# WEE WAA FLOOD MITIGATION STRATEGY REF WORKS CONSTRUCTION DOCUMENTATION

Sheet No.	Drawing Title	Revision	Date
LP01	COVER SHEET	D	13/5/2022
LP02	OVERALL SITE PLAN	D	13/5/2022
LP03	SITE PLAN - PART A	D	13/5/2022
LP04	PART A - LANDSCAPE PLAN 01 & 02	D	13/5/2022
LP05	PART A - LANDSCAPE PLAN 03 & 04	D	13/5/2022
LP06	PART A - LANDSCAPE PLAN 05 & 06	D	13/5/2022
LP07	PART A - LANDSCAPE PLAN 07 & 08	D	13/5/2022
LP08	SITE PLAN - PART B	D	13/5/2022
LP09	PART B - LANDSCAPE PLAN 01 & 02	D	13/5/2022
LP10	PART B - LANDSCAPE PLAN 03 & 04	D	13/5/2022
LP11	PART B - LANDSCAPE PLAN 05 & 06	D	13/5/2022
LP12	PART B - LANDSCAPE PLAN 07 & 08	D	13/5/2022
LP13	PART B - LANDSCAPE PLAN 09	D	13/5/2022
LP14	DETAILS	D	13/5/2022
LP15	SPECIFICATION	D	13/5/2022

OLOCALITY PLAN Source: Esri Scale 1:5000 @ A1



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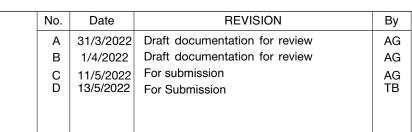


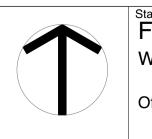
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5. CONFIRM LOCATION OF ALL SERVICES ON SITE PRIOR TO EXCAVATION.
6. DRAWINGS TO BE PRINTED IN COLOUR ONLY

Architect: SHAC

Warren Smith Consulting Engineers





FOR SUBMISSION
Wee Waa Flood Mitigation
Off Kamilaroi Highway, Wee Waa NSW

COVER SHEET

SCALE: 1:5000

ORIGINAL DRAWING AT A1.

Drawn By:
CN / AG
Checked By:
TB

Project No.

2114

Drawing No.
Rev
LP01
D



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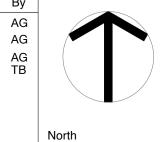


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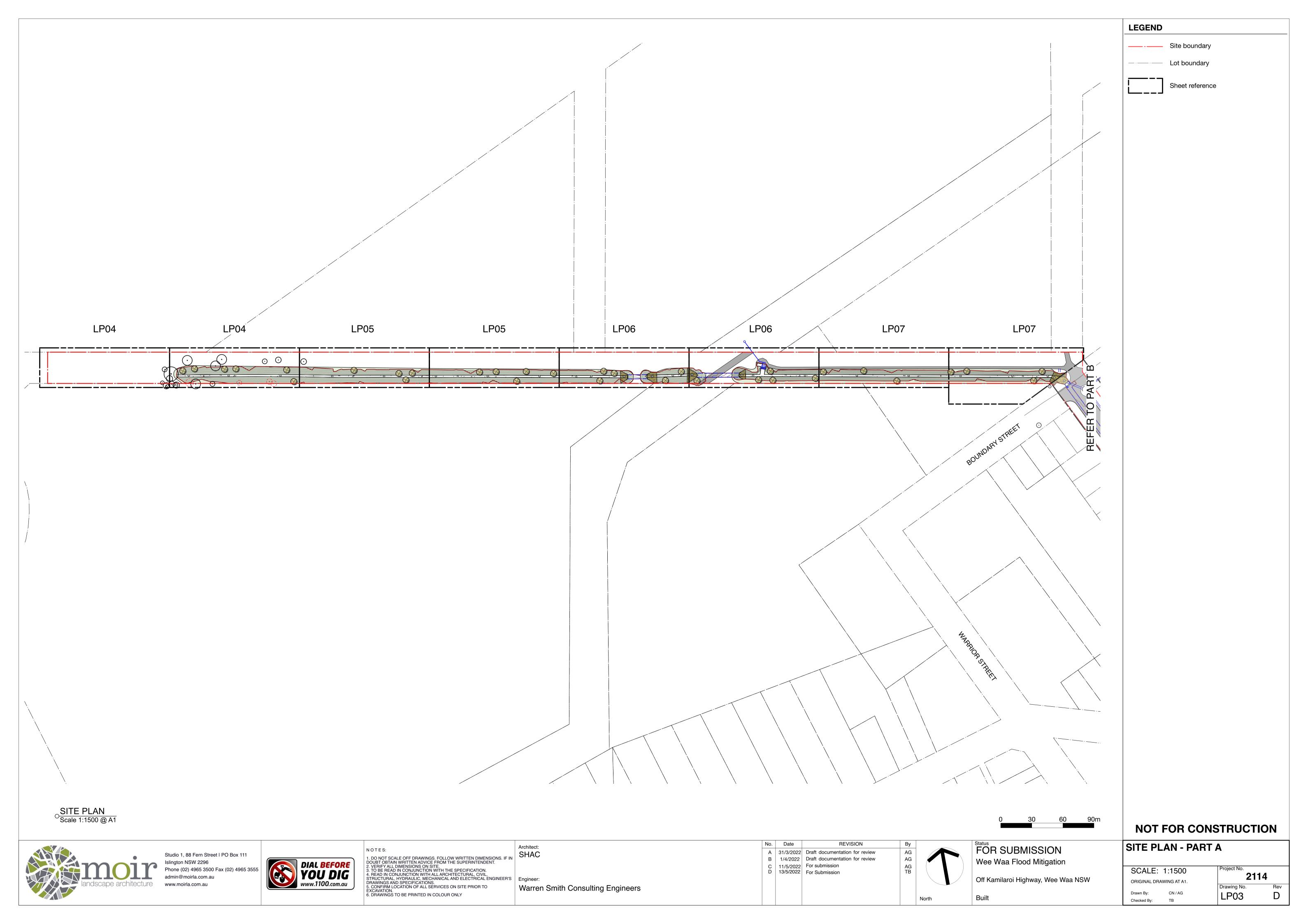
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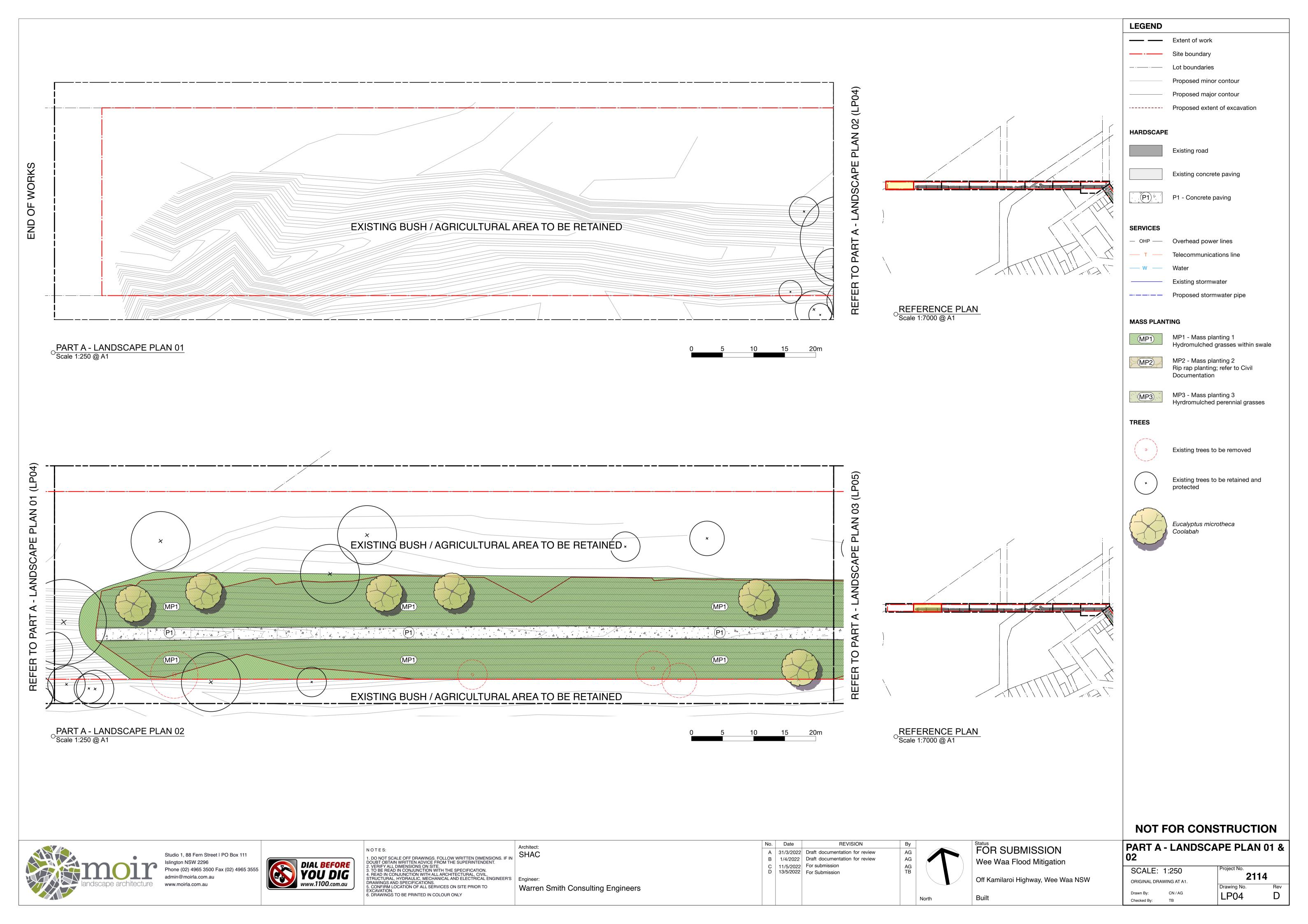
A 31/3/2022 Draft documentation for review
B 1/4/2022 Draft documentation for review
C 11/5/2022 For submission
D 13/5/2022 For Submission

