY 2022	20/RL/T/01B
DESIGNED WJ	
DRAWN WJ	



LEGEND

- QUARTZ STONE MULCH
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- ORGANIC MULCH
- KIKUYU "VILLAGE GREEN" TURF
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- ROOT BARRIER BY OTHERS
- SELECTED GRANITE BOULDERS
- CONCRETE MOWING EDGE
- ROOT BARRIER

NOTES:
STONE BASIN ACCESS RAMPS TO BE AS DIRECTED ON SITE

THE 100mm CONTOURS ON THE DRAWINGS ARE FINAL LEVELS RESULTING FROM EARTHWORKS UNDER THE CIVIL CONTRACT.

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Principal	
Contractor	
Superintendent	

REV. A 9/3/22. NOTE ON CLEARING ALTERED

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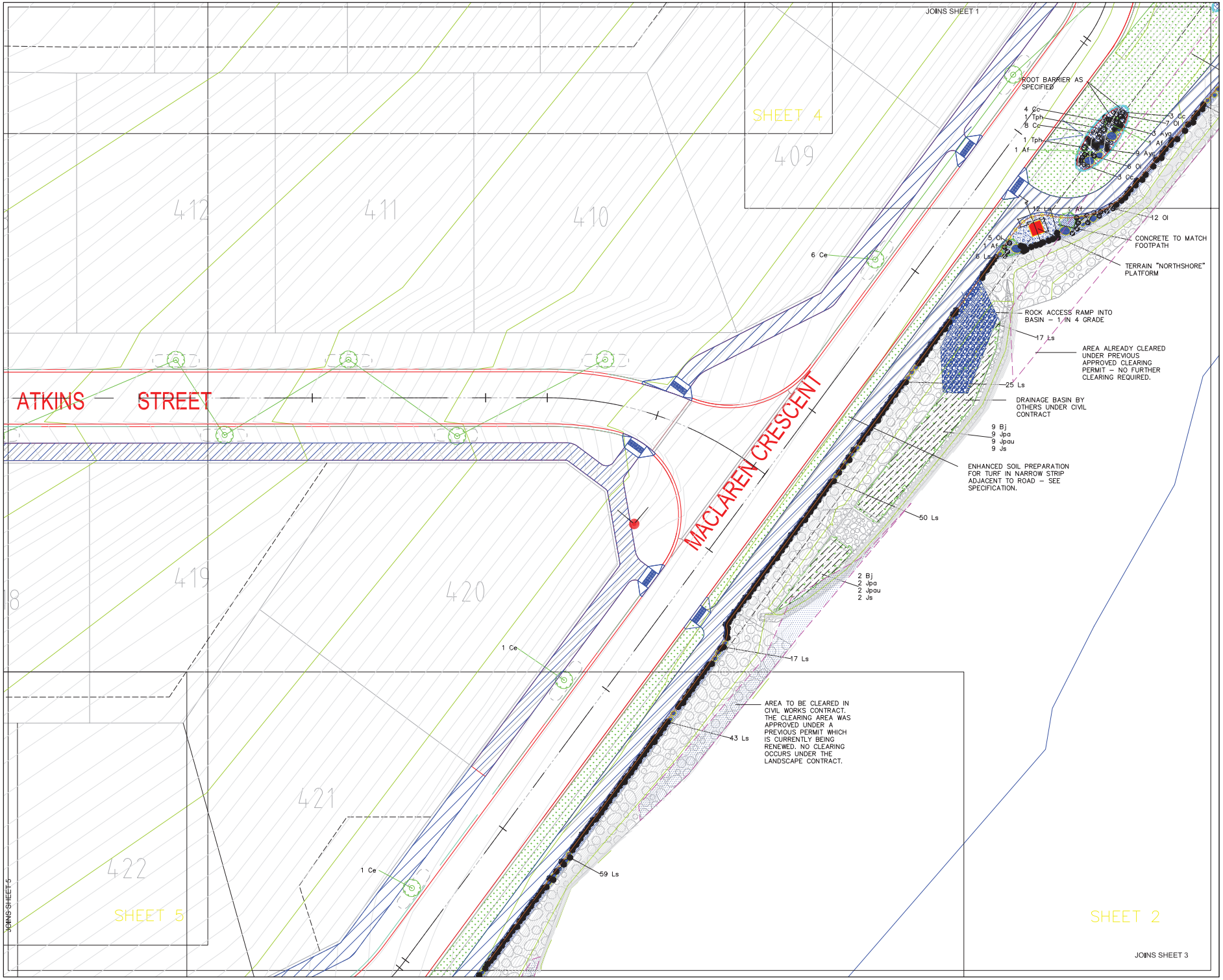
CLIENT: BALWYN MARGARET RIVER PTY LTD

