

**Lot 9001
Waterloo Road,
Roelands WA**

Revegetation Plan



Bio Diverse Solutions

FINAL v.3

23/08/2019

DOCUMENT CONTROL

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Job No.: MPM002-004
Client: Roelands Development Pty Ltd

REVISION RECORD

Revision	Summary	Revised By	Date
Draft V.1 21/6/2019	Internal QA	K. Kinnear	26/06/2019
Draft v.2 26/06/2019	Updated per internal QA and submitted to client for review	B. Theyer	26/06/2019
Final v.1 8/7/2019	Updated per client review and reissued to client	B. Theyer	8/7/2019
Final v.2 16/07/2019	Issued to Client as final and submitted to DWER	B. Theyer	16/07/2019
Final v.3 23/8/2019	Updated and issued to client and DWER as final.	B. Theyer	23/08/2019



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1. Introduction and Scope

Roelands Development Pty Ltd commissioned Bio Diverse Solutions (Environmental Consultants) to prepare a Revegetation Plan for the existing Elvira Gully located in Lot 9001 Waterloo Road, Roelands (the “subject site”), which is to be implemented at the time of subdivision of Lot 9001. The Revegetation Plan (RP) is required as per WAPC 154305 Condition 28.

The purpose of this RP is to provide a mechanism for coordinating and implementing management and protection of the Elvira Gully area.

The objectives of this plan are to:

- Provide the Developer guidance on remnant vegetation to be protected during the Development process;
- Provide a framework for implementing further revegetation works and weed management across the allocated section of the Elvira Gully adjacent to the development;
- Increase catchment health for downstream wetlands through revegetation and foreshore protection; and
- Provide protection to the Elvira Gully and increase future biodiversity values to the area.

1.1. Site location

The “subject site” is defined as Lot 9001 Waterloo Road, whilst the “survey area” described within this report includes the Elvira Gully and the riparian zone within the proposed northern lots of Lot 9001 Waterloo Road, Roelands. The subject site is approximately 13 km east of Australind (CBD), and is within the locality of Roelands, within the municipality of the Shire of Harvey. Please refer to Figure 1 below – Subject Site Locality. As part of this process an Effluent Management Plan was developed and accepted by the Shire of Harvey, whereby the edge of remnant gully vegetation (as determined by surveyors) was used to determine the 30m effluent setback (refer to Figure 2 Effluent and building envelope plan). This remnant gully vegetation has been utilized to determine the riparian zone that is to be revegetated.



Figure 1: Subject site locality

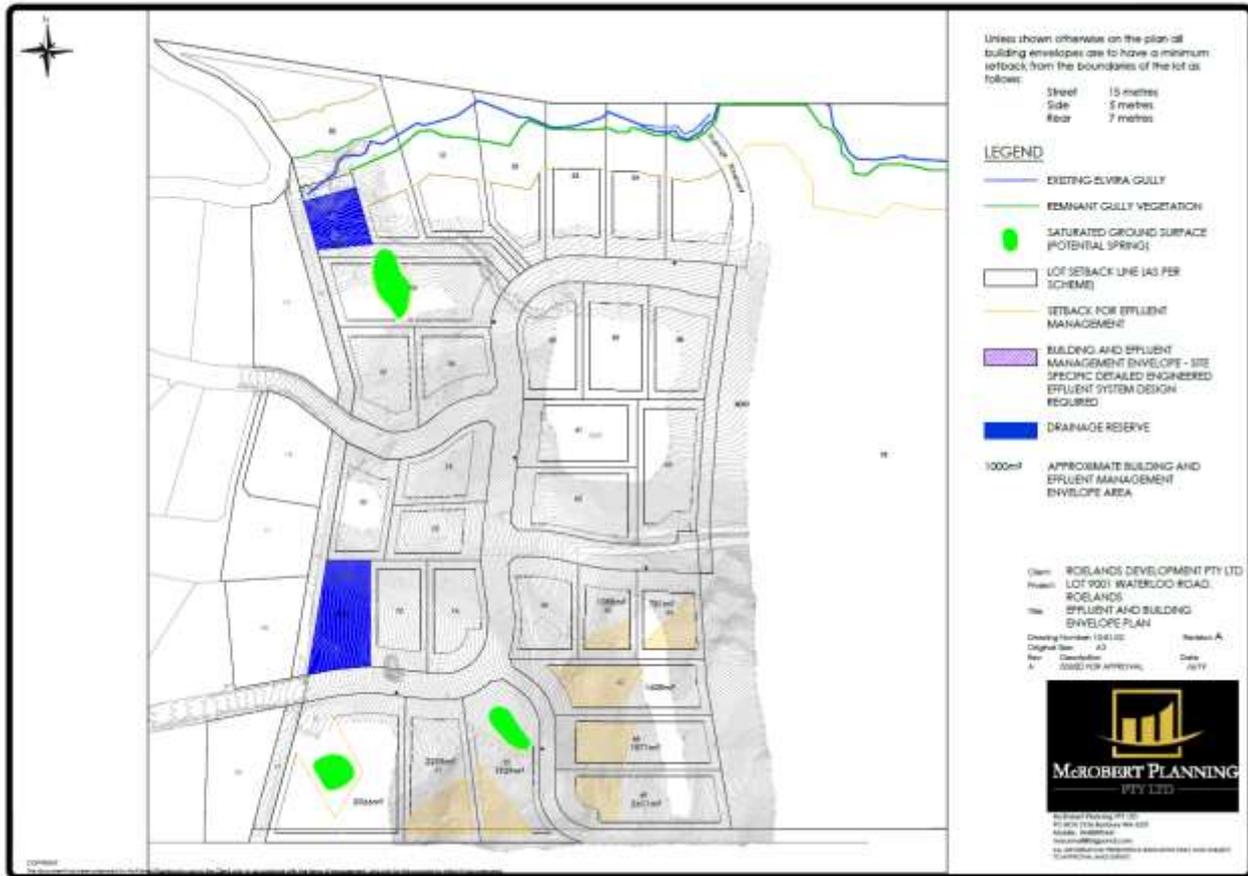


Figure 2: Effluent and building envelope plan

1.2. Development proposal

The development has been approved (WAPC 154305) and will include 29 Lots; 28 rural residential lots ranging from 3037m² to 1.19ha, whilst Lot 78 (14.86ha) will remain currently undeveloped. The northern lots of the development (50-54 and part of Lot 78) contain an existing Elvira Gully that must be revegetated as part of the WAPC conditions (Condition 28). As part of this process an Effluent Management Plan was developed and accepted by the Shire of Harvey, whereby the edge of remnant gully vegetation (as determined by surveyors) was used to determine the 30m effluent setback. This remnant gully vegetation has been utilized to determine the Riparian Zone within which areas are to be revegetated.