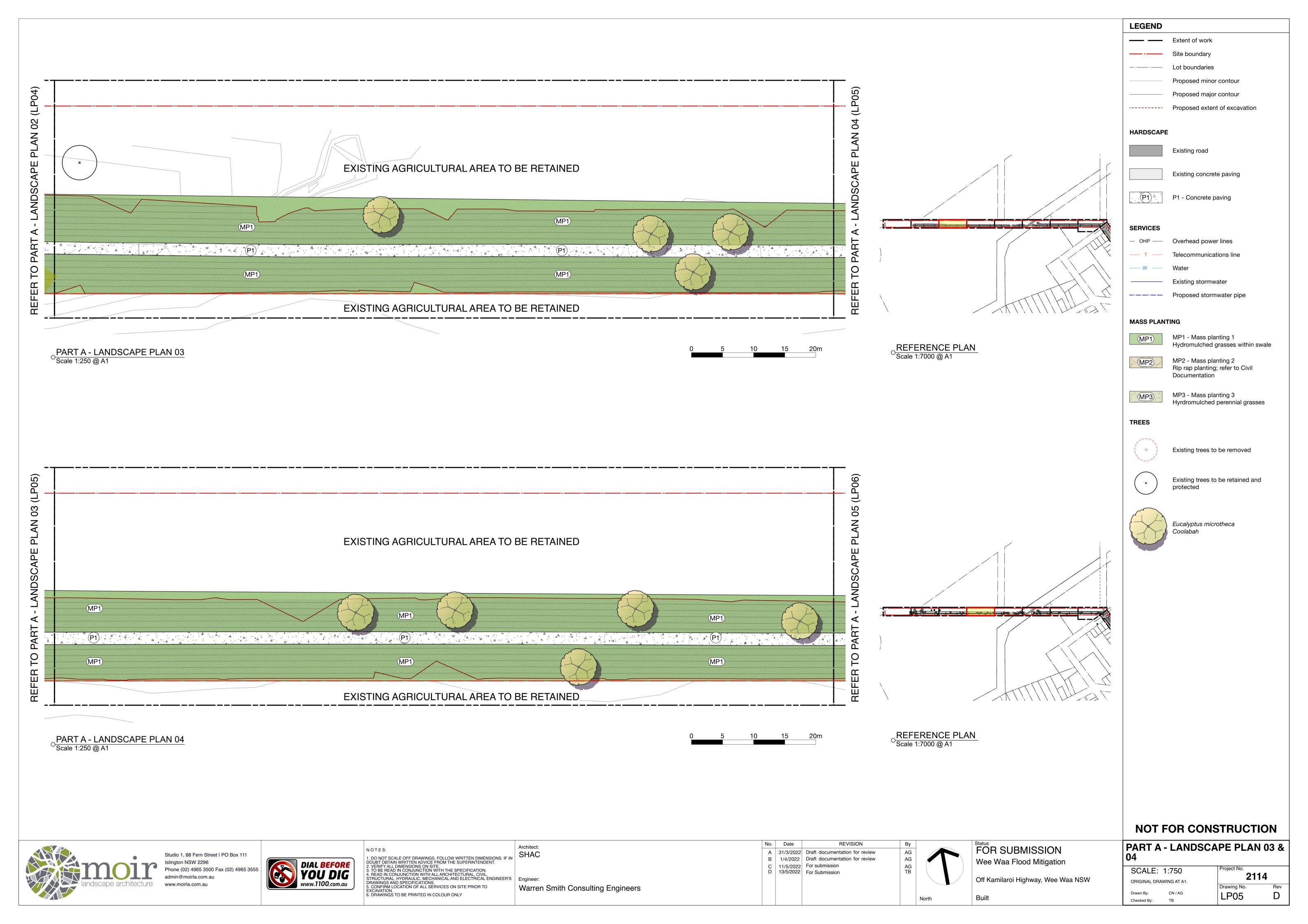


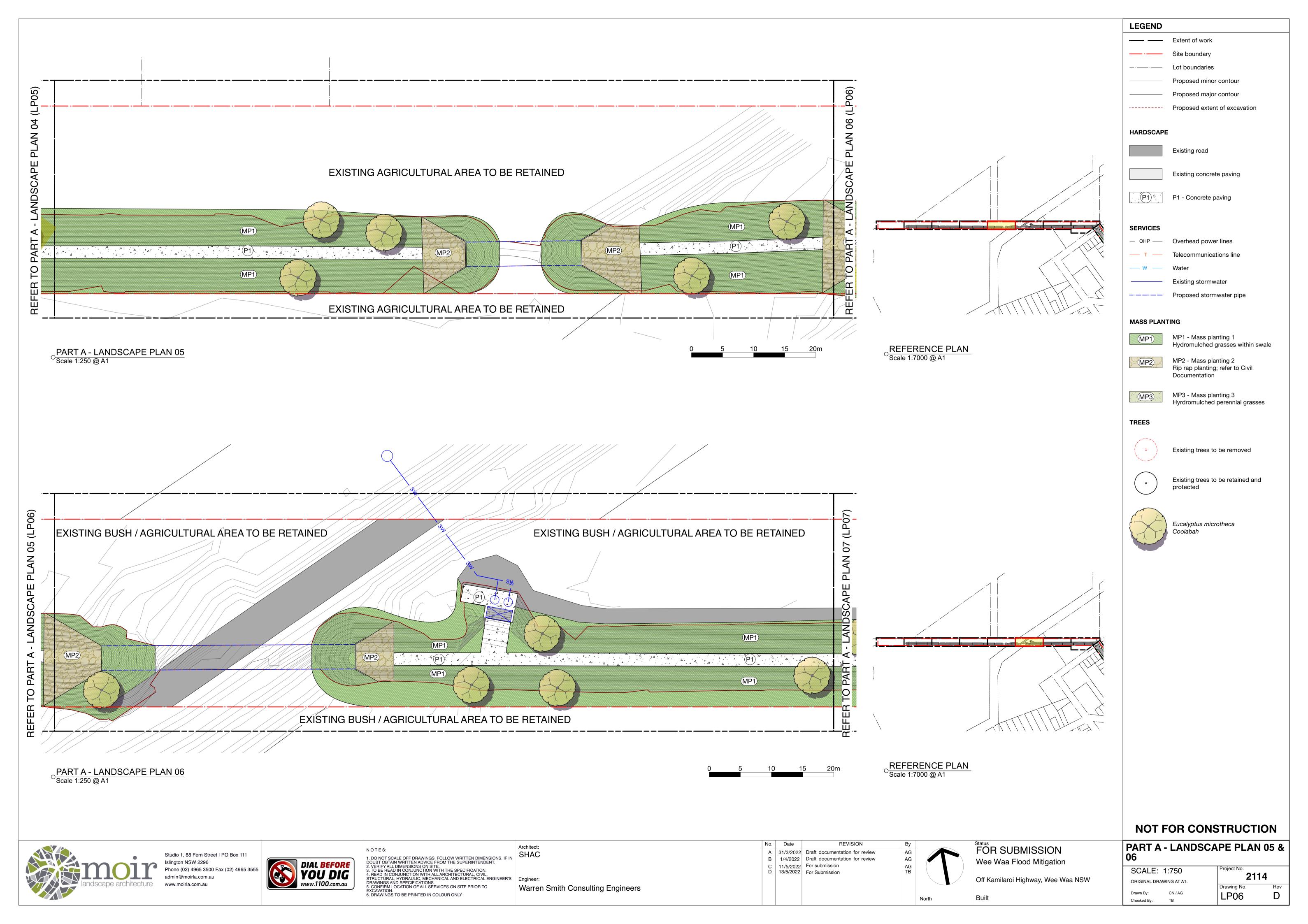
Wee Waa Flood Mitigation Off Kamilaroi Highway, Wee Waa NSW