JOB: RAPIDS LANDING STAGE 7

DRAWING: LAYOUT - SHEET 1 of 6

SCALE 1:200@A1	DRAWING NO.
DATE 24 JANUARY 2022	20/RL/T/02A
DESIGNED WJ	
DRAWN WJ	



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Contractor	
Superintendent	

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REV. A 9/3/22. NOTE ON CLEARING ALTERED

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CLIENT: BALWYN MARGARET RIVER PTY LTD

JOB: RAPIDS LANDING STAGES 7 AND 10

DRAWING: LAYOUT - SHEET 2 of 6

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DATE 24 JANUARY 2022	20/RL/T/03B
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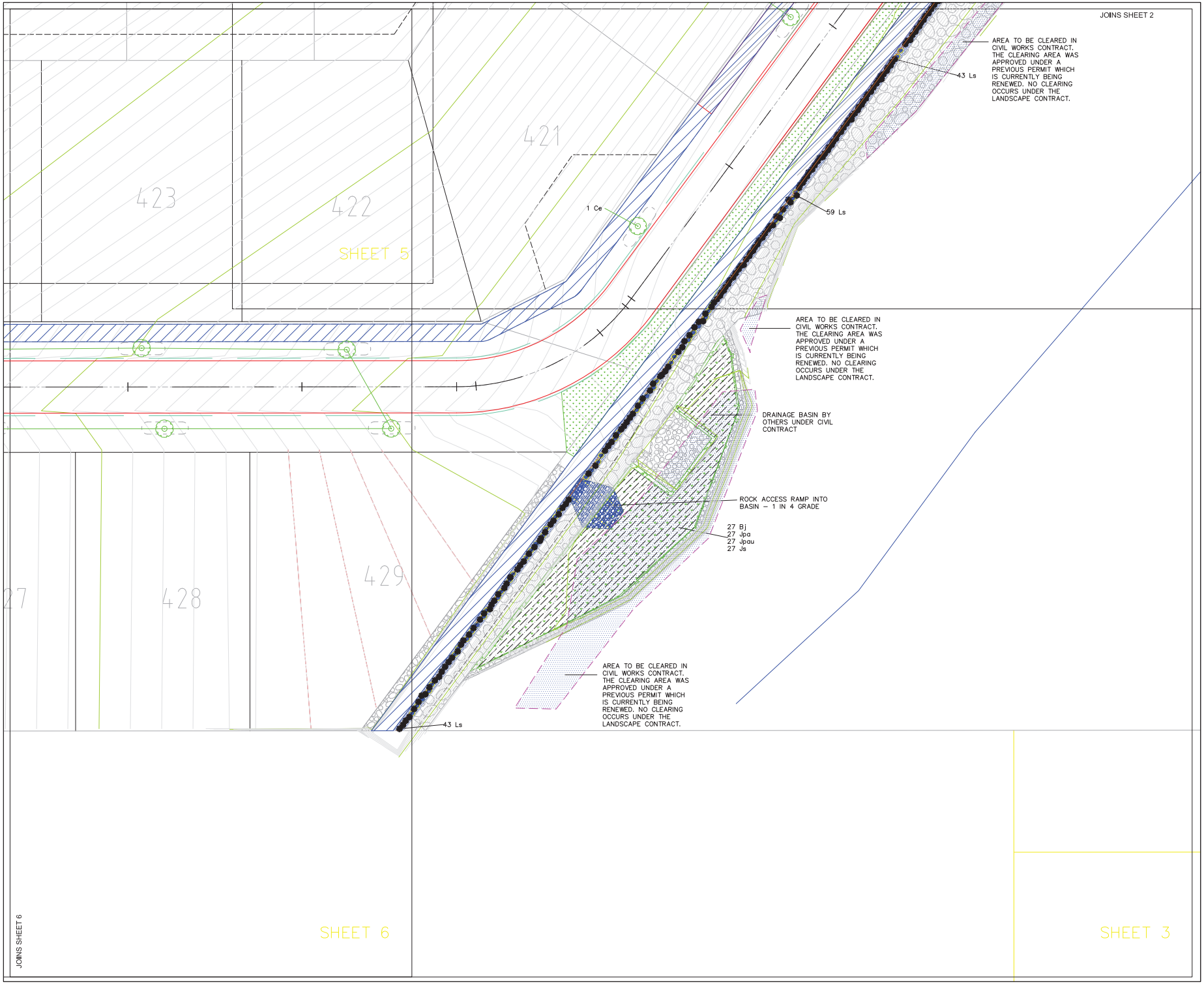