It is noted the revegetation area will end up in private ownership, the developer will have no control over revegetation after the three-year maintenance period has expired.

2. Remnant Vegetation Values

The subject site lies within the SWA2 - Swan Coastal Plain Interim Bio-geographic Regional Area (IBRA bioregion). Mitchell *et al* (2002) describes the Swan Coastal Plain IBRA region as: “*low lying coastal plain, mainly covered with woodlands. It is dominated by Banksia or Tuart on sandy soils, Casuarina obesa on outwash plains, and paperbark in swampy areas. In the east, the plain rises to duricrusted Mesozoic sediments dominated by Jarrah woodland.*”

The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd *et al* 2002) in the 1970’s, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics (Sandiford and Barrett 2010). A GIS search of J.S. Beards vegetation classification for the general area places the site within 2 Vegetation Associations (DPIRD, 2018);

- **System Association Name:** Pinjarra
- **Vegetation Association Number:** 968
- **Vegetation Description:** Woodland southwest; Jarrah, Marri and Wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*.

- **System Association Name:** West Darling
- **Vegetation Association Number:** 4
- **Vegetation Description:** Woodland southwest; Jarrah, Marri and Wandoo *Eucalyptus marginata*, *Corymbia calophylla*, *E. wandoo*.

2.1. Soil Characteristics

Soil landscape mapping within the publicly available NRInfo shows the subject site lies within the Lowden Valleys System which is characterised by “*Deep gneissic valleys, in the south of the Western Darling Range. Loamy earth, loamy duplex, gravel and stony soils. Jarrah-marri forest.*” (DPIRD, 2018). The soil landscape mapping zone is the Western Darling Range Zone which is described as “*Moderately dissected lateritic plateau on granite with deeply incised valleys, includes the Darling Scarp on the western margin. Soils are formed in laterite, lateritic colluvium and weathered in-situ granite and gneiss*” (DPIRD, 2018). During the site visit the soils were described as sandy loamy clay.

2.2. Existing Vegetation

On the 29th May 2019 Bianca Theyer (Bio Diverse Solutions) undertook an assessment of the existing Elvira Gully area. The site is highly degraded and contains minimal native vegetation. The Elvira Gully was at the time of assessment mainly devoid of water except in the eastern portion of the survey area where there is a small dam. The vegetation present within the survey area consists of pasture species such as Kikuyu ** (*Cenchrus clandestinus*) and Cape Weed ** (*Arctotheca calendula*), with a small infestation of Black Berry ** (*Solanum nigrum*), and an introduced orchard species found along the Elvira Gully and Bulrush ** (*Typha sp.*) being present in the small dam area in the east. There are some sparsely located Marri (*Corymbia calophylla*) and Paperbarks (*Melaleuca raphiophylla*) along the Elvira Gully area. (** denotes weed species). The vegetation within the survey area is therefore classed as being “Completely Degraded” (Keighery, 1994) refer to Table 1 below.

Table 1: Condition Rating Scale (Keighery, 1994)

Vegetation Condition Rating	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species.
Very good	Vegetation structure altered, obvious signs of disturbance.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate to it.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management.
Completely Degraded	Vegetation structure not intact; the area completely or almost completely without native species.

The survey area is eroded in some areas, with only a few native tree species located along the Elvira Gully. There is no existing fringing vegetation (i.e. rushes etc) within the riparian area or Elvira Gully. Therefore, the area has been categorized as D Grade (refer to Table 2). The area doesn’t fit entirely into any one category, however it is best categorized as “Drain-weed dominated”. The Elvira Gully does not contain water year-round, therefore erosion is not prevalent along the whole Elvira Gully, but is localised in areas that are steeper than the remaining Elvira Gully, or where tree roots etc result in water flow issues. The vast majority of the Elvira Gully is covered in pasture species and there is devoid of fringing vegetation. Refer to Figure 3.

Table 2: Foreshore Condition Assessment Grading (Waters and Rivers Commission 1999)

