Archaeo-Environments Pty Ltd
heritage soils and landscape

Sustainability Report
Bennett Road Development Plan
Gisborne South

Land Capability Assessor
Dr Chris Day
Archaeo-Environments Pty Ltd
ABN 89 119 932 437

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LAND CAPABILITY AND STORM WATER REPORT
Bennett Road Development Plan, Gisborne South

ABOUT THE AUTHOR

Dr Chris Day DPhil, MIFA Director, Archaeo-Environments Ltd
Chris has over 35 years experience in geology, geomorphology, soils and heritage work which included 12 years in Bendigo and Benalla with DSE. This included management of catchment and salinity research teams and soil and soil permeability (recharge) mapping as a basis for Dryland Salinity Management Plans across the Avoca, Loddon, Campaspe and Goulburn Broken Catchments.

1 INTRODUCTION

A sustainability report has been commissioned by several landowners for input to a Development Plan for a 130ha property at Bennett Road, Gisborne (the study area). The land is subject to Macedon Ranges Planning Scheme Development Plan Overlay 18 (DPO18) and also the Rural Living Zone Schedule 2 under the recent C110 Planning Scheme Amendment. A Development Plan is required for the entire 130ha (estimated 50 lots) and will provide an overview document for future planning permit applications.

The proposed development will provide for lots consistent with the Panorama Dr estate to the north, which appears to function well in terms of "sustainability" / environmental considerations. The aim of this report is to identify sustainability issues which will enhance sub-division and planning permit applications to Macedon Ranges Shire Council.

1.1 SCOPE OF WORKS

The sustainability report will include a summary of potential site issues relevant to DPO18 :

A sustainability plan will identify environmental assets and initiatives to be implemented as part of development activities on the site including but not limited to : how the principles of water sensitive design are to be achieved in subdivision and development activities and how flora/fauna/biodiversity/revegetation may be integrated into the overall development plan.

The sustainability study is conservative, aimed at the protection of environmental and human health. It is not intended to support a particular proposal, but rather to describe the existing land parcels and suggest how adverse environmental impacts of the proposal may be minimised. Field work was conducted on March 24, 2018.

2.0 DATA SCOPE AND LIMITATIONS

The land planning assessment has been prepared by Dr. Chris Day (Archaeo-Environments Ltd) Assessment has been conducted at a scale of 1 : 2500 and provides a guide and professional overview of site conditions. Terrain mapping, soil properties, climatic and botanical data are based on reconnaissance field-work and regional data sources for the purpose of reasonable and relevant estimates. As physical conditions, soils and local hydrology may vary over time, the overview assessment on which estimates are made in this report should be reassessed if natural conditions change. This assessment is sufficient for a broad assessment within DPO18. The report should be used within the scope and scale of the brief and not for detailed design or property layout works or for any development beyond those of the brief. The report and recommendations therein are to be used to provide guidance toward - but do not guarantee – planning permission. It is not to be used, in full or in part, by any other party without written permission from the author.

3 LOCATION AND PROPERTY BACKGROUND

3.1 LOCATION

The study area is composed of 6 properties and 6 individual landowners. The site occupies approximately 130ha in and around Bennett Rd Gisborne. Located within Macedon Ranges Planning Scheme Development Plan Overlay (DPO18) and Rural Living Zone Schedule 2 under the recent C110 Planning Scheme Amendment. Both the Zone and DPO refer to a minimum lot size of 2ha.

Fig 1 Location Map : Aerial view

3.2 GENERAL SETTING/SITE CONDITION

The study area is characterised by a broad and open volcanic plain which includes an incised waterway across the south-west. The area has been almost entirely cleared of native vegetation, with minor clumps of eucalypts (predominantly grey box) and tree plantations, with the main vegetation existing as exotic plantings as driveway avenues and some cypress windbreaks and boundary plantings. There are 10 dams which are for the most part across gentle drainage depressions. The study area is fenced throughout with a range of grazing property and lifestyle properties.

3.3 USE OF ADJOINING LAND

The study area is bounded to the west by Bennett Road with the Calder Freeway to the west, McGregor Road to the north and Dalrymple Road to the south with developed blocks to the north and sloping terrain toward Jacksons Creek to the east.

