

Development Plan

10 Marlo Road, Marlo

Reference – 16273

Version 7
21 February 2020



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Report Register

This report register documents the development and issue of report entitled Development Plan – 10 Marlo Road, Marlo completed by Crowther & Sadler Pty Ltd in accordance with internal quality management systems.

Issue Date	File Ref	Version No	Description	Issued to
24/09/2015	16273	1	Development Plan	EGSC
03/08/2016	16273	2	Development Plan	EGSC
21/11/2016	16273	3	Development Plan	EGSC
18/09/2017	16273	4	Development Plan	EGSC
18/09/2017	16273	4	Development Plan	EGSC
25/01/2017	16273	5	Development Plan	EGSC
14/11/2019	16273	6	Development Plan	EGSC
21/02/2020	16273	7	Development Plan	EGSC

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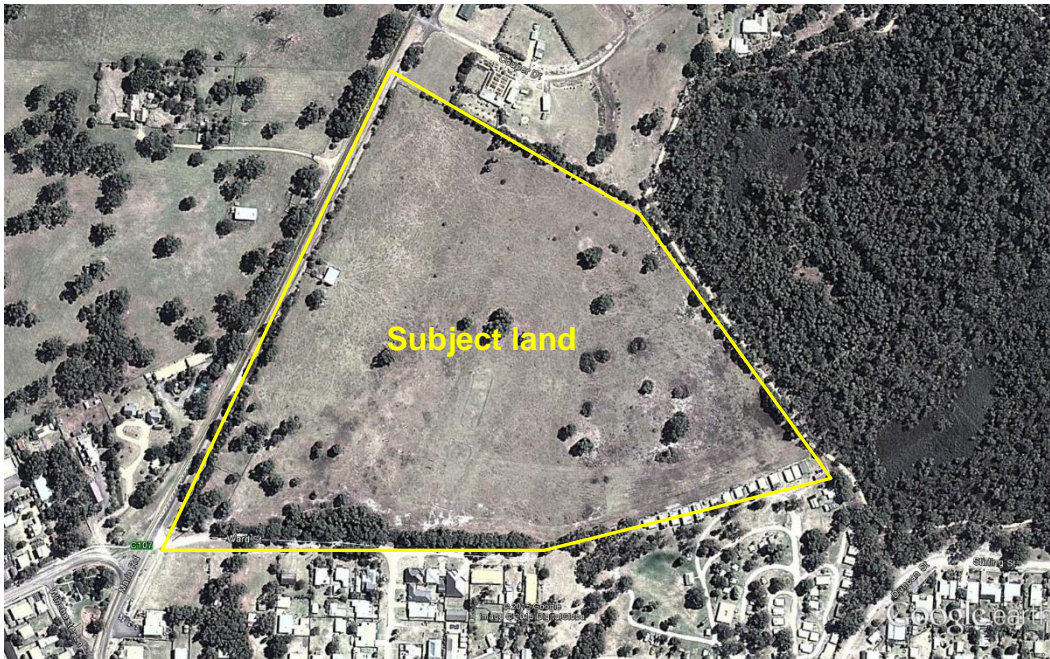
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1. Introduction

This Development Plan is prepared in accordance with Clause 3 under Schedule 7 of the Development Plan Overlay as contained within the *East Gippsland Planning Scheme*. In accordance with Schedule 7 this Development Plan applies to the whole of the land known as 10 Marlo Road, Marlo and formally described at Lot 2 on Plan of Subdivision 144829.



Aerial image of 10 Marlo Road and surrounds (Source: Google Earth)

2. Development Principles

The Development Plan has been prepared in accordance with the following development principles:

- *A subdivision layout which responds to the features of the land, such as inundation and bushfire, as identified in the Site Analysis Plan.*
- *A subdivision layout which is sympathetic to remnant native vegetation, particularly mature indigenous trees and vegetation.*
- *The provision of useable open space.*
- *That new development incorporates water sensitive urban design principles for appropriate drainage solutions.*
- *That indigenous plant species should be used for landscaping of public open space reserves and for revegetation in accordance with the Department of Sustainability and Environment's Revegetation Planting Standards.*
- *That the subdivision layout is designed to facilitate the provision of efficient and effective pedestrian, bicycle and vehicle movements, and to ensure connectivity with the existing public transport network (if present).*
- *The subdivision layout provides appropriate linkages to adjoining land.*

A subdivision layout has been prepared and is included as part of this Development Plan. The subdivision layout is considered to respond appropriately to the features and constraints of the site as identified in the Site Analysis Plan (refer to Figure 1: Proposed Subdivision Plan).

The subdivision layout is considered to respond appropriately to remnant native vegetation. The land contains minimal remnant vegetation which is limited to the southern boundary and south-west corner of the property. There are also some scattered trees throughout the property, with some regrowth given grazing activities have been downscaled on the land in recent years.

Overall remnant vegetation is considered to offer limited aesthetic and environmental value. Remnant trees are proposed to be retained adjacent to Ward Street, east of Perry Street with the creation of an additional width of road reserve. Understorey vegetation and selective pruning of lower limbs will occur to vegetation adjacent to Ward Street to provide vehicle access to proposed lots. Larger, paired crossings are proposed to minimise the impact to mature trees adjacent to Ward Street by rationalising the number of vehicle crossing points (Refer to Figure 3: Vegetation Management Plan).

Lot A at the south-west corner has been retained as a larger lot. This is in part due to the irregular shape of the subject land but also to provide the opportunity for some remnant trees to be retained. A concept layout plan was prepared and considered as part of Amendment C80 which identified the south-west corner of the land as possibly being developed with medium density housing. Lot A is also considered to be ideally situated near the township entry with potential for a variety of possible uses. The provisions of the General Residential Zone provide limited opportunities for non-residential development.

With a variety of development opportunities available to Lot A this Development Plan does not intend to specify any particular use or development. This Development Plan only deals with the creation of Lot A as part of the overall subdivision Scheme.

A separate Development Plan for Lot A must be approved before any further development occurs following the completion of Stage 1 and creation of Lot A. The Development Plan must satisfy the requirements of Schedule 7 to the Development Plan Overlay.

Landscaping works within the proposed Reserves will be minimal. Reserve No.1 is primarily intended to provide a bushfire buffer between residential lots and adjoining Crown Land. In order for the bushfire buffer to be effective existing open grassland currently within Reserve No. 1 must be retained and further landscape planting avoided. A special rate levy will be applied to all allotments created within the subdivision for the ongoing maintenance of vegetation within the bushfire buffer in accordance with mitigation measures prescribed within the Bushfire Management Plan.

Landscaping works will be limited to planting of street trees with species to be to the satisfaction of the Responsible Authority. Details of street tree species, planting locations and numbers can be included within the mandatory landscape plan condition as required by Schedule 7.

Reserves 2, 3 and 4 are proposed for the purpose of retaining and enhancing existing landscape planting adjacent to Marlo Road. Further planting within these Reserves will offer a consistent and continuous landscape buffer for the full length of the Marlo Road frontage, other than at the proposed intersection. The landscape buffer will maintain the character of roadside vegetation which is considered to be an intrinsic feature when approaching the town centre.

Fencing of the boundary between Reserves 2, 3 and 4 and the proposed lots is also considered to be an important element of the Marlo Road streetscape. Unless otherwise controlled there is the potential for the boundary adjacent to Marlo Road to have a variety of different fences constructed which has the potential to detract from the streetscape. It is proposed that fencing of the boundary between Reserves 2, 3 and 4 and the adjoining allotments maintain consistent height, colour and materials. The fence will be constructed by the Developer and will be required by future property owners in accordance with an agreement under Section 173 of the *Planning and Environment Act 1987*.

The overall subdivision layout includes two reserves that will offer some passive recreational benefits (public open space). Reserve 1 being at the eastern end of the property and Reserve 2 at the western end the site. Reserve No. 1, the large reserve, will primarily serve to provide a bushfire buffer. Reserve No 1 and Reserve No. 5 will both provide some informal recreation facilities (i.e. children's playground or half basketball court) to serve the needs of future residents.

The proposed subdivision layout is considered to facilitate effective pedestrian, bicycle and vehicle movements. The provision of footpaths throughout the subdivision provides for the safe circulation of pedestrians throughout the site. The proposed footpath network will connect to the existing shared trail in Marlo Road adjoining the western boundary.

The establishment of a reserve at the eastern end of the subject land offers connection to the adjoining Marlo State Forest that contains a network of trails and pathways. As part of the development pedestrian and cycling connections will be provided at the northern and southern ends of Reserve No 1 giving access to gravel trail within the Marlo State Forest that is aligned parallel to the eastern boundary of the subject land.

The upgrade of Ward Street will also provide for connection to Marlo Road. It is also proposed a footpath be constructed on one side of Perry Street between Ward Street and Marine Parade.

[Figure 1]

PROPOSED SUBDIVISION

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 1 - PS802727D

NOTATIONS

AREAS ARE APPROXIMATE ONLY
DIMENSIONS ARE SUBJECT TO SURVEY

FIGURE 1

SCALE (SHEET SIZE A3)

SURVEYORS REF.

1 : 2000

16273
VERSION 10 - 19/12/2019

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FILENAME: 16273 Prop V10.pro

MGA94 ZONE 55



3. Site Analysis

The subject land is an irregular shaped parcel of land formally described as Lot 2 on Plan of Subdivision 144829 with an approximate area of 13.64ha.

The property has a frontage of 428 metres to Marlo Road. Marlo Road is an arterial road included within the VicRoads Road Management Plan and is classified as a Road Zone Category 1. Any change to current access to the subject land from Marlo Road is subject to consent from Vic Roads.



View across the north-west corner of the subject land from Marlo Road

There are two existing locations for access to the property from Marlo Road. The northern access is located adjacent to the existing dwelling. A second informal access exists approximately 120 metres south of the primary driveway.



View of existing access to dwelling from Marlo Road



View of southern access from Marlo Road

A modest single storey weatherboard dwelling is sited on the property adjacent to the western boundary. The land does not contain any other buildings or structures.



Existing dwelling

The land contains some scattered trees, but for the most part is otherwise open and clear of vegetation with minimal development constraints. The land is slightly undulating, with the highest point being in the north-west corner. From the north-west corner the land gently falls in a southerly direction across the front of the site and in a south-easterly direction to the head of a shallow ephemeral watercourse situated in the centre of the property. Runoff from much of the land is captured by the watercourse that discharges into Ward Street.



View of runoff discharging into Ward Street

The southern boundary of the land adjoins Ward Street for a length of approximately 333 metres. Ward Street is a gravel road with a wide grassed verge on the south side. Properties on the south side of Ward Street comprise of typical residential allotments varying in size generally between 330m² and 1450m². Property frontages also vary in width from 14 metres to 30 metres. Overhead powerlines are also present in Ward Street



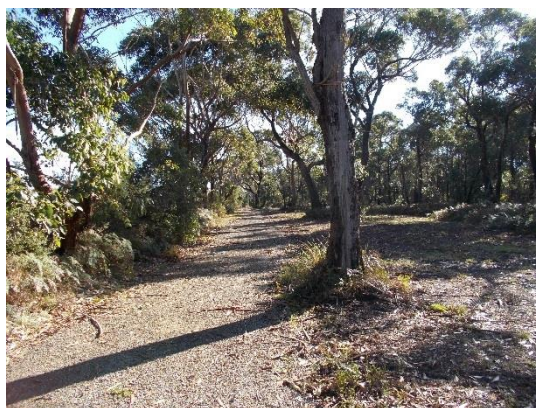
View east on Ward Street

The south-east corner of the subject land adjoins a caravan park. A recent survey of the property boundaries has determined a proportion of the subject land is in fact occupied by the caravan park and contains a number of caravans and associated structures.



View of caravans from the south-east corner of the subject land

The Marlo State Forest (the State Forest) adjoins the eastern boundary of the subject land and is heavily vegetated. A gravel trail for cyclists and pedestrians has been established and appears well maintained. Vegetation on the northern side of the trail appears to be regularly maintained, presumably as part of a bushfire manage program conducted by Parks Victoria (DELWP).