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

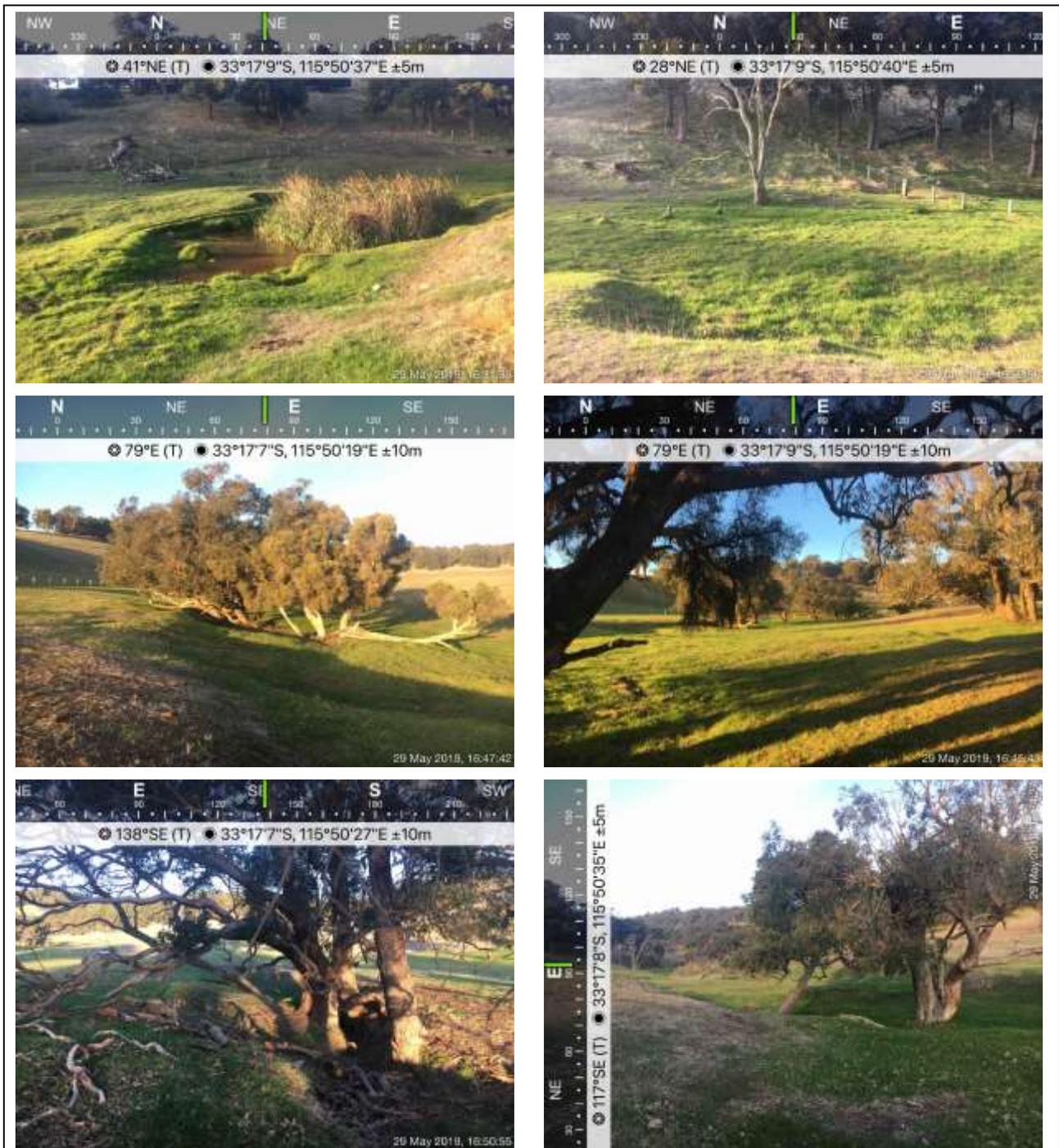


Figure 3: Photographs depicting conditions within the survey area / Elvira Gully area.

3. Restoration and Revegetation Works

3.1. Objectives

- To re-instate native vegetation to protect the riverbanks of the Elvira Gully and associated riparian zone area.
- To establish and preserve existing vegetation and regeneration of denuded areas with local endemic species without increasing bushfire risks; and
- To remove identified Black berry, Bulrush and Orchard escapee species.

3.2. Strategies

The following strategies are to be employed on the site to reach successful revegetation of the Elvira Gully / riparian zone area:

- Revegetation to take place in two stages (see Table 3 below). Stage 1 is to be carried out at time of subdivision. Stage 2 is to be carried out when the balance of land (Lot 78) is developed;
- Planting local and endemic native vegetation to reinstate / increase the future biodiversity and Elvira Gully qualities of the area;
- To implement a weed management plan to reduce competition of weeds with native species; and
- Create barriers to revegetation areas.

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

Table 3: Revegetation Zones

Stage	Description	Total Area m ²
Stage 1	Gully area within this stage of the subdivision. Lots 50-54 and part of Lot 78.	1663.47
Stage 2	Gully located in next stage of subdivision – Lot 78.	1600.55

Surface preparation

Currently the Elvira Gully area within the riparian zone is completely vegetated with grass species. As the Elvira Gully does not hold water year-round no dredging of the Elvira Gully will occur. To ensure that native seed germination and seedling survival rates are maximised, weed removal through spraying and selective removal (See Section 4 for more detail) will be undertaken; providing optimal soil condition for germination and root development.

No clearing or excavation of the banks is permitted as such direct planting using a pottiputki parallel to any banks or slopes should be undertaken and direct planting in flat areas only as this will assist with minimising runoff, whilst brushing can reduce effects of wind erosion. In areas where the banks are higher and/or have become eroded a pottiputki for direct seedling planting will be utilised and/or sandbagging for replanting will be undertaken. To reduce rabbit grazing pressure seedlings should be planted deeply in the soil profile, ensuring up to a third of the stem is buried. In the steep bank areas shrubs and sedges should be planted in sandbags to ensure the longevity and establishment of the plants in the steep banked areas. In addition, seedlings not placed within sandbags should be planted deeply in the soil profile, ensuring up to a third of the stem is buried to reduce rabbit grazing pressures.

Sandbagging techniques include:

- Sandbags to placed / stacked on an angle parallel to the flow at an average of two bags per square metre.
- Two stems to be planted per sandbag to achieve 4 stems per square metre.

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

Species selection and plant allocations

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

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

Table 4 outlines the plant species as a guide and final selection may be subject to budget, soil conditions and availability of stock at time of revegetation. The majority of revegetation species are rushes/sedges so as not to increase any bushfire risks to the site through the establishment of shrubs and trees. Some occasional trees are incorporated into the revegetation plan.

Table 4: Species for Revegetation

Sedges / rushes	Shrubs / Trees
<i>Baumea juncea</i>	<i>Melaleuca raphiophylla</i>
<i>Carex appressa</i>	<i>Eucalyptus rudis</i>
<i>Ficinia nodosa</i>	
<i>Juncus kraussii</i>	
<i>Juncus pallidus</i>	
<i>Juncus pauciflorus</i>	
<i>Lepidosperma effusum</i>	
<i>Lepidosperma longitudinale</i>	
<i>Lepidosperma tetraquetrum</i>	

The above table is a guide and can be refined when seed stock/seedling availability is defined. Proposed planting densities of the tree and sedges/rush species are:

- Trees: 1 stem every 10m along the gully.
- Sedges and rushes: 4 stems/5m².

Completion Targets

At the end of installation, a report will be provided to the Shire of Harvey detailing the final numbers of seedlings planted in the revegetation zones, and any variations from the original revegetation plan.