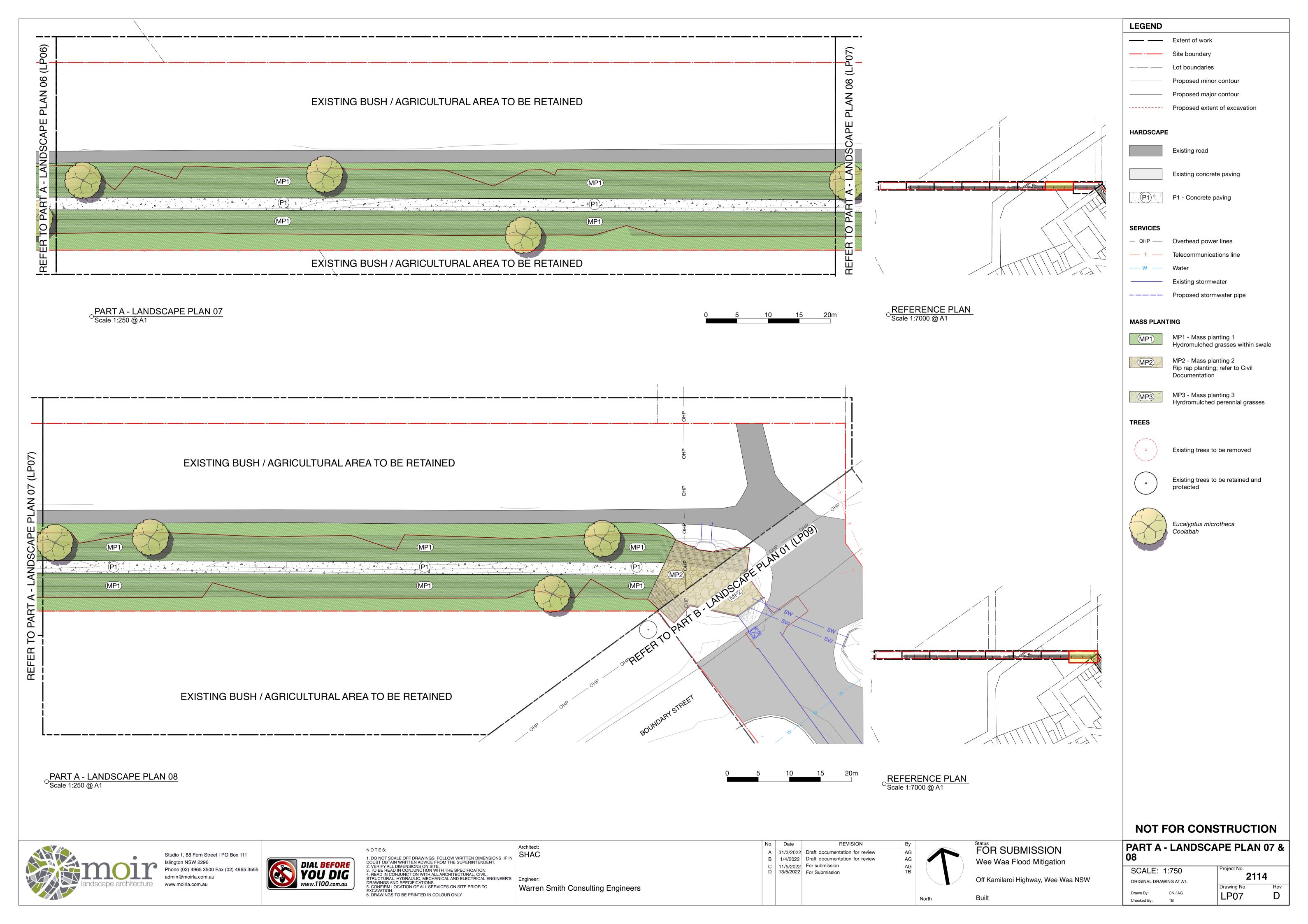
SCALE: 1:750 2114 ORIGINAL DRAWING AT A1. Drawn By: CN / AG LP02 Checked By:

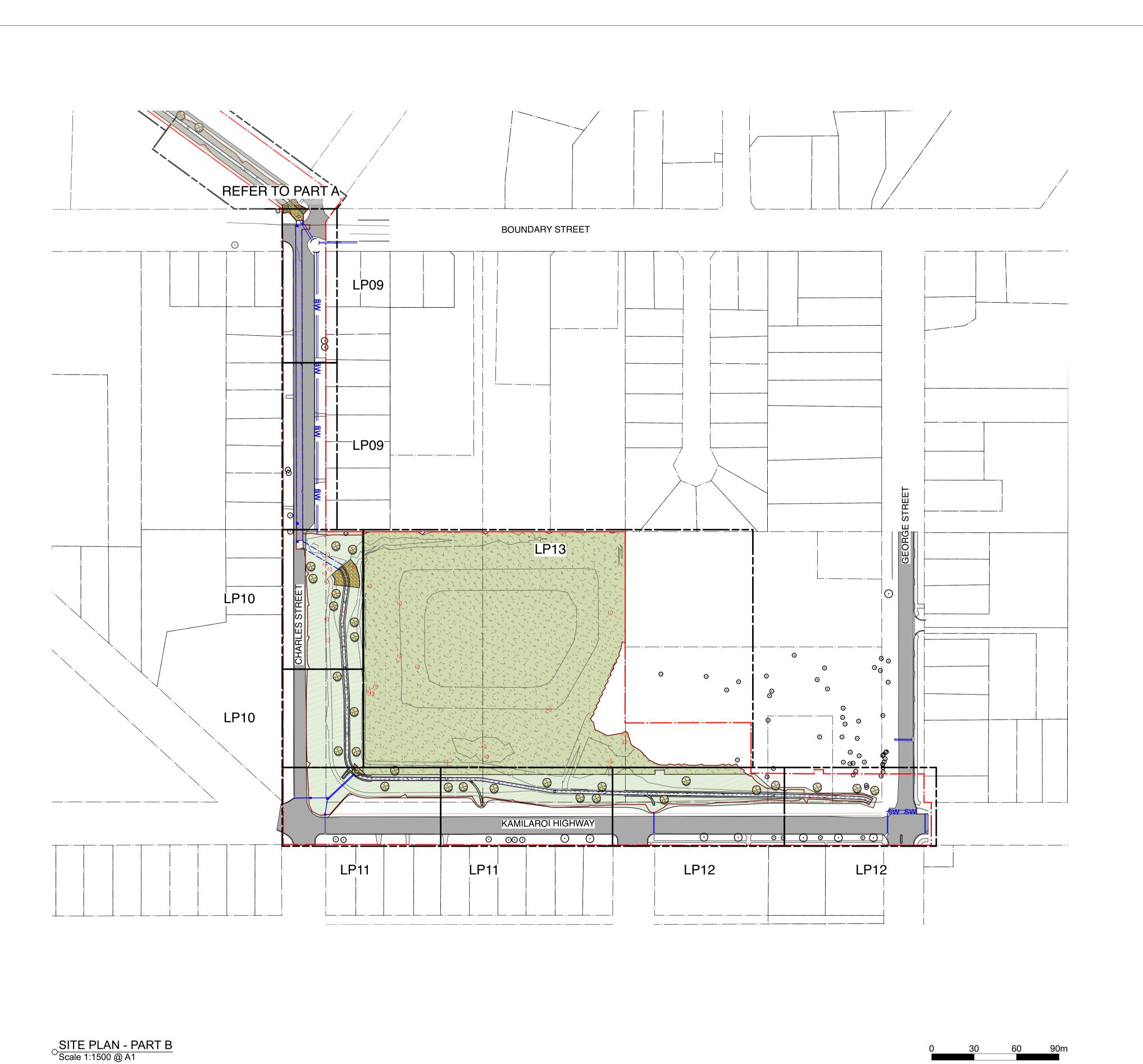












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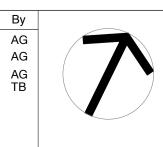
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Architect:

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FOR SUBMISSION Wee Waa Flood Mitigation Off Kamilaroi Highway, Wee Waa NSW