3.4 CLIMATE

Average annual rainfall is in the order of 750-800mm. A one-in-ten year rain is ~750mm. Average estimated annual evapo-transpiration is in the order of ~1350mm. Evaporation may exceed rainfall for 8 months (September to April) in an "average" year and these dry months may be challenging for agricultural production. The district can experience significant variations in rainfall and temperature and can have very cool winters & warm to hot and windy summers (which can have implications for vegetation establishment).

3.5 TOPOGRAPHY AND DRAINAGE

The land encompasses a gently undulating volcanic terrain which falls toward the north and north-east. Water flow and local drainage is predominantly toward a defined waterway (Djirri Djirri Creek) which extends across the south-west corner of the property. Otherwise drainage across the property is via very gentle drainage swales and undefined drainage depressions. There is rock outcrop along the edge of low escarpments above the main drainage line to the east as well as within a stoney rise in the south-east part of the block.

Land form and soil description is based on field inspection and reference to the report : A Study of the Land in the Catchments to the North of Melbourne (Jeffrey P J 1981) SCA. Fig 2 shows general landform and land units across the development area.

Five main land units have been mapped across the development area.

LU 1 Open plain
LU2 Gentle-moderate slopes
LU3 Steep slopes
LU4 Valley floor
LU5 Stoney rise (o/c)