The following completion targets are hoped to be achieved post initial planting:

- A 90% survival rate of the planted seedlings within the designated areas. Should this rate not be met, infill planting will be required to raise the surviving plant numbers above 90% of the initial planting density;
- In the specified revegetation zones the target is less than 20% weed cover, and for all declared and priority weed species to be 0%; and
- Stabilization of banks that have become eroded.

It is noted the revegetation area will end up in private ownership, the developer will have no control over revegetation after the three-year maintenance period has expired.

Seedling Planting

Planting of seedlings will commence after the season's first major rains (typically June/July) when the soil is sufficiently wet to plant without the need for additional watering and to allow maximum root growth and plant establishment before summer. It is generally an optimum time after three-four continuous rain days observed in Autumn months, however later planting due to recent drier climate patterns can extend this period into June/July. Individual species will be planted irregularly to reflect the distribution found in natural areas.

Infill planting will be carried out in subsequent winters as required. The quantities required for infill planting will be calculated through monitoring between plant installations in subsequent winter and autumns with final numbers being based on percentage survival rates of initial planting.

Site and Plant Protection

Rabbit proof barriers may need to be installed around seedlings at time of planting. In the steep bank areas, a technique of planting shrubs and sedges in sandbags to ensure the longevity and establishment of the plants in the steep banked areas, whilst also providing protection from rabbits.

Maintenance

Revegetation maintenance work will be carried out for a period of three years post initial planting. The developer (Roelands Pty Ltd) has indicated that a note will be placed on the offer and acceptance for those properties with revegetation within the lot (i.e. for Stage 1 Lots 50 – 54). This note will indicate the developer is to maintain the vegetation for the three years post implementation as per this revegetation plan and will require access for these purposes. A copy of the revegetation plan will also be handed on to the relevant lot owners upon purchase of said lot. A schedule for revegetation, maintenance works and monitoring is shown in Appendix A – Revegetation Management Plan & Implementation Schedule.

4. Weed Management Plan

Weed management is to be used in conjunction with dieback disease management. The following Weed Management Plan is to apply to all aspects of site operations. All operations shall conform to this Weed Management Plan, and monitoring to occur post construction for any infestations.

4.1. Aims of Weed Management Plan

The aims of the Weed Management will be to:

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

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

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

4.2. Program for weed control

The following program for weed management will be implemented during site construction phases and post monitoring phases. Table 5 (over the page) is a guide for aggressive and common species (adapted from Department of Agriculture and Food recommended techniques) and should be used as a guide to treat any infestations promptly. Further information for any species and recommended treatment not listed in Table 5 should be gained from the Department of Primary Industries and Regional Development (previously Department of Agriculture and Food).

Table 5: Weed Management Program

Species	Treatment
Grasses	
Bearded Oat <i>Avena barbata</i>	A grass selective herbicide is preferred in most situations. A mixture of 5mL Targa® or Fusilade®212 (or 2mL Verdict®520) plus 100mL spray oil in 10L water applied in winter before flowering will provide control with little effect on broad-leaved species.
Kikuyu <i>Pennisetum clandestinum</i>	Manual control difficult. 100mL glyphosate (450g/L) in 10L of water whilst actively growing (spring/autumn). Repeat every 8 weeks or when regrowth reaches 5cm tall. Mowing and cultivation ineffective.
Guildford Grass <i>Romulea rosea</i>	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse® or 2.5-5 g/ha + Pulse®. Apply just on flowering at corm exhaustion.
Ryegrass <i>Lolium rigidum</i>	Prevent seed set. Spary with 5mL Select® or 10mL quizalofop (100g/L) or 4mL Verdict®250 or 30mL Fusilade®Forte plus 100mL spary oil in 10L water in winter when thegrass has 2-8 leaves. In agricultural settings ryegrass may be resistant to grass-selective herbicides and will need to be treated with glyphosate.
Woody Weeds	
Blackberry <i>Rubus ulmifolius</i>	Three annual summer applications of 100mL Grazon plus 25mL of pulse in 10L of water, use 100mL Glyphosate in 10L of water in sensitive areas (i.e. creek lines).
Night shade <i>Solanum nigrum</i>	Prevent seed set for several years. Hand remove plants before flowering and/or spray 20mL Starane in 10L water during the plant is growing in summer.
Common Fig <i>Ficus carica</i>	Hand remove seedlings. Stem inject with 50% glyphosate and foliar spray regrowth with 10% glyphosate. For stems less than 30 cm diameter apply 250 ml Access® in 15 L of diesel to basal 50 cm of trunk (basal bark)
Herbs	
Cape Weed <i>Arctotheca calendula</i>	For large infestations apply Lontrel® 6 ml/10 L (300 ml/ha) in early growth stages. Glyphosate at 0.2% will provide some selective control if the plants are young or at the budding stage, otherwise spot spraying glyphosate at 10 ml/L will control capeweed at all growth stages.
Fleabane <i>Conyza species</i>	Spray in late spring Lontrel® 5mL plus 25mL wetting agent in 10L water. Hand removal- remove taproot.
Smooth Cats Ear <i>Hypochaeris glabra</i>	Apply 500mL/ha of Lontrel®. Rosettes may be wiped with 1-part glyphosate in 2 parts water. Small infestations use 50mL of Tordon®75-D in 10L of water.
White Clover <i>Trifolium repens</i>	Prevent seed set for 5 years. 500mL/ha Lontrel® or 50g/ha Logran® applied in early winter provides reasonably selective control.
Arum Lily <i>Zantedeschia aethiopica</i>	Mechanical control only effective is all root fragments removed. Multiple rotary hoeing over a few years provides control. Herbicides are most effective use 1g chlorsulfuron(750g/kg) plus 10mL 2,4-D amine(500g/L) plus 25mL Pulse® per 10L of water. Or use 1g metsulfuron(600g/L) plus 25mL Pulse® per 10L of water.
<i>Watsonia</i> sp.	Thick infestations difficult to control manually. 100g 2,2-DPA (740g/kg) plus 25mL wetting agent in 10L water is the preferred herbicide. Apply from flower stem emergence to mid flowering for best control. For larger areas use 10kg/ha 2,2-DPA (740g/kg) plus 0.25% wetting agent.