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CLIENT
BALWYN MARGARET RIVER PTY LTD

JOB
RAPIDS LANDING STAGES 7 AND 10

DRAWING
LAYOUT SHEET 3 of 6

SCALE 1:200@A1	DRAWING NO.
DATE 24. JANUARY 2022	
DESIGNED WJ	20/RL/T/04B
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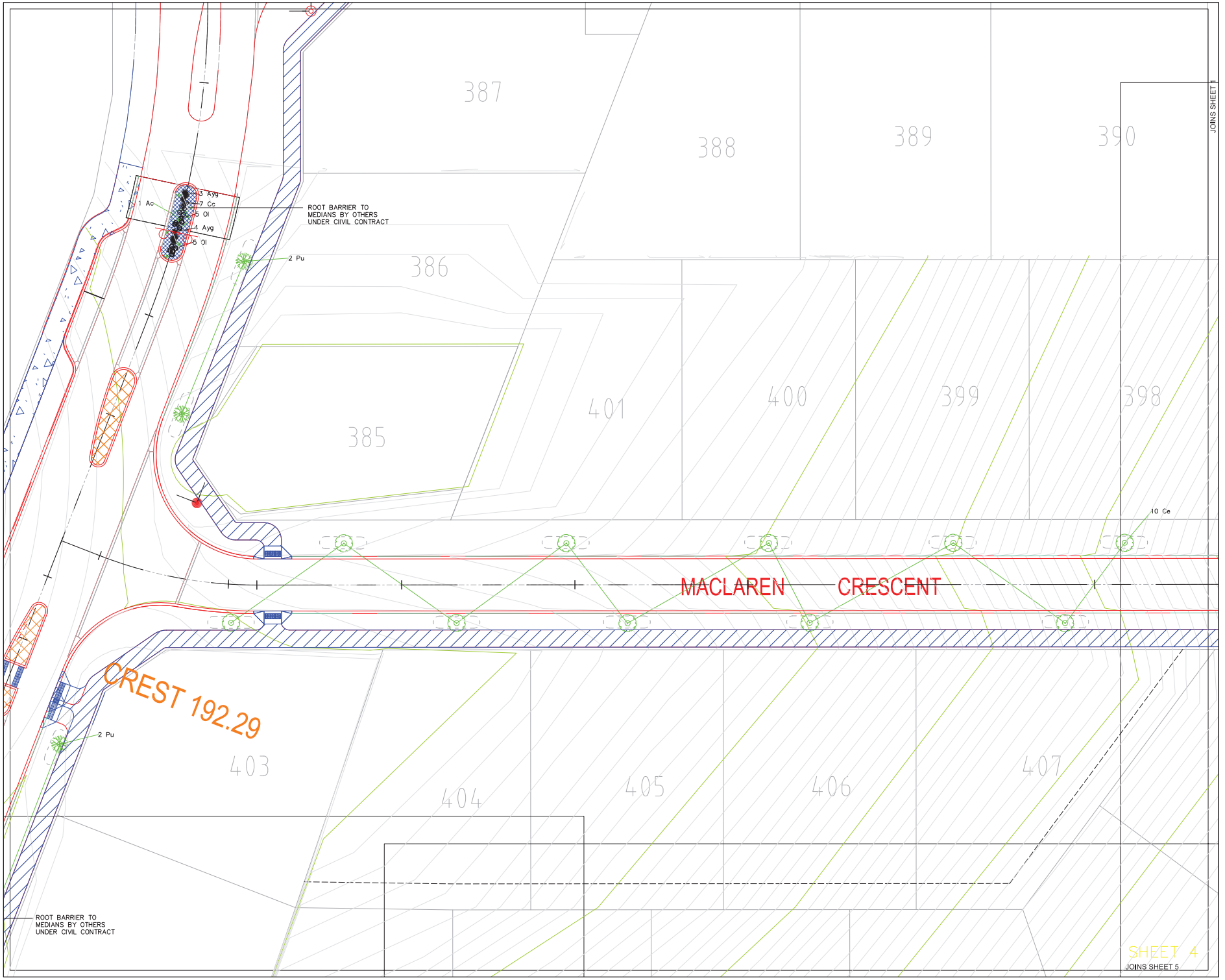