SITE PLAN - PART B

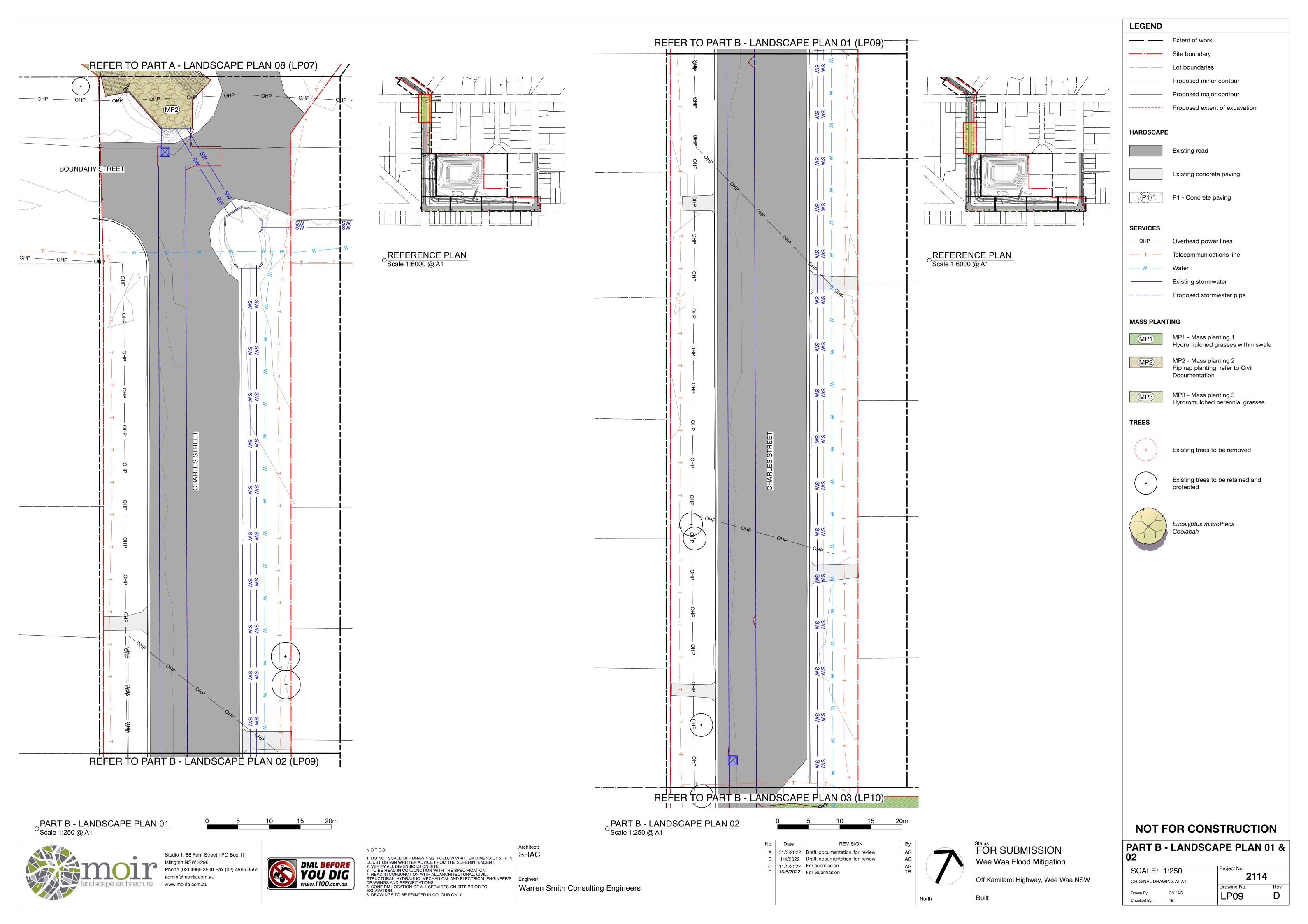
**LEGEND** 

Site boundary

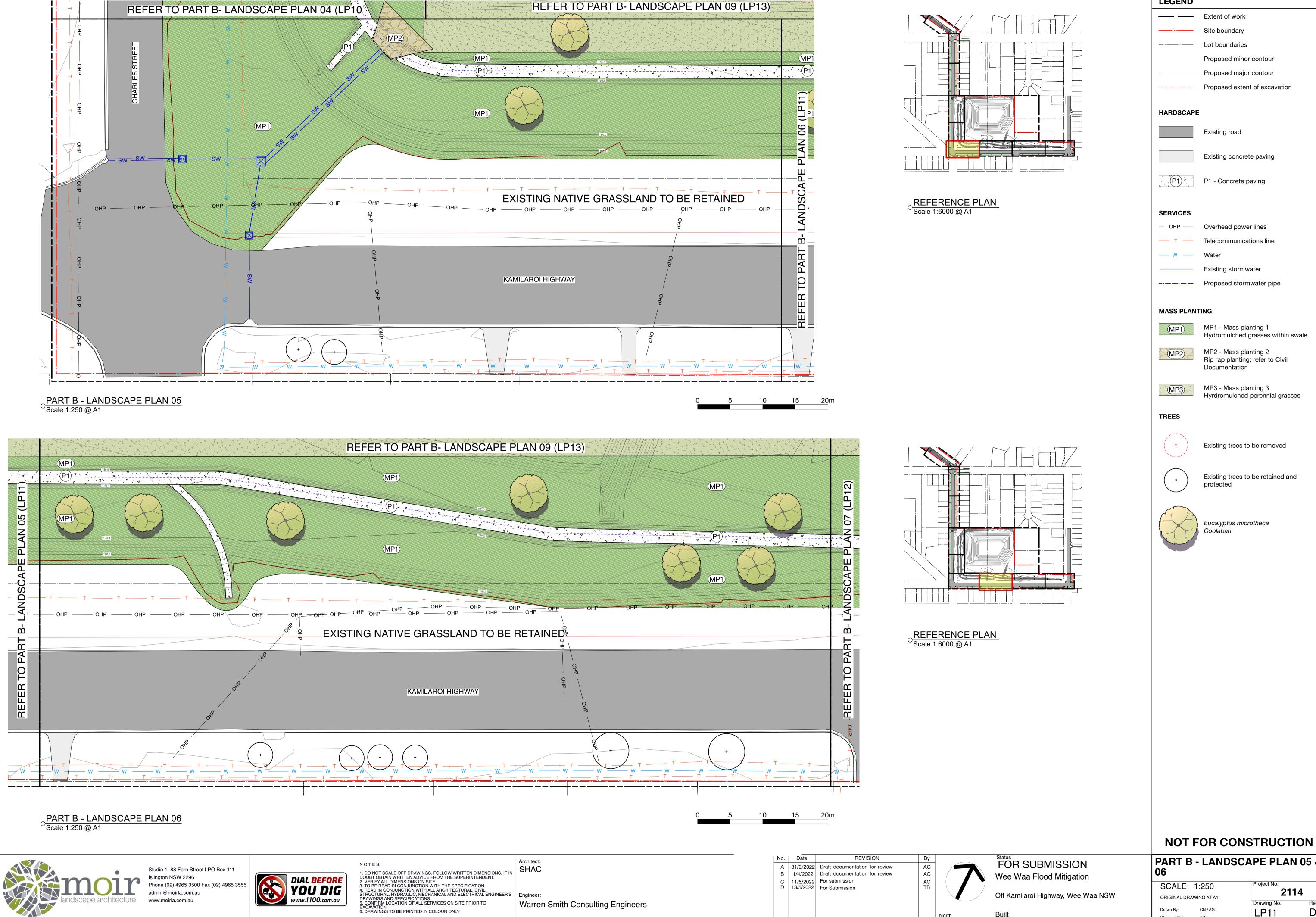
—·— Lot boundary

Sheet reference

SCALE: 1:1500 2114 ORIGINAL DRAWING AT A1. Drawn By: CN / AG LP08 Checked By:







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**LEGEND** Extent of work Lot boundaries Proposed minor contour Proposed major contour ----- Proposed extent of excavation Existing concrete paving P1 - Concrete paving OHP — Overhead power lines Telecommunications line Existing stormwater ----- Proposed stormwater pipe MP1 - Mass planting 1 Hydromulched grasses within swale MP2 - Mass planting 2 Rip rap planting; refer to Civil Documentation MP3 - Mass planting 3 Hyrdromulched perennial grasses