Ref: Western Australian Herbarium (1998-) and Moore and Wheeler (2002).

Disclaimer

Note: The above herbicide treatments in Table 5 are direct quotes from *Southern Weeds and their control* (J. Moore and J. Wheeler, Department of Agriculture and Food WA.) and *The Western Australia Herbarium (1998-)* the control methods are based on using common cultural, biological and herbicidal control techniques. The reader should read the label of herbicides for further information, MSDS and registration status.

4.3. Management and Control of weeds

Initial management will be undertaken by the developer as part of the ongoing management. The annual spraying and weed management shall continue for a period of three years post works commencing. Some weeds such as kikuyu will be difficult to completely eradicate from the site without implementing extreme management objectives which will be costly and impractical in terms of long-term management. It is recommended that modest management objectives in regards to weed control are implemented and that non-declared and non-invasive weeds can be managed in a way that is periodically beneficial to site works and overall completion objectives (e.g. some non-invasive species are currently providing soil stabilisation). The larger areas within the riparian zone not revegetated will remain as grassland. This has been done in

part to keep future maintenance for landowners to a modest level. These areas will need to be mowed and maintained throughout the management period.

As the new foreshore area will be managed by the new landowners weed management needs to be able to be successfully implemented with modest management. The new landowner may be required to continue the weed management program to ensure continued natural regeneration occurs due to a reduction in further establishment of weeds. Refer to Appendix A – Revegetation Management Plan & Implementation Schedule for management actions and timeframes.

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

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

5. Implementation

Roelands Development Pty Ltd have agreed to implement the approved Revegetation Plan at the time of subdivision of Lot 9001 Waterloo Road, Roelands. In doing so they give a commitment to a works and implementation schedule as outlined in Appendix A – Revegetation Management Plan & Implementation Schedule. As Lot 78 of the subdivision is not going to be developed at this stage a staged approach to the revegetation plan is to be applied, whereby the section of Elvira Gully within Lot 78 will be revegetated at a later date. The gully partially extends into Lot 78; however, revegetation will cease at the existing fence line and also where the gully subsequently extends out into the adjacent property. DWER has indicated that this staged approach is acceptable given the balance of land (Lot 78) is to remain undeveloped (*pers comms* D. Wong, 2019).

6. Timing of works

Stage 2 construction of the Roelands estate is programmed for summer 2019/2020. A guide for the timing of development of the revegetation plan is shown in Appendix A.

7. Performance monitoring

The developer will implement monitoring procedures to assess the success of management strategies addressing weed control activities and slope stability during the three-year management period. This will allow the identification of any areas requiring remedial works to be identified early and appropriately planned.

8. Revegetation performance criteria and reporting

The revegetation zones will be monitored and maintained for three years following installation to ensure progress towards the completion targets are met. The following completion targets are hoped to be achieved post initial planting:

- A 90% survival rate of the planted seedlings within the designated areas. Should this rate not be met, infill planting will be required to raise the surviving plant numbers above 90% of the initial planting density;
- In the specified revegetation zones the target is less than 20% weed cover, and for all declared and priority weed species to be 0%; and
- Stabilization of banks that have become eroded.

It is noted the revegetation area will end up in private ownership, the developer will have no control over revegetation after the three-year maintenance period has expired.

9. Completion of project

Prior to the occupation, or as otherwise agreed to in writing by the SoH, detailed plans outlining the success/failure of the revegetation plan will be submitted to the SoH demonstrating the implementation and targets met. A site inspection will be undertaken with the SoH to inspect the completion of the project and the successful implementation of the revegetation plan. If there are areas of concern from the SoH this will be attended to by the developer. If the matter cannot be resolved within the specified timeframes Roelands Pty Ltd will need to make an arrangement to the satisfaction of the SoH and the new landowner for the ongoing works.

10. Fire Protection Measures

The approved Bushfire Management Plan for stage 2 Lot 9001 Waterloo Road did not account for revegetation in the Elvira Gully. An updated BAL Contour Plan based on the revegetation being classified as “Woodland Type B” is shown in Appendix B. Post implementation of this revegetation plan BAL-29 or less will apply to the proposed building envelopes as per the requirements of SPP3.7.

11. References

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12. Appendices

Appendix A – Revegetation Management Plan & Implementation Schedule

Appendix B – BAL Contour Map (Updated 26/06/2019).