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CLIENT: BALWYN MARGARET RIVER PTY LTD

JOB: RAPIDS LANDING STAGES 7 AND 10

DRAWING: LAYOUT - SHEET 4 of 6

SCALE 1:200@A1
DATE 24 JANUARY 2022
DESIGNED WJ
DRAWN WJ

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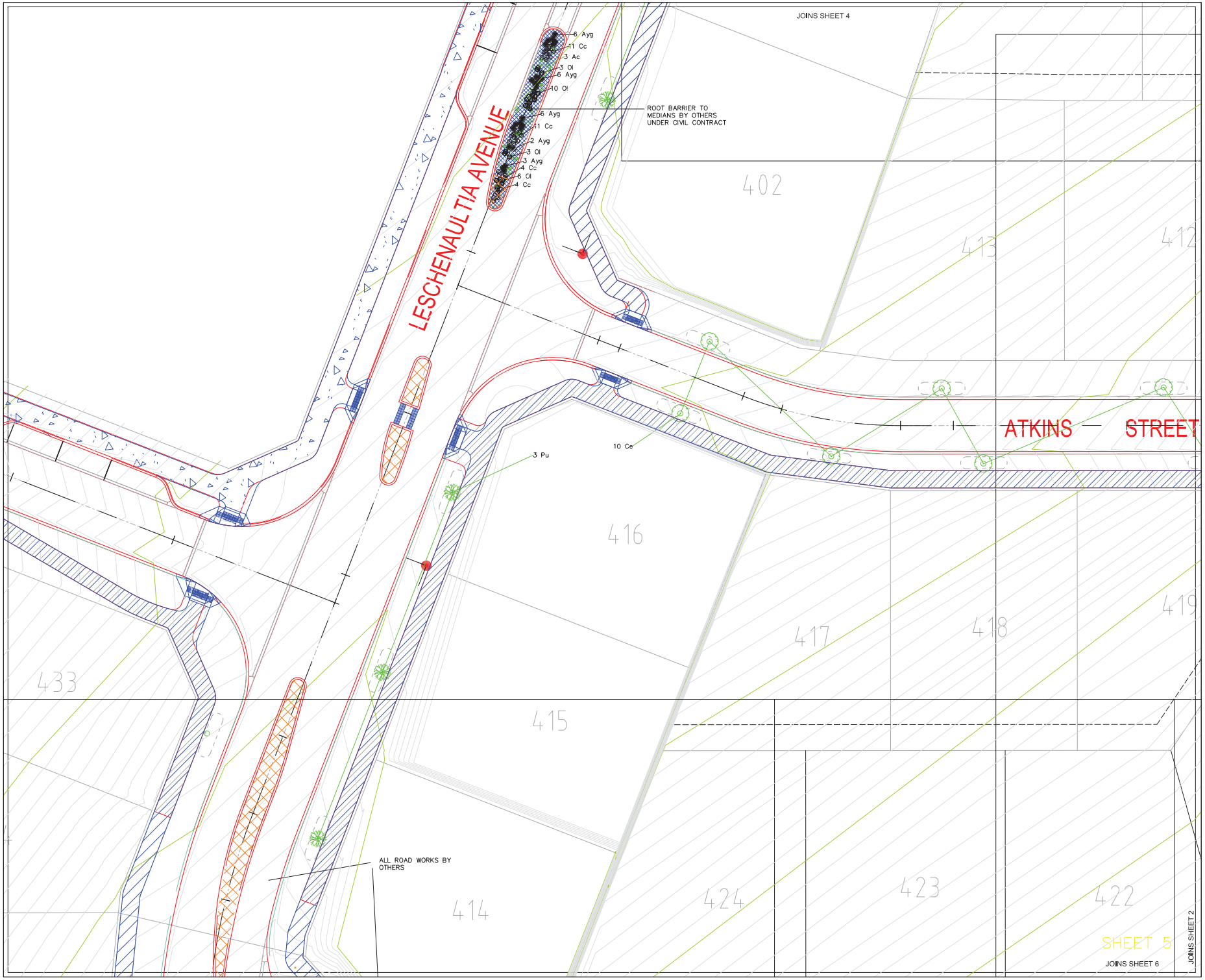