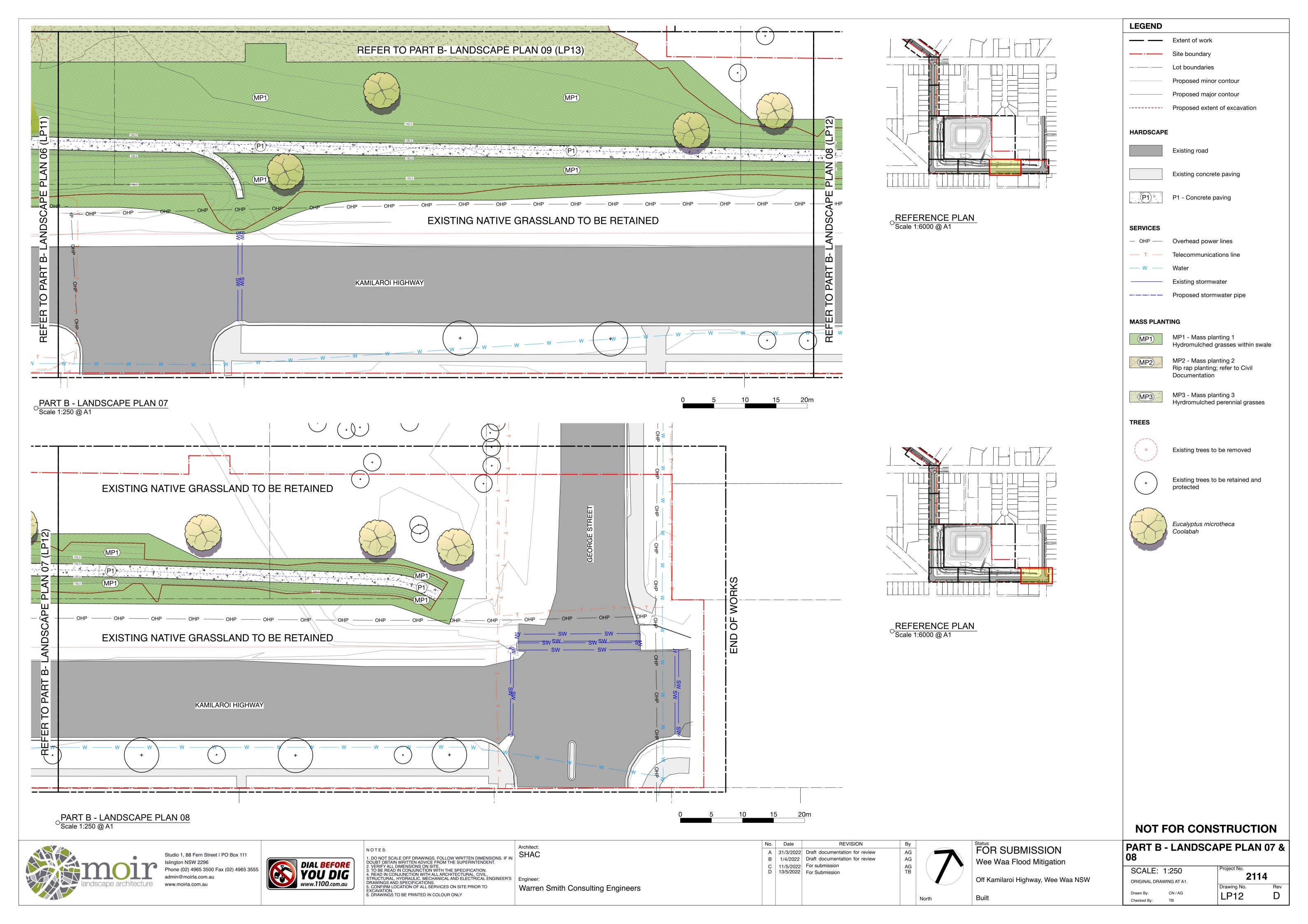
Existing trees to be removed

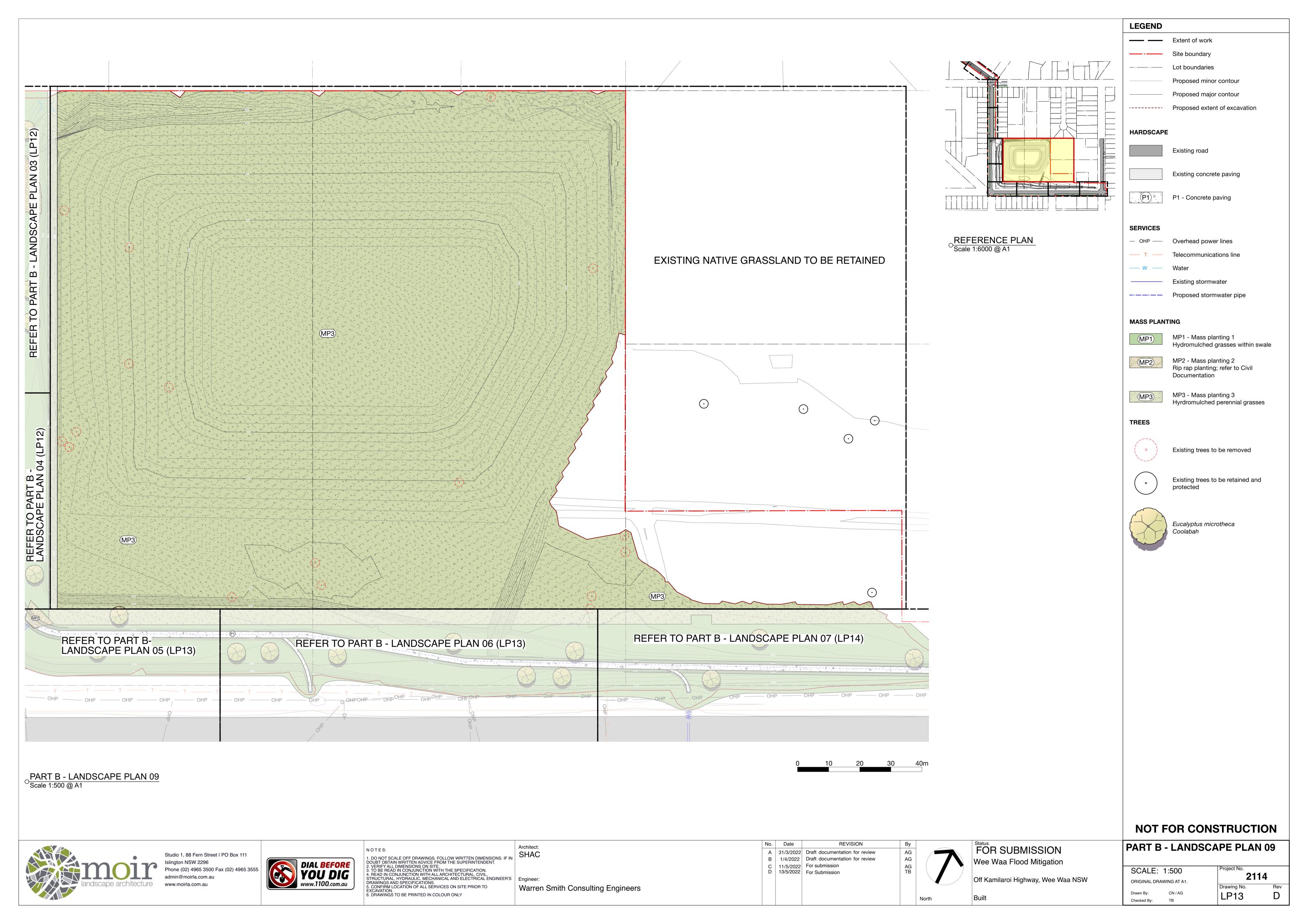
Existing trees to be retained and

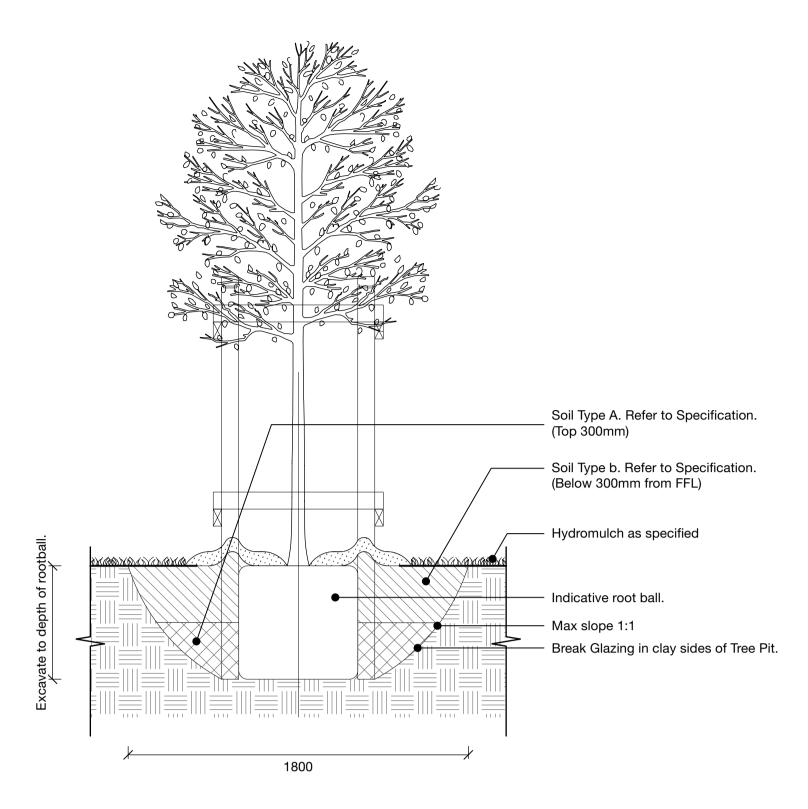
Eucalyptus microtheca

PART B - LANDSCAPE PLAN 05 &

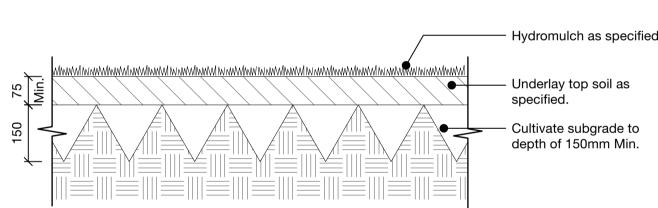
2114 ORIGINAL DRAWING AT A1 Drawn By: LP11 Checked By:







01 TYPICAL TREE IN MASS PLANTING DETAIL LP14 Scale: 1:20



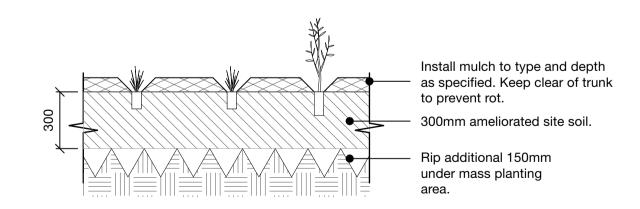
# IOTES:

- Finish crossfall shall be 1:80 min.
   Finish flush with adjoining surfaces.
- High flush with adjoining surfaces.
   Hydromulch as specified.
   2. Ameliorate site soil or import topsoil to
  - provide an underlay that complies with AS4419.