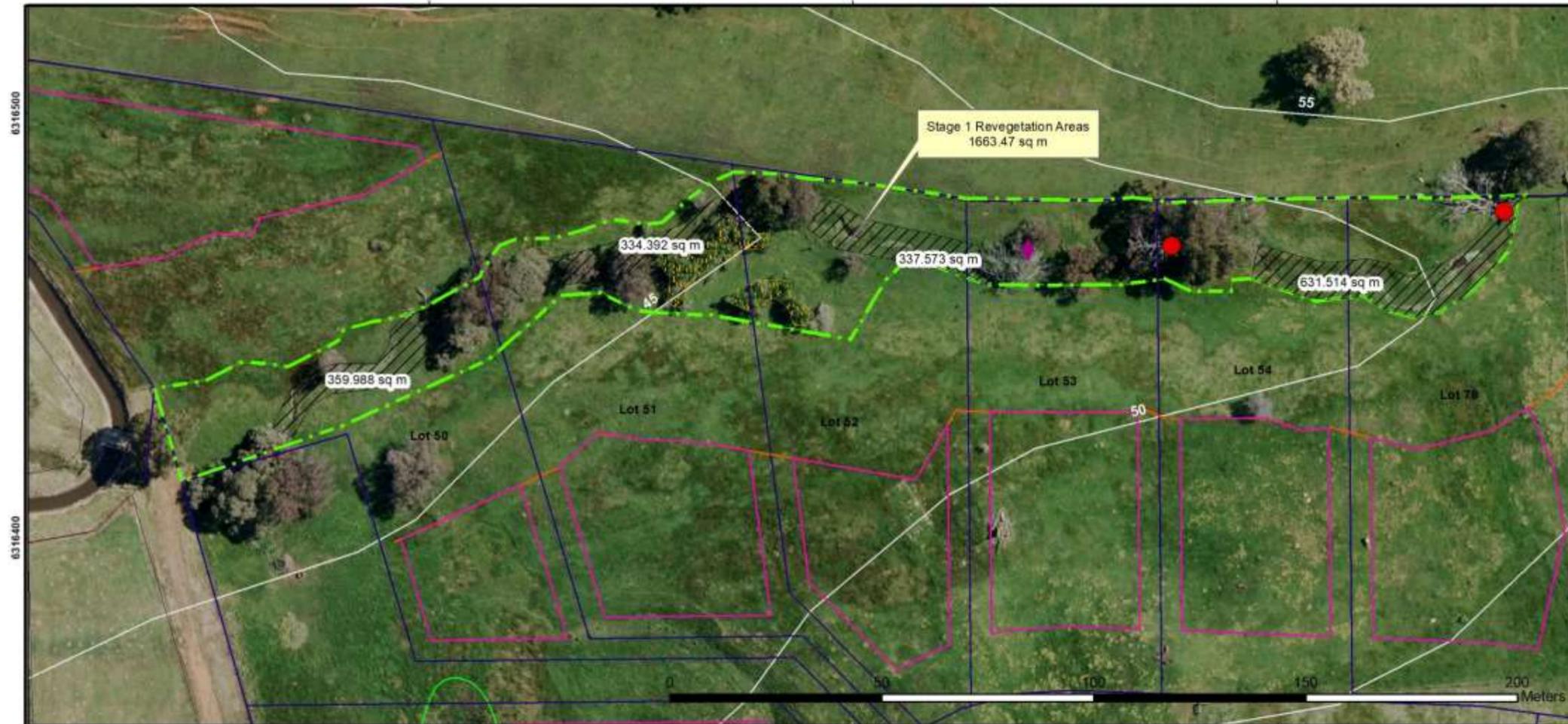
Appendix A

Revegetation Management Plan & Implementation Schedule

Revegetation Management Plan



Overview Map Scale 1:100,000



Legend

-  Lot Layout
-  Building Envelopes
-  30m Effluent Management Setback
-  Cadastre
-  5m Contours
-  Revegetation Area (Riparian Zone)
-  Black Berry infestation
-  Dead tree to be removed
-  Typha sp. infestation
-  Introduced tree species for removal
-  Revegetation Zones



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

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
RIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT

Roelands Development Pty Ltd
Lot 9001 Waterloo Road
Roelands, WA

Revegetation Master Plan

Survey Personnel BT	QA Check KK	Drawn by BT
STATUS FINAL	FILE MPM002-004	DATE 26/06/2019

Implementation Schedule

Weed Management - Refer to Section 4 -Table 4												
Period Post Subdivision	Broadleaf weeds Kikuyu, water couch etc.	Bearded Oat	Guildford Grass	Ryegrass	Watsonia	Blackberry	Common Fig	Nightshade	Fleabane	Smooth Cats Ear	Arum Lily	White Clover
Year round	Mowing and maintenance of larger areas of grass. 100mL gyphosate (450g/L) in 10L of water.				100g 2,2-DPA plus 25mL wetting agent in 10L water. Start at upper river reaches. Dig isolated plants.		Hand remove seedlings					Manual removal of small/isolated infestations year round.
Year 1 Post subdivision Spring Sept-Nov	100mL gyphosate (450g/L) in 10L of water. Repeat every 8 weeks or when regrowth reaches 5cm tall.								Spray in late spring Lontrel 5mL plus 25mL wetting agent in 10L water. Hand removal-remove taproot.	Hand remove small infestations and/or isolated plants, ensuring the taproot is removed.		
Year 1 Post subdivision Summer Dec-Feb						Three annual summer applications of 100mL Grazon plus 25mL of pulse in 10L of water, use 100mL Glyphosate in 10L of water in sensitive areas (i.e. creeklines).	Stem inject with 50% glyphosate and foliar spray regrowth with 10% glyphosate. For stems less than 30cm diameter apply 250 ml Access® in 15 L of diesel to basal 50 cm of trunk (basal bark).	Prevent seed set for several years. Hand remove plants before flowering and/or spray 20mL Starane in 10L water during the plant is growing in summer.				
Year 1 Post subdivision Autumn Mar-May												
Year 1 Post subdivision Winter Jun-Aug		A mixture of 5mL Targa® or Fusilade®212 (or 2mL Verdict®520) plus 100mL spray oil in 10L water applied in winter before flowering will provide control with little effect on broad-leaved species.	Spot spray metsulfuron methyl 0.2 g/15 L + Pulse® or 2.5-5 g/ha + Pulse®. Apply just on flowering at corn exhaustion.	Prevent seed set. Spary with 5mL Select® or 10mL quizalofop (100g/L) or 4mL Verdict®250 or 30mL Fusilade®Forte plus 100mL spary oil in 10L water in winter when thegrass has 2-8 leaves. In agricultural settings ryegrass may be resistant to grass-selective herbicides and will need to be treated with glyphosate.						Apply 500mL/ha of Lontrel. Rosettes may be wiped with 1 part glyphosate in 2 parts water. Small infestations use 50mL of Tordon®75-D in 10L of water. Manual removal of small infestations and/or isolated plants.	Mechanical control only effective is all root fragments removed. Multiple rotary hoeing over a few years provides control. Herbicides are most effective use 1g chlorsulfuron (750g/kg) + 10mL 2,4-D amine(500g/L) + 25mL Pulse® per 10L of water. Or use 1g metsulfuron (600g/L) + 25mL Pulse® per 10L of water.	500mL/ha Lontrel® or 50g/ha Logran® applied in early winter provides reasonably selective control.

Disclaimer Note: the above herbicide treatments are direct quotes from Southern Weeds and their control (J.Moore and J.Wheeler, Department of Agriculture and Food WA.) and The Western Australian Herbarium (1998-) or the control methods are based on using common cultural, biological and herbicidal control techniques. The reader should read the label of herbicides and MSDS for further information, treatment and registration status.