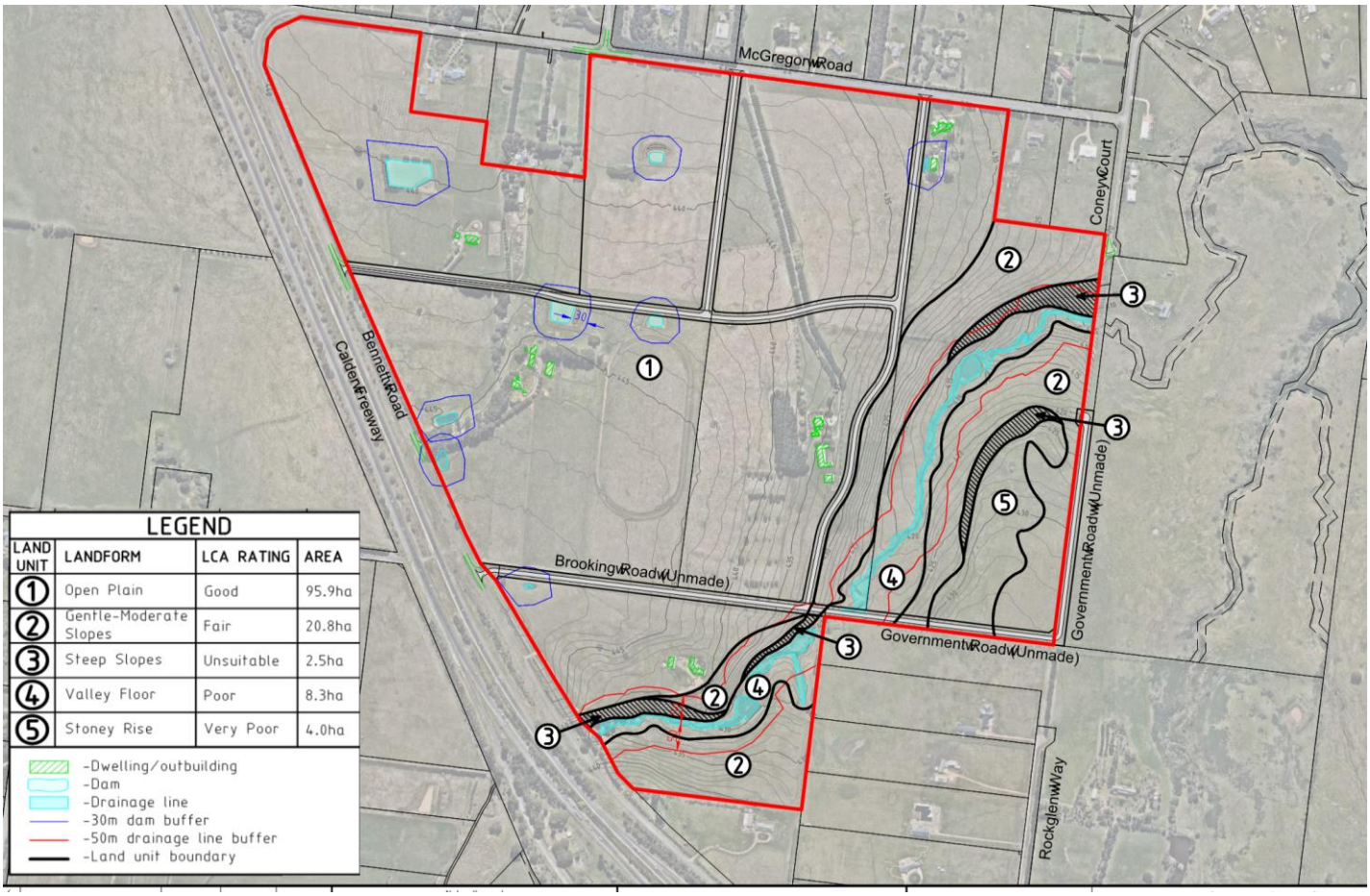


Fig 2 Land Unit Map (Courtesy Terraco Ltd)

Table 1 presents a summary of soil and landform values across the study area as background for the sustainability assessment.

Table 1 Land capability summary

Land Unit	**Landform**	**Area (ha)**	**Soil type**	**Slope %**
1	Open Plain	73	Yellow-grey clay loam	0-2
2	Gentle-Mod plain	16	Reddish-brown silty clay (floaters)	7-10
3	Steep slopes	2	Reddish brown clay and common bedrock outcrop	12-25
4	Valley floor	6	Dark grey-black heavy clay	1-3
5	Stoney rise	3	Shallow stoney soil and bedrock outcrop	2-4

4.0 ENVIRONMENTAL ASSETS (input included from Ecology and Heritage Partners)

4.1 FLORA AND FAUNA

Native vegetation in the study area is representative of four Environmental Vegetation Classes (EVCs) characteristic of the Victorian Volcanic Plains: Plains Grassland Heavier-soils (EVC 132_61), Plains Sedgy Wetland (EVC 647), Tall Marsh (EVC 821) and Stony Knoll Shrubland (EVC 649). The presence of these EVCs is generally consistent with the modelled pre-1750s native vegetation mapping (DELWP 2017b).

The remainder of the study area comprises introduced and planted vegetation, present as stands of non-Victorian eucalypt species, pasture and Victorian Eucalypts. Targeted surveys have indicated that there are no Matted Flax-lily (May – August), Swamp Everlasting (November – March) and Swamp Fireweed (November – March) on the land.

Plate 1 View to north toward example of introduced vegetation/windbelt within the study area.

Despite current land uses the study area contains patches of native vegetation, scattered trees and some introduced vegetation that is of value to fauna. There are patches of Plains Grassland and remnant riparian vegetation along the creek line. Targeted surveys by Ecology and Heritage Partners have indicated no presence of Golden Sun Moth or Growling Grass Frog across the study area.

4.2 FLORA AND FAUNA MANAGEMENT and INTEGRATION

The primary protection of environmental assets will include protection of native vegetation up to a minimum of 30 metres either side of the Djirri Djirri Creek line which will be retained and stock excluded. Dwellings will be set back from the drainage line buffer by at least 20 metres. Trees within the road reserve, including revegetation, will be retained where possible (Appendix 1)

There are potential remnants of native vegetation and fauna which have been addressed in the environmental report (Ecology and Heritage Partners). Targeted surveys of flora and fauna species were undertaken and no remnant species were recorded. It is understood that the creek line and immediate surrounds – which will be preserved via a minimum of 30m buffer from stock – will be the corridor within which significant environmental assets will be preserved and managed. These will be appropriately assessed at the planning permit stage.

As described above, trees will be retained within road reserves where possible and removal or lopping of native trees will require a planning permit.

A program of revegetation of Djirri Djirri Creek will provide habitat, erosion and flood mitigation as well as an area of passive recreation (Plate 2). In addition the wider Development Area will retain original vegetation where possible and establish a program of buffer/corridor planting, road reserve and habitat planting (Fig 3) with the aim of retaining existing assets and improving shelter, screening, microclimate, fauna habitat and general amenity.

