

Appendix 11

Rehabilitation Report



OCTOBER 2014

REHABILITATION REPORT

For:

Section 75W Modification (2)

DA No. 267 – 11 - 99

Roberts Rd, Maroota

Prepared For

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Client

Hodgson Quarry Products Pty Ltd



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1.0 Introduction

This report has been prepared by R. L. Frew Landscape Architectural Services Pty Ltd, T/A Conzept, to describe the proposed landscape rehabilitation strategy for the sand extraction activity located at Hodgson Maroota Quarry (Lot 1 & 2, DP 228308, and Lot 2, DP 312327).

This report has been prepared to accompany consultants plans and reports prepared for the proposal, including the planning report prepared by **Nexus Environmental Planning Pty Ltd**, and the engineering plans and reports prepared by **VGT Environmental Compliance Solutions Pty Ltd**.

The site is subject to approved sand extraction activity, and the aim of this report is to regularise and update the landscape rehabilitation process in line with the proposal.

This report should be read in conjunction with the plans and reports prepared by the above mentioned consultants, and the following plans prepared by this office, including:

LPDA 15-94 / 1 - **Cover Sheet**

LPDA 15-94 / 2 – **Bund Rehabilitation Plan**

LPDA 15-94 / 3 – **Bund Rehabilitation Details**

LPDA 15-94 / 4 – **Final Rehabilitation Plan**

LPDA 15-94 / 5 – **Final Rehabilitation Details**

The report and associated plans have been prepared with reference to the following:

- EA, s75W Modification (2) Sand Extraction Report prepared by Nexus Environmental Planning
- Site Layout and Extraction Plans by VGT Environmental Compliance Solutions Pty Ltd.
- Modified Dam Design by VGT Environmental Compliance Solutions Pty Ltd.
- Acoustic Impact & Air Quality Assessment prepared by Wilkison Murray
- The Hills Local Environmental Plan 2012
- 'Leading Practice Sustainable Development Program for the Mining Industry' Commonwealth Government 2006
- Site Analysis and inspections during November 2014

2.0 Objectives

The objectives of the Landscape Rehabilitation Plans and Report presented here are to:

- Co-ordinate with the current application and associated reports and plans



- Update the proposed rehabilitation methodology in line with the proposed modified staging, regularised extraction process and final extraction levels
- Propose a temporary landscape rehabilitation process for temporary bunding associated with the delineation of staged extraction cells
- Propose a permanent landscape rehabilitation process and methodology for permanent bunding associated with the final extraction cells and completing perimeter bunding to the site
- Propose a final rehabilitation treatment and methodology to suit the proposed final extraction levels and profile of the site
- Implementation of a landscape maintenance programme which will help assure the success of the proposed rehabilitation works

3.0 Visual Analysis

The site is located in Maroota at the intersection of Old Northern Road and Roberts Road, and is approximately 29.5 Hectares in size.

Whilst the subject site has undergone modification due to the nature of the activities including sand extraction for a period of time, the character of the surrounding natural areas is typical of **Shale – Sandstone Transitional Forest**. The proposed landscape rehabilitation plan proposes to largely reinstate this character, with a range of endemic plant species selected from local vegetation Community lists, and either harvested locally or purchased from a certified seed supplier.

Landscape bunds created as part of the initial rehabilitation works create a visual landscaped buffer around portions of the perimeter to the site, specifically along the southern portion of Old Northern Road & Roberts Rd. These create a visual buffer to these areas of the site, and the bunds will be extended as part of the completed landscape rehabilitation for the site (refer to LPDA 15-94 / 2 – **Bund Rehabilitation Plan**)

4.0 Rehabilitation Strategy

4.1 Protection of Existing Vegetation

As the subject site is proposed for sand extraction in its entirety, the focus of tree and vegetation protection would be limited to the existing vegetation to the perimeter of the site, including the vegetated earth bunds, which were created as part of the initial approval of the extraction works. These bunds will be extended in accordance with the proposed Bund Rehabilitation Plans, revegetated and the resulting area shall be treated as a 'no go' zone.

Temporary chain-mesh style fencing may be erected to protect these bunds, however, as they are at the perimeter of the site, and will be completed in line with the latter stages of staged cell extractions, it is unlikely the areas will be disturbed once planted.



4.2 Cell Extraction & Revegetation

'All Works – Phases' Plans prepared by **VGT Environmental Compliance Solutions Pty Ltd** address the proposed Cell extraction for the site, which modifies and regularises the process outlined in the existing approval.

The updated process and methodology proposes that the extraction works will occur across the face of a number of active cells. The resulting extracted cells will primarily allow access for heavy machinery to extract from cells behind those extracted.

As a result, the proposed landscape rehabilitation of areas within the site can only occur when the active cells have been fully extracted all the way to the site perimeter and are no longer being utilized by machinery to access further cells, or for stockpiling etc.

As soon as areas within the site have been fully extracted as outlined above, these areas shall be made available for rehabilitation in accordance with the detailing and specification outlined in the rehabilitation plans, and fenced off to allow for undisturbed regeneration.

4.3 Top Soil Stripping & Storage

Areas of the site approved for extraction works shall have the topsoil level stripped and stockpiled for later re-use. This material will be referred to as '**Topsoil**'

Following topsoil stripping, approximately 500mm of the next layer of soil shall also be stripped and stockpiled, in a similar manner to the topsoil. The purpose of stripping this additional layer of soil is for reuse in temporary and permanent bunding (refer to LPDA 15-94 / 2 – **Bund Rehabilitation Plan**) and also to replicate the soil profile in rehabilitated areas as close to the existing growing conditions of the vegetation community to be re-established. This secondary stockpiled material will be referred to as '**Subsoil**'

It is proposed to stockpile the topsoil & Subsoil in a convenient location which is both out of the way of daily activity, however, easily accessed for re-use in the creation of bunds and for preparation of rehabilitation areas as necessary.

The **Stage 5 extraction cell** as identified on the 'All Works - Phases' plan prepared by **VGT Environmental Compliance Solutions Pty Ltd**, and as identified on the **Final Rehabilitation Plan** (LPDA 15-94 / 4) prepared by our office, is the location nominated for initial stockpiling.

The location of stockpiled material may change depending on the of nature extraction works on site, and the re-use of stockpiled material will occur in line with extraction operations and the timing schedules outlined in the planning report.



4.4 Bunding Construction & Staging

There will be two types of bunding associated with the proposed staging of the extraction works. These will be **Temporary Bunds**, and **Permanent Bunds**. Both type of bunds will essentially be built in the same way, with the same form and profile (as detailed in 'Hodgson Maroota Quarry Schematics' Plans prepared by **VGT Environmental Compliance Solutions Pty Ltd & LPDA 15-94 / 3 – Bund Rehabilitation Details**, however, the top profile layer and final planting treatments shall vary as follows:

4.4.1 Temporary Bunds

Temporary bunds shall be constructed with a profile as detailed in the plans prepared by **VGT Environmental Compliance Solutions Pty Ltd** from site material, including stockpiled subsoil material where available.

The finished layer for planting shall consist of a 300mm layer of site topsoil, which shall be laid with turf stripped from site.

The completed turfed bund shall then be the subject of landscape maintenance in accordance with the **Landscape Maintenance Schedule** (Item 4.7)

4.4.2 Permanent Bunds

Permanent bunds shall be constructed with a profile as detailed in the plans prepared by **VGT Environmental Compliance Solutions Pty Ltd** from site material, including stockpiled subsoil material where available, as per temporary bunds. Material from temporary bunding may also be used.

The finished surface for planting shall consist of a 300mm layer of site topsoil, over which shall be pegged a layer of approved jute matting material.

Jute matting shall be pocket planting with specified planting as detailed in Details 05 & 06 on LPDA 15-94 / 3 – **Bund Rehabilitation Details**, and finished with a 75mm layer of approved organic mulch.

The completed landscaped bund shall then be the subject of landscape maintenance in accordance with the **Landscape Maintenance Schedule** (Item 4.7)

4.5 Final Rehabilitation Treatment

This section addresses the intended finished results for final rehabilitation, including the process involved and the source of the species to be planted on site.



4.5.1 Seed Collection / Certified Stock

To ensure the re-establishment of plant communities that are indigenous to the area, native seed and plant cuttings shall be collected at appropriate times from the site and surrounding areas by a qualified and experience horticulturalist or bush regeneration specialist that has knowledge and proven experience in this work.

The majority of seed collected from the area shall be utilized in the hydromulch mix to be sprayed on site in accordance with LPDA 15-94 / 4 – **Final Rehabilitation Plan**. The remainder of the seed, together with site cuttings, shall be propagated under appropriate nursery conditions, and maintained until the resultant seedlings are ready to be planted on site in line with the proposed planting schedules and finishes.

Seed and cuttings shall be collected treated, stored and propagated by an approved specialist to ensure the quality, quantity and viability of the seed and plant stock for planting on site. The approved horticulturalist shall be appointed and co-ordination maintained during the extraction operations to ensure that the seed and cutting quantities are in line with those required for the areas made available for rehabilitation on an on-going basis.