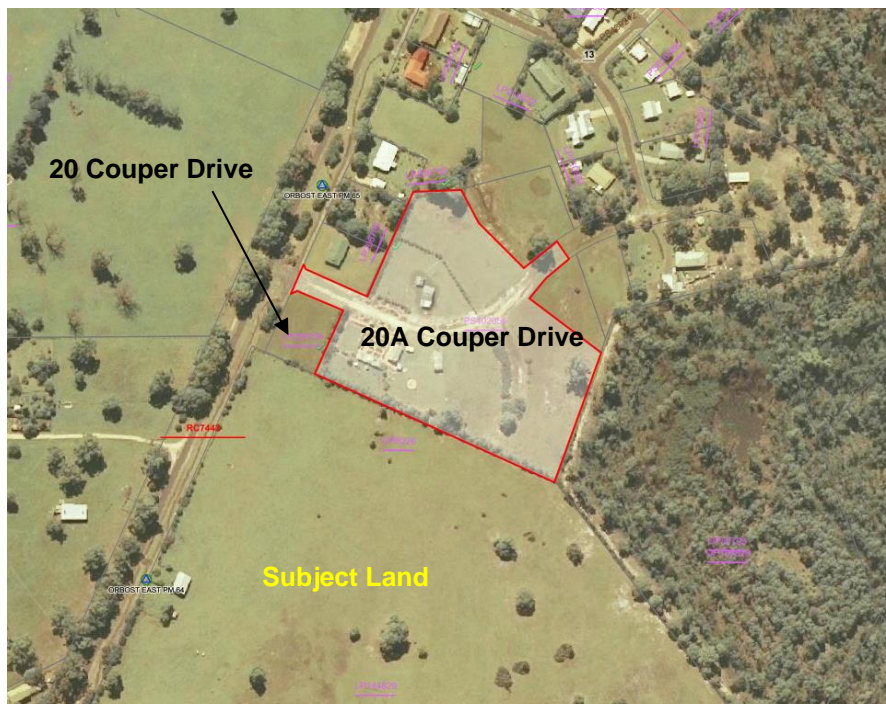
Views south-east and north-west (respectively) of adjoining Crown Land

The land to the north is contained within the General Residential Zone. Two properties known as 20 and 20A Couper Drive immediately adjoin the northern boundary of the subject land. The property at 20 Couper Drive is a regular shaped lot having an area of approximately 2000m² and is vacant. The land is flat and clear of vegetation other than grass which is well maintained.



View south of 20 Couper Drive, Marlo

The property at 20A Couper Drive is a large irregular shaped allotment with an area of approximately 2.5ha. The property contains an established dwelling and several outbuildings. The property is substantially clear of vegetation. On inspection of the neighbourhood this property appeared to be regularly maintained with short mown grass and scattered garden beds with predominantly non-native plant species.



Aerial view of 20A Couper Drive, Marlo north of the subject land

A comprehensive Site Analysis Plan is contained in Figure 2.

[Figure 2]

FIGURE 2

SITE ANALYSIS PLAN

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 2 - LPI44829



- EXISTING MAIN ROAD (MARLO ROAD)
- EXISTING LOCAL ROAD (WARD STREET)
- EXISTING FOOTPATH
- EXISTING TREE
- SLOPE OF LAND
- EXISTING WATER
- EXISTING SEWER
- EXISTING OVERHEAD POWERLINE
- EXISTING SEWER
- DRAINAGE LINE (WATER WAY)

NOTATIONS

SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 2500	16273 VERSION 2 - 11/09/2015
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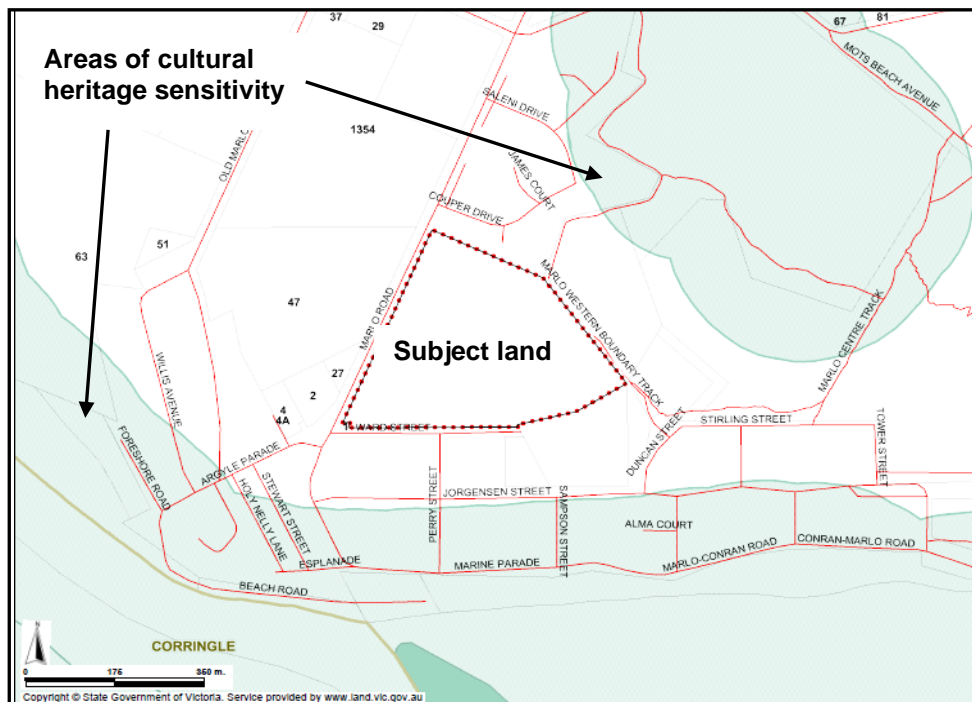
4. Cultural Heritage Management Plan

The requirement for the preparation of a Cultural Heritage Management Plan (CHMP) is prescribed under Regulation 6 of the *Aboriginal Heritage Regulations 2007* (the Regulations) and states:

A cultural heritage management plan is required for an activity if—

- (a) all or part of the activity area for the activity is an area of cultural heritage sensitivity; and*
- (b) all or part of the activity is a high impact activity.*

The subdivision of the subject land in accordance with the Development Plan will constitute a high impact activity as prescribed by Regulation 46, however the subject land is not identified as being a site of cultural heritage sensitivity. A CHMP is therefore not required to be approved before a Planning Permit is able to be granted.



Cultural heritage sensitivity mapping (Source: Planning Maps Online)

5. Conservation and Archaeological Management Plan

The subject land is not contained within a Heritage Overlay under the *East Gippsland Planning Scheme* and is not included on the Victorian Heritage Register. There is no indication the property has in any way been previously used or developed whereby it would contain sites of conservation or archaeological significance. The property does not contain any buildings, structures or ruins that indicate the property has been used in any way other than for the grazing of livestock.

6. Environmental Management Plan

An Environmental Management Plan has been prepared by *Crossco Consulting* and is contained at Appendix 1. The Environmental Management Plan outlines the extent of anticipated earthworks associated with subdivision of the land and also outlines erosion control measures to be implemented during the construction of future dwellings.

A Vegetation Management Plan has also been prepared in addition to the Environmental Management Plan. The Vegetation Management Plan (Figure 3) details the extent of vegetation to be removed or presumed lost associated with the development of the land. The Vegetation Management Plan has been formulated in consultation with *Ethos NRM* and was informed by a Habitat Hectares and Offset Requirement for Proposed Subdivision which is included at Appendix 2.

Remnant vegetation is limited to a relatively narrow strip of vegetation along the southern boundary of the land and scattered trees through the site. A cluster of trees is also contained in the south-west corner of the property. Planted vegetation is prominent along the western boundary adjoining Marlo Road.

The random scattering of trees internally through the site provides limited opportunities to retain the trees. It is also considered these trees offer minimal aesthetic or environmental value. Consequently it is considered the vast majority of scattered trees be removed with development of the land.

It is considered that vegetation should be retained and enhanced on those areas of the site where it can have the greatest benefit. Established screen planting adjacent to the western boundary is proposed to be retained and extended north of the proposed access road in Marlo Road. Retention and enhancement of the screen planting will maintain the vegetation corridor along this principal accessway to the Marlo township. Reserves 2, 3 and 4 are proposed for the purpose of retaining the roadside screen planting in single ownership and management. Reserves 2, 3 and 4 will be vested with East Gippsland Shire Council.

Lot A at the south-west corner is proposed as a larger allotment for the purpose of optimising the retention of mature remnant trees. This allotment will provide opportunity for a future alternative use or development that can respect the remaining trees and be compatible with adjoining residential land, but also compliment nearby shops and tourist accommodation.

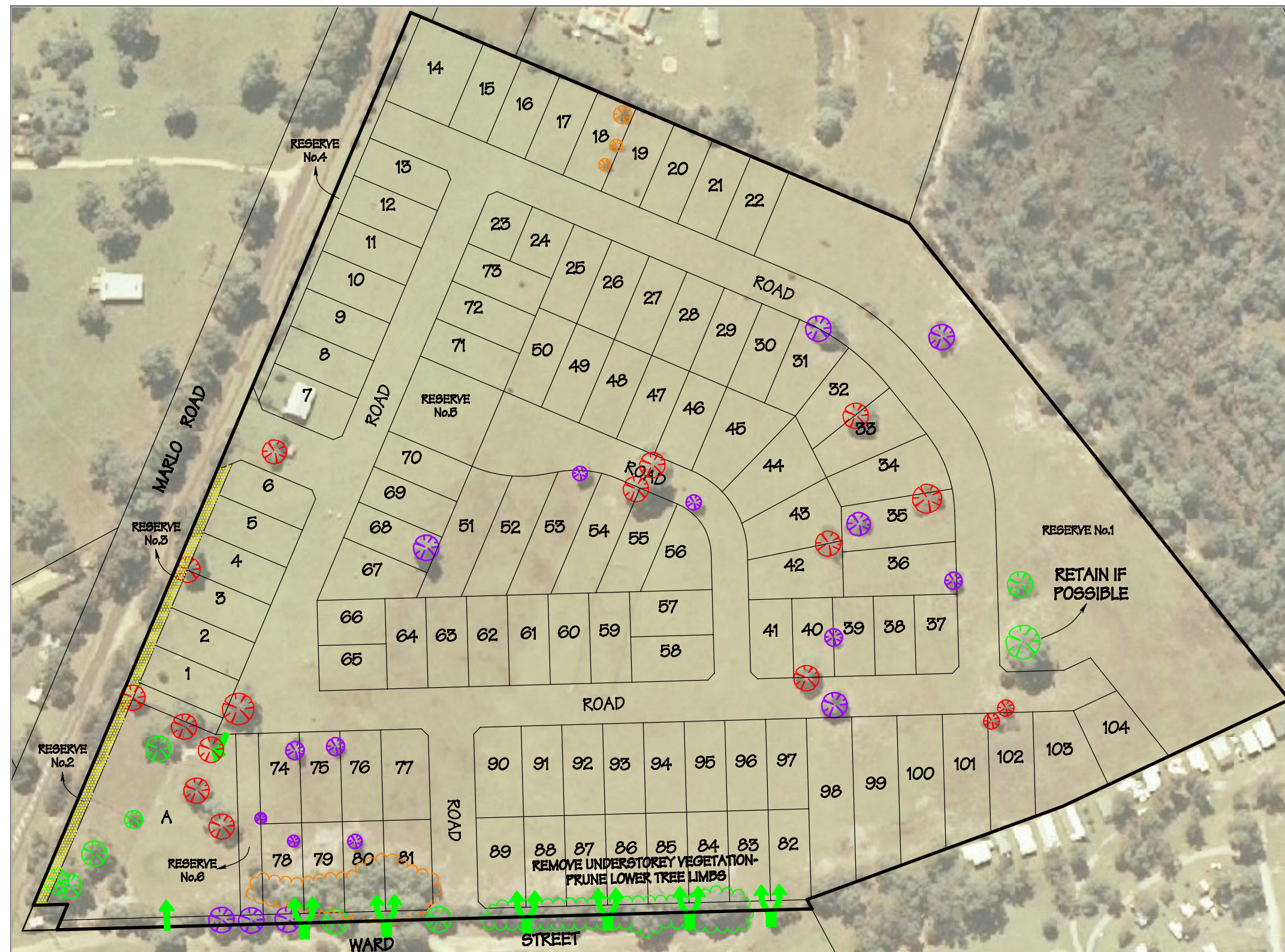
Vegetation adjoining the southern boundary consists of some mature trees and unkempt understorey. Understorey vegetation will be removed, however the mature trees are intended to be retained for aesthetic purposes.








The location of vehicle access points to proposed lots adjacent to Ward Street will be selected with the intention of avoiding impact to mature trees. It is expected vehicle crossings will be combined to minimise the number of access points required between trees.