    3. Ameliorate clay subsoil with gypsum applied at the rate specified by the manufacturer.
  - Remove contaminated areas, deleterious material such as large rocks greater than 50mm, rubbish and large twigs.

    4. Water in and maintain consistent deep watering for 14
  - weeks minimum.Consistently top dress depressions to provide an
  - Consistently top dress depressions to provide a even surface.
  - 6. Control pests and disease consistently during the remainder of the planting establishment period.

# O2 TYPICAL HYDROMULCHING PLANTING DETAIL Scale: 1:10



03 TYPICAL MASS PLANTING DETAIL
1914 Scale: 1:20



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Architect:
SHAC

Warren Smith Consulting Engineers

 No.
 Date
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 By

 A 31/3/2022 B 1/4/2022 C Draft documentation for review B 1/4/2022 C T 11/5/2022 D Traft documentation for review Draft documentation for review AG Draft documentation for review AG

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Wee Waa Flood Mitigation
Off Kamilaroi Highway, Wee Waa NSW
Built

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DETAILS

SCALE: AS SHOWN
ORIGINAL DRAWING AT A1.

Project No.
2114

LP14

CN / AG

Drawn By:

Checked By:

Overall Area

722 sqm

31,689 sqm

12.5% mix

12.5% mix

Planting Schedule

**Botanical Name** 

Rytidosperma bipartitum

Sporobolus creba

<b>Trees</b> EUC mic	Eucalyptus microtheca	Coolabah	45 litre	15 - 25m	6 - 10m	62		
MP1 Hydromule	ched grasses within swale						23,247 s	ear
							20,247	эчп
ARI ram	Aristida ramosa	Purple Wiregrass	Seeded Hydromulch			12.5	5% mix	
AUS ver	Austrostipa verticilata	Slender Bamboo Grass	Seeded Hydromulch			12.5	5% mix	
AUS sca	Austrostipa scabra	Rough Spear Grass	Seeded Hydromulch			12.5	5% mix	
CHL tru	Chloris truncata	Windmill Grass	Seeded Hydromulch			12.5	5% mix	
DIC ser	Dicanthium sericeum spp sericeum	Queensland Bluegrass	Seeded Hydromulch			12.5	5% mix	
DIG bro	Digitaria brownii	Cotton Grass	Seeded Hydromulch			12.5	5% mix	
	-							

Pot Size

Seeded Hydromulch

Seeded Hydromulch

MP2 Rip rap mass planting

 CAR app
 Carex appressa
 Tall Sedge
 Tubestock
 0.8 - 1.0m
 0.6 - 0.9m
 1445
 4 / sqm

 ISO nod
 Isolepis nodosa
 Knobby Club-rush
 Tubestock
 0.6 - 0.75m
 0.3 - 0.6m
 1445
 4 / sqm

\*MP3 Hydromulched perennial grasses

SKU WALV01 Rytidosperma geniculata Easy Spread Wallaby Lawn Mix Seeded Hydromulch

Common Name

Wallaby Grass

Slender Rat's Tail Grass

\*Use seed mix from supplier Native Seeds (1300473337), applied at the rate recommended by the suppliers.

# NOTE

RYT bip

SPO cre

CONTRACTOR IS REQUIRED TO CHECK ALL NUMBERS ON DRAWINGS AND CONFIRM WITH SCHEDULE PRIOR TO ORDERING. NUMBERS ON DRAWINGS TO TAKE PRECEDENCE ALONG WITH QUARE METRE RATES.

# SPECIFICATION

# 1.0 GENERAL

# 1.1 EXISTING SERVICES

Existing services on site include stormwater drainage, water, and associated power service conduits. Locations of all services should be established prior to excavation of planting holes and installation of trees. The drawings DO NOT indicate the extent of existing services. Existing services must be confirmed by the contractor prior to excavation. Do not excavate by machine within 1m of existing underground services without prior approval or identification of service location by the site superintendant

# 1.2 PROTECTION OF EXISTING FEATURES

During installation protect all existing trees, shrubs and other specified vegetation, features and improvements, structures and utilities. Protect trees to be retained from damage from groundworks. Take necessary precautions, including the following:

Harmful Materials: Do not store or otherwise place bulk materials and harmful materials under or near trees. Do not place spoil from excavations against tree trunks, even for short periods. Prevent wind blown materials such as cement from harming trees and plants. <u>Damage:</u> prevent damage to tree bark. Do not attach stays, guys and the like to trees.

Work under trees: Do not add or remove topsoil within the drip line, use hand methods such that root systems are preserved intact and undamaged. Open up excavations under tree canopies for as short a period as possible.

Roots: Where it is necessary to cut tree roots, use means such that the cutting does not unduly disturb the remaining root system. <u>Compacted Ground:</u> Avoid compaction of the ground under trees.

# 1.3 GENERAL HOLD POINTS

During the pre-construction, construction and post construction phases a series of hold & witness points have been laid out to ensure compliance with

**NOTE:** Inspections are to be arranged with at least 10 working days notice before the inspection.

Hold Point	Completed	Notes:
Pre-ordering of plant stock in accordance with the specification	YES/NO	Inspection required by Landscape Architect.
Certification that trees comply with the Tree Supply Specification from supplying nursery.	YES/NO	Provide 2 weeks lead time. Supply certification to Landscape Architect.
Completion of subgrade preparation prior to spreading of any imported soil or ameliorated site soil (in accordance with AS4419-2018)	YES/NO	Delivery dockets, receipts must be provided. Inspection required by Landscape Architect.
Batch Certificates for all imported soil in accordance with AS4419 - 2018. Should site soil be utilised for planting purposes, soil testing must be conducted in accordance with AS4419 - 2018. A copy of the results must be provided to the superintendent, where amelioration of the soil is required, evidence of this application must be communicated and will form a hold point.	YES/NO	Test results to be supplied to Landscape Architect.
Where ameliorated stockpiled soil or site soil is required and utilised for planting purposes in accordance with AS4419-2018, evidence of associated amelioration measures must be provided	YES/NO	Test results, delivery dockets, receipts must be provided. Inspection required by Landscape Architect.
Evidence of certification of all associated imported topsoil for street tree planting in accordance with AS4419- 2018.	YES/NO	Delivery dockets, receipts must be provided to Landscape Architect.
Completion of nominated soil spreading, mulching, associated proprietary products and beginning of planting in accordance with the landscape specifications.	YES/NO	Inspection and sign off required by landscape architect.
Tree delivery prior to installation and certification that trees comply with AS2303- 2018 Tree Stock for Landscape Use.	YES/NO	Inspection and sign off requiredby landscape architect.
Set out tree pits with existing concrete footpath.	YES/NO	Notify Landscape Architect of any potential problems.
Excavation of tree pits with root barrier and sub-surface drainage installed in accordance with Detail Drawings.	YES/NO	Inspection and sign off required by landscape architect.
Commencement of tree planting.	YES/NO	Inspection and sign off required by landscape architect.
Completion of all landscape works in accordance with the Landscape Construction Specification and subject DA approval consent.	YES/NO	Inspection required by Landscape Architect at practical completion to issue Defects Report and Compliance Report/Practical Completion Certificate.
Manufacturer's warranty and maintenance information for all proprietary products.	YES/NO	Supply all warranties and information for proprietary products to Landscape Architect. To be provided within 1 month of Practical Completion.

# 2.0 MATERIALS

# 2.1 PLANT MATERIAL

Discrepancies within the planting schedule and the drawing should be referred to Moir Landscape Architecture for clarification. Make no substitutions unless approved. Substitutions shall not be approved unless the contractor complies with this specification. Contractor to verify quantities against plant rates and quantities on drawings prior to comencement of work.