If the seed and cutting quantities and quality collected and propagated cannot be achieved, or the range of specified species available using collection techniques, plant material may be sourced from a local supplier, who is able to certify seed or plant stock has been locally sourced and grown.

4.5.2 Rehabilitation Treatment

There are three (3) types of landscape rehabilitation treatments proposed; hydromulching, pocket planting in natural material & pocket planting in jute matting (for steeper grades).

1. **Hydromulching:** This treatment is proposed for the open, general flat areas of the site, located centrally. The process is detailed in **Detail 10** of LPDA 15-94 / 5 – **Final Rehabilitation Details**, which includes preparation and specification for the proposed hydromulching works
2. **Pocket planting in natural finishes:** This treatment is proposed for the finished embankments located around the perimeter of the site (in accordance with the 'Hodgson Maroota Quarry Final Landform' Plan prepared by **VGT Environmental Compliance Solutions Pty Ltd**. This treatment is proposed for embankments up to a **maximum grade of 1 in 3**. The process is detailed in **Detail 7 & 8** of LPDA 15-94 / 5 – **Final Rehabilitation Details**, which includes preparation and plant schedules for this process.
3. **Pocket planting in Jute Matting:** This treatment is proposed for the finished embankments located around the perimeter of the site (in accordance with the 'Hodgson Maroota Quarry Final Landform' Plan prepared by **VGT Environmental Compliance Solutions Pty Ltd**. This treatment is proposed for embankments **which exceed a grade of 1 in 3**.

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The process is detailed in **Detail 7 & 11** of LPDA 15-94 / 5 – **Final Rehabilitation Details**, which includes preparation and plant schedules for this process.

4.6 Vegetation Cover & Progressive Rehabilitation

Following the establishment of soil profiles, the specified vegetation cover is to be established through the following process:

1. **Areas nominated for hydromulching:**

The central (level) areas of the site identified as areas suitable for hydromulching shall be prepared in accordance with **Detail 10** of LPDA 15-94 / 5 – **Final Rehabilitation Details**. The hydromulch mix shall be prepared and applied in accordance with the specification provided.

The hydromulch seed stock shall have two (2) components:

- A **Grass seed component** which is intended to produce a temporary vegetation cover to ensure surfaces are stabilized as the specified native seed mix germinates. The grass seed component has either an Autumn & Winter Mix, or a Spring & Summer mix to suit the period of the year for the application.
- A **Native Seed Mix**, which is made up of locally sourced and collected seed stock (refer to item 4.5.1 Seed Collection and Certified Stock) and shall be applied in the quantities and species outlined in the hydromulching specification (Detail 10)

All surfaces which fail to germinate following this application shall be reseeded.

2. **Areas nominated for pocket planting:**

The perimeter embankment areas of the site have been identified as areas requiring pocket planting, and shall be prepared in accordance with **Details 7, 8 & 11** of LPDA 15-94 / 5 – **Final Rehabilitation Details**. The pocket planting mix, layout and intended finish shall be in accordance with the schedules and sections shown on LPDA 15-94 / 5 – **Final Rehabilitation Details**. All planting sizes for pocket planting shall be **tube stock**.

All areas of pocket planting and rehabilitation shall be subject to on-going landscape maintenance (in accordance with the schedule & item 4.7).

The proposed landscape rehabilitation of areas within the site can only occur when the active cells have been fully extracted all the way to the site perimeter and are no longer being utilized by machinery to access further cells, or for stockpiling etc. Once such areas within the site become available, these areas shall be subject to rehabilitation in accordance with the detailing and specification outlined in the rehabilitation plans.

Once these areas have been hydromulched or planted, they shall be fenced off to allow for undisturbed regeneration. Temporary fencing for these areas shall be 1.8m star picket with galvanized wires to support plastic high visibility mesh fencing.



5.0 Maintenance

5.1 General

After the completion of the specified rehabilitation works, vegetated areas shall be subject to a minimum landscape works period of **12 Months**. During this time the landscape contractor shall make good all defects which may occur for whatever reason.

Consolidation and Maintenance shall mean the care and maintenance of all areas undergoing rehabilitation in accordance with this report and associated plans, ensuring that a satisfactory result occurs for these areas with regards to germination and establishment.

The maintenance shall include, but not be limited to, the following items where and as required:

- Watering all landscaped areas
- Monitoring germination, Replacement planting and re-hydromulching
- Weed Control
- Make good areas of soil subsidence or erosion
- Topping up of mulched areas
- Spray / treatment for Insect and disease control
- Monitoring and controlling rabbits

5.2 Watering

All areas which have been hydromulched or pocket planted shall be watered in thoroughly following initial works, & shall be watered a minimum 3 times per week during winter, and 4 times per week during summer. Watering shall be done by hand, utilizing dam water on site. Frequency of watering may be adjusted based on whether conditions, with the objective to ensure the maximum percentage of successful established plant stock.

5.3 Monitoring Germination, Replacement planting & re-hydromulching

Areas undergoing rehabilitation shall be continually monitored until well established, with failures being replaced in line with the report and landscape specification, and failed hydromulching re-sprayed.

All replacements shall be to specification, and of a size equivalent to similar healthy species surrounding the rejected plant, or, as in the case of mature trees, to the original size and quality, as a minimum.



5.4 Weed Control

Weed removal shall be conducted regularly, with hand remove all top growth roots, rhizomes and stolons of unwanted vegetation. The Regular control of all weeds is essential. The applications of pre-emergent sprays are acceptable with approved chemicals applied in strict accordance with manufacturer directions. Any spraying shall be done during calm days, to avoid winds blowing herbicides onto native planting.

5.5 Insect, Disease Control & Controlling Rabbits

The Landscape Contractor shall become familiar with the healthy appearance of the plant material and constantly monitor it for damage or pest infestations. When either of these become evident the Contractor shall immediately apply the necessary control measures.

If newly planted areas are becoming subject to rabbit attack, it may be necessary to install approved rabbit-proof fencing to the area of rehabilitation, to ensure minimal damage is done.

6.0 Conclusion

It is proposed that if the methods outlined in the report and plans are followed, then:

- The nominated extraction areas can be successfully rehabilitated, re-establishing an extensive endemic vegetation cover
- That vegetated bunds may be utilized to minimise the visual impact of the extraction works
- The proposed rehabilitation process can be staged in an effective manner so as to progressively rehabilitate areas of the site where extraction has been completed, final levels achieved, and all activity has ceased
- Appropriate standards will be set for the on-going monitoring of the rehabilitation process and maintenance works to ensure the successful establishment of rehabilitated areas on site, resulting in a sustainable, endemic landscape in character with the original **Shale – Sandstone Transitional Forest vegetation Community.**

On this basis, we recommend granting approval for this application,

Yours sincerely,

Robert Frew

BLA Cert. IV Hort. AILA RLA (Director)



7.0 Plans

APPENDIX

- 7.1 LPDA 15-94 / 1 - Cover Sheet
- 7.2 LPDA 15-94 / 2 – Bund Rehabilitation Plan
- 7.3 LPDA 15-94 / 3 – Bund Rehabilitation Details
- 7.4 LPDA 15-94 / 4 – Final Rehabilitation Plan
- 7.5 LPDA 15-94 / 5 – Final Rehabilitation Details

DOCUMENT REGISTER

Document 1:

Title: Cover Sheet

DWG #: LPDA 15 - 94 / 1

Document 2:

Title: Bund Rehabilitation Plan

DWG #: LPDA 15 - 94 / 2

Document 3:

Title: Bund Rehabilitation Details

DWG #: LPDA 15 - 94 / 3

Document 4:

Title: Final Rehabilitation Plan

DWG #: LPDA 15 - 94 / 4

Document 5:

Title: Final Rehabilitation Details

DWG #: LPDA 15 - 94 / 5

Document 6:

Title: Rehabilitation Report

CONSULTANTS INFORMATION

REFER TO PLANS, DETAILS, SPECIFICATION AND REPORTS PREPARED BY OTHER CONSULTANTS FOR ALL INFORMATION RELATING TO THAT PRACTICE, INCLUDING:

- NEXUS ENVIRONMENTAL PLANNING: PROJECT MANAGEMENT AND PLANNING
- LYLE MARSHALL & ASSOCIATES: TRAFFIC AND ACCESS
- AUSTRALIAN GROUNDWATER TECHNOLOGIES: GROUNDWATER MONITORING & MANAGEMENT
- PETER DUNDON & ASSOCIATES: GROUNDWATER
- VGT ENVIRONMENTAL COMPLIANCE SOLUTIONS: SITE LAYOUT AND EXTRACTION PLANS, MODIFIED DAM DESIGN, MODIFIED RESOURCE VOLUMES
- WILKINSON MURRAY: ACOUSTIC IMPACT ASSESSMENT, AIR QUALITY ASSESSMENT