Plate 2 View to south across Djirri Djirri Creek planned for revegetation

The study area is located within the Macedon Ranges municipality and is zoned Rural Living Zone 2 (RLZ2). Development Plan Overlay (DPO18) applies to the land proposed for subdivision.

A Planning Permit from Macedon Ranges Council will be required to remove, destroy or lop any native vegetation on site. A Planning Permit will be assessed in accordance with the 'The Guidelines for the removal, destruction or lopping of native vegetation' (Guidelines) and Clause 52.17 of the Whittlesea Planning Scheme.

Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DELWP.

Weeds listed as noxious under the *Catchment and Land Protection Act 1994* (CaLP Act) (Artichoke Thistle, Fennel, Paterson's Curse, African Box-thorn, Blackberry, Chilean Needle-grass and Serrated Tussock) were recorded during the assessment. Weeds should be managed in accordance with the Act.

4.3 WATER

4.3.1 STORM WATER AND WATER SENSITIVE DESIGN

While domestic water use will be via reticulated supply from Western Water, supply will be enhanced by harvesting of rainwater via rainwater tanks. Otherwise storm water retention dams can harvest run-off from hard surfaces, roads etc.

Rainwater shall be retarded on site to maintain flow at current conditions. Maintaining a vegetative cover will be part of management recommendations to avoid erosion and soil loss. The existing dams and additional dams will retain water supply on site.

The primary focus of water management is within the individual lots in the form of water sensitive design as follows :

- Promotion of water conservation fittings within domestic and gardens as well as public space and infrastructure.
- Revegetation programs within any public areas and along road reserves to improve habitat, shade biodiversity and soil stability.
- The study area is not connected to sewer. There is also ample capacity for management of waste water

At an individual lot level, it is expected that rain water runoff from dwellings and shedding would be managed to reduce run-off and retain rain water on site. It is recommended that each block will be landscaped and planted to reduce/retard run-off off-site.

4.3.2 WATER MANAGEMENT RECOMMENDATIONS

Water management across the study area might include :

A) Design of drainage areas : driveways, paved area to mitigate off-site drainage.

B) Harvesting of rainwater from dwelling and sheds to large water tanks as well as retarding basins

C) Construction of contour banks to mitigate run-off where necessary

D) Establishment of tree/vegetation belts to minimise risk of overland flow.

E) Sediment control

Recommendation

Engineering design to manage/reduce run-off from driveways and paved areas. Potential design might include direction of excess runoff toward either a sump or area of tree planting aimed at reducing ponding / mitigating off-site runoff.

Recommendation

Stormwater will be harvested to rainwater tanks and overflow pipes will be directed toward treed areas or off-site drainage to avoid ponding.

4.4 SOIL EROSION/SEDIMENT CONTROL MANAGEMENT

Local volcanic soils have an organic topsoil which can be susceptible to erosion when exposed. Local areas of poor drainage within each lot could be drained/vegetated to avoid ponding. Overall erosion risk is however low across the study area.
Soils are of low-moderate erosion risk following construction of the new driveway and other earthworks allied with development of new dwellings. To the south-east of the Djirri Djirri Creek where there is a stony rise a detailed site assessment at the time of subdivision shall inform lot yield and lot configuration.

Recommendations

- *During house, shed and infrastructure works, minimize soil exposure and potential soil erosion during wet periods by staged works and use of gravel cover where necessary.*
- *Establishment of contour tree planting to minimize overland flow*
- *Construction of a dam in suitable part of the property could be used to harvest stormwater and site drainage.*
- *Construction and maintenance of any access roads should be designed for optimal drainage with stone/gravel cover to reduce erosion risk.*
- *Maintain vegetative cover over undeveloped parts of the property - avoid areas of exposed soil.*

Fig 3 below presents a storm water management map of typical 2ha lot.