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REV. A 9/3/22, NOTE ON CLEARING ALTERED

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CLIENT: BALWYN MARGARET RIVER PTY LTD

JOB: RAPIDS LANDING STAGES 7 AND 10

DRAWING: LAYOUT SHEET 5 of 6

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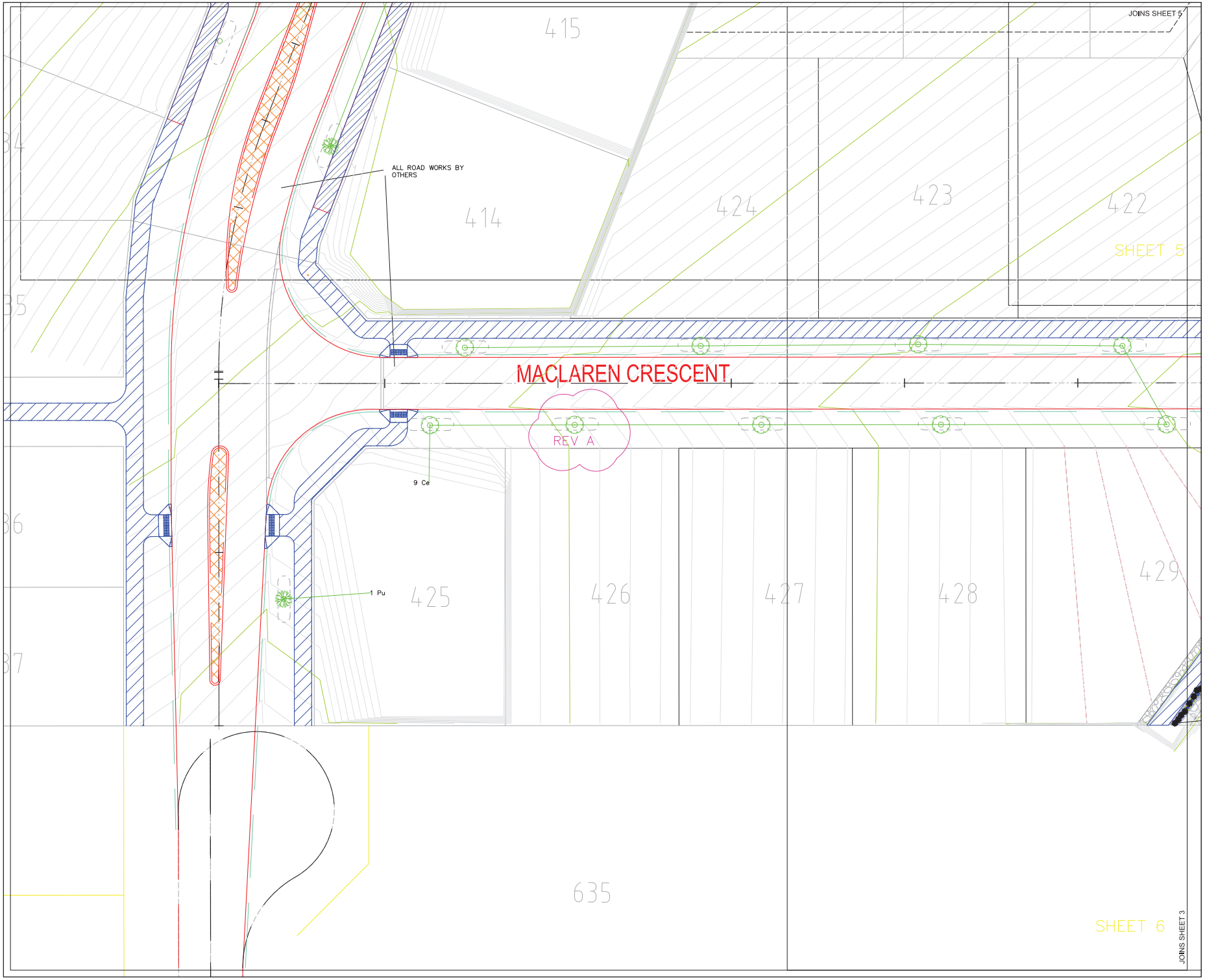