GENERAL NOTE: Figured dimensions take precedence to scale readings. Verify all dimensions on site. TPO's plans may vary slightly in Scale for that indicated on plans. Report any discrepancies to the Landscape Architect before proceeding with the work. © Copyright R. L. Frew Landscape Architectural Services T/A CONCEPT This drawing is a copyright of the copyright owner. All rights are reserved. Unless permitted under the Copyright Act 1968, no part of this drawing may in any form or by any means be reproduced, published, broadcast or transmitted without the prior written permission of the copyright owner. If the Status of this drawing is not signed off For Construction it may be subject to change, alteration or amendment at the discretion of the architect. If the Concept is not taken to any final, damage, harm or injury whether special, consequential, direct or indirect, suffered by you or any other person as a result of your use of this drawing for construction purposes.		LANDSCAPE ARCHITECT:  Sunt 101, 506 Miller Street, CAMMERAY NSW 2062 Phone: 9922 5312 Fax: 8209 4982 Mob: 0413 861 351 www.concept.net.au enquiries@concept.net.au		COUNCIL HILLS SHIRE CLIENT HODGSON QUARRY PRODUCTS PTY LTD PLANNER NEXUS ENVIRONMENTAL PLANNING		<table><tr><th>REV</th><th>DATE</th><th>NOTATION/AMENDMENT</th></tr><tr><td>A</td><td>17/09/14</td><td>Preliminary concept prepared for review</td></tr><tr><td>B</td><td>14/10/14</td><td>Prepared for Section 75W Modification issue</td></tr><tr><td>D</td><td>07/09/15</td><td>Coordinated with revised final landform design</td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></table>		REV	DATE	NOTATION/AMENDMENT	A	17/09/14	Preliminary concept prepared for review	B	14/10/14	Prepared for Section 75W Modification issue	D	07/09/15	Coordinated with revised final landform design										PROJECT: PROPOSED REHABILITATION OF EXISTING SAND MINE ROBERTS ROAD, MAROOTA NSW		TITLE: COVER SHEET DWG.No: LPDA 15 - 94 / 1 ISSUE: D		STATUS: SECTION 75W MODIFICATION (2) SCALE: 1:1500 @ A1 DRAWN: D.G DATE: OCTOBER 2014 CHECKED: R.F	
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LEGEND

- STAGED EXTRACTION ZONES -
REFER ENGINEER'S PLANS
- TEMPORARY BUND WALLS:**
STAGES 1 AND 2 BUND WALL TO BE
RE-TURFED WITH STRIPPED TURF
FROM STAGES 1 AND 2 EXTRACTION
ZONES - REFER DETAILS 1, 2 AND 3
- PERMANENT BUND WALLS:**
STAGES 3, 4, 5 AND 6 BUND WALLS
TO BE STABILISED WITH JUTE
MATTING AND POCKET PLANTING -
REFER DETAILS 4, 5 AND 6
- EXISTING VEGETATED BUND WALLS
TO BE RETAINED

PRIOR TO COMMENCEMENT OF STAGES 1 AND 2 EXTRACTION WORKS, THE FOLLOWING SHALL BE UNDERTAKEN TO ENSURE AVAILABLE MATERIAL FOR THE CONSTRUCTION OF BUND WALLS:

- TURF TO BE STRIPPED USING A TURF CUTTER AND STORED IN AN APPROPRIATE LOCATION
- 300MM DEPTH TOPSOIL TO BE EXCAVATED AND STOCKPILED (OUTSIDE OF EXTRACTION AREAS)
- SUBSOIL TO BE TO BE EXCAVATED AND STOCKPILED (OUTSIDE OF EXTRACTION AREAS)

PRIOR TO COMMENCEMENT OF STAGES 3, 4, 5 AND 6 EXTRACTION WORKS, THE FOLLOWING SHALL BE UNDERTAKEN TO ENSURE AVAILABLE MATERIAL FOR THE CONSTRUCTION OF BUND WALLS:

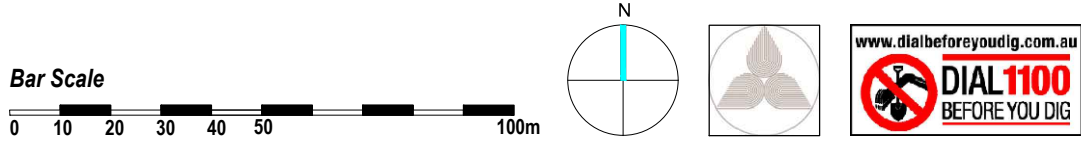
- 300MM DEPTH TOPSOIL TO BE EXCAVATED AND STOCKPILED (OUTSIDE OF EXTRACTION AREAS)
- SUBSOIL TO BE TO BE EXCAVATED AND STOCKPILED (OUTSIDE OF EXTRACTION AREAS)

STOCKPILES MUST BE CLEARLY LABELLED AND IDENTIFIABLE TO ENSURE CORRECT FUTURE USE. STOCKPILING SHALL BE LOCATED IN AN AREA OUTSIDE OF SUBSEQUENT EXTRACTION AREAS AND AS CLOSE AS POSSIBLE TO THE FUTURE BUND WALLS LOCATIONS. APPROPRIATE SEDIMENT AND EROSION CONTROL MEASURES SHALL BE UNDERTAKEN TO ENSURE NO MIXING, LEACHING, RUN-OFF OR CONTAMINATION OF STOCKPILES.

CONSULTANTS INFORMATION

REFER TO PLANS, DETAILS, SPECIFICATION AND REPORTS PREPARED BY OTHER CONSULTANTS FOR ALL INFORMATION RELATING TO THAT PRACTICE, INCLUDING:

- NEXUS ENVIRONMENTAL PLANNING: PROJECT MANAGEMENT AND PLANNING
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- WILKINSON MURRAY: ACOUSTIC IMPACT ASSESSMENT, AIR QUALITY ASSESSMENT