An additional width of road reserve is proposed to effectively increase the width of Ward Street in order for vegetation adjoining the southern and western boundaries of the land to remain under one entity rather than multiple land owners.

[Figure 3]

MGA94 ZONE 55



-  - EXISTING TREE TO BE RETAINED
-  - EXISTING TREE TO BE REMOVED
-  - VEGETATION TO BE RETAINED WHERE POSSIBLE
-  - REGROWTH <10 YEARS OLD RECENTLY REMOVED
-  - REGROWTH <10 YEARS OLD TO BE REMOVED
-  - VEGETATION RECENTLY REMOVED
-  - EXISTING PLANTED VEGETATION TO BE RETAINED

THE CONSTRUCTION OF VEHICLE CROSSINGS TO LOTS FRONTING WARD STREET MUST SEEK TO AVOID THE REMOVAL OF VEGETATION. THE REMOVAL OF ANY VEGETATION FOR VEHICLE CROSSINGS MUST BE MINIMISED AND OFFSETS PROVIDED.

FIGURE 3

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FILENAME: 16273 Veg Management V6.pro

NOTATIONS

SCALE (SHEET SIZE A3)

1 : 2000

SURVEYORS REF.

16273

VERSION 6 - DRAWN 19/12/2019

VEGETATION MANAGEMENT PLAN

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 1 - PS802727D

7. Public Open Space Plan

The subdivision layout includes five Reserves throughout the site that will offer opportunities for landscape planting adjacent to Marlo Road, protection from bushfire hazards and passive recreation for future residents.

Reserve No. 1 is proposed at the east side of the subject land having an area of approximately 1.562ha. The site for this reserve is substantially cleared of trees and consists of exotic grasses. A mature native tree is currently located at the south-west corner of the proposed reserve and will be retained if possible. It is noted that for the purpose of native vegetation controls this tree is presumed to be removed due to the close proximity of the internal road network.



View south from northern corner of proposed Reserve #1

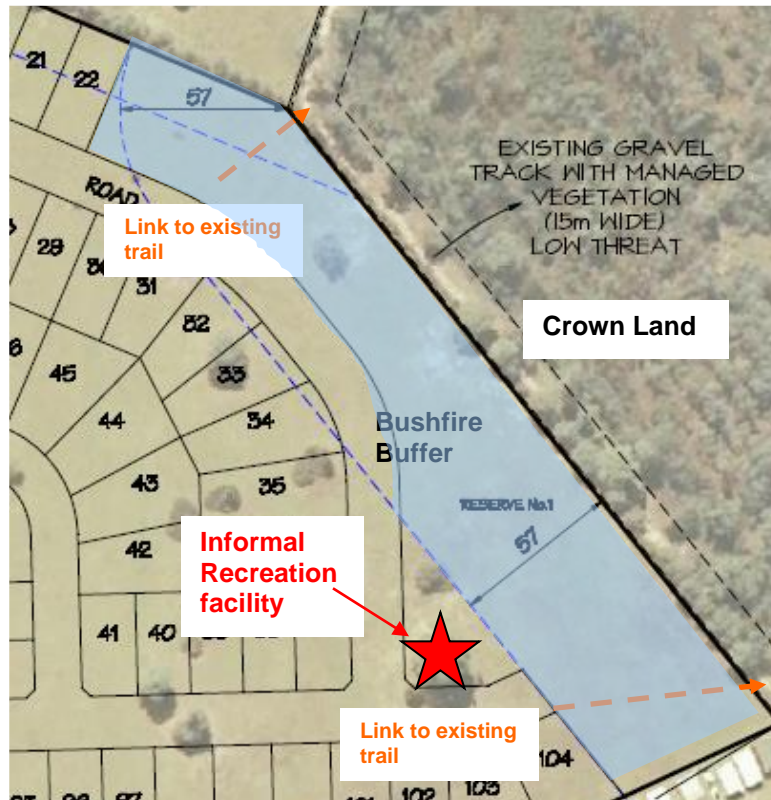
Minimal improvement is proposed for the land contained within Reserve No. 1. Some minor earthworks may be required for the establishment of a minor recreation facility and for footpaths to provide connection to the existing trail within the adjoining Marlo State Forest (the State Forest). Footpath connections to the State Forest are proposed at the north east corner and south east corner of Reserve No. 1.

Reserve No. 1 has a primary purpose as a buffer for the protection of future dwellings from the risk of bushfire associated with adjoining heavily vegetated State Forest. It is considered that minimal enhancement planting should occur within Reserve No.1 in order to avoid any increased risk from bushfire.

Management and maintenance of vegetation within Reserve No. 1 will be necessary particularly during the declared Fire Danger Period which typically applies annually between October and April. During the declared Fire Danger Period periodic maintenance (mowing) will be necessary to comply with the Bushfire Management Plan (refer to Part 10.1) Regular mowing of the Reserve is not considered to impose an unreasonable burden on Council in the future given road reserves and other reserves within the town are regularly maintained by the Council as part of a maintenance programme.

A children's playground to comprise of swings and climbing frame is proposed to be established in Reserve #5 adjacent to the proposed cul-de-sac. The central location will benefit from high surveillance from the internal road network and from nearby allotments.

Figure 4: Proposed Reserves



Proposed pedestrian connections to existing train in Crown Land



Proposed children's playground Reserve #5

Reserves 2, 3 and 4 will provide for landscape planting adjacent to Marlo Road. Reserves 2, 3 and 4 are separate to the Marlo Road road reserve and therefore will prevent any direct vehicle access from the adjoining lots to Marlo Road.

The three Reserves are 5m wide to serve for the retention of established vegetation at the southern end of the land and provide for new landscape planting adjacent to Marlo Road in front of the existing dwelling to the north-west corner.

It is proposed that fencing of the boundary between Reserves 2, 3 and 4 and the adjoining allotments have a consistent height, colour and materials. It is proposed a *Colorbond* type steel fence to a height of 1.8m be constructed as part of Stage1 and Stage 2 at full cost to the Developer.



Image of Colorbond style fence proposed

The fence will be an intrinsic element to the Marlo Road streetscape. To ensure the fence remains contiguous after the development is complete it will be necessary to ensure future owners are informed of their obligation to maintain the same consistent style of fence adjacent to the Reserves. It will therefore be necessary to include a condition on a subsequent Planning Permit requiring the Developer to enter into an agreement under Section 173 of the *Planning and Environment Act 1987* providing for the fence to be maintained by future adjoining property owners in accordance with the approved landscape plan.

Specific details of landscaping within Reserves 2, 3 and 4 and fencing of the boundary fence can be confirmed with the approval of landscape plans. A Planning Permit issued for the subdivision of the land must include a condition requiring a detailed landscape plan prepared by the Developer and approved by Council before a Statement of Compliance is issued for Stage 1 of the subdivision. Landscaping works must be completed and the fence constructed before a Statement of Compliance for Stage 1 and Stage 2 respectively.

Public Open Space contribution

The provisions of Clause 52.01 of the *East Gippsland Planning Scheme* require a public open space contribution in an amount specified in the schedule to Clause 52.01, or if no amount is specified, in accordance with Section 18 of the *Subdivision Act 1988*. The schedule to Clause 52.01 of the *East Gippsland Planning Scheme* does not specify an amount for a public open space contribution.

Section 18 of the *Subdivision Act 1988* states the responsible authority may require that either land be set aside or require a payment to Council being a percentage of the site value of the land, or a combination of both, not exceeding 5 percent.

Reserves 2, 3 and 4 will not offer any public open space opportunities and therefore must be excluded from the calculation of the public open space contribution as proscribed by Section 18 of the *Subdivision Act 1988*. Only Reserve 1 and Reserve 5 will offer some passive public open space benefits.

Reserve No. 1 is significantly encumbered by serving as a buffer to the bushfire hazard. Any part of Reserve 1 within 57m of the eastern boundary serves as defensible space from the adjoining bushfire hazard and therefore is excluded from the public open space contribution. By serving to provide a bushfire buffer the proportion of the public open space contribution that can be derived from Reserve 1 is severely limited.

Reserve 1 has a total area of 1.562ha of which only 1246m² at the south–west corner of the reserve is outside the area of defensible space and not encumbered by stormwater drainage infrastructure. The south-west corner retains sufficient area for an informal recreation facility and therefore provides an area of unencumbered public open space equivalent to 0.91 percent of the area of the subject land.

Reserve 5 has been included to serve as passive public open space and will be partially encumbered by proposed stormwater treatment facility (raingarden) with an area of 150m². Reserve 5 has an area of 1440m² being with an unencumbered area of 1290m² being equivalent to 0.95 percent of the area of the subject land.

The combined contribution of Reserve 1 and Reserve 5 for public open space is 1.86 percent of the subject land. The Developer must therefore provide a further contribution of 3.03 percent of the site value in accordance with Section 18 of the *Subdivision Act 1988*.

A Planning Permit will include a condition for a public open space contribution.

8. Stormwater Management Plan

The topography of the land effectively establishes two catchments with outfall to the east (Marlo Caravan Park) and to the south-west (Marlo Road/Ward Street). The subject land is capable of accommodating underground stormwater drainage for residential development.

A stormwater drainage scoping study for the whole of the land has been completed in order to determine the location for the discharge of stormwater from the development site together with the size and location of stormwater detention and WSUD facilities required throughout the site to achieve best practice standards.

The Stormwater Management Plan has identified existing underground drainage in Marlo Road adjacent to the Ward Street intersection which can command the south-west catchment of the development site. Stormwater drainage is also located within the Marlo Caravan Park which is capable of servicing the eastern catchment of the development site. Outfall of stormwater from the subject land will need to be controlled so as to not exceed the capacity of the existing drainage infrastructure. Underground detention tanks are proposed to be constructed as part of the drainage network within the subject land.

The Stormwater Management Plan has also determined the location and size of WSUD treatment facilities. Water treatment measures include three raingardens at selected locations and a grassed swale in the eastern Reserve (see Figure 5 for stormwater drainage layout).

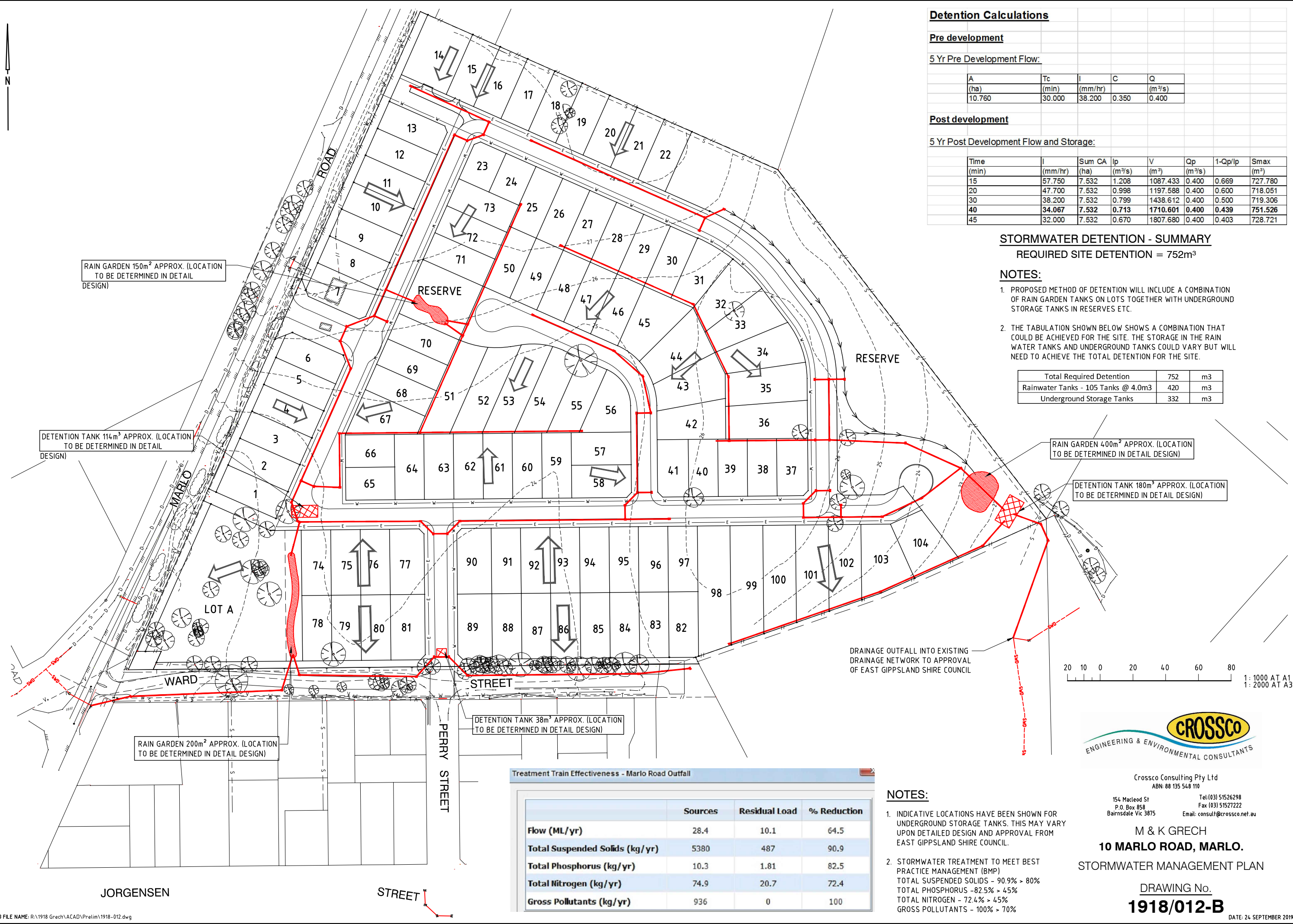
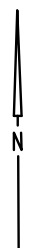
The detailed stormwater drainage design for the entire development will be required to be prepared and approved by the responsible authority as a condition of a Planning Permit. The detailed stormwater drainage design must be approved before any works commence for Stage 1.