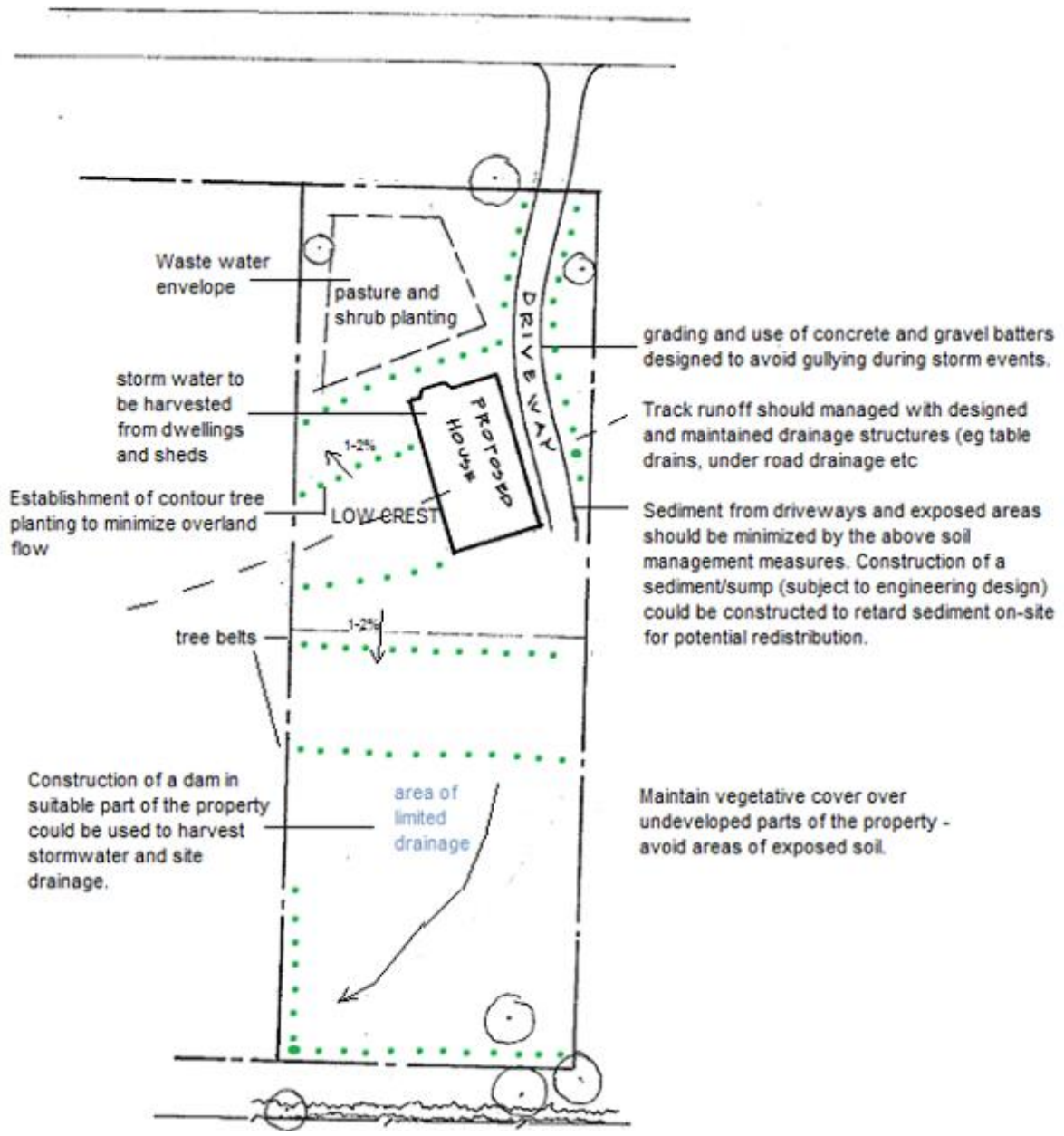