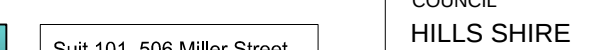
SITE PHOTO 1: EXISTING GRASS BUND WALLS TO BE RETAINED

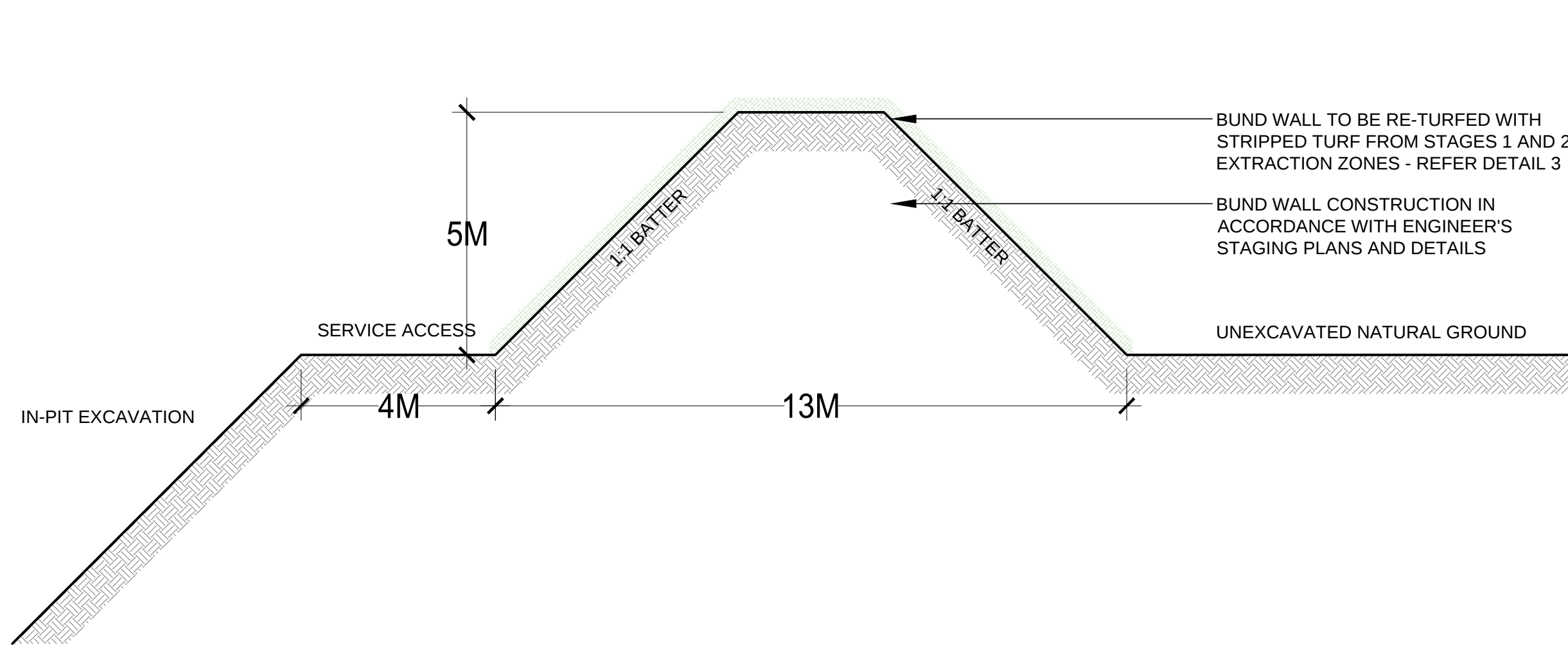


SITE PHOTO 2: GRASS BUND WALLS RECENTLY MASS PLANTED WITH ENDEMIC TUBE STOCK



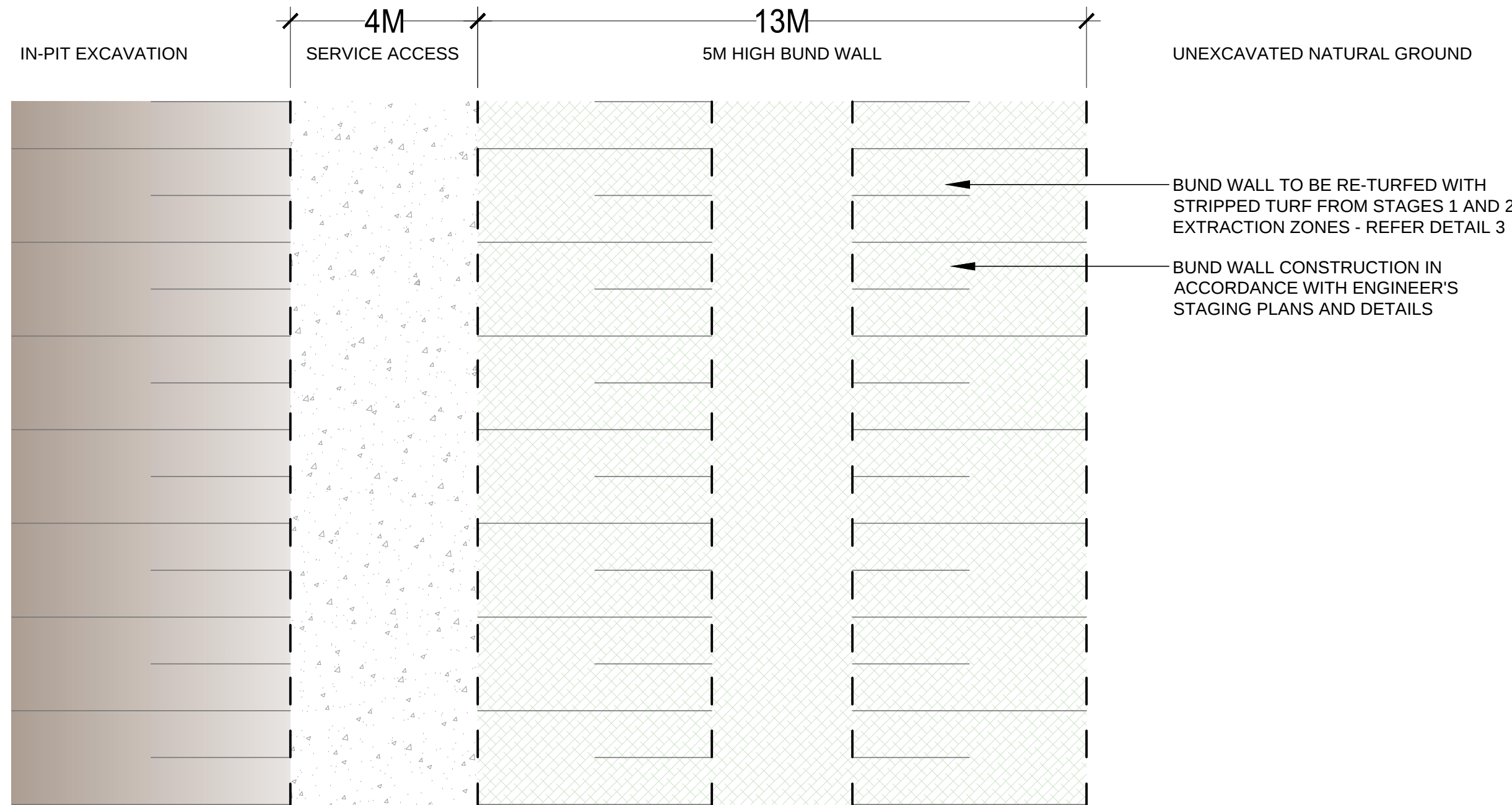
SITE PHOTO 3: EXISTING BUND WALLS WITH ESTABLISHED ENDEMIC VEGETATION

PLANNER: Nexus Environmental Planning Pty Ltd PO Box 212 CONCORD NSW 2137 T: (02) 9736 1313 F: (02) 9736 1306 M: 0418 419 279 E: kennan@ozemail.com.au	GENERAL NOTE: Typical dimensions take precedence to scale readings. Verify all dimensions on site. 750% plans may vary slightly in Scale for final indicated on plans. Report any discrepancies to the Landscape Architect before proceeding with the work. © Copyright R.L.F. Few Landscape Architectural Services T/A CONCEPT This drawing is protected by copyright. All rights are reserved. Unless permitted under the Copyright Act 1968, no part of this drawing may in any form or by any means be reproduced, published, broadcast or transmitted without the prior written permission of the copyright owner. If the Status of this drawing is not signed off by the Construction it may be subject to change, alteration or amendment at the discretion of our office. R.L.F. Concept is not liable for any loss, damage, harm or injury whether special, consequential, direct or indirect, suffered by you or any other person as a result of your use of this drawing for construction purposes.	LANDSCAPE ARCHITECT:  Sullt 101, 506 Miller Street, CAMMERAY NSW 2062 Phone: 9922 5312 Fax: 8209 4982 Mob: 0413 861 351 www.concept.net.au enquiries@concept.net.au	COUNCIL: HILLS SHIRE	CLIENT: HODGSON QUARRY PRODUCTS PTY LTD	PLANNER: NEXUS ENVIRONMENTAL PLANNING	REV	DATE	NOTATION/AMENDMENT	PROJECT: PROPOSED REHABILITATION OF EXISTING SAND MINE ROBERTS ROAD, MAROOTA NSW	TITLE: BUND REHABILITATION PLAN	DWG.No: LPDA 15 - 94 / 2	ISSUE: D	DRAWN: D.G	CHECKED: R.F	STATUS: SECTION 75W MODIFICATION (2)
						A	17/09/14	Preliminary concept prepared for review							
						B	14/10/14	Prepared for Section 75W Modification issue							
						C	10/11/14	Staging and bund walls revised to reflect engineer's plans							
						D	07/09/15	Coordinated with revised final landform design							



