Planning Proposal
Maldon Bridge Road

Road Design and Stormwater Management

July 2022

southeast
engineering+environmental

a: PO Box 96 Moruya NSW 2537
p: 02 4474 4439
e: lachlan@south-east.com.au

Document Verification

Document title: Planning Proposal, Maldon Bridge Road Design and Stormwater Management.

Project number: 655

Prepared by: Lachlan Bain

Issue and date: Rev A (July 2022)

Issue to: Cameron McArthur (Boral)

Document history:

Table of Contents

1.0 BACKGROUND AND SCOPE

Southeast Engineering and Environmental have been engaged to investigate road design modifications and stormwater management for the planning proposal to expand the IN3 Heavy Industrial and Environmental Conservation Zones, Maldon Bridge Road, Maldon (Figure 1.1).

The proposal involves the rezoning of the predominantly cleared areas to an IN3 Heavy Industrial Zone, serviced by the existing Maldon Bridge Road and conversion of the heavily vegetated riparian areas and area adjacent to Stonequarry Creek to an Environmental Conservation Zone.

Figure 1.1 Rezoning proposal

2.0 EXISTING SITE WATER MANAGEMENT

Maldon Bridge Road currently services a range of Boral activities along the eastern side of Maldon Bridge Road. The eastern side of Maldon Bridge Road that fronts Boral's existing activities has kerb and gutter, stormwater drainage and some basic Water Sensitive Urban Design (WSUD) features, including kerb cutouts and swales. This stormwater network collects runoff from part of Maldon Bridge Road as well as runoff from some of the Boral operations on the eastern side.

The road's vertical alignment contains two sag points currently collecting some street and site runoff. Maximum longitudinal grades are about 4%, meaning that the road is highly suitable for roadside WSUD stormwater features.

The western side of the Maldon Bridge Road pavement currently sheet flows to the existing undeveloped landscape to the west. Grades are such that this is currently an appropriate stormwater approach, and there is no evidence of concentrated flows or erosion.

There are two stormwater management basins, Dam West A and Dam West B currently used by Boral Cement that collect stormwater runoff from the Boral Cement site, as well as Maldon Bridge Road. This water is occasionally re-used within the Boral Cement water management system for washdown and dust suppression. Dam West B overflows to Dam West A which is an EPA licensed discharge point for the Boral Cement operation.

Discharge from Dam West A, as well as sheet runoff from Maldon Bridge Road eventually makes its way to the vegetated unnamed watercourse that then discharges to Stonequarry Creek.

Refer to Table 2.1 for a range of site photos of existing road and stormwater management features.

Table 2.1 Site photos of existing road and stormwater management

	View along Maldon Bridge Rd looking north. Kerb on east, no kerb on west side. Note existing trees where power lines are not a constraint.
	Example of sheet flow off western side of Maldon Bridge Road
	Existing kerb cut-out to pit and swale.

	Dam West A

3.0 RELEVANT PLANNING CONTROLS AND GUIDELINES

3.1. SREP No.20 Hawkesbury-Nepean River

The Sydney Regional Environmental Plan (REP) No. 20 – Hawkesbury-Nepean River is a planning policy with the aim to protect the Hawkesbury-Nepean River system though a consistent, catchment-wide approach to environmental protection. Of relevance to this rezoning are the water quality and water quantity policies and strategies in Clause 6 of the REP.

(3) Water quality

Policy:

Future development must not prejudice the achievement of the goals of use of the river for primary contact recreation (being recreational activities involving direct water contact, such as swimming) and aquatic ecosystem protection in the river system. If the quality of the receiving waters does not currently allow these uses, the current water quality must be maintained, or improved, so as not to jeopardise the achievement of the goals in the future. When water quality goals are set by the Government these are to be the goals to be achieved under this policy

Strategies:

a) Quantify, and assess the likely impact of, any predicted increase in pollutant loads on receiving waters.

b) Consider the need to ensure that water quality goals for primary contact recreation and aquatic ecosystem protection are achieved and monitored.

c) Approve development involving primary contact recreation or the withdrawal of water from the river for human contact (not involving water treatment), such as showers, only in locations where water quality is suitable (regardless of water temperature).