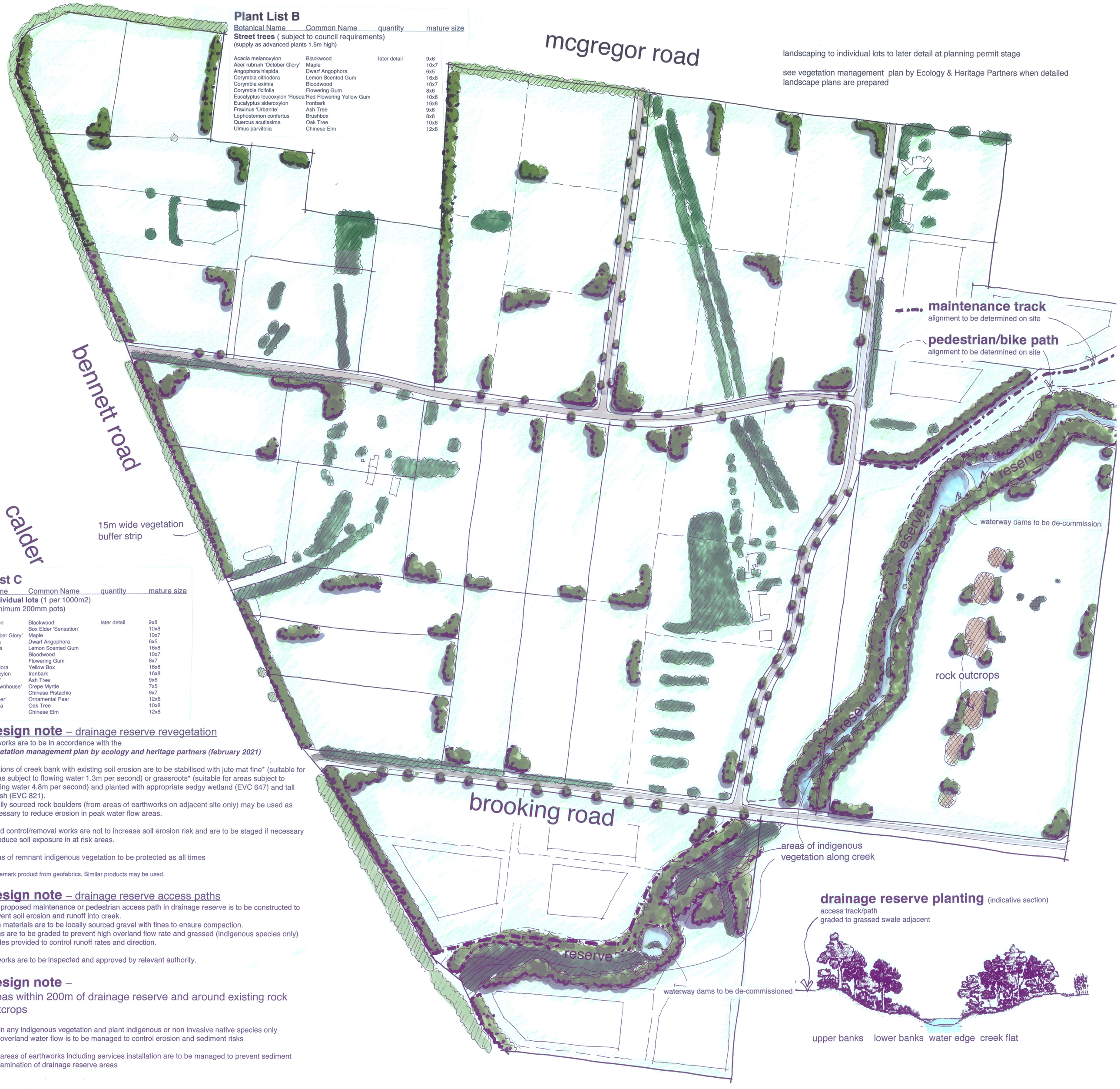