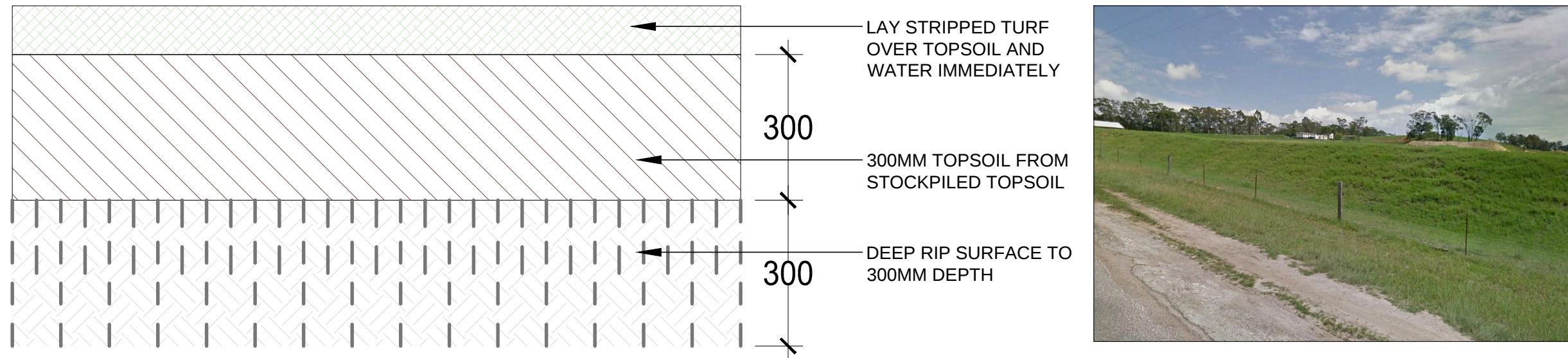
DETAIL 01: TEMPORARY BUND WALL SECTION

SCALE 1:100



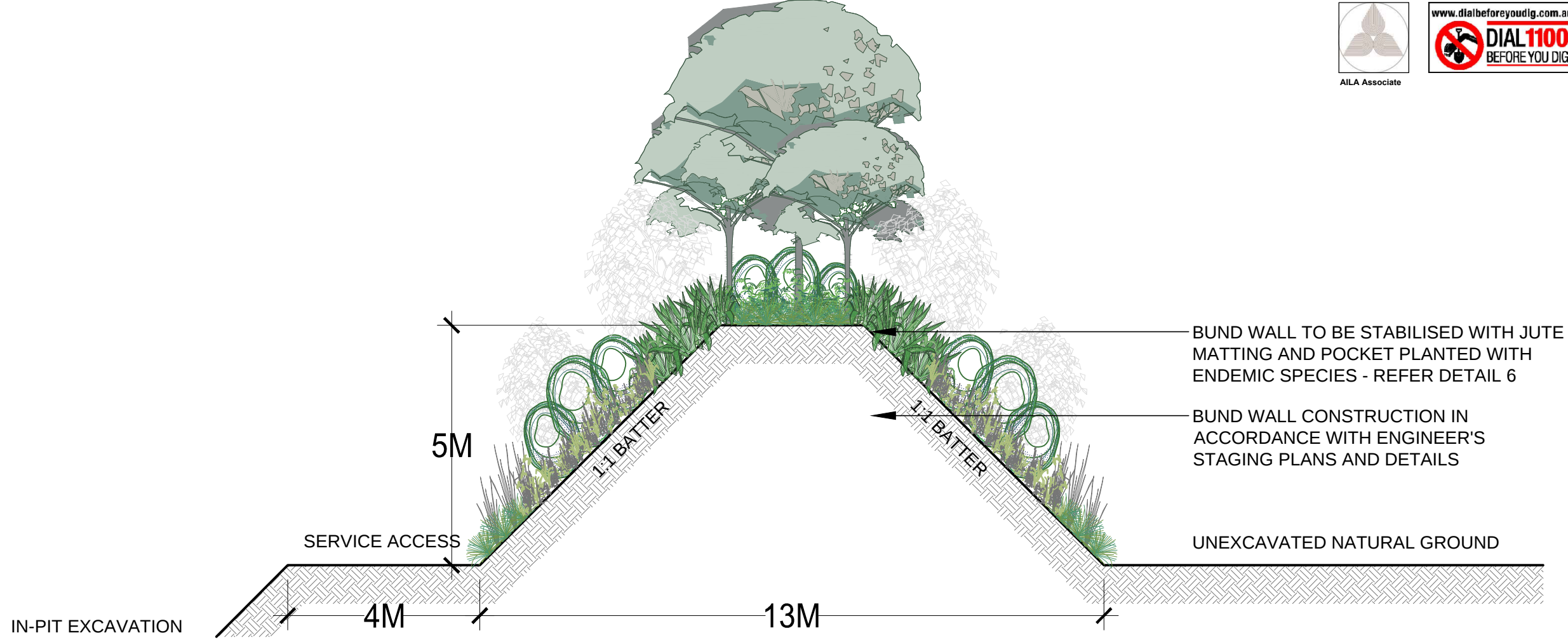
DETAIL 02: TEMPORARY BUND WALL PLAN

SCALE 1:100



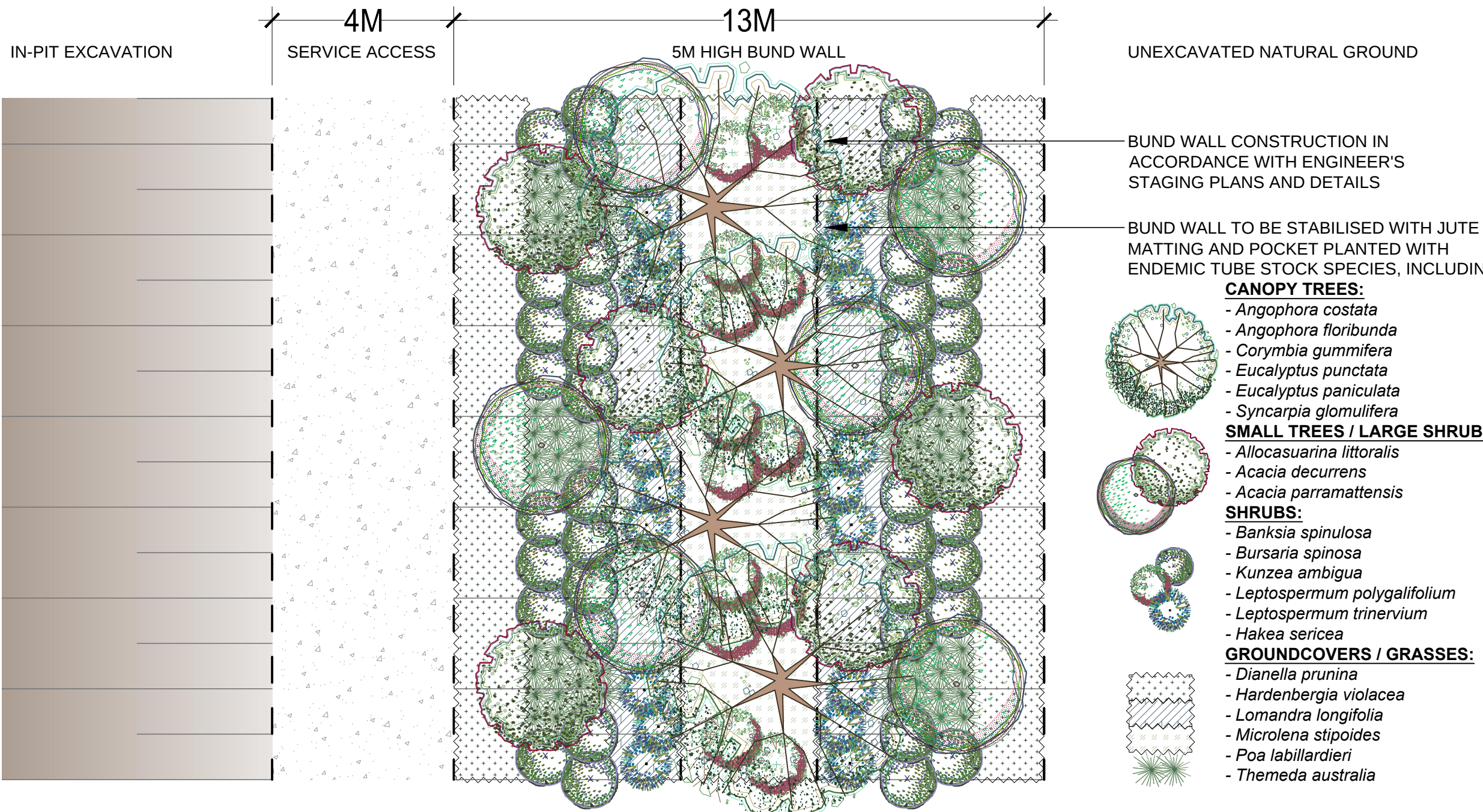
DETAIL 03: TEMPORARY BUND WALL TURFING

SCALE 1:10



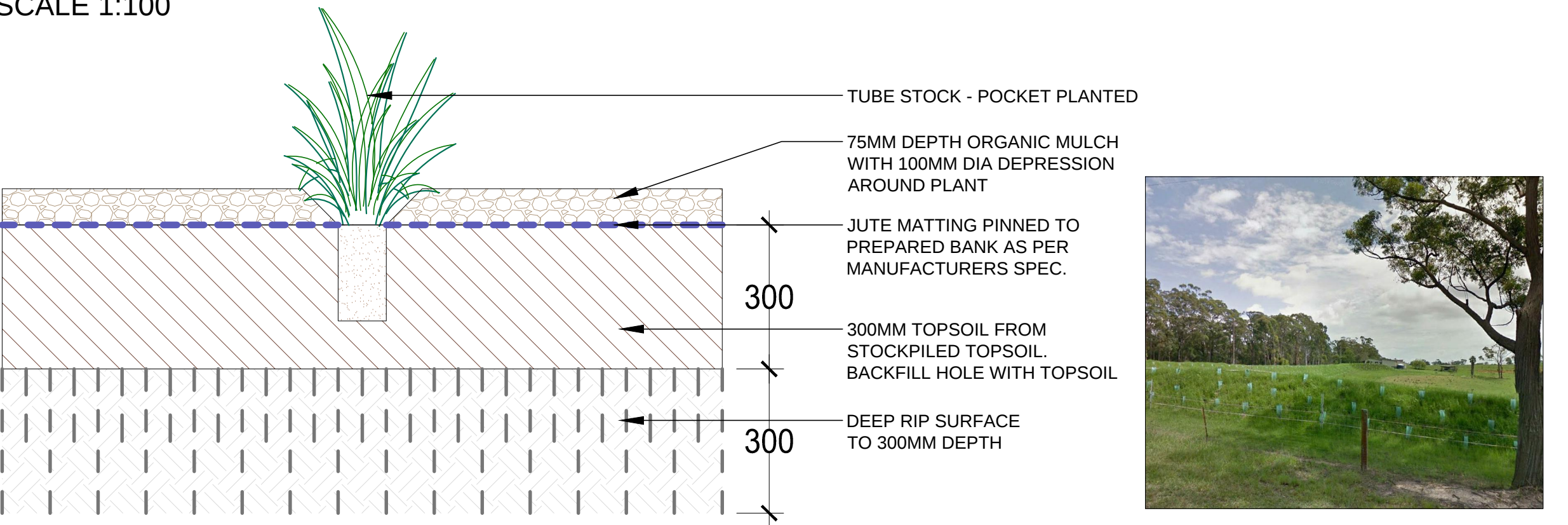
DETAIL 04: PERMANENT BUND WALL SECTION

SCALE 1:100



DETAIL 05: PERMANENT BUND WALL PLAN

SCALE 1:100



DETAIL 06: PERMANENT BUND WALL TUBE STOCK PLANTING

SCALE 1:10



MAINTENANCE SCHEDULE

GENERAL
AFTER THE COMPLETION OF THE SPECIFIED REHABILITATION WORKS, VEGETATED AREAS SHALL BE SUBJECT TO A MINIMUM LANDSCAPE WORKS PERIOD OF **12 MONTHS**. DURING THIS TIME THE LANDSCAPE CONTRACTOR SHALL MAKE GOOD ALL DEFECTS WHICH MAY OCCUR FOR WHATEVER REASON.

CONSOLIDATION AND MAINTENANCE SHALL MEAN THE CARE AND MAINTENANCE OF ALL AREAS UNDERGOING REHABILITATION IN ACCORDANCE WITH THIS REPORT AND ASSOCIATED PLANS, ENSURING THAT A SATISFACTORY RESULT OCCURS FOR THESE AREAS WITH REGARDS TO GERMINATION AND ESTABLISHMENT.

THE MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING ITEMS WHERE AND AS REQUIRED:

- WATERING ALL LANDSCAPED AREAS
- MONITORING GERMINATION, REPLACEMENT PLANTING AND RE-HYDROMULCHING
- WEED CONTROL
- MAKE GOOD AREAS OF SOIL SUBSIDENCE OR EROSION
- TOPPING UP OF MULCHED AREAS
- SPRAY / TREATMENT FOR INSECT AND DISEASE CONTROL
- MONITORING AND CONTROLLING RABBITS

WATERING
ALL AREAS WHICH HAVE BEEN HYDROMULCHED OR POCKET PLANTED SHALL BE WATERED IN THOROUGHLY FOLLOWING INITIAL WORKS, & SHALL BE WATERED A MINIMUM 3 TIMES PER WEEK DURING WINTER, AND 4 TIMES PER WEEK DURING SUMMER. WATERING SHALL BE DONE BY HAND, UTILIZING DAM WATER ON SITE. FREQUENCY OF WATERING MAY BE ADJUSTED BASED ON WHETHER CONDITIONS, WITH THE OBJECTIVE TO ENSURE THE MAXIMUM PERCENTAGE OF SUCCESSFUL ESTABLISHED PLANT STOCK.

MONITORING GERMINATION, REPLACEMENT PLANTING AND RE-HYDROMULCHING
AREAS UNDERGOING REHABILITATION SHALL BE CONTINUALLY MONITORED UNTIL WELL ESTABLISHED, WITH FAILURES BEING REPLACED IN LINE WITH THE REPORT AND LANDSCAPE SPECIFICATION, AND FAILED HYDROMULCHING RE-SPRAYED.

ALL REPLACEMENTS SHALL BE TO SPECIFICATION, AND OF A SIZE EQUIVALENT TO SIMILAR HEALTHY SPECIES SURROUNDING THE REJECTED PLANT, OR, AS IN THE CASE OF MATURE TREES, TO THE ORIGINAL SIZE AND QUALITY, AS A MINIMUM.

WEED CONTROL