Contractor is required to check all numbers on drawings and confirm with schedule prior to ordering. Numbers on drawings to take precedent along with square metre rates.

Plant material: Plants shall be of the species, sizes and quantities as shown on the drawing. Plants shall be vigorous, well established, of good form, not soft or forced, free from disease and insect pests. Plants shall have large healthy root systems.

Trees are to be supplied in accordance with 'AS2303:2018 Tree Stock for landscape Use'.

Top 300mm soil to be equal to AS4419-2018 'Organic Soil' with texture to AS4419-2018 Table K1- Sandy Loam. Below 300mm do not incorporate organic matter. Below 300mm soil to be equal to AS4419-2018 'Soil blend' with max 5% organic matter content. Texture to AS4419-2018 Table K1- Sandy Loam.

# 2.2.1 DEFINITIONS

Site topsoil: Soil excavated from the site which has the following characteristics Contains minimum 2% organic matter, supports plant life, and is free from unwanted matter

Unwanted matter (in topsoil): Stones over 25mm diameter, clay lumps, weeds and tree roots, sticks and rubbish and material toxic to plants.

Where available use ameliorated site topsoil. Where unavailable, import topsoil from an off-site source approved by the Superintendent, equivalent to specification above.

Soil to be used for these landscape works shall be: Ameliorated Site Topsoil or Imported General Purpose Soil to the areas and locations as specified. Soil for the works shall be free from noxious weeds etc. Soil shall be assumed to be placed to all revegetated areas and backfill to all plantings. Unless otherwise directed by site superintendent, the landscape contractor is responsible for the removal and or disposal of all spoil or excess soil excavated in the process of implementing the landscape works.

# 2.2.2 SOIL TESTS

Test soil and ameliorate in accordance with soil test results. Where unavailable for reuse import suitable topsoil to support native plant growth.

Sampling: As recommended in AS 4419 (2018) Appendix A (when on site soil is to be used).

Sampling technique: Follow sampling techniques and guidelines according to AS 4419 (2018). Where discrepancies arise, refer to the Superintendent for clarification prior to proceeding with any works.

# The Contractor shall arrange for the following soil tests to be carried out:

 One test of any proposed imported topsoil; and • Where site topsoil is to be used, one site topsoil test by an approved soil testing laboratory as specified, from topsoil stockpiles.

Type of Soil Test Required: The Contractor shall specify that a 'major soil test' is required, for the purpose of analysing the characteristics and recommendations for use as a landscaping topsoil for native species.

<u>Results:</u> The results of all soil tests should be submitted to the superintendent prior to work commencing.

Lead time: Allow a minimum of 10 full working days for completion of soil testing, and check with laboratory to ensure testing will not delay landscaping works. Supply soil tests to site superintendent once available and according to the hold and witness point schedule.

Soil test results are only valid if soil is stockpiled for less than 12 months. If soil has been stockpiled for a longer period, new tests need to be done as described in AS 4419 (2018)

# **2.2.3 SUBSOIL**

Excavated Planting Beds: Where defined planting beds are indicated on the landscape drawings with specific species scheduled and no turfing shown, treat as an excavated landscape planting bed

Excavation technique: Excavate to backfill with ameliorated site soil or imported general purpose soil to bring to levels shown on the drawings to allow for mulching and placement of imported soil. Rip and cultivate to depths as shown on the drawings.

# 2.2.4 SOIL TEXTURES

Use soils described by the following terms (or their equivalents) which comply generally with the texture classifications and typical uses of AS 4419 – (2018) Table K1 Medium textured - Sandy loam

## 2.2.5 SOIL LEVELS

Finished soil levels shall allow turf or mulch to be finished to top of kerb, gravel pavement, existing levels or as otherwise shown on drawings.

# Tamp lightly and uniformly in 150 mm layers. Avoid differential subsidence and excess compaction and produce a finished topsoil surface which has the following characteristics:

- Finished to design levels. Smooth and free from stones or lumps of soil.
- Graded to drain freely, without ponding, to catchment points.
- Graded evenly into adjoining ground surfaces.
- Ready for planting.

Backfill Soil: Backfill holes using ameliorated site topsoil. Stock pile site soil onsite. Confirm stockpiles of site soil with superintendent prior to placement of materials. Site soil to be free from debris and weeds.

Additive types and rates: The Contractor shall incorporate additives to the subsoil or topsoil at rates recommended by the soil test results. This may include but not limited to PH neutral compost, lime, gypsum, urea, potash.

Application: Where subsoil additives are recommended by the soil tests apply additives after cultivation of the subsoil.

Where site topsoil is to be stockpiled for reuse, incorporate additives as recommended in soil tests by cultivating through the topsoil. For excavated garden beds or backfill to planting holes, incorporate additives into stockpiled topsoil prior to placement. In all situations, ensure additives are thoroughly mixed through topsoil.

# 2.2.7 FERTILISERS AND SOIL CONDITIONERS

Fertiliser: Apply fertilisers according to the manufacturer's recommendations and recommended rates. Native plant slow release fertiliser applied at manufacturers recommendation - N:P:K 17:1.6:8.7

The use of mulch shall be limited to those areas which are specified on the plans, highly disturbed areas, and in locations where there is low erosion potential. Composted site mulch or an approved equivalent product (approved by site superintendant) spread to a depth of 75mm, is to be used. Where there is risk of mobilisation of surface materials due to weed management and/or planting works coir logs shall be used. For planting on slopes greater than 1:3 - Refer to relevant details. Depending on site conditions, coir logs may be necessary in combination with biodegradable mulch mat. All mulch to conform to AS4419-2018 with certification supplied to the Landscape Architect to verify it's compliance.

Where composted site mulch is to be used, to comply with Table 3.1 (A), 3.1(B) and 3.1(C) "Composted Product", compliance to be demonstrated according to Appendix Q of AS4454-2012 and results supplied to the Landscape Architect.

Note: this does not apply to playground softfall mulch.

# 2.4 HYDROMULCHING

B weeks before Hydromulching apply glyphosate herbicide to eliminate weed and grass growth from the planting bed. Prior to hydromulching loosen the surface of the seed bed with rake or scarifier to provide textured surface

Seed
All seed used shall be of the species and varieties listed in the Plant Schedule and shall be sown at the application rates specified. The Constructor shall submit to the Superintendent the name/s of the proposed seed supplier(s) at least ten (10) working days prior to application at

The Constructor's attention is drawn to the lead time that may be required to procure some native seed species. The seed shall be delivered to the site in separate lots for each species and variety, clearly labelled to show species, variety and weight. All seed must be accompanied by a "Certificate of Authenticity" which shall be furnished by the Constructor to the Superintendent upon request at

any stage of the work. Grass and clover seed shall be pre-packed commercially with an accompanying certificate of germination. Fertiliser shall be an organic material specifically formulated for addition to Hydromulching media such as Hydroganics from Nugrow (1300 684

Vegetable mulch used in hydromulching shall consist of straw, chaff, wood fibre, paper pulp or similar material all finely shredded to a maximum dimension of 10 mm. Meadow hay or weeds shall not be used and paper pulp if used shall not exceed 50% by mass of the total mulch.

Water used shall be potable and fit for purpose.

Binder
The binder used in hydromulching and strawmulching shall be Grade ASS, slow setting anionic bitumen emulsion, complying with AS 1160.

# The soil wetting agent added in hydromulching or hydroseeding shall be 'Aquasoil' applied at 1 litre/1000 litres of mix water

769) - Additional Fertiliser shall not be used – in particular avoid material with additional phosphorus.

Sow from autumn to spring coincided with rain. It is important after sowing grass seed to ensure seeds do not dry out. Irrigate for the first three

# weeks if natural rainfall does not occur. Apply water 3 times a week, taking into account the weather.

Material: Root barriers shall be manufactured from a 100% recycled HDPE. with a minimum barrier thickness of 1mm.

Depth: As shown on approved drawings. Refer to Details. Installation: Install in accordance with approved project plans and manufacturer's specifications.

Overlap and the seal joins in accordance with manufacturer's specification. Supplier: Arborgreen or equivalent

# 3.0 CRITERIA FOR TREE STOCK ASSESSMENT

# **3.1 GENERALLY**

Tree stock to conform to AS2303-2018

Trees will be assessed against AS2303-2018 and rejected if not in accordance with the specification

# 4.0 EXECUTION

# **4.1 EXCAVATION OF PLANTING HOLES**

Locations for plants and/or outlines of areas to be planted are to be staked out at the site. Locate and mark all subsurface utility lines. Approval of the stakeout by the supervisor is required before excavation begins. Tree pits are to be excavated to the depth and widths indicated on the drawings. If the planting area under any tree is initially dug too deep, the soil added to bring it up to the correct level should be thoroughly tamped. The bottom of the planting hole shall slope parallel to the proposed grades or toward any subsurface drain lines within the planting bed.

Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not excavate compacted subgrades of adjacent pavement or structures.