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Year 2 Post subdivision Spring Sept-Nov	100mL gyphosate (450g/L) in 10L of water. Repeat every 8 weeks or when regrowth reaches 5cm tall.								Spray in late spring Lontrel 5mL plus 25mL wetting agent in 10L water. Hand removal-remove taproot.	Hand remove small infestations and/or isolated plants, ensuring the taproot is removed.		
Year 2 Post subdivision Summer Dec-Feb						Three annual summer applications of 100mL Grazon plus 25mL of pulse in 10L of water, use 100mL Glyphosate in 10L of water in sensitive areas (i.e. creeklines).	Stem inject with 50% glyphosate and foliar spray regrowth with 10% glyphosate. For stems less than 30cm diameter apply 250 ml Access® in 15 L of diesel to basal 50 cm of trunk (basal bark).	Prevent seed set for several years. Hand remove plants before flowering and/or spray 20mL Starane in 10L water during the plant is growing in summer.				
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Year 3 Post subdivision Spring Sept-Nov	100mL gyphosate (450g/L) in 10L of water. Repeat every 8 weeks or when regrowth reaches 5cm tall.								Spray in late spring Lontrel 5mL plus 25mL wetting agent in 10L water. Hand removal- remove taproot.	Hand remove small infestations and/or isolated plants, ensuring the taproot is removed.		
Year 3 Post subdivision Summer Dec-Feb						Three annual summer applications of 100mL Grazon plus 25mL of pulse in 10L of water, use 100mL Glyphosate in 10L of water in sensitive areas (i.e. creeklines).	Stem inject with 50% glyphosate and foliar spray regrowth with 10% glyphosate. For stems less than 30cm diameter apply 250 ml Access® in 15 L of diesel to basal 50 cm of trunk (basal bark).	Prevent seed set for several years. Hand remove plants before flowering and/or spray 20mL Starane in 10L water during the plant is growing in summer.				
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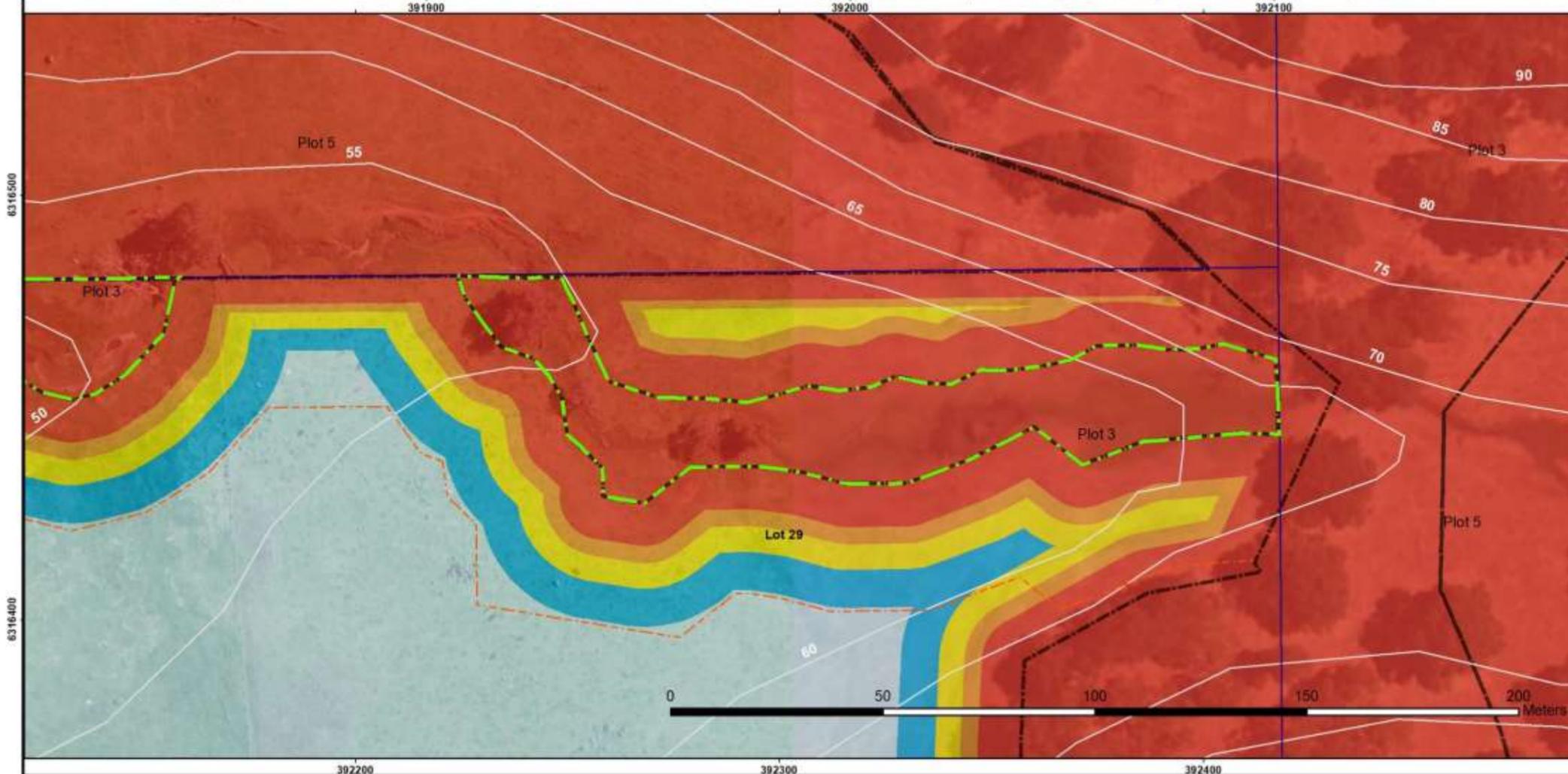
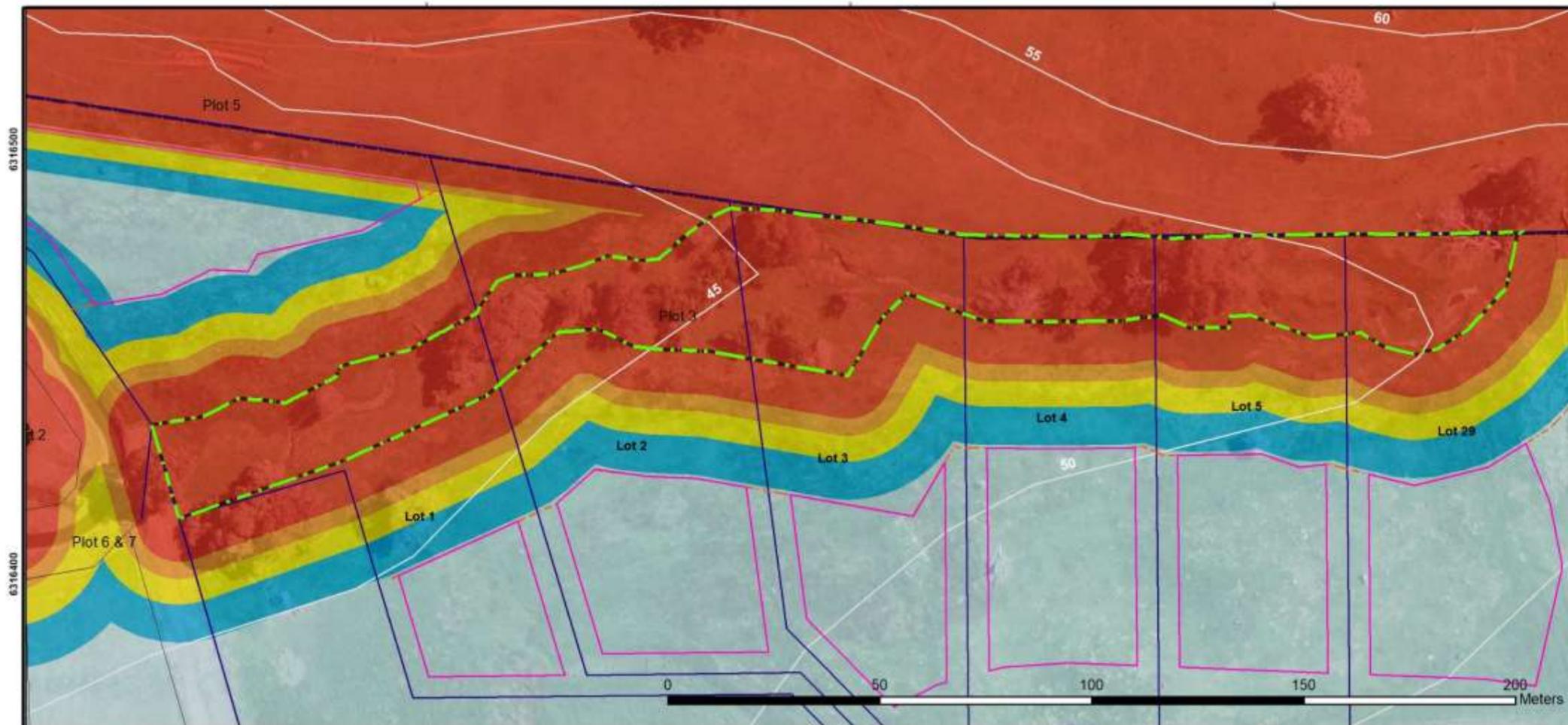
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Period	Restoration / Revegetation Works / Bank stability. See Section 3	Weed Management. See Section 4
Year round	Observations on seedling survival throughout the revegetation area and slope stability in eroded areas of bank. Any urgent works to be actioned immediately.	Observations on weed management, with remedial actions (i.e. mulching) implemented within the next weed management round.
Year 1 Spring Sept-Nov		Commence weed management including mulching.
Year 1 Summer Dec-Feb		Commence weed management including mulching where required.