WEED REMOVAL SHALL BE CONDUCTED REGULARLY, WITH HAND REMOVE ALL TOP GROWTH ROOTS, RHIZOMES AND STOLONS OF UNWANTED VEGETATION. THE REGULAR CONTROL OF ALL WEEDS IS ESSENTIAL. THE APPLICATIONS OF PRE-EMERGENT SPRAYS ARE ACCEPTABLE WITH APPROVED CHEMICALS APPLIED IN STRICT ACCORDANCE WITH MANUFACTURER DIRECTIONS. ANY SPRAYING SHALL BE DONE DURING CALM DAYS, TO AVOID WINDS BLOWING HERBICIDES ONTO NATIVE PLANTING.

INSECT, DISEASE CONTROL AND RABBIT CONTROL
THE LANDSCAPE CONTRACTOR SHALL BECOME FAMILIAR WITH THE HEALTHY APPEARANCE OF THE PLANT MATERIAL AND CONSTANTLY MONITOR IT FOR DAMAGE OR PEST INFESTATIONS. WHEN EITHER OF THESE BECOME EVIDENT THE CONTRACTOR SHALL IMMEDIATELY APPLY THE NECESSARY CONTROL MEASURES.

IF NEWLY PLANTED AREAS ARE BECOMING SUBJECT TO RABBIT ATTACK, IT MAY BE NECESSARY TO INSTALL APPROVED RABBIT-PROOF FENCING TO THE AREA OF REHABILITATION, TO ENSURE MINIMAL DAMAGE IS DONE.

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	FINAL DAM LOCATION AND EXTENTS - REFER ENGINEER'S PLANS
	EXISTING VEGETATION TO BE RETAINED AND PROTECTED
	STAGES 3, 4, 5 AND 6 BUND WALLS TO BE STABILISED WITH JUTE MATTING AND POCKET PLANTING - REFER DETAILS 4, 5 AND 6
	STAGES 3, 4, 5 AND 6 BUND WALLS TO BE REMOVED WHERE WITHIN FINAL EXCAVATION EXTENTS
	EXISTING VEGETATED BUND WALLS TO BE RETAINED
	EXISTING VEGETATED BUND WALLS TO BE REMOVED WHERE WITHIN FINAL EXCAVATION EXTENTS
	BOTTOM OF PIT TO BE HYDRO-MULCHED WITH NATIVE SEED MIX - REFER DETAIL 10
	1V:3H GRADE EMBANKMENTS MASS PLANTED WITH ENDEMIC SPECIES - REFER DETAILS 07 AND 08
	EMBANKMENTS WITH FINAL SLOPES STEEPER THAN 1V:3H TO BE STABILISED WITH JUTE MATTING AND POCKET PLANTED WITH ENDEMIC SPECIES - REFER DETAILS 07 AND 11
	ENDEMIC SCREEN PLANTING WITHIN PERIMETER BUFFER SETBACKS - REFER DETAILS 07 AND 08
	STAGE 5B EXTRACTION ZONE TO BE USED FOR THE STOCKPILING OF SITE TOPSOIL AND SUBSOIL, AND USED FOR FINAL REHABILITATION PLANTING PREPARATION WORKS - REFER DETAILS

STOCKPILES MUST BE CLEARLY LABELLED AND IDENTIFIABLE TO ENSURE CORRECT FUTURE USE. APPROPRIATE SEDIMENT AND EROSION CONTROL MEASURES SHALL BE UNDERTAKEN TO ENSURE NO MIXING, LEACHING, RUN-OFF OR CONTAMINATION OF STOCKPILES.

- NEXUS ENVIRONMENTAL PLANNING: PROJECT MANAGEMENT AND PLANNING
- LYLE MARSHALL & ASSOCIATES: TRAFFIC AND ACCESS
- AUSTRALIAN GROUNDWATER TECHNOLOGIES: GROUNDWATER MONITORING & MANAGEMENT
- PETER DUNDON & ASSOCIATES: GROUNDWATER
- VGT ENVIRONMENTAL COMPLIANCE SOLUTIONS: SITE LAYOUT AND EXTRACTION PLANS, MODIFIED DAM DESIGN, MODIFIED RESOURCE VOLUMES
- WILKINSON MURRAY: ACOUSTIC IMPACT ASSESSMENT, AIR QUALITY ASSESSMENT