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Principal	
Contractor	
Superintendent	

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REV. B 9/3/22, NOTE ON CLEARING ALTERED
REV A. 18/02/22 TREE AND ROOT BARRIER LOCATION CHANGED

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BALWYN MARGARET RIVER PTY LTD

JOB
RAPIDS LANDING STAGES 7 AND 10

DRAWING
LAYOUT SHEET 6 of 6

SCALE 1:200@A1	DRAWING NO.
DATE 24 JANUARY 2022	18/RL/T/07B
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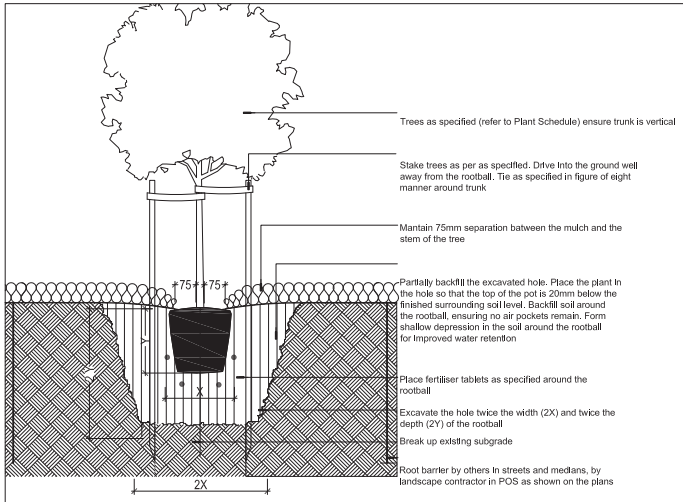
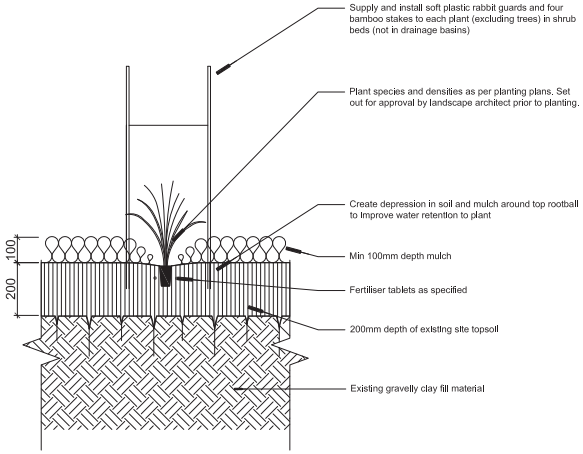
DRAWN WJ	