Fig 3 Storm water management map of typical 2ha lot within the study area showing location of proposed dwelling (BE) and waste water envelope WWE with general land and storm water management recommendations.

4.4 STOCK MANAGEMENT

It is expected that some properties will have limited stock such as horses or sheep at a rural "domestic scale". It is expected that this could be successfully undertaken as is the case in the 2 lot subdivision at the Panorama Drive Estate to the north.

Fig 4 below presents the concept landscape plan which shows current and planned vegetation planting / habitat corridors.



landscaping to individual lots to later detail at planning permit stage

see vegetation management plan by Ecology & Heritage Partners when detailed landscape plans are prepared

Plant List B

Botanical Name | Common Name | quantity | mature size

Street trees (subject to council requirements)
(supply as advanced plants 1.5m high)

Acacia melanoxylon	Blackwood	later detail	9x6
Acer rubrum 'October Glory'	Maple		10x7
Angophora hispida	Dwarf Angophora		6x5
Corymbia citriodora	Lemon Scented Gum		16x8
Corymbia eximia	Bloodwood		10x7
Corymbia ficifolia	Flowering Gum		8x6
Eucalyptus leucoxylon 'Rosea'	Red Flowering Yellow Gum		10x6
Eucalyptus sideroxylon	Ironbark		16x8
Fraxinus 'Urbanite'	Ash Tree		9x6
Lophostemon confertus	Brushbox		8x6
Quercus acutissima	Oak Tree		10x8
Ulmus parvifolia	Chinese Elm		12x8

Plant List C

Botanical Name | Common Name | quantity | mature size

Trees on individual lots (1 per 1000m2)
(Supply in minimum 200mm pots)

Acacia melanoxylon	Blackwood	later detail	9x8
Acer negundo	Box Elder 'Sensation'		10x8
Acer rubrum 'October Glory'	Maple		10x7
Angophora hispida	Dwarf Angophora		6x5
Corymbia citriodora	Lemon Scented Gum		16x8
Corymbia eximia	Bloodwood		10x7
Corymbia ficifolia	Flowering Gum		8x7
Eucalyptus melliodora	Yellow Box		16x8
Eucalyptus sideroxylon	Ironbark		16x8
Fraxinus 'Urbanite'	Ash Tree		9x8
Lagerstroemia 'Townhouse'	Crepe Myrtle		7x5
Pistacia chinensis	Chinese Pistachio		9x7
Pyrus c. 'Chanticleer'	Ornamental Pear		12x6
Quercus acutissima	Oak Tree		10x8
Ulmus parvifolia	Chinese Elm		12x8

design note – drainage reserve revegetation

all works are to be in accordance with the
vegetation management plan by ecology and heritage partners (february 2021)

sections of creek bank with existing soil erosion are to be stabilised with jute mat fine* (suitable for areas subject to flowing water 1.3m per second) or grassroots* (suitable for areas subject to flowing water 4.8m per second) and planted with appropriate sedgy wetland (EVC 647) and tall marsh (EVC 821).
locally sourced rock boulders (from areas of earthworks on adjacent site only) may be used as necessary to reduce erosion in peak water flow areas.

weed control/removal works are not to increase soil erosion risk and are to be staged if necessary to reduce soil exposure in at risk areas.

areas of remnant indigenous vegetation to be protected as all times

*trademark product from geofabrics. Similar products may be used.

design note – drainage reserve access paths

any proposed maintenance or pedestrian access path in drainage reserve is to be constructed to prevent soil erosion and runoff into creek.
path materials are to be locally sourced gravel with fines to ensure compaction.
paths are to be graded to prevent high overland flow rate and grassed (indigenous species only) swales provided to control runoff rates and direction.

all works are to be inspected and approved by relevant authority.

design note –

areas within 200m of drainage reserve and around existing rock outcrops

retain any indigenous vegetation and plant indigenous or non invasive native species only
any overland water flow is to be managed to control erosion and sediment risks

any areas of earthworks including services installation are to be managed to prevent sediment contamination of drainage reserve areas

drainage reserve planting (indicative section)

Plant List A

Plant List – revegetation within 60m wide drainage reserve

Botanical Name | Common Name | Quantity (plants per m2)

(Supply in cells, tubes or direct seeding for grasses)