9. Traffic Management Plan

A Traffic Management Plan has been prepared by *Crossco Consulting* and is contained at Appendix 4. The Traffic Management Plan includes estimated traffic volumes, pedestrian and cycle pathways, and describes the internal road network and linkages with adjoining land. The Traffic Management Plan also includes concept designs for the upgrade of intersections at Ward Street and Perry Street, Ward Street and Marlo Road and the construction of a new intersection in Marlo Road for access to the subject land.

The upgrade to the intersections of Ward Street/Marlo Road and Ward Street/Perry Street will be constructed with Stage 1 of the subdivision. The new intersection in Marlo Road will be constructed with Stage 2.

[Figure 5]



Detention Calculations

Pre development

5 Yr Pre Development Flow:

A	Tc	I	C	Q
(ha)	(min)	(mm/hr)		(m³/s)
10.760	30.000	38.200	0.350	0.400

Post development

5 Yr Post Development Flow and Storage:

Time	I	Sum CA	lp	V	Qp	1-Qp/lp	Smax
(min)	(mm/hr)	(ha)	(m³/s)	(m³)	(m³/s)		(m³)
15	57.750	7.532	1.208	1087.433	0.400	0.669	727.780
20	47.700	7.532	0.998	1197.588	0.400	0.600	718.051
30	38.200	7.532	0.799	1438.612	0.400	0.500	719.306
40	34.067	7.532	0.713	1710.601	0.400	0.439	751.526
45	32.000	7.532	0.670	1807.680	0.400	0.403	728.721

STORMWATER DETENTION - SUMMARY

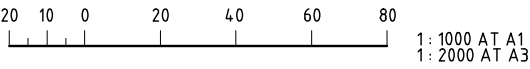
REQUIRED SITE DETENTION = 752m³

NOTES:

1. PROPOSED METHOD OF DETENTION WILL INCLUDE A COMBINATION OF RAIN GARDEN TANKS ON LOTS TOGETHER WITH UNDERGROUND STORAGE TANKS IN RESERVES ETC.
2. THE TABULATION SHOWN BELOW SHOWS A COMBINATION THAT COULD BE ACHIEVED FOR THE SITE. THE STORAGE IN THE RAIN WATER TANKS AND UNDERGROUND TANKS COULD VARY BUT WILL NEED TO ACHIEVE THE TOTAL DETENTION FOR THE SITE.

Total Required Detention	752	m3
Rainwater Tanks - 105 Tanks @ 4.0m3	420	m3
Underground Storage Tanks	332	m3

DRAINAGE OUTFALL INTO EXISTING DRAINAGE NETWORK TO APPROVAL OF EAST GIPPSLAND SHIRE COUNCIL



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M & K GRECH
10 MARLO ROAD, MARLO.
STORMWATER MANAGEMENT PLAN

DRAWING No.
1918/012-B

DATE: 24 SEPTEMBER 2019

Treatment Train Effectiveness - Marlo Road Outfall			
	Sources	Residual Load	% Reduction
Flow (ML/yr)	28.4	10.1	64.5
Total Suspended Solids (kg/yr)	5380	487	90.9
Total Phosphorus (kg/yr)	10.3	1.81	82.5
Total Nitrogen (kg/yr)	74.9	20.7	72.4
Gross Pollutants (kg/yr)	936	0	100

NOTES:

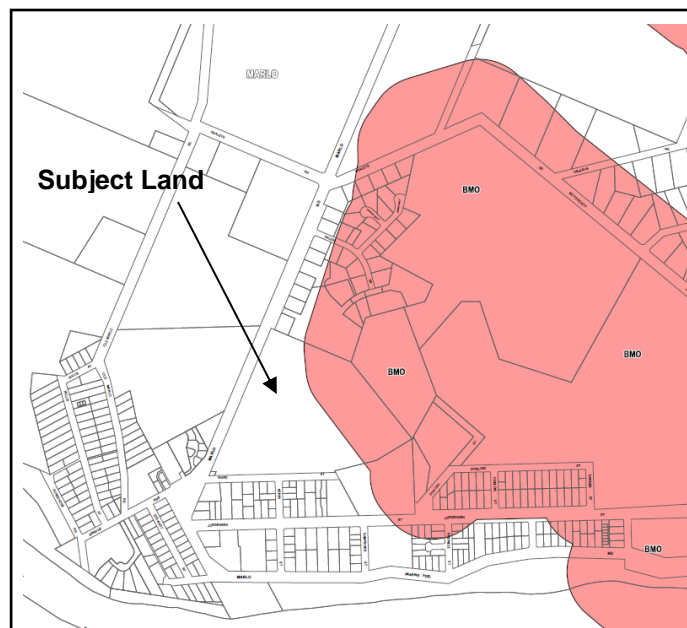
1. INDICATIVE LOCATIONS HAVE BEEN SHOWN FOR UNDERGROUND STORAGE TANKS. THIS MAY VARY UPON DETAILED DESIGN AND APPROVAL FROM EAST GIPPSLAND SHIRE COUNCIL.
2. STORMWATER TREATMENT TO MEET BEST PRACTICE MANAGEMENT (BMP)
TOTAL SUSPENDED SOLIDS - 90.9% > 80%
TOTAL PHOSPHORUS - 82.5% > 45%
TOTAL NITROGEN - 72.4% > 45%
GROSS POLLUTANTS - 100% > 70%

10. Infrastructure Plan

10.1 Bushfire Management

The eastern portion of the subject land is contained within the Bushfire Management Overlay (BMO), due to the land being within 150m of the Marlo State Forest. The balance of the subject land is within a designated Bushfire Prone Area. All future dwellings will be required to be constructed in accordance with the BAL Rating nominated within the Bushfire Management Plan..

With much of the subject land included within the BMO, it is considered appropriate to prepare a Bushfire Management Plan for the whole site consistent with the requirements of Clause 53.02 of the *East Gippsland Planning Scheme*.



Proposed Bushfire Management Overlay map Source: DTPLI

The provisions of Clause 53.02 prescribe that a Bushfire Hazard Landscape Assessment (BHLA) and Bushfire Hazard Site Assessment (BHSA) be prepared for the subdivision of land within the BMO. The information derived from the BHLA and BHSA will influence the Bushfire Management Plan (BMP).

10.1.1 Bushfire Hazard Landscape Assessment

The township of Marlo is located on the Snowy River estuary approximately 17km south of Orbost.

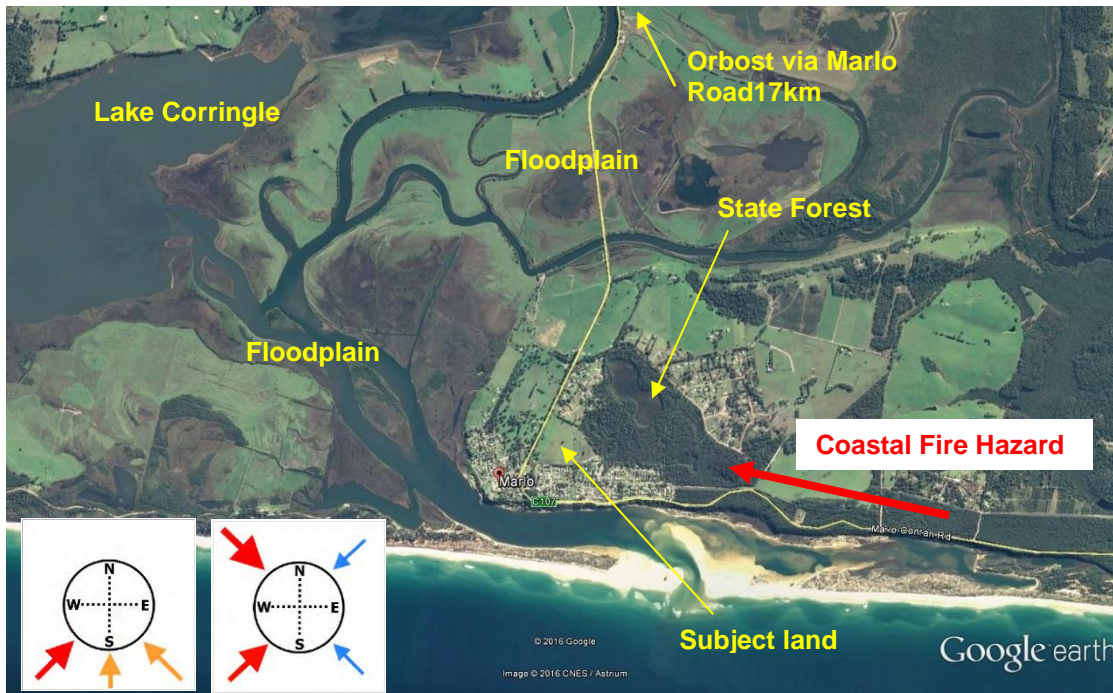


Figure 6: Bushfire Hazard Landscape Assessment

The Snowy River floodplain together with the Brodribb River surrounds the western and northern aspects of the township, comprising of low lying marshland and swamps together with large areas of fertile high quality agricultural land.

The settlement is situated on an elevated terrace providing the town with views south of the coastline as well as views to the west and north of the floodplain. Much of the land within the settlement boundaries consists of developed residential land with sparse vegetation.

The Marlo State Forest, situated on the east side of the subject land, poses a bushfire hazard to the subject land. The bushfire hazard extends in a south-easterly direction due the presence of coastal vegetation. Marlo Road offers protection from bushfire providing safe egress in the event of a bushfire.

The surrounding land conditions are considered to represent a *Broader Landscape Type 2*.

10.1.2 Bushfire Hazard Site Assessment

The land contains some scattered trees, but for the most part otherwise comprises open *Grassland* vegetation. The topography of the land is slightly undulating, with the highest point being in the north-west corner. Overall the land is characterised by downslopes of $>0-5^{\circ}$.



View north at eastern end of the subject land



View west across subject land

Land to the north and south of the subject land has been developed for residential purposes. Residential properties appear regularly maintained with minimal landscaping. Adjoining land to the north is considered to contain *Modified* vegetation.



Aerial image northern aspect (Saleni Drive neighbourhood)

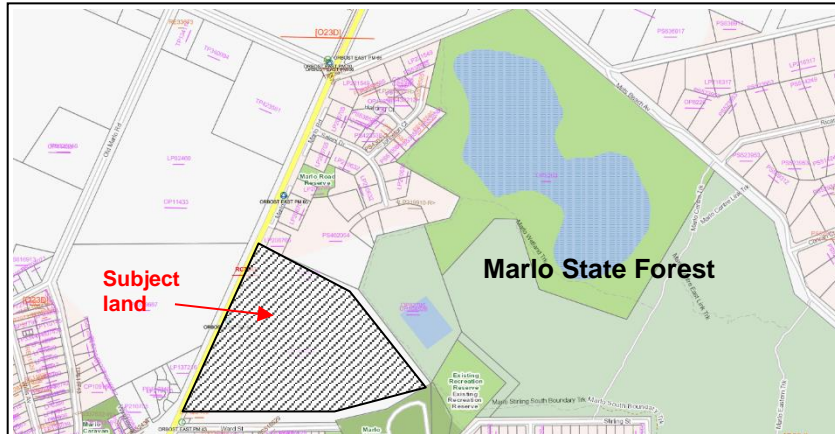


Photo 1



Photo 2

The Marlo State Forest (the State Forest) is located on the eastern boundary of the subject land which includes a network of trails and also contains a wetland in the north. Vegetation within the State Forest is comprised of Banksia Woodland EVC14 with extensive vegetation cover including canopy trees and understorey species. Vegetation within the State Forest is consequently considered to constitute *Forest* for the purpose of a BHSA.