TREE PLANTING
Scale 1:10



SHRUB PLANTING
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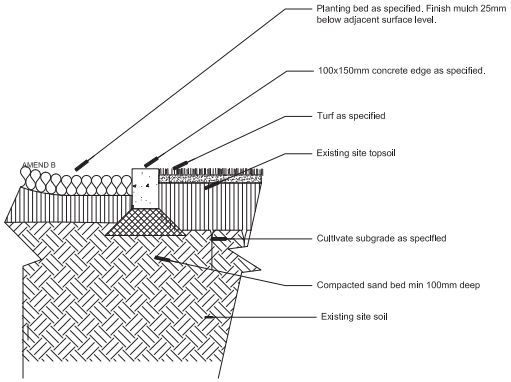
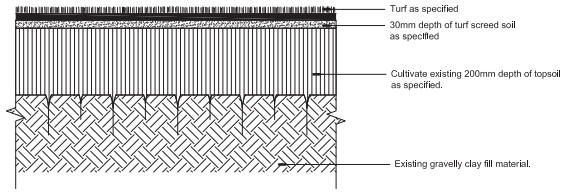
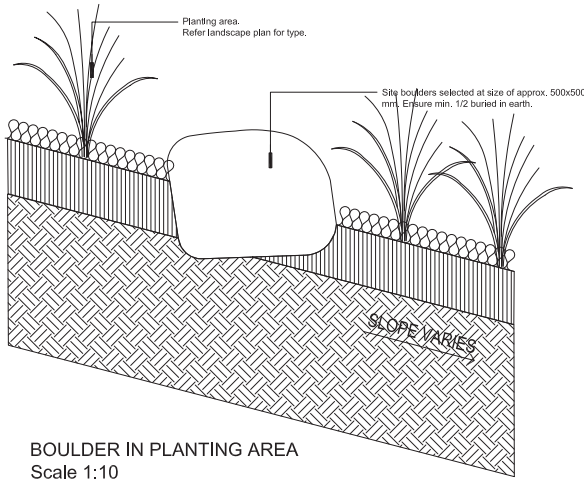


MOWING EDGE
Scale 1:10

TURF NOTES: 1. MATERIALS. TURF IS TO BE FREE FROM INSECT PESTS, DISEASE AND WEED SPECIES. 2. PREPARATION. REMOVE ANY EXISTING TURF, WEEDS OR DEBRIS. 3. LAYING. LAY PIECES OF TURF IN STRAIGHT LINES RUNNING PERPENDICULAR TO THE SLOPE, WITH CROSS-JOINTS STAGGERED, AND CLOSE BUTTING. LAY TURF WITH AN EVEN GRADIENT, FREE FROM LUMPS AND DEPRESSIONS AND NOT ABLE TO POND WATER. ENSURE THAT NEW TURF FINISHES FLUSH WITH EXISTING TURF. TAMP DOWN WELL AND FILL ALL JOINTS WITH TOP DRESSING. 4. TOP DRESSING. TOP DRESSING IS TO BE CLEAN SAND TO COMPLY WITH AS 4419. SPREAD SAND EVENLY OVER SURFACE OF GRASS IN LAYERS OF NOT MORE THAN 10MM. DO NOT BURY GRASS.

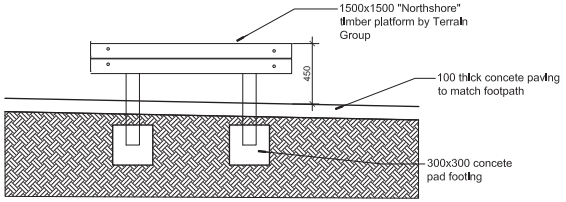


TURF DETAIL
Scale 1:10

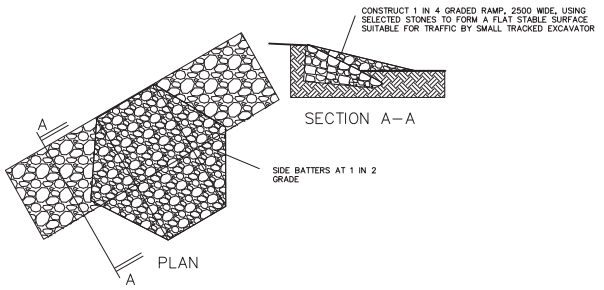


BOULDER IN PLANTING AREA
Scale 1:10

CONCRETE PAD AND SEATING PLATFORM LAYOUT
SCALE 1:50



SEATING PLATFORM DETAIL
SCALE 1:20



SERVICE ACCESS RAMP TO BASINS
SCALE 1:100

REISSUED FOR AMRSC APPROVAL 9 MARCH 2022

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Principal	
Contractor	
Superintendent	

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WILLIAM JAMES LANDSCAPE ARCHITECT
156 ROSA GLEN ROAD, ROSA GLEN WA 6285
Phone 042 777 8087, email wjland18@gmail.com

CLIENT
BALWYN MARGARET RIVER PTY LTD

JOB
RAPIDS LANDING STAGES 7 AND 10

DRAWING
DETAILS - SHEET 1

SCALE	AS SHOWN	DRAWING NO.	
DATE	24 JANUARY 2022		
DESIGNED	WJ		20/RL/T/08
DRAWN	WJ		