d) Do not carry out development involving on-site disposal of sewage effluent if it will adversely affect the water quality of the river or groundwater. Have due regard to the nature and size of the site.

e) Develop in accordance with the land capability of the site and do not cause land degradation.

f) Consider the need for an Erosion and Sediment Control Plan (to be in place at the commencement of development) where the development concerned involves the disturbance of soil.

g) Minimise or eliminate point source and diffuse source pollution by the use of best management practices.

h) Site and orientate development appropriately to ensure bank stability. Plant appropriate native vegetation along banks of the river and tributaries of the river, but not so as to prevent or inhibit the growth of aquatic plants in the river, and consider the need for a buffer of native vegetation.

i) Consider the impact of the removal of water from the river or from groundwater sources associated with the development concerned.

j) Protect the habitat of native aquatic plants.

(4) Water quantity

Policy:

Aquatic ecosystems must not be adversely affected by development which changes the flow characteristics of surface or groundwater in the catchment.

Strategies:

a) *Future development must be consistent with the interim or final river flow objectives that are set for the time being by the Government.*
b) *Ensure the amount of stormwater run-off from a site and the rate at which it leaves the site does not significantly increase as a result of development. Encourage on-site stormwater retention, infiltration and (if appropriate) reuse.*
c) *Consider the need for restricting or controlling development requiring the withdrawal or impoundment of water because of the effect on the total water budget of the river.*
d) *Consider the impact of development on the level and quality of the water table.*

3.2. Independent inquiry into the Hawkesbury Nepean River System (Healthy Rivers Commission of New South Wales, 1998)

The NSW Government established the Healthy Rivers Commission in 1995 to conduct independent public enquiries into some NSW Rivers and make recommendations on strategies to achieve environmental, social and economic objectives for the river systems investigated.

Key findings from the inquiry into the Hawkesbury Nepean River system were the reduction in nutrient loads. Water quality objectives for nutrients within receiving waters were developed with an understanding of the variability expected in river water quality. These are outlined inTable 3.1..

Subsequent to the inquiry, the targets and other strategies associated with the inquiry were endorsed by NSW government agencies associated with the catchment, including Wollondilly Shire Council.

Table 3.1 Water quality objectives for nutrients (HRC, 1998)

Water quality indicator (µg/l)	Mixed use Rural areas and sandstone plateau
Total phosphorous objective	35
Total nitrogen objective	700
Total phosphorous measured range	10-740
Total nitrogen measured range	100-800

3.3. Guidelines and Policies

3.3.1. Western Sydney Street Design Guidelines 2020

The Western Sydney Street Design Guidelines are a relatively new set of guidelines that aim to improve the function of streetscapes to not only provide for vehicle movement, but also accommodate other forms of transport (bicycles, pedestrians etc) as well as improve the street landscape by incorporating increased canopy cover and water sensitive design elements for management of stormwater. The guidelines contain specific concepts for industrial streets. Key components relating to this proposal include:

- WSUD elements to be 3-5% of impervious catchment
- Cycle/Pedestrian pathways
- Passive irrigation
- Tree planting