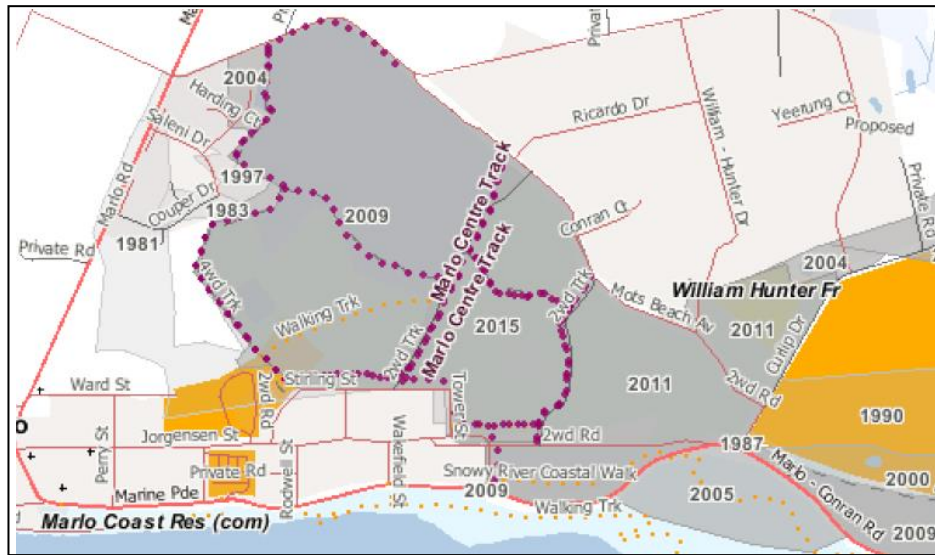


The State Forest is managed by Parks Victoria (DELWP). A gravel trail has been established adjacent to the south-west and western boundary of the State Forest. On inspection of properties surrounding the subject land it appears the gravel trail was in good condition and regularly maintained. It was also found that understorey adjacent to the trail was also maintained. The width of the trail together with the area of managed vegetation provides a 15m wide buffer between the boundary with the subject land and classifiable *Forest* vegetation.



View north and south of gravel trail within the Marlo State Forest adjacent to the subject land

The management of the State Forest has also included a program of planned burns for the management of fuel loads. Planned burns have been conducted throughout the State Forest between 2005- 2015.



Map of Planned Burns within Marlo State Forest (DELWP)

10.1.3 Response to Bushfire Risk

The subdivision layout has been designed having regard to the highest bushfire risk arising from the State Forest. Reserve 1 at the eastern end of the subject land has been included to provide a buffer between the State Forest and future dwellings. Reserve 1 together with the internal road network will offer the opportunity for all future dwellings to be setback at least 57 metres from the bushfire hazard and therefore achieve a BAL-12.5 consistent with the requirements of Clause 53.02-4.2, AM5.2 under the *East Gippsland Planning Scheme*. Lots 31-34 (inclusive) will include a restriction on title for future dwellings to be setback a minimum 6m from the front boundary to comply with the requirements for BAL12.5.

The retention and enhancement of landscaping adjacent to Marlo Road with the creation of Reserves 2 and 4 will result in a change in conditions from the current situation. The enhancement of vegetation immediately adjacent to future dwellings is considered to warrant consideration.

The enhancement of vegetation along the roadside is expected to pose a relatively low hazard. To minimise the risk to future dwellings (and outbuildings) some method of protection from bushfire is considered appropriate. The establishment of a *Colorbond* style steel fence outlined under the Public Open Space Plan (Part 7) will offer a reasonable degree of protection by shielding embers, radiant heat and flames.

The proposed fence is required to be constructed before lots adjoining Marlo Road are released meaning the fence will be established before any buildings are constructed on Lot A and Lots 1-14(inclusive).

The Bushfire Management Plan also proposes a restriction preventing the construction of any building within 6 metres of the western boundary to Lot A and Lots 1-14 (inclusive) consistent with the provisions of Clause 3.2.3 *Adjacent structures* under Australian Standard AS3959-2018 *Construction of buildings in bushfire-prone areas*.

The bushfire hazard from *Grassland* vegetation within the site will be reduced over time as the development progresses. However development of the land will be undertaken in stages and therefore is likely to take several years to complete. Bushfire mitigation measures must therefore be undertaken during development in order adequately protect dwellings developed within the early stages of the subdivision.

The Bushfire Management Plan at Figure 8 requires vegetation within the subject land to be maintained by the Developer during the declared Bushfire Danger Period typically between October to April until all stages of the development have been completed.

On completion of the development Reserve 1 will be vested with East Gippsland Shire Council. The Council will therefore become responsible for the management of vegetation within Reserve 1 in accordance with the Bushfire Management Plan to ensure the risk from the bushfire hazard remains at an acceptable level. A special rate levy will be applied to all allotments created within the subdivision for the ongoing maintenance of vegetation within the bushfire buffer in accordance with mitigation measures prescribed within the Bushfire Management Plan.

In addition to approval of this Development Plan, a Planning Permit will be required for the subdivision of the subject land. The application must include a Bushfire Hazard Landscape Assessment, Bushfire Hazard Site Assessment and Bushfire Management Plan.

The provisions of Clause 44.06-3 under the Bushfire Management Overlay impose mandatory conditions for a permit to subdivide land for residential purposes on land within the General Residential Zone. The mandatory conditions will require the Developer to enter into an agreement under Section 173 of the *Planning and Environment Act 1987* requiring the Developer and future property owners (including Council) to comply with the requirements of the Bushfire Management Plan.

[Figure 7]

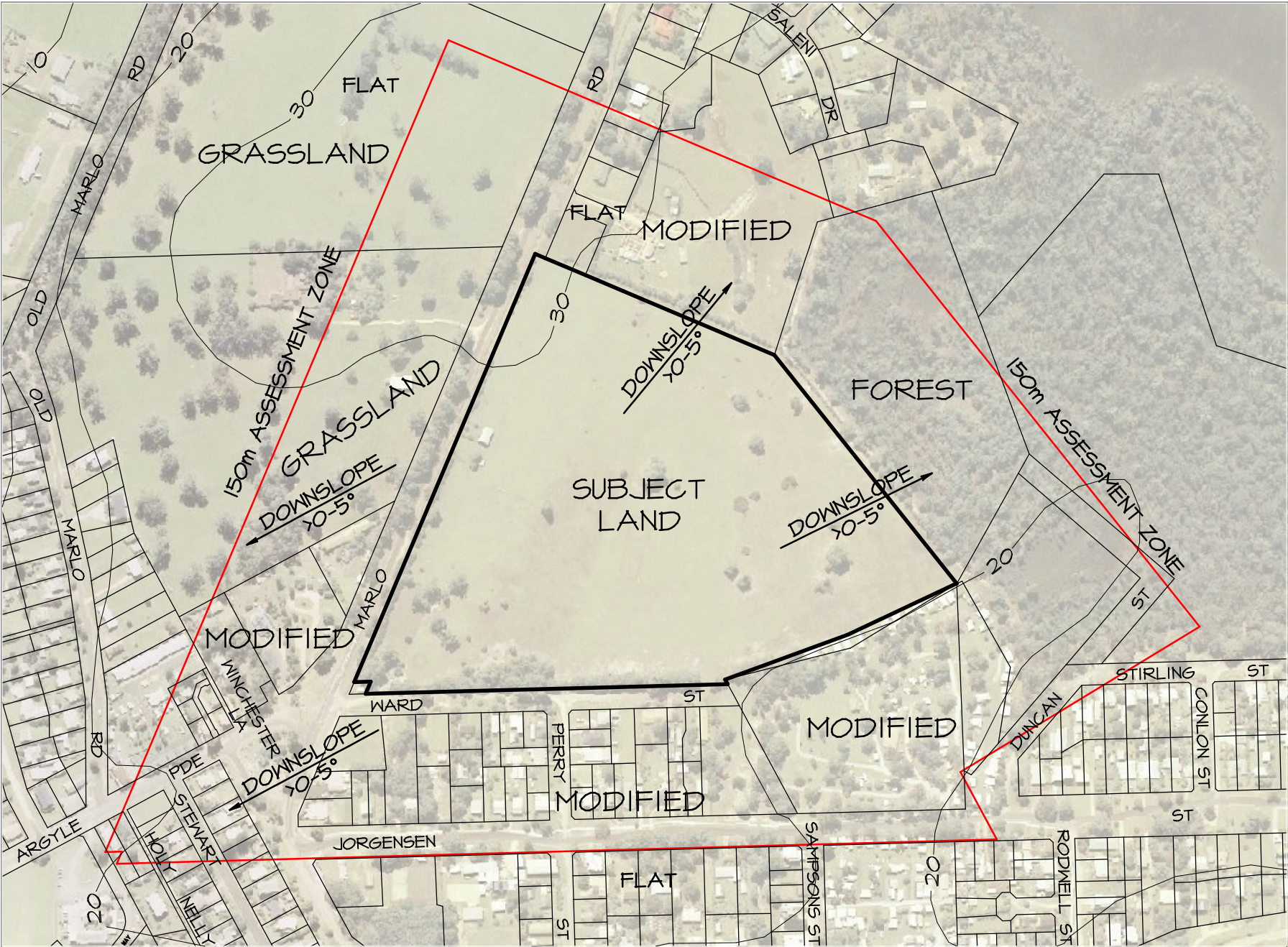
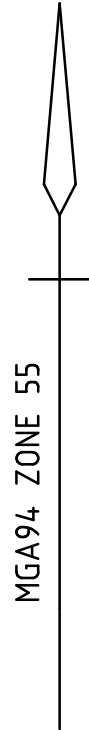


FIGURE 7

MICHAEL & KATHERINE GRECH
10 MARLO ROAD, MARLO

Crowther & Sadler Pty.Ltd.
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FILENAME: 16273 BHSA V4.pro

	NORTH	EAST	SOUTH	WEST
SLOPE	FLAT	DOWNSLOPE >0-5°	DOWNSLOPE >0-5°	DOWNSLOPE >0-5°
VEG TYPE	MODIFIED	FOREST	MODIFIED	GRASSLAND
SETBACK TO VEGETATION	N/A	57	N/A	22

SCALE (SHEET SIZE A3)

1 : 5000

SURVEYORS REF.

16273

VERSION 4 - DRAWN 14/11/2019

BUSHFIRE HAZARD SITE
ASSESSMENT PLAN

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 1 - PS80272TD

[Figure 8]

FIGURE 8








BUSHFIRE MANAGEMENT PLAN

SHEET 1 OF 2

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 1 - PS802727D

LEGEND

-  1.8m COLORBOND (OR SIMILAR) STEEL FENCE
-  6m WIDE BUILDING EXCLUSION ZONE
-  DEFENDABLE SPACE BOUNDARY (57m)
-  RESERVE No.4 (PART) - PROPOSED LANDSCAPE PLANTING TO 2m AT MATURITY
RESERVE No.2 - EXISTING SCREEN PLANTING TO BE RETAINED
-  TREES/VEGETATION TO BE RETAINED
-  EXISTING CANOPY TREES ADJACENT TO WARD ST TO BE RETAINED WITH UNDERSTOREY REMOVED
-  TREES/VEGETATION TO BE REMOVED

SCALE (SHEET SIZE A3)

1 : 2000

SURVEYORS REF.

16273

VERSION 6 - 19/12/2019

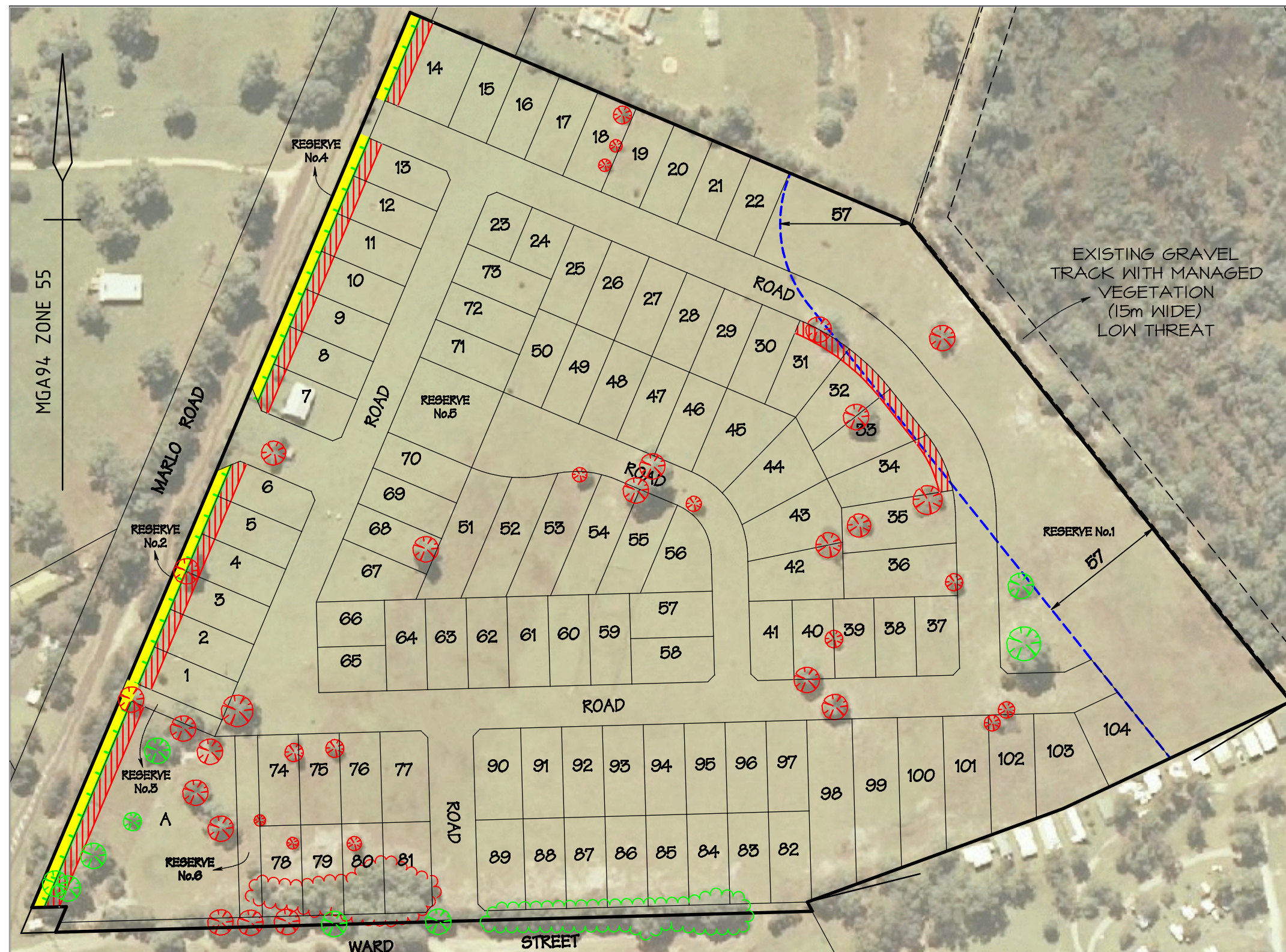
MICHAEL & KATHERINE GRECH
10 MARLO ROAD, MARLO

Crowther & Sadler Pty. Ltd.

LICENSED SURVEYORS & TOWN PLANNERS

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FILENAME: 16273 BMP V6.pro



PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 1 - PS802727D

DEVELOPMENT STAGES 1-5
'BY DEVELOPER'


RESERVE No. 1
'POST DEVELOPMENT'

MANAGEMENT OF VEGETATION

VEGETATION (AND OTHER FLAMMABLE MATERIALS) WILL BE MODIFIED AND MANAGED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS;

- GRASS THROUGHOUT THE DEVELOPED SITE MUST BE SHORT CROPPED AND MAINTAINED DURING THE DECLARED FIRE DANGER PERIOD.
- FOR TREES TO BE RETAINED THERE MUST BE A CLEARANCE OF AT LEAST 2m BETWEEN THE LOWEST TREE BRANCHES AND GROUND LEVEL.
- STREET TREES TO BE PLANTED WITH THE INTERNAL ROAD NETWORK MUST NOT EXCEED A DENSITY OF 1 TREE PER LOT.

WESTERN BOUNDARY FENCE

 1.8m COLORBOND (OR SIMILAR) STEEL FENCE
ON REAR BOUNDARY OF LOTS A, 1-13 (INCLUSIVE)
& WEST BOUNDARY OF LOT 14
TO BE CONSTRUCTED AS PART OF STAGES 1 & 2

BUILDING EXCLUSION ZONE

 6m WIDE BUILDING EXCLUSION ZONE
- NO BUILDING OR PART OF A BUILDING,
IS TO BE CONSTRUCTED WITHIN THE
BUILDING EXCLUSION ZONE WITHOUT
PRIOR WRITTEN APPROVAL OF COUNCIL

MANAGEMENT OF VEGETATION

ON COMPLETION OF THE DEVELOPMENT (INCLUDING ANY PRESCRIBED RESERVE MAINTAINACE PERIOD)RESERVE No. 1 MUST BE MAINTAINED BY EAST GIPPSLAND SHIRE COUNCIL IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS;

- GRASS MUST BE SHORT CROPPED AND MAINTAINED DURING THE DECLARED FIRE DANGER PERIOD.
- THERE MUST BE A CLEARANCE OF AT LEAST 2m BETWEEN THE LOWEST TREE BRANCHES AND GROUND LEVEL.
- TREES RETAINED WITHIN A RESERVE MUST NOT OVERHANG OR TOUCH ANY ELEMENTS OF A BUILDING.
- ANY FUTURE LANDSCAPE PLANTING WITHIN RESERVE No.1 MUST BE UNDERTAKEN IN A MANNER SO AS TO COMPLY WITH THE CATEGORY OF 'LOW THREAT VEGETATION' IN ACCORDANCE WITH AUSTRALIAN STANDARD AS 3959.2009 - CONSTRUCTION OF BUILDINGS IN BUSHFIRE PRONE AREAS.

DWELLING CONSTRUCTION

ALL DWELLINGS MUST BE DESIGNED & CONSTRUCTED TO A MINIMUM BUSHFIRE ATTACK LEVEL BAL-12.5 IN ACCORDANCE WITH AS 3959-2009

SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 2000	16273 VERSION 6 - 19/12/2019
MICHAEL & KATHERINE GRECH 10 MARLO ROAD, MARLO	

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10.2 Physical Infrastructure

Essential services including reticulated water, reticulated sewerage and electricity are all currently available within Marlo. Subdivision of the land will require that these essential services are connected to all lots at each respective stage of subdivision. Reticulated gas is not available to Marlo.

Reticulated sewerage is established in Ward Street and a sewerage main is also contained within the land adjacent to the northern and eastern boundaries.

The subject land is not presently connected to Council's drainage system. The nearest underground drain is located at the corner of Ward Street and Marlo Road. Stormwater drainage is not presently available in either Ward Street or Perry Street. The Stormwater Management Plan outlines the provision of stormwater drainage associated with subdivision of the land.

10.2.1 Ending of Section 173 Agreement AJ819739B

The upgrade to Ward Street (west of Perry Street) was identified during discussions involved with Amendment C80 to the *East Gippsland Planning Scheme* which facilitated the rezoning of the subject land for residential purposes. The owner of the subject land at the time was required to enter into an Agreement under Section 173 of the *Planning and Environment Act 1987* which included the upgrading of Ward Street between Perry Street and Marlo Road, including the intersections, to an agreed cost.

Circumstances have changed since the execution of this Agreement; these include a change in ownership, Council's public art policy is understood to have lapsed, the Infrastructure Design Manual has been adopted and the proposed subdivision layout has been refined. It is also considered many of the owners obligations under the Section 173 Agreement are considered to duplicate the requirements of the Development Plan.

The Development Plan is considered the most effective means of achieving the upgrade to Ward Street and provision of other new infrastructure associated with the development of the subject land. A request to end Agreement AJ819739B will be submitted to Council and considered in conjunction with the Development Plan.

10.2.2 Physical Infrastructure to be provided

Infrastructure to be provided with subdivision of the subject land will include:

- Underground electricity to the satisfaction of *Ausnet Services*.
- Reticulated water and sewerage to the satisfaction of *East Gippsland Water*
- Underground stormwater drainage including WSUD and detention facilities to the satisfaction of *East Gippsland Shire Council*.
- Internal roads, including pedestrian and cycling pathways will be constructed to the satisfaction of *East Gippsland Shire Council*.
- Construction of a new intersection from Marlo Road to the satisfaction of VicRoads
- Full upgrade of Ward Street, including the intersection of Ward Street and Perry Street, as proposed under the Traffic Management Plan to the satisfaction of *East Gippsland Shire Council*.
- Upgrade of the intersection at Ward Street and Marlo Road (Stage 1).
- Development of Reserve 5 with a playground (Stage 2).
- Development of an informal recreation facility within Reserve 1 (Stage 5).
- Construction of a 2.5 metre wide pathway on one side of Perry Street, between Ward Street and Marine Parade (the Esplanade). The pathway is to be constructed as part of Stage 1, or as otherwise agreed by Council.
- Vehicle access to the existing dwelling (Lot 7) from Marlo Road must be removed immediately upon construction of the new access road from Marlo Road (Stage 2).

An Infrastructure Plan has been prepared and is contained at Figure 9. The Infrastructure Plan sets out the extent of roadworks, development of proposed Reserves within the subject land as well as the upgrade to Ward Street, the intersection at Ward Street and Marlo Road, the intersection of Ward Street and Perry Street, the proposed access from the subject land to Marlo Road and a new footpath in Perry Street between Ward Street and Marine Parade.

All infrastructure works referred to in the Infrastructure Plan are to be undertaken at full cost to the Developer other than for the upgrade of Ward Street which will be a shared cost between the Developer of the subject land and East Gippsland Shire Council. It is considered the full upgrade of Ward Street can be achieved more cost effectively if undertaken as one project. East Gippsland Shire Council will contribute 30 percent of the cost to the upgrade of Ward Street with the Developer of the subject land to fund 70 percent of the cost.

The construction of internal roads, footpaths and stormwater drainage must be undertaken in accordance with detailed plans approved by *East Gippsland Shire Council* as prescribed by conditions within a Planning Permit.

Infrastructure to be constructed within the subject land will be funded by the Developer relevant to each stage of as shown on the Staging Plan (refer to Figure 10) as required by the relevant authority.

10.2.3 Ward Street Intersection Upgrade

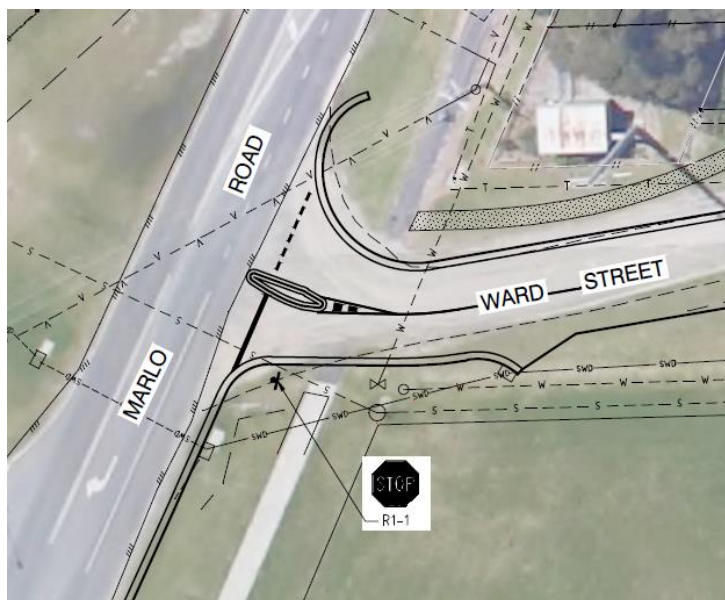
The type or extent of the upgrade of the intersection of Ward Street and Marlo Road was not specified within the Section 173 Agreement but is considered an important aspect to the development of the subject land and therefore must be recognised within the Development Plan.

The current *Marlo Urban Design Framework Master Plan* identifies the development of a roundabout at the intersection of Marlo Road, Argyle Parade and Ward Street. The roundabout is considered important to announcing arriving at Marlo and for improved pedestrian access across a multiple road intersection.

An assessment of current traffic volumes and forecast traffic volumes arising from the development of the subject land do not warrant construction of the roundabout at the present time. Construction of the proposed roundabout has not been scheduled and it may be sometime before it occurs.

With the timeframe for construction of the roundabout presently unknown the upgrade of Ward Street will need to formalise a two-way intersection based on the existing intersection layout.

The upgraded intersection of Ward Street and Marlo Road must be designed and constructed to cater for traffic volumes anticipated by the development of the subject land. If possible, the intersection should be capable of being incorporated into the functional layout for the future roundabout however if this is not possible, the intersection must be designed and constructed in a cost effective manner in anticipation the intersection may be altered when the roundabout is constructed.

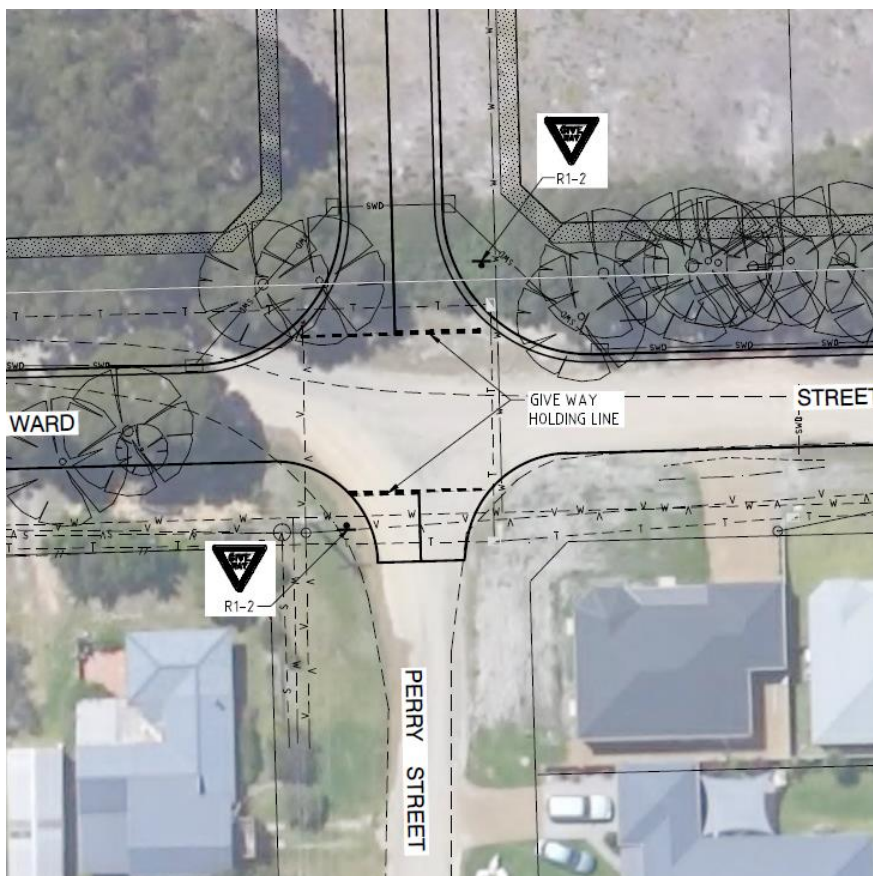


*Extract from Conceptual Ward St & Marlo Road Intersection Layout
(Source: Crossco Consulting Drawing No 1918/014-A)*

The upgrade to the intersection of Ward Street and Marlo road must also include a pedestrian connection (pram crossing) as part of the footpath network on the east side of Marlo Road opposite the existing pram crossing situated on the west side of Marlo Road immediately opposite the south-west corner of Ward Street.

Plans for the detailed design of the intersection will be required as a condition within the Planning Permit. The design must also include provision for pedestrian crossing point on Marlo Road. The upgrade to the intersection of Marlo Road and Ward Street must be completed as part of Stage 1 of the development.

The full upgrade to Ward Street will also necessitate construction of the intersection at Ward Street and Perry Street.



*Extract from Conceptual Ward St & Marlo Road Intersection Layout
(Source: Crossco Consulting Drawing No 1918/014-A)*

10.3 Planning Permit Conditions – Infrastructure

A Planning Permit issued for the subdivision of the Planning Permit must include the following conditions.




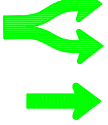





<i>Item</i>	<i>Requirement</i>	<i>Response</i>
1	<i>Upgrade of the intersection at Marlo Road, Ward Street</i>	Include conditions within a Planning Permit requiring detailed construction plans for the upgrade of the intersection of Ward Street and Marlo Road.
2	<i>Pedestrian access at Marlo Road</i>	Include a condition within a Planning Permit for provision of pedestrian connection (pram crossing) to the existing footpath network on the west side of Marlo Road as part of the upgraded to the Ward Street intersection as part of Stage 1 of the subdivision
3	<i>Proposed footpath on one side of Perry Street to provide connection from the subject land to the Esplanade.</i>	<p>Include a condition within a Planning Permit for the construction of a 2.5m wide pathway on one side of Perry Street, between Ward Street and Marine Parade (the Esplanade).</p> <p>Construction of the pathway may be staged with the approval of Council.</p>
4	<i>Detailed stormwater drainage design.</i>	Include conditions within a Planning Permit requiring a detailed stormwater drainage design for the whole of the subject land to be submitted to and approved by the Responsible Authority that includes all stages of the development. The plans must be approved before any works commence for Stage 1

Item	Requirement	Response
5	<i>Public open space contribution</i>	<p>Include a condition within a Planning Permit requiring a public open space contribution of 5 percent to be made to Council in accordance with Section 18 of the <i>Subdivision Act 1988</i>.</p> <p>The public open space will comprise a combination of land being 1.86 percent and a payment to Council equal to 3.14 percent of the site value of the land in accordance with Section 18 of the <i>Subdivision Act 1988</i>. The public open space contribution may be paid prior to a Statement of Compliance for each stage of the development.</p>
6	<i>Construction of a fence consistent fence type and landscaping, adjacent to Marlo Road,</i>	Include a condition within a Planning Permit requiring construction of a <i>Colorbond</i> style steel fence and landscape planning adjacent to Marlo Road as part of Stages 1 and 2 of the subdivision.
7	<i>Ensure boundary fences adjacent to Marlo Road are maintained by future owners and prevent direct vehicle access from any lot adjoining Marlo Road. Pedestrian access to the walking network may be permitted.</i>	The owner to enter into a Section 173 Agreement to ensure the fence is maintained by future lot owners and prohibiting vehicle access to Marlo Road from any adjoining lot.
8	<i>Implementation of Bushfire Management Plan</i>	<p>Include a condition within the Planning Permit requiring the land owner to be responsible for bushfire mitigation measures as prescribed by the approved Bushfire Management Plan for the duration of the development</p> <p>The land owner to enter into a Section 173 Agreement to ensure all future land owners, including the Responsible Authority, are responsible for complying with the requirements of the Bushfire Management Plan,</p>

Item	Requirement	Response
9	<i>Reserve No. 1 Bushfire Buffer</i>	The owner to enter into a Section 173 Agreement to inform future owners Council will impose a special rate levy to cover the cost of ongoing vegetation management within Reserve No.1 in accordance with the Bushfire Management Plan.
10	<i>Community Infrastructure Levy</i>	<p>The owner to enter into a Section 173 Agreement to inform future owners a Community Infrastructure Levy must be paid to the Responsible Authority prior to the occupancy of a dwelling on the owner's lot.</p> <p>The Community Development Contribution will not be greater than prescribed by Section 46L of the Planning and Environment Act 1987.</p>

[Figure 9]

MGA94, ZONE 55

-  - FUTURE ROUNDABOUT (BY OTHERS)
-  - PROPOSED INTERSECTION FROM MARLO ROAD
-  - EXISTING INTERSECTION TO BE UPGRADED (TWO WAY)
-  - VEHICLE CROSSING TO MINIMISE IMPACT TO EXISTING TREES
-  - FOOTPATH (CONCRETE)
-  - 2.5m WIDE FOOTPATH (CONCRETE)
-  - SHARED PATH
-  - GRAVEL FOOTPATH
-  - INFORMAL RECREATION FACILITY

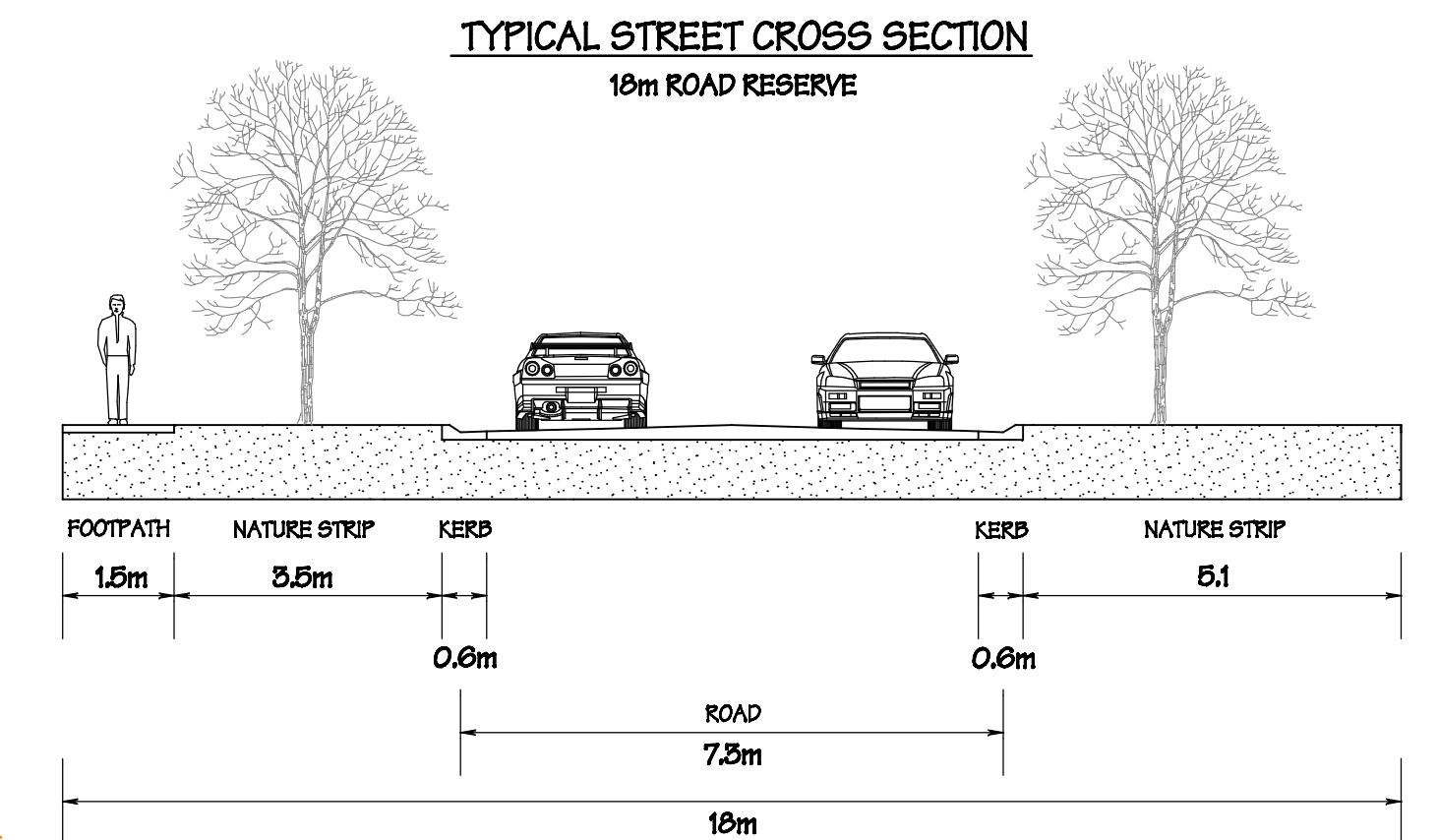
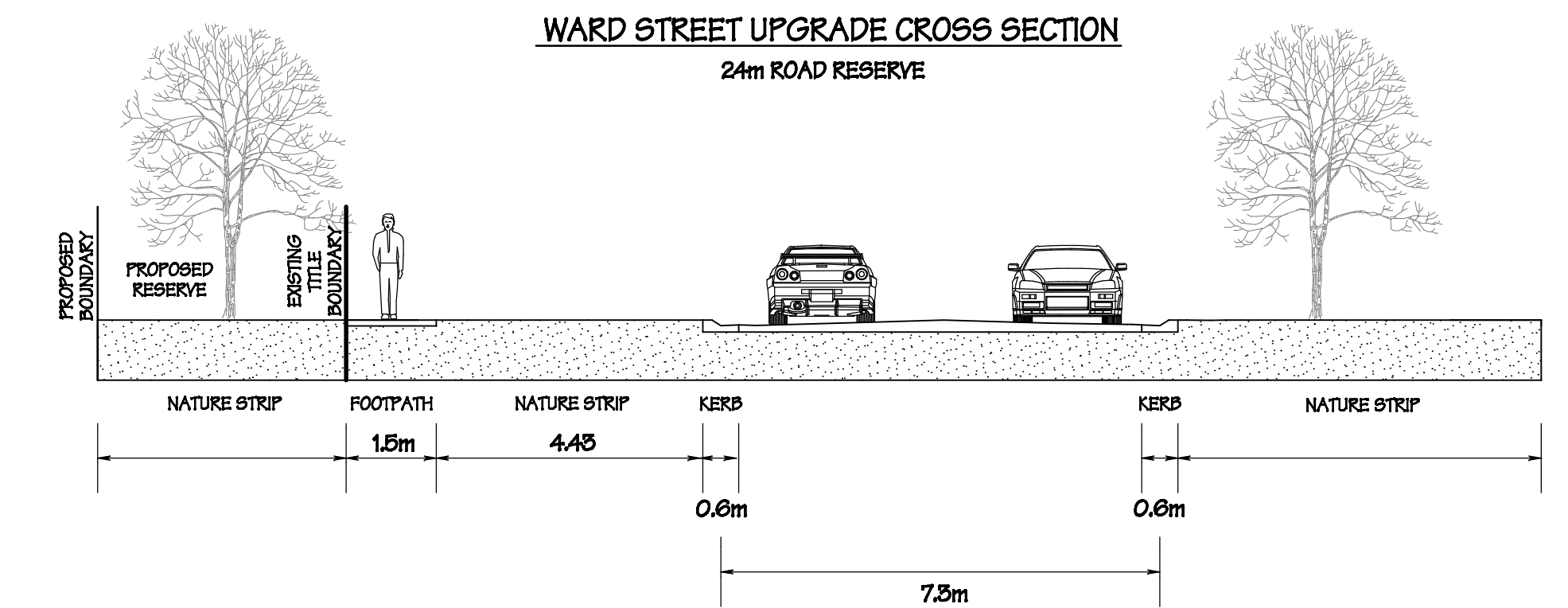


FIGURE 9

MICHAEL & CATHERINE GRECH
10 MARLO ROAD, MARLO

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LICENSED SURVEYORS & TOWN PLANNERS
182 MACLEOD STREET, BAIRNSDALE, VIC., 3875
P. (03) 5182 5011 E. contact@crowthersadler.com.au

FILENAME: 16273 Infrastructure Plan V4.pro

NOTATIONS

SCALE (SHEET SIZE A1)	SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 1000	1 : 2000	16273 VERSION 4 - 14/11/2019

LEGEND

INFRASTRUCTURE PLAN

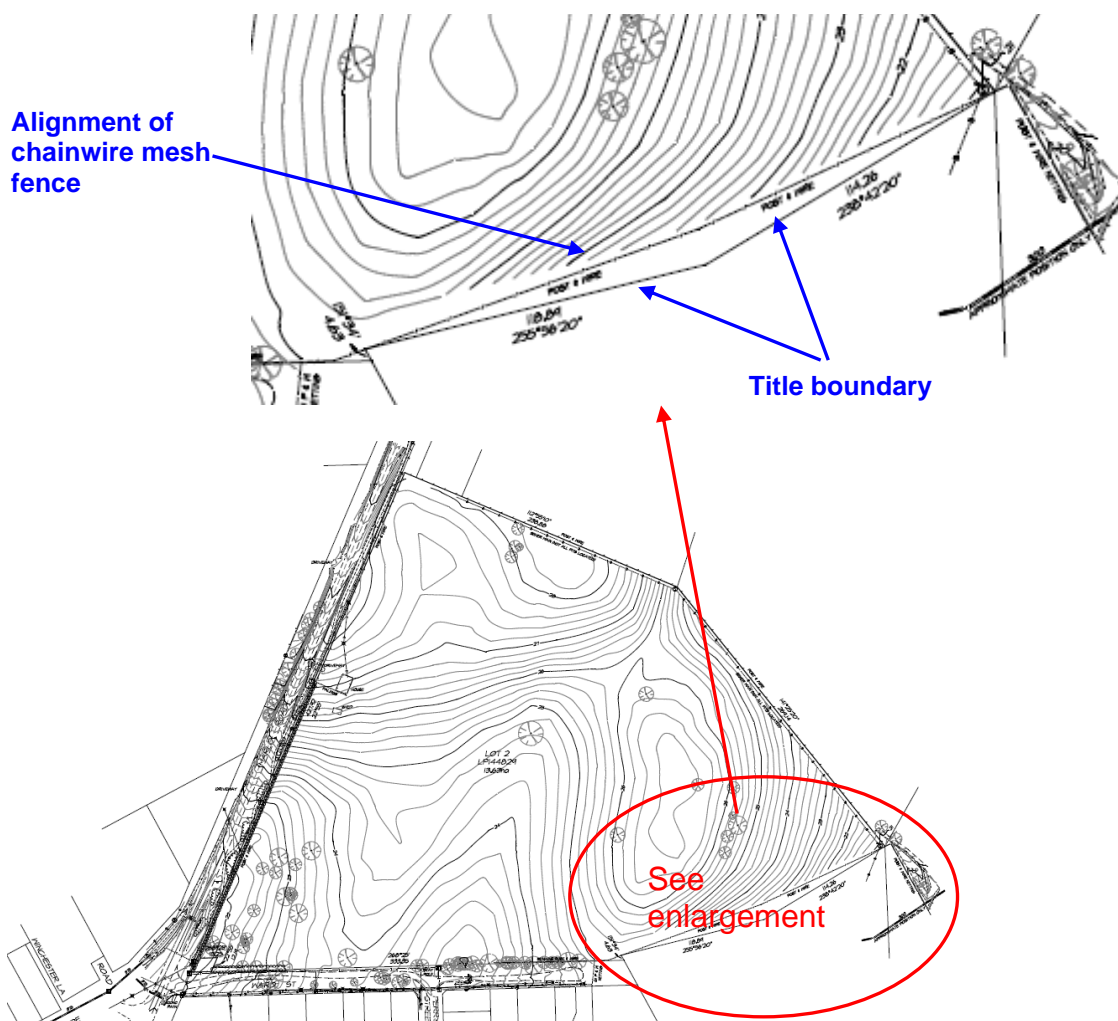
PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)
LOT 1 - PS80212TD

11. Staging Plan

A Staging Plan (Figure 9) has been prepared to demonstrate the orderly and progressive delivery of the proposed residential development.

Subdivision will occur in a logical sequence beginning at the southern end of the property due to the availability of services and access from Ward Street. Stages 2-5 progress sequentially west to east across the property.

In addition to the subdivision of residential lots, the land will require a subdivision to facilitate the acquisition of land in the south-east of the property that is currently occupied by the adjoining caravan park. This strip of land currently contains a number of on-site caravans and annexes and associated infrastructure. It is considered appropriate that the ownership of land be consistent with the current and proposed uses. The subdivision of this lot can be undertaken at any time independent of Stages 1-4 but must be completed at the latest as part of Stage 5.



[Figure 10]

MGA94 ZONE 55

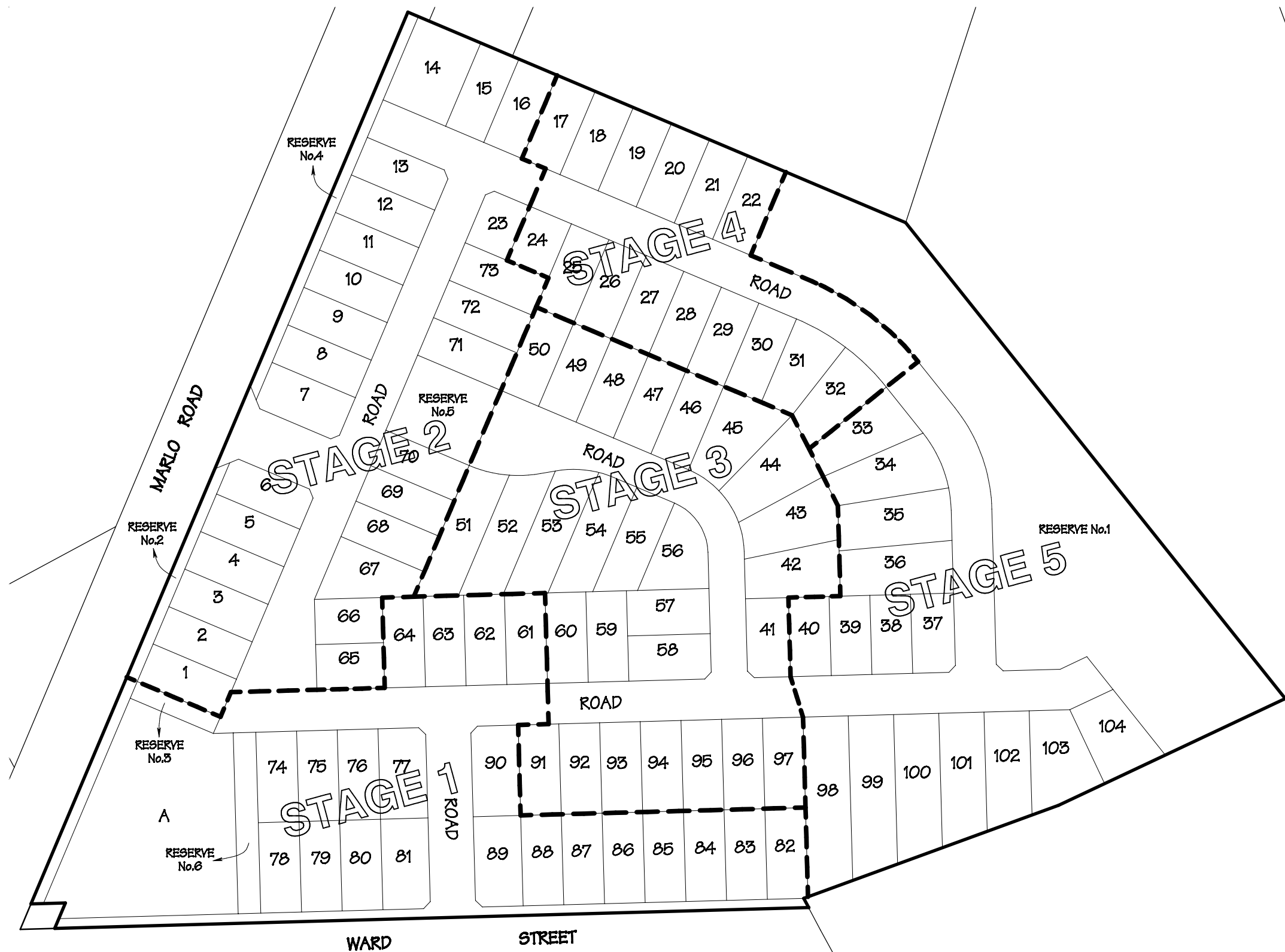


FIGURE 10

MICHAEL & KATHERINE GRECH
10 MARLO ROAD, MARLO

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FILENAME: 16273 Staging V8.pro

NOTATIONS

SCALE (SHEET SIZE A3)

1 : 2000

SURVEYORS REF.

16273

VERSION 8 - DRAWN 19/12/2019

STAGING PLAN

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 96 (PART)

LOT 1 - PS802727D

12. Table of Appendices

Appendix 1:	Environmental Management Plan Crossco Consulting Pty. Ltd.
Appendix 2:	Habitat Hectares & Offset Requirement for proposed subdivision Ethos NRM Pty. Ltd.
Appendix 3:	Traffic Management Plan Crossco Consulting