SMALL TREE: ACACIA PARRAMATTENSIS



GROUND COVER: *HARDENBERGIA*

NEXUS: Environmental Planning Pty Ltd PO Box 212 CONCORD NSW 2137 T: (02) 9736 1316 F: (02) 9736 1303 M: 0418 419 279 E: kernan@ezemail.com.au	GENERAL NOTE: Figured dimensions take preference to scale readings. Verify all dimensions on site. PFD's may have any slighty to Scale for the indicated on plan. Report any discrepancies to the Landscape Architect before proceeding with the work. © Copyright R. L Free Landscape Architectural Services T/A CONCEPT This drawing is protected by Copyright. All rights are reserved. Unless permitted under the Copyright Act 1968, no part of this drawing may in any form or by any means be reproduced, published or transmitted without the prior written permission of the copyright owner. In the States of this drawing is not signed or for Construction it may be subject to change, alteration or amendment at the discretion of the office. If so, Concept is not liable for any loss, damage, harm or injury whether special, consequential, direct or indirect, suffered by you or any other person as a result of your use of this drawing for construction purposes.	LANDSCAPE ARCHITECT:  Suit 101, 506 Miller Street, GAMMERSLEY NSW 2062 Phone: 9922 5312 Fax: 8209 4982 Mob: 0413 961 351 www.concept.net.au enquiries@concept.net.au	COUNCIL: HILLS SHIRE CLIENT: HODGSON QUARRY PRODUCTS PTY LTD PLANNER: NEXUS ENVIRONMENTAL PLANNING	<table><tr><th>REV</th><th>DATE</th><th>NOTATION/AMENDMENT</th></tr><tr><td>A</td><td>08/10/14</td><td>Preliminary concept prepared for review</td></tr><tr><td>B</td><td>14/10/14</td><td>Prepared for Section 75W Modification issue</td></tr><tr><td>C</td><td>10/11/14</td><td>Staging and bund walls revised to reflect engineer's plans</td></tr><tr><td>D</td><td>07/09/15</td><td>Coordinated with revised final landscape design</td></tr></table>	REV	DATE	NOTATION/AMENDMENT	A	08/10/14	Preliminary concept prepared for review	B	14/10/14	Prepared for Section 75W Modification issue	C	10/11/14	Staging and bund walls revised to reflect engineer's plans	D	07/09/15	Coordinated with revised final landscape design	PROJECT: PROPOSED REHABILITATION OF EXISTING SAND MINE ROBERTS ROAD, MAROOTA NSW	TITLE: FINAL REHABILITATION PLAN DWG. NO.: LPDA 15 - 94 / 4 ISSUE: D	STATUS: SECTION 75W MODIFICATION (2) SCALE: 1:1500 @ A1 DATE: MAY 2015 DRAWN: D.G CHECKED: R.F
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SECTION AA: FINAL REHABILITATION OF SITE

SCALE 1:1000

LEGEND & SCHEDULE

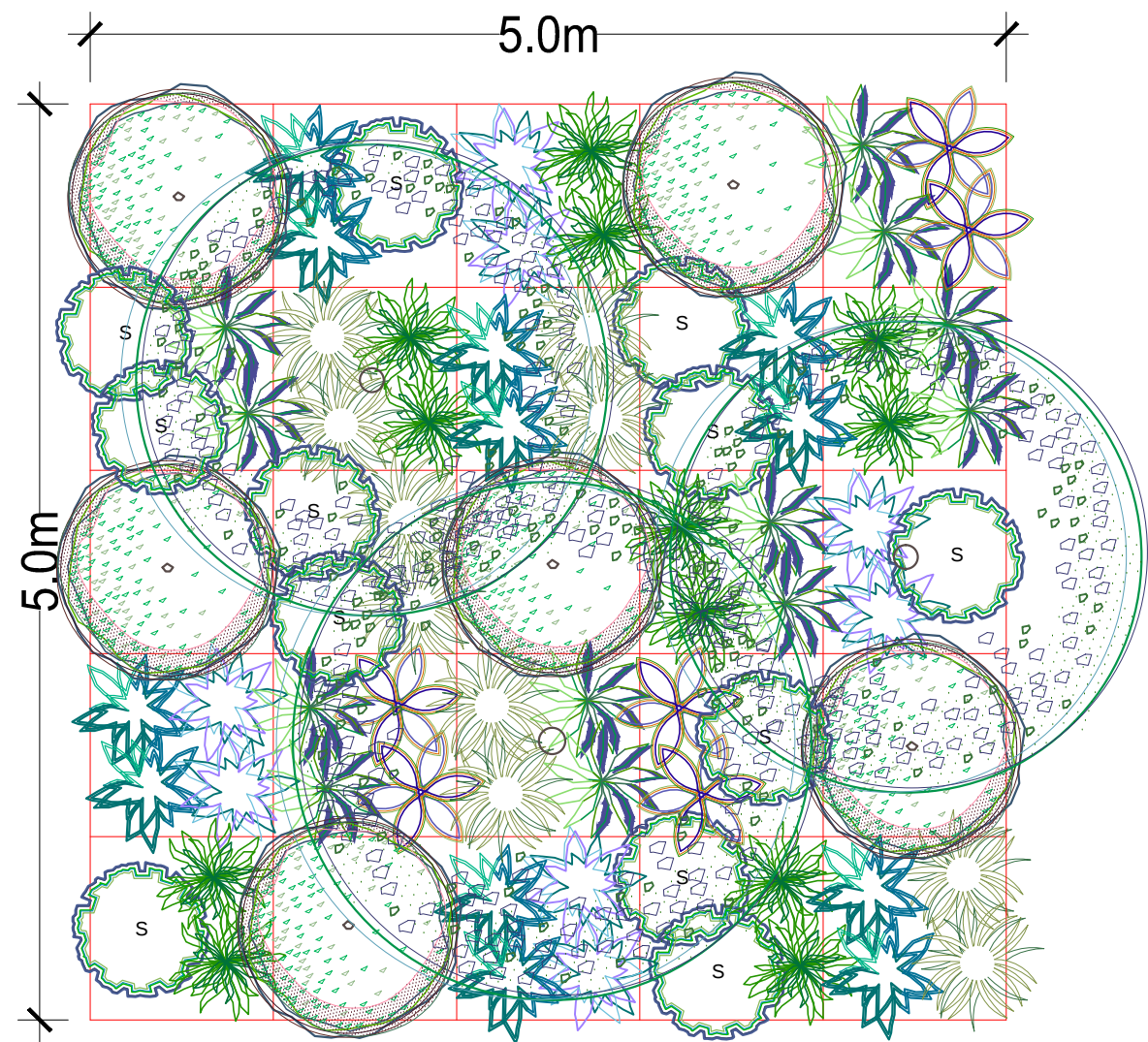
Planting shall be modified to suit embankment, existing trees and natural elements and where planting areas are smaller than the 5m grid. Refer to the Final Rehabilitation Plan for required planting areas.

TREES
Angophora costata, *Angophora floribunda*, *Corymbia gummifera*, *Eucalyptus punctata*, *Eucalyptus paniculata*, *Syncarpia glomulifera*
Pot size: tube stock
Planting Density: 3 per 5m grid (alternate species each 5m grid)

SHRUBS
Banksia spinulosa, *Bursaria spinosa*, *Kunzea ambigua*, *Leptospermum polygalifolium*, *Leptospermum trinervium* & *Hakea sericea*
Pot size: tube stock
Planting Density: 12 per 5m grid (2 of each species per 5m grid)

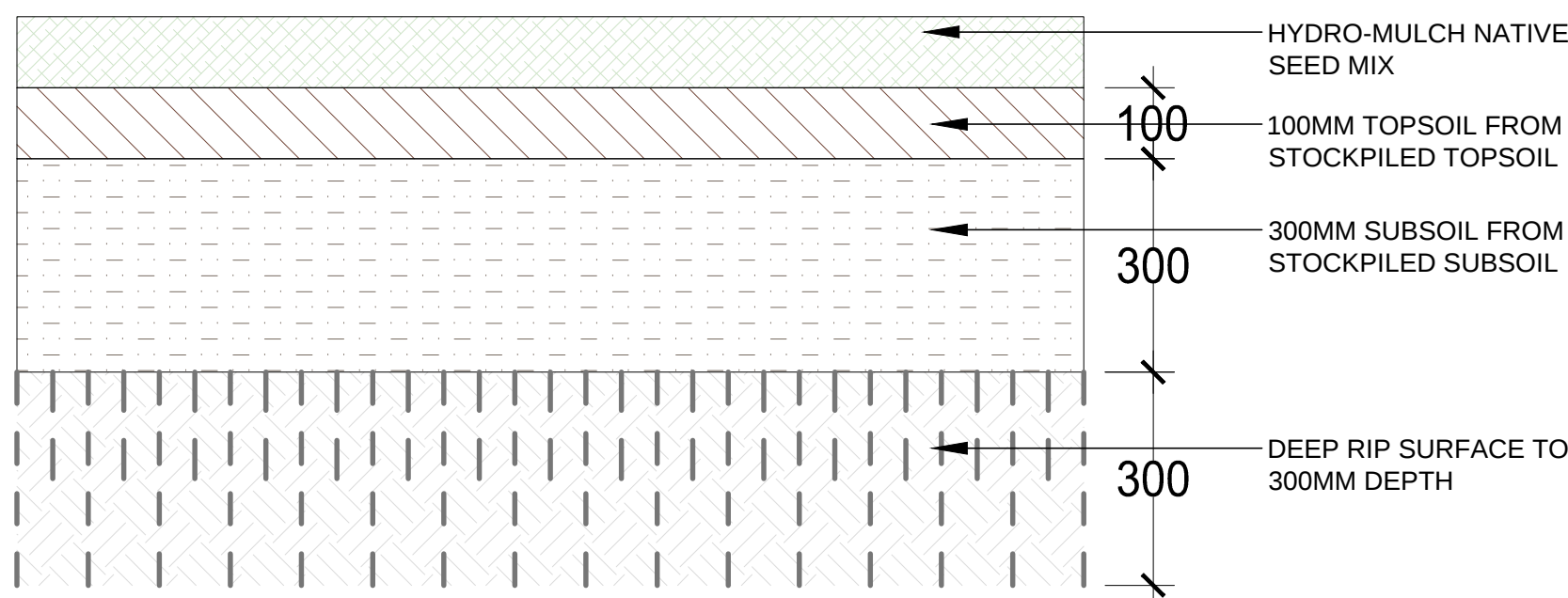
SMALL TREES / LARGE SHRUBS
Allocasuarina littoralis, *Acacia decurrens* & *Acacia parramattensis*
Pot size: tube stock
Planting Density: 6 per 5m grid (2 of each species per 5m grid)