Year 1 Autumn Mar-May	Commence surface preparation.	
Year 1 Winter Jun-Aug	Commence planting.	Commence weed management including mulching where required.
Year 2 Spring Sept-Nov	Inspect planting uptake / success.	Site inspection to assess weed management and determine the need and intensity of further remedial works.
	Site inspection of bank slopes post first winter.	
	Any urgent remedial works to be actioned immediately.	Continue weed management including mulching where required.
Year 2 Summer Dec-Feb		Continue weed management including mulching where required.
Year 2 Autumn Mar-May	Inspect planting uptake / success.	Site inspection to assess weed management and determine the need and intensity of further remedial works.
Year 2 Winter Jun-Aug	Replanting where required.	Continue weed management including mulching where required.
Year 3 Spring Sept-Nov	Inspect planting uptake / success.	Site inspection to monitor weed management, prioritise areas with high levels of weed cover for further weed management.
	Site inspection of bank slopes, any urgent remedial works to be actioned immediately.	
		Continue weed management including mulching where required.
Year 3 Summer Dec-Feb		Continue weed management including mulching where required.
Year 3 Autumn Mar-May	Inspect planting uptake / success.	
Year 3 Winter Jun-Aug	Replanting where required.	Continue weed management including mulching where required.
Completion Targets	90% survival rate of planted seedlings.	Reduction in overall weed density, with less than 20% weed coverage in specified revegetation zones.
	Stabilisation of bank slopes in areas previously devoid of vegetation.	0% declared weeds within all Zones.
	Removal of rabbit/kangaroo guards once established and prior to handover to new landowner	

**** Note the revegetation area will end up in private ownership, the developer will have no control over revegetation after the three-year maintenance period has expired.**

Appendix B

BAL Contour Map (Updated 26/06/2019).



29 Hercules Crescent
Albany, WA 6330
Australia

Tel: 08 9842 1575



Overview Map Scale 1:100,000

Legend

- Lot Layout
- Building Envelopes
- - - 30m Effluent Management Setback
- Cadastre
- 5m Contours
- - - - - Revegetation Area (Riparian Zone)

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW



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

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT

Roelands Development Pty Ltd
Lot 9001 Waterloo Road
Roelands, WA

BAL Contour Plan - Post Development

Survey Personnel BT	QA Check KK	Drawn by BT
STATUS FINAL	FILE MPM002-004	DATE 26/06/2019