Acacia mearnsii	**Black wattle**	**1 plant per 10m2**
Acacia melanoxylon	**Blackwood**	**1 plant per 20m2**
Acacia paradoxa	**Hedge Wattle**	**1 plant per 10m2 (average. vary density)**
Anthosachne scabra s.l.	Common Wheat-grass	seeded
Austrodanthonia caespitosa	Common Wallaby Grass	"
Austrodanthonia setacea	Bristly Wallaby Grass	"
Austrostipa spp	Spear Grass	1 per m2
Bulbine bulbosa	Bulbine Lily	2 per m2
Carex appressa	*Tall Sedge*	*1 per m2*
Carex breviculmis	*Short-stem Sedge*	*1 per m2*
Chrysocephalum apiculatum s.l.	Common Everlasting	1 per m2
Convolvulus erubescens spp. agg	Pink Bindiweed	1 per m2
Crassula sieberiana s.l.	Sieber Crassula	1 per m2
Dichondra repens	Kidney Weed	1 per m2
Eucalyptus camaldulensis	***Red Gum***	***1 plant per 200m2***
Eucalyptus melliodora	**Yellow Box**	**1 plant per 100m2**
Eucalyptus ovata	***Swamp Gum***	***1 plant per 80m2***
Geranium spp	Geranium	1 per m2
Goodenia pinnatifida	Cut-leaf Goodenia	1 per 2m2
Haloragis aspera	Grassland Raspwort	1 per m2
Hydrocotyle laxiflora	Stinking Pennywort	1 per m2
Hypericum gramineum	Small St John's Wort	1 per m2
Juncus sp	*Rush*	*1 per m2*
Kennedia prostrata	Running Postman	1 per 2m2
Leptospermum lanigerum	Woolly Tea Tree	1 per 3m2
Melycitis dentata	Tree Violet	1 per 6m2
Microlaena stipoides var. stipoides	Weeping Grass	seeded
Pimelea humilis	Common Rice-flower	1 per m2
Poa labillardierei	Common Tussock Grass	seeded
Poa sieberiana	Grey Tussock Grass	seeded
Rumex brownii	Slender Dock	1 per m2
Rytidosperma spp.	Wallaby Grass	seeded
Senecio glomeratus	Annual Fireweed	1 per 2m2
Senecio quadridentatus	Cotton Fireweed	1 per m2
Themeda triandra	Kangaroo Grass	seeded
Veronica gracilis	Slender Speedwell	1 per m2
Wahlenbergia sp	Native Bluebell	1 per m2

Plants in plain text are for all areas except water edge
Plants in plain italic text are for water edge areas that may be subject to frequent inundation
Plants in bold italic text are primarily for lower streambanks that may be subject to flood inundation
Plants in bold are primarily for upper stream banks

Note that there may be overlap in some areas depending on site conditions

key

existing vegetation

individual trees, shelterbelts, groups of trees of various species
indigenous species are to be retained see Ecology & Heritage Partners Flora & Fauna Surveys

note that any environmental weed species should be removed as soon as practicable and other unsuitable species removed as new plantings establish
cupressus and pine species established as windbreak/screening to be assessed and retained/removed as per ecologist/relevant authority advice.

areas of indigenous vegetation within drainage reserve are to be protected
see Ecology & Heritage Partners Flora & Fauna Surveys

proposed street trees

indicative only (later detail at planning stage)
refer to list B

proposed lot trees

indicative only (landscaping to individual lots to later detail at planning stage)
refer to list C

proposed revegetation of drainage reserve

refer to plant list A

proposed lots

buffer planting

15m wide planting zone along bennett road

landscape concept plan

project: bennett road, gisborne

client:

scale: 1:2500 A1 **date:** november 2021 **sheet:** 1 of 1
issue A

habitat
landscape and environmental design consultants 9836 1272

this plan is intended as a layout and planting guide only.all dimensions, locations, etc are to be checked and verified on site. Refer to architectural and engineering plans and permit conditions.
habitat accepts no responsibility or liability as a result of errors or omissions on this plan

APPENDIX A
LIMITATIONS

This report is solely for the use of Client (owners) and any reliance of this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by Archaeo-Environments Pty Ltd.

This document is not intended to reduce the level of responsibility accepted by Archaeo-Environments Pty Ltd but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.
This report has been prepared for the specific purpose outlined in the proposal and no responsibility is accepted for the use of this document, in whole or part, in other purposes or contexts.

The scope and period of services are as described in the proposal. Conditions may exist which were undetectable given the limited nature of the enquiry AE ltd was engaged to assess with respect to the site. Conditions may vary between sample sites, with special conditions within the study area not revealed by the assessment and which have therefore not been accounted for in the report. Additional studies and actions may therefore be required.

It is recognised that time affects the information and assessment provided in this report. The opinions of AE Ltd are based on information current at the time the report was produced. It is understood that the services provided by AE Ltd lead to opinions based on the actual conditions of the study area at the time the study area was visited. These opinions cannot be used to assess effects of any subsequent changes in the quality of the site or its surroundings or any laws and regulations.

Any advice made in this report, are based on conditions from published sources and the investigation described herein. Where information provided by the client or other sources have been used, it is assumed that the information is correct unless otherwise stated. No responsibility is accepted by AE Ltd for incomplete or inaccurate data supplied by others.

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