GRASSES & GROUNDCOVERS
Dianella prunina, *Hardenbergia violacea*, *Lomandra longifolia*, *Microtena stipoides*, *Poa labillardieri* & *Themeda australis*
Pot size: tube stock
Planting Density: 60 per 5m grid (10 of each species per 5m grid)



DETAIL 07: TUBE STOCK MASS PLANTING

SCALE 1:40

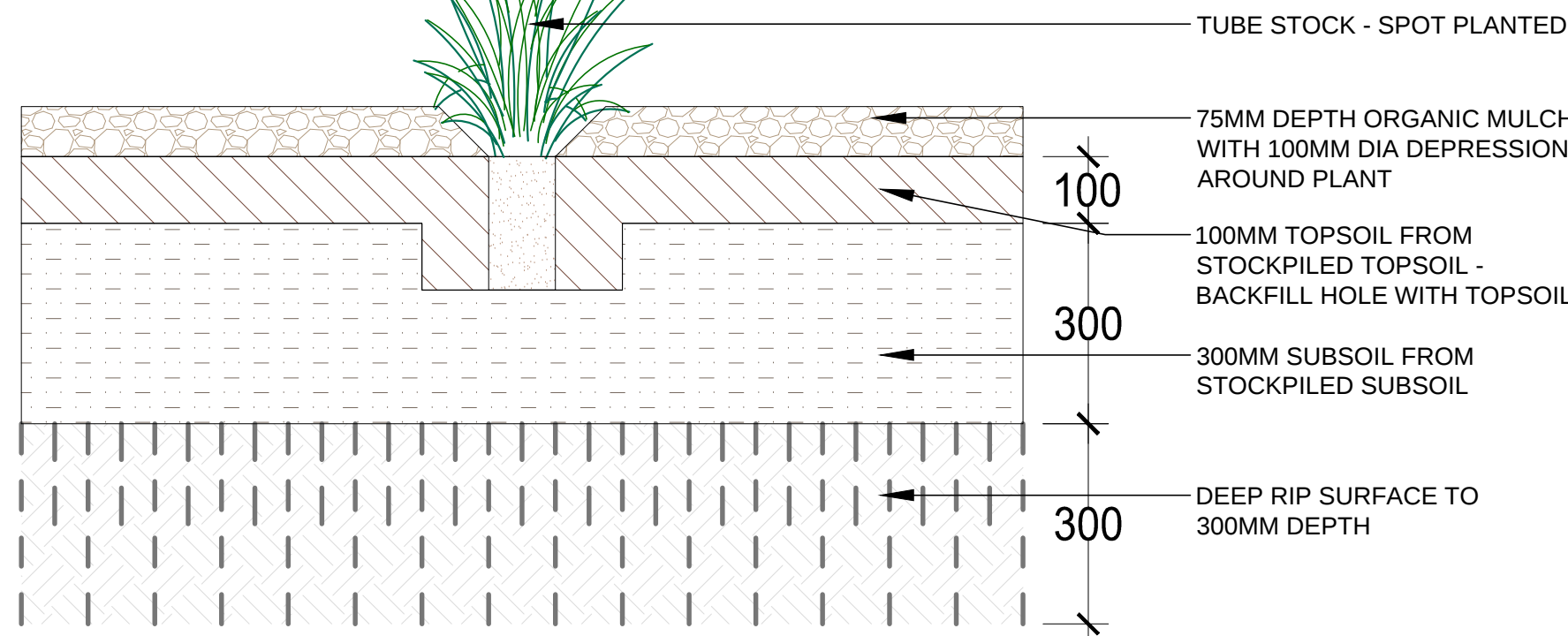


DETAIL 10: HYDRO-MULCH TREATMENT

SCALE 1:10

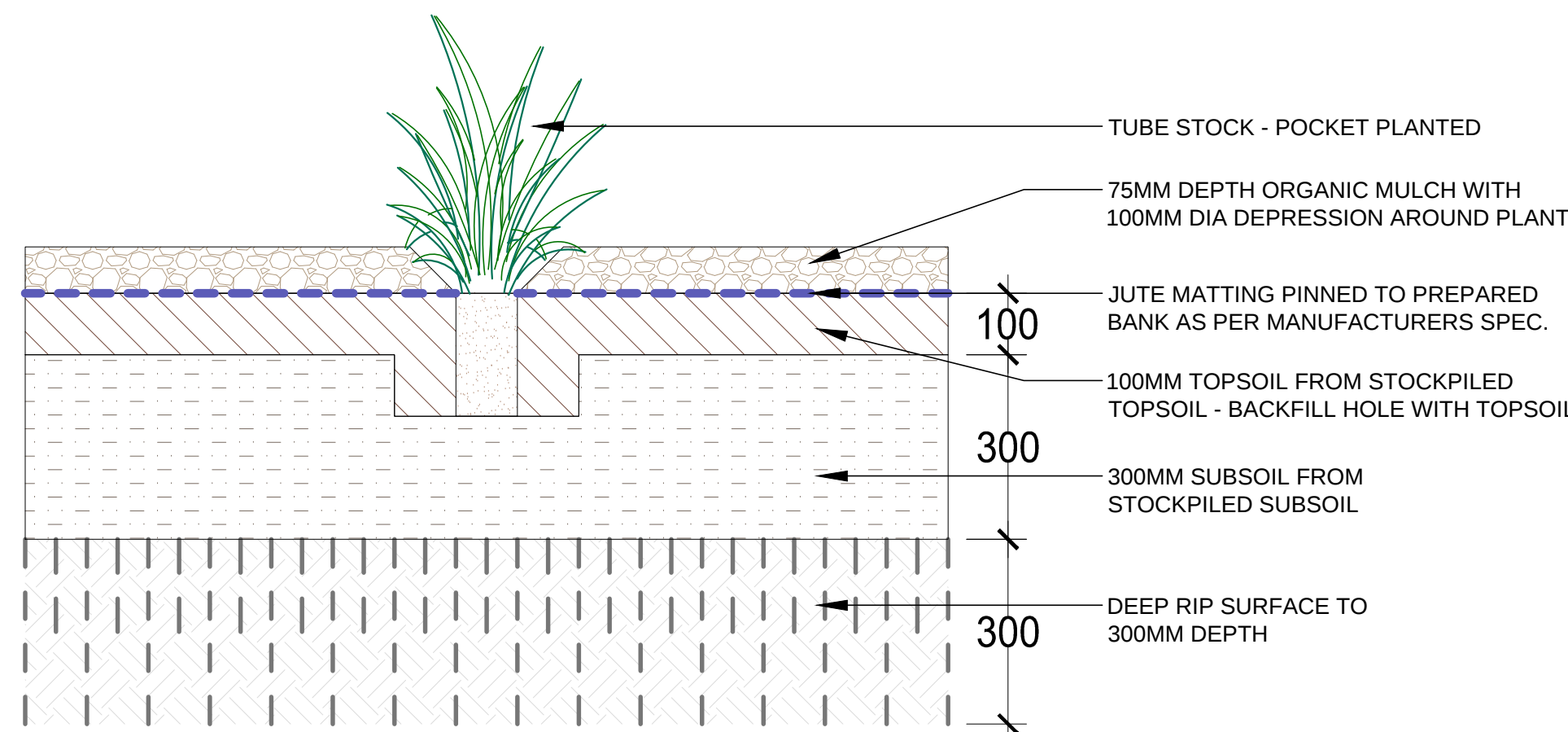
DETAIL 08: PLANTING FOR BUFFER SETBACKS AND EMBANKMENTS WITH 1V:3H GRADE

SCALE 1:10



DETAIL 09: TYPICAL BUFFER SCREEN PLANTING AND EMBANKMENT TREATMENT

SCALE 1:200



DETAIL 11: PLANTING FOR EMBANKMENTS STEEPER THAN 1V:3H GRADE

SCALE 1:10

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