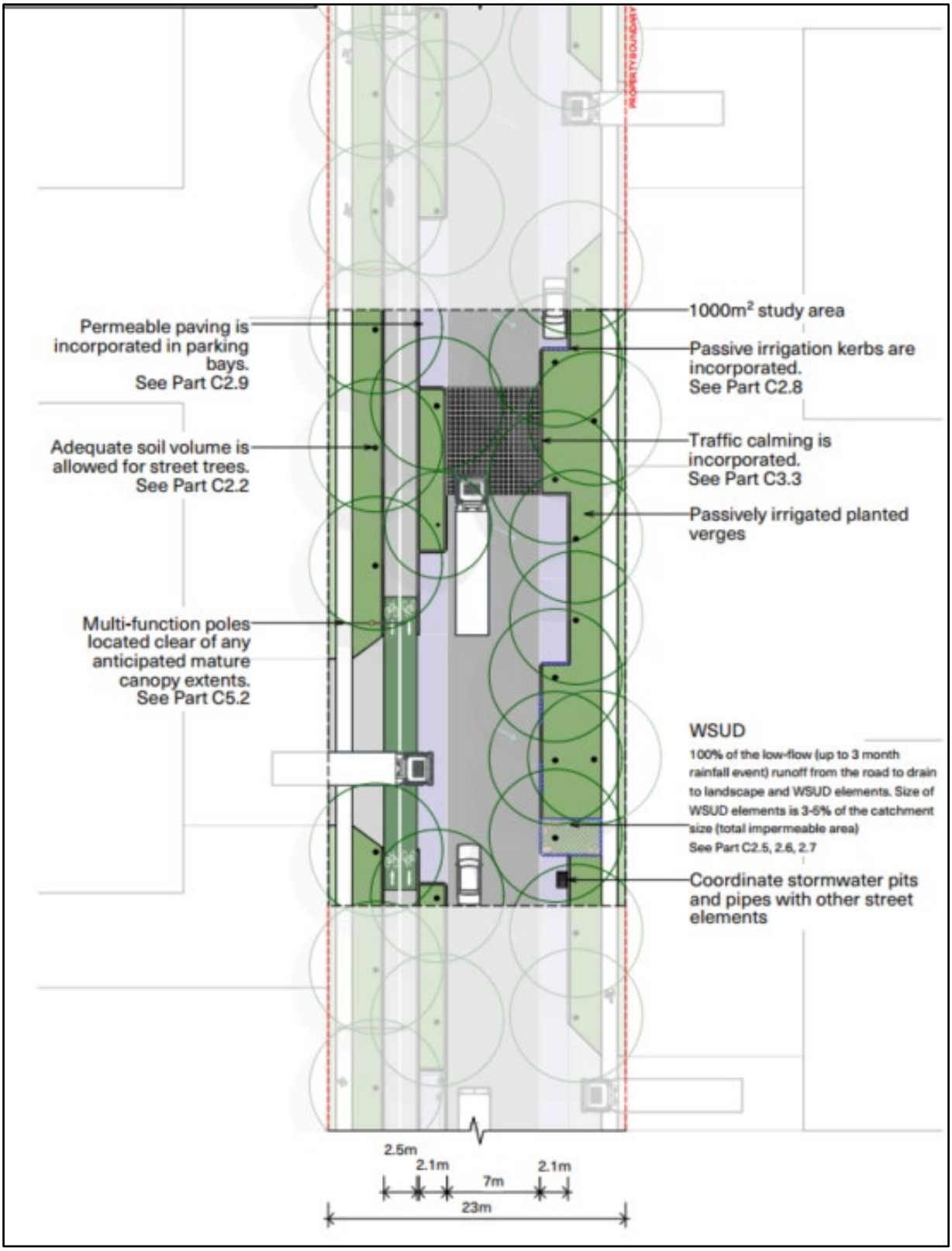


Figure 3.1 Typical industrial road (Western Sydney Design Guidelines)

3.3.2. Wollondilly Shire Council Design Specification 2016

Wollondilly Shire Council has considered the receiving environment water quality objectives and the HRC inquiry, and based on their endorsement have developed their own water quality and quantity objectives for developments within the LGA outlined in Table 3.2.

Council suggests maintaining peak flows for events up to the 2 year ARI. Peak flow management is generally a function of the capacities of downstream environments and infrastructure. In this case, there are no infrastructure capacity constraints downstream of the site, therefore peak flow management is less critical.

Table 3.2 Stormwater treatment objectives (WSC, 2016)

Pollutant-	**Description**	**Treatment objective**
Coarse Sediment	Particles 0.1mm to 5mm	80% of the load
Fine Sediment	Particles 0.1mm or less	50% of the load
Nutrients	TP and TN	45% of the load
Hydrocarbons, motor oils, oils and grease		90% of the load TPH<10mg/L

4.0 ROAD MODIFICATIONS AND STORMWATER MANAGEMENT

Wollondilly Shire Council are in the process of adopting, or have adopted the Western Sydney Street Design Guidelines, which outline stormwater, access and landscape design approaches for new roads, including industrial roads. In this case the road is existing, and an assessment has been made of the existing road reserve to determine how the existing road can be modified to better match the Western Sydney Street Design Guideline approaches for industrial roads. A typical plan example is shown in Figure 3.1, a road concept matching as much as possible the guideline approach is contained in Appendix A, this includes typical sections at three different locations demonstrating how paths, parking and WSUD features can be incorporated.

Table 4.1 outlines how the objectives of the Western Sydney Street Design Guidelines can be achieved in this case with additions and modifications to the existing road. Widening of the road reserve is not necessary to achieve these objectives.

Table 4.1 Comparison with Western Sydney Street Design Guidelines

Guideline component	Modification to existing road reserve to meet Guidelines
Pedestrian access	1.2m wide footpath shown on western side. Some minor retaining required in some areas to install.
Cycle access	2.25m wide shared path can be constructed on the eastern side. Some earthworks and minor retaining will be required to fit.
Landscaping and tree planting	Much of the eastern side already landscaped with medium sized shrubs and mown lawn. Additional tree planting is only possible in some areas as high voltage power lines exist on both sides of the road.
Parking	Average of 10parks/100m of road easily achievable. Shown at nominal 2.5m wide. No standing area incorporated at the end of the proposed rezoning to allow for U-turn to access parks on western side.
Passive irrigation of landscaping	Kerb cutouts already exist on the eastern side in some locations, western side currently sheet flows to the landscape. Modifications including new kerb and gutter with cutouts on the western side, and modifications to the existing kerb and gutter on the eastern side will be required to achieve more passive landscaping and street WSUD.
Street WSUD	New kerb and gutter with cutouts will be required on the eastern side. Can easily achieve the recommended 3-5% of impervious area as WSUD treatment as well as passive landscape areas. New stormwater collection and piped drainage will be required to transfer runoff and treated flows to the existing stormwater network at low points.

5.0 INDUSTRIAL SUBDIVISION STORMWATER MANAGEMENT

5.1. Existing conditions

The proposed rezoning includes creation of industrial areas adjacent to Maldon Bridge Road and over the historic employee housing area on the western side of the unnamed watercourse draining to Stonequarry Creek. A large vegetated and riparian area is to be retained with the zoning boundary roughly contiguous with the edge of existing well structured vegetation and change in grade. This creates a riparian area of about 60-120m width.

Currently, stormwater from Maldon Bridge Road and some runoff from the adjacent Boral operations to the east pass through the proposed IN3 zone area. Some of this is currently formalised with stormwater outlets discharging to shallow drains that link to stormwater management basins known as Dam West A, and Dam West B, the remainder is sheet flow running off Maldon Bridge Road to the west and though the existing cleared land.

Dam West A and Dam West B are managed by Boral Cement, stormwater can by pumped back to the water management system within the Boral Cement, for use in washdown and dust suppression. Dam West A is also a licenced discharge point for the EPA for the Boral Cement operation.

As Boral Cement has changed from cement manufacturing to bulk cement handling, water demand has significantly reduced, and the need for these stormwater collection basins for reuse has diminished. This could allow for the decommissioning or modification of these basins into the future.

5.2. Stormwater detention and treatment

Stormwater treatment for the industrial subdivision shall be undertaken at the lot level. Allowance will need to be made for each site to detain flows and treat stormwater such that targets set by Council and other State Government bodies can be met for both stormwater quality and quantity. A nominal 3 to 5% of the lot area is likely to be required to achieve this, however this will ultimately depend on the development type proposed for the lot. As an IN3 land use zoning will allow a range of operations, stormwater treatment and management will need to be developed and assessed on a case by case basis. It may be that Council are not the determining authority for stormwater management depending on development type.

5.3. Stormwater discharge

The proposed IN3 zoned areas all grade towards the unnamed watercourse and proposed conservation zoned areas. To limit disturbance to this area, discharge of stormwater from each site will need to be undertaken in a stable fashion. The best approach is likely to be multiple discharge points along the frontage to the conservation area that incorporate infiltration for minor flows and a well-constructed level spreaders to facilitate sheet flow discharge prior to runoff reaching the steeper watercourse slopes. Again, these will need to be designed as part of the development for each proposed lot.

5.4. Stormwater easements for upstream flows

As discussed, stormwater generated by Maldon Bridge Road and part of the Boral Cement plant drain via a piped drainage network to Dam West A and Dam West B via the low points in Maldon Bridge Road. Easements will need to be created for these pipe networks, overland flow paths and any retained stormwater management ponds to allow for the ongoing operation and management of these stormwater systems.

6.0 CONCLUSION AND RECOMMENDATIONS

6.1. Road design modifications

The existing road reserve has sufficient space to allow for the modification of the road reserve to achieve the objectives of the Western Sydney Street Design Guidelines for industrial roads.

The relatively shallow longitudinal grades and limited landscape crossfall allows for the road modifications with limited earthworks and retaining. Key modifications that will need to be incorporated into the new road design include:

- Kerb and gutter on the western side with cutouts to allow for passive landscape irrigation and discharge to street WSUD components;
- Modification to kerb and gutter on the eastern side to allow for parking and WSUD components;
- Street WSUD components such as bioretention systems and swales;
- Additional pit and pipe drainage to collect WSUD system outflows and stormwater from the eastern side of the road;
- Footpath and cycle path with minor earthworks and retaining;
- Formalised car parking and turning area to access car parks; and
- Where overhead powerlines allow, install tree plantings.

Refer to Appendix A for a concept design outlining how the Street Design Guidelines can be met.

6.2. Industrial subdivision stormwater management

Site stormwater management

Stormwater collection, detention and treatment will need to be undertaken at the subdivision lot level. This will include allowing space for stormwater detention and treatment systems, which would be in the order of 3-5% of the lot.

Stormwater easements

As the subdivision develops, and the necessity of Dam West A and B are determined, easements for the stormwater pipe network and overland flows will need to be created within the IN3 zoned land. This can occur subsequent to the rezoning.

Stormwater discharge

Infiltration and level spreaders should be used as the mechanism for stormwater discharge from the new industrial lots to the adjacent conservation area to limit concentrated flows and limit disturbance to the conservation zone area.

REFERENCES

Healthy Rivers Commission, 1998*, Independent inquiry into the Hawkesbury Nepean River System*

Western Sydney Planning Partnership, 2020, *Western Sydney Street Design Guidelines,* NSW Government

Wollondilly Shire Council, 2016, *Wollondilly Shire Council Design Specification*, WSC.

APPENDIX A – MALDON BRIDGE ROAD MODIFICATION CONCEPT

BORAL CEMENT MALDON

BORAL MALDON RAIL TERMINAL

EXISTING CONCRETE BATCHING PLANT

IN3

IN3

IN3

IN3

CONSERVATION ZONE

ROAD DESIGN AREAS

LENGTH OF ROAD WITH FRONTAGE TO NEW LOTS = 800M (APPROX).
ROAD RESERVE WIDTH = 20.1M
TOTAL ROAD RESERVE = 20.1 X 800 = 16080SQM
ROAD PAVEMENT NOMINAL WIDTH = 7.8M
ROAD PAVEMENT AREA = 6420SQM (40% OF RESERVE)
PARRALLEL PARKING = 560SQM
FOOTPATH = 2510SQM
WSUD = 1047SQM (APPROX 11% OF IMPERVIOUS)

TOTAL PERVIOUS APPROXIMATELY 40%.

southeast
engineering + environmental

PO Box 96 Moruya NSW 2537
p: 02 44744439
e: lachlan@south-east.com.au
brogan@south-east.com.au

PROJECT: Plannning Proposal Rezone - Maldon Road
Road Design & Stormwater Management

CLIENT: Boral Resources Pty Ltd

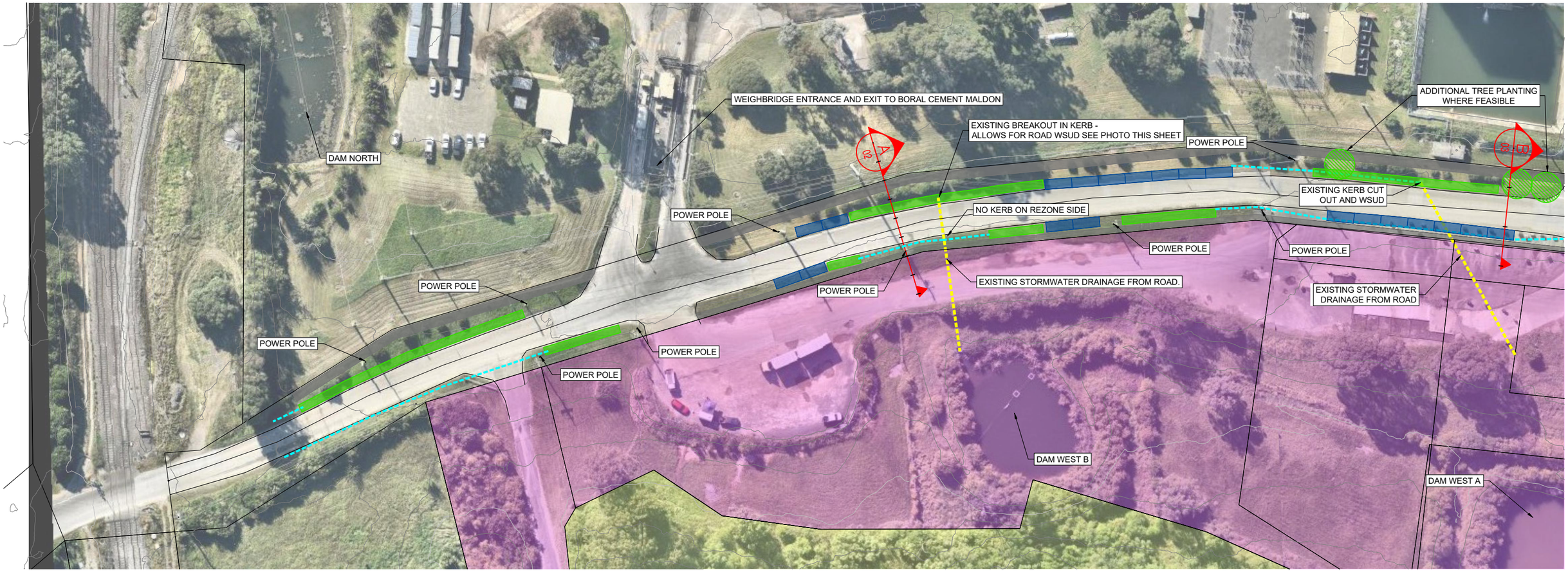
DRAWING TITLE: Maldon Bridge Road and Rezone Context

DRAWING NUMBER: 655-01 | SCALE: 1:2500@A3 | SHEET: 01/04 | DESIGNED: LB | CHECKED: BA

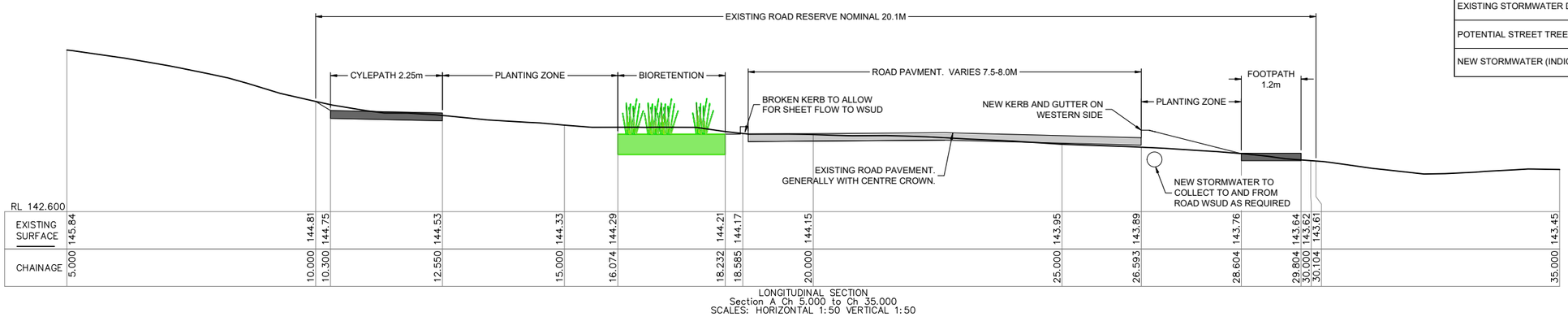
PURPOSE: Planning Proposal

DATE OF ISSUE: 16/07/2022

REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE
A	PLANNING PROPOSAL INFO	LB	16/07/2022				



LEGEND	
SHARED CYCLE AND PEDESTRIAN PATH (2500w)	
FOOTPATH (1200w)	
POTENTIAL STREET WSUD	
POTENTIAL PARRALELL CAR PARKING	
EXISTING STORMWATER DRAINANGE	
POTENTIAL STREET TREES	
NEW STORMWATER (INDICATIVE)	



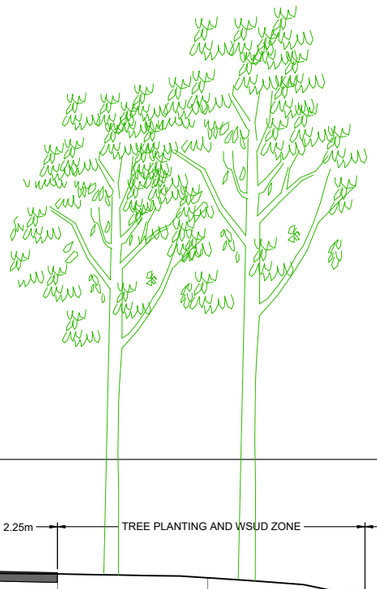
LONGITUDINAL SECTION
Section A Ch 5.000 to Ch 35.000
SCALES: HORIZONTAL 1:50 VERTICAL 1:50

southeast
engineering + environmental

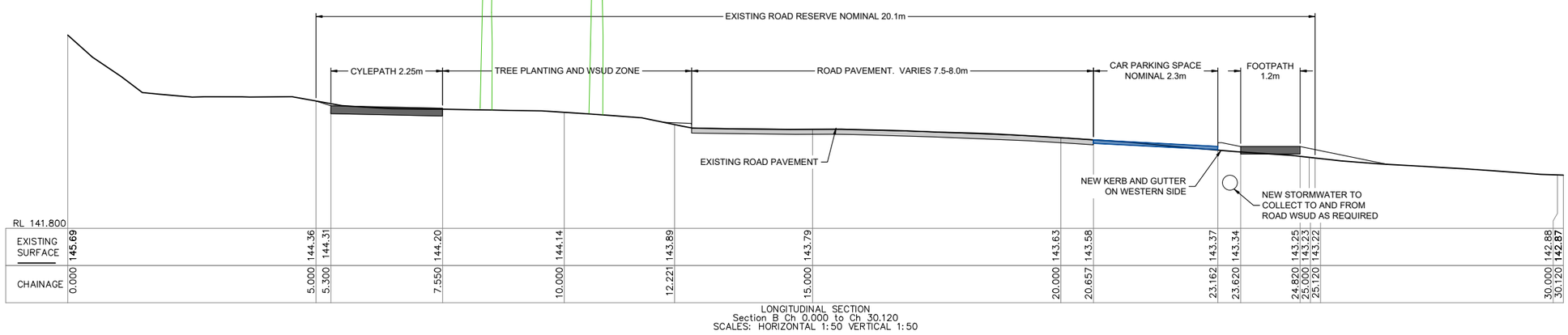
PO Box 96 Moruya NSW 2537
p: 02 44744439
e: lachlan@south-east.com.au
brogan@south-east.com.au

PROJECT: Plannning Proposal Rezone - Maldon Road Road Design & Stormwater Management	DRAWING TITLE: Road Concept Detail 1					PURPOSE: Planning Proposal	
CLIENT: Boral Resources Pty Ltd	DRAWING NUMBER: 655-02	SCALE: 1:1000@A3	SHEET: 02/04	DESIGNED: LB	CHECKED: BA	DATE OF ISSUE: 16/07/2022	

REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE
A	PLANNING PROPOSAL INFO	LB	16/07/2022				



LEGEND	
SHARED CYCLE AND PEDESTRIAN PATH (2500w)	
FOOTPATH (1200w)	
POTENTIAL STREET WSUD	
POTENTIAL PARRALELL CAR PARKING	
EXISTING STORMWATER DRAINANGE	
POTENTIAL STREET TREES	
NEW STORMWATER (INDICATIVE)	



LONGITUDINAL SECTION
Section B Ch 0.000 to Ch 30.120
SCALES: HORIZONTAL 1:50 VERTICAL 1:50

southeast
engineering + environmental
PO Box 96 Moruya NSW 2537
p: 02 44744439
e: lachlan@south-east.com.au
brogan@south-east.com.au

PROJECT: Plannning Proposal Rezone - Maldon Road
Road Design & Stormwater Management

CLIENT: Boral Resources Pty Ltd

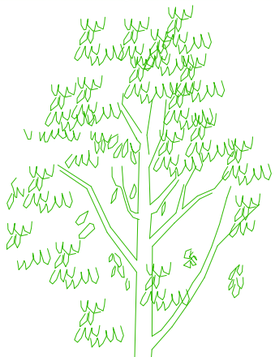
DRAWING TITLE: Road Concept Detail 2

DRAWING NUMBER: 655-03 | SCALE: 1:1000@A3 | SHEET: 03/04 | DESIGNED: LB | CHECKED: BA

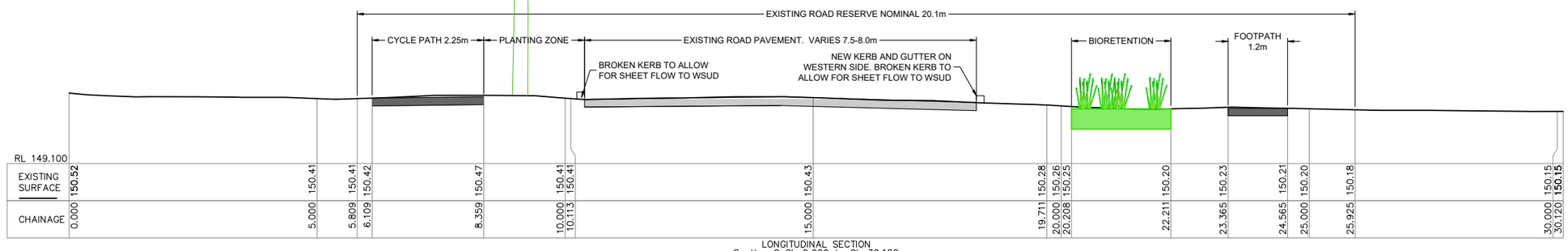
PURPOSE: Planning Proposal

DATE OF ISSUE: 16/07/2022

REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE
A	PLANNING PROPOSAL INFO	LB	16/07/2022				



LEGEND	
SHARED CYCLE AND PEDESTRIAN PATH (2500w)	
FOOTPATH (1200w)	
POTENTIAL STREET WSUD	
POTENTIAL PARRALELL CAR PARKING	
EXISTING STORMWATER DRAINANGE	
POTENTIAL STREET TREES	
NEW STORMWATER (INDICATIVE)	



LONGITUDINAL SECTION
Section C Ch 0.000 to Ch 30.120
SCALES: HORIZONTAL 1:50 VERTICAL 1:50

southeast
engineering + environmental
PO Box 96 Moruya NSW 2537
p: 02 44744439
e: lachlan@south-east.com.au
brogan@south-east.com.au

PROJECT:	Plannning Proposal Rezone - Maldon Road Road Design & Stormwater Management
CLIENT:	Boral Resources Pty Ltd
DRAWING TITLE:	Road Concept Detail 3
DRAWING NUMBER:	655-04
SCALE:	1:1000@A3
SHEET:	04/04
DESIGNED:	LB
CHECKED:	BA
PURPOSE:	Planning Proposal
DATE OF ISSUE:	16/07/2022

REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE
A	PLANNING PROPOSAL INFO	LB	16/07/2022				