Subgrade soils shall be separated from the topsoil, removed from the area, and not used as backfill in any planted or lawn area. Excavations shall not be left uncovered or unprotected. For trees and shrubs planted in individual holes in areas of good soil that is to remain in place and/or to receive amendment in the top 150mm layer, excavate the hole to the depth of the root ball and to widths shown on the drawing. (Slope the sides of the excavation at a 45 degree angle up and away from the bottom of the excavation.)

Preparation of subgrades to be inspected prior to the installation or modification of topsoil or planting mix. Till the subsoil into the bottom layer of topsoil or planting mix. Loosen the soil of the subgrade to a depth of 50 to 75 mm with a rototiller or other suitable device.

Detrimental soil conditions: The supervisor is to be notified, in writing, of soil conditions encountered, including poor drainage, that the contractor considers detrimental to the growth of plant material. When detrimental conditions are uncovered, planting shall be discontinued until instructions to

Obstructions: If rock, underground construction work, utilities, tree roots, or other obstructions are encountered in the excavation of planting areas, alternate locations for any planting shall be determined by the landscape architect.

# 4.2 PLANTING OPERATIONS

resolve the conditions are received.

Before planting begins thoroughly water the plants and planting areas. Water plants again immediately after planting.

Install subsurface drains as shown on the details and connect to Stormwater. All tree planting holes and mass planting areas shall have subsurface drainage.

Plants shall be set on flat-tamped or unexcavated pads at the same relationship to finished grade as they were to the ground from which they were dug, unless otherwise noted on the drawings. Plants must be set plumb and braced in position until topsoil or planting mix has been placed and tamped around the base of the root ball. Improper tamping of the soil around the root ball may result in the tree settling or leaning. Plants shall be set so that they will be at the same depth and so that the root ball does not shift or move laterally one year later.

Determine the elevation of the root flare and ensure that it is planted at grade. This may require that the tree be set higher than the grade in the nursery. If the root flare is less than 50mm below the soil level of the root ball, plant the tree at the appropriate level above the grade to set the flare even with the grade. If the flare is more than 50mm at the centre of the root ball the tree shall be rejected.

Lift plants only from the bottom of the root balls or with belts or lifting harnesses of sufficient width not to damage the root balls. Do not lift trees by their trunk or use the trunk as a lever in positioning or moving the tree in the planting area.

Remove plastic, paper, or fibre pots from containerised plant material. Score the side of the root ball with a sharp knife and tease out roots. Immediately after removing the container, install the plant such that the roots do not dry out. Pack planting mix around the exposed roots while planting. Completely remove any waterproof or water-repellant strings or wrappings from the root ball and trunk before backfilling.

Place soil mixes, tamping lightly to reduce settlement. Ensure that the backfill immediately around the base of the root ball is tamped with foot pressure sufficient to prevent the root ball from shifting or leaning, in layers of 150mm deep.

Thoroughly water all plants immediately after planting. Apply water by hose directly to the root ball and the adjacent soil. Remove all tags, labels, strings, etc. from all plants. Following installation of stakes and ties according to the detail drawings, remove nursery/ formative stakes and ties from trees. Remove any excess soil, debris, and planting material from the job site at the end of each workday.

# Fine Grading

Provide smooth transitions between slopes of different gradients and direction. Modify the grade so that the finish grade is flush with all paving surfaces or as directed by the drawings. Fill all dips and remove any bumps in the overall plane of the slope.

# Staking and Guying

Stake or guy a tree as shown on the details.

Plants shall not be heavily pruned at the time of planting. Pruning is required at planting time to correct defects in the tree structure, including removal of injured branches, double leaders, waterspouts, suckers, and interfering branches. Healthy lower branches and interior small twigs should not be removed except as necessary to clear paths and roads. In no case should more than one-quarter of the branching structure be removed. Retain the normal or natural shape of the plant. All pruning shall be completed using clean, sharp tools. All cuts shall be clean and smooth, with the bark intact with no rough edges or tears.

Pruning of trees to comply with AS4373-2007 with emphasis on deadwooding, formative pruning and crown lifting to comply with AS2303-2018

All trees are to be mulched to the depths shown on the drawing. Mulch must not be placed within 8 cm of the trunks of trees. Spread 75mm layer mulch to all mass planting beds and individual plantings in turf. Finish to the required levels. Keep mulch away from the plant stems. No mulch to

Turf Underlay: Turf underlay used must be topsoil material, but may be general purpose topsoil in accordance with AS4419-2018. The soil mix must not contain any of the following:

- Materials toxic to humans and plant health.
- Plant roots of diameter greater than 12 mm. Clay lumps.
- Stones greater than 10 mm size.

# 5.0 LANDSCAPE MANAGEMENT

The approach for establishing a resilient landscape for the flood mitigation works has been developed around the need to deliver a long term drought resilient covering of vegetation that will allow effective operation of the flood conveyance channel. The design intent is to provide the flat channel floor with a low growing grass species that can tolerate periods of inundation and periods of low water availability, and sides/batters of the flood channel that will tolerate extended periods of low water availability with occasional inundation. The installation and management of this landscape outcome is a balance of the installation cost and the effectiveness of the management regime.

Given the soil types, climatic extremes, performance criteria and environmental benefits – the most appropriate landscape treatment is a mix of native grass species - similar to that which currently exists adjacent to the Kamilaroi Highway between George and Charles St. The most cost effective and successful method for broad scale establishment of native grasses is to Hydromulch with a nominated seed mix. The seeding of native grasses is an established technique widely used in broad scale landscape establishment (e.g. mine area rehabilitation, large highway and road projects etc). The hydro mulch is broadcast with a high pressure hose from a specialised vehicle. The mixture contains a cellulose pulp 'carrying' media and a selection of species grass seeds. The exact species list for Wee Waa is currently being developed with advice from

Installation and establishment of native grasses

• Prepare the seed bed by regular periodic application of herbicide in 2 or 3 applications approximately 2 – 3 weeks apart – dependant on the rate

Avoid the application of fertiliser – this only encourages the growth of exotic species. Native grasses are perfectly suited to existing Australian

Apply the hydro-mulch seed mix

• Irrigate and/or apply water 2 – 3 times per week to ensure adequate moisture is received by plantings during emergent growth • Maintain the planting for a minimum 3 months and monitor germination

• Small plants will emerge within 7 – 21 days (2 or 3 leaf stage) and will remain relatively static above ground for 6 – 8 weeks dependant on weather – however sub-surface root establishment occurs during this period to sustain the future growth of grass plant • Reduce weed load within the planting bed with consistent, regular and detailed control of weeds – hand weeding and detailed application of spot sprayed herbicide

 Maintain clean planting bed for minimum 3 months (seasonally dependent) • Following a 4 – 6 months period with successful establishment a broad leaf herbicide can be applied to kill off emerging broadleaf weeds. Irrigation after 4- 6 months should not be necessary.

# Long Term Maintenance requirements for Native Grasslands

 Native grasses are generally perennial meaning they last over multiple seasons and do not require annual re-seeding to remain in place. Native grasses do not require irrigation or supplementary watering

• Some natural seed-set and seed-drop is desirable to maintain the grass population in perpetuity through natural regeneration

 Seed set usually occurs in mid – late summer and grass cutting should not occur before seed set. • Slash or cut grasses no shorter that 150mm in spring and in late autumn to reduce the risk of snakes. Curt grass a maximum of 3 events/year.

 Allow arisings to remain in place on site for natural seed disbursement Apply selective herbicide or hand remove of weed species to maintain a healthy and biodiverse grass land in perpetuity

NOT FOR CONSTRUCTION

**SPECIFICATION** 

	SCALE: N/A ORIGINAL DRAWING AT A1.		Project No.		
			2114		
			2117		
			Drawing No.	F	
	Drawn By:	CN / AG	1.545		



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. DO NOT SCALE OFF DRAWINGS. FOLLOW WRITTEN DIMENSIONS. IF IN OUBT OBTAIN WRITTEN ADVICE FROM THE SUPERINTENDENT VERIFY ALL DIMENSIONS ON SITE. 2. VEHIF Y ALL DIMENSIONS ON SITE. 3. TO BE READ IN CONJUNCTION WITH THE SPECIFICATION. 4. READ IN CONJUNCTION WITH ALL ARCHITECTURAL, CIVIL, TRUCTURAL, HYDRAULIC, MECHANICAL AND ELECTRICAL ENGINEER'S PRAWINGS AND SPECIFICATIONS. EXCAVATION. DRAWINGS TO BE PRINTED IN COLOUR ONLY

SHAC

Warren Smith Consulting Engineers

C 11/5/2022 For submission D | 13/5/2022 | For Submission

A 31/3/2022 Draft documentation for review

B 1/4/2022 Draft documentation for review

REVISION

AG AG

AG

Wee Waa Flood Mitigation Off Kamilaroi Highway, Wee Waa NSW

FOR SUBMISSION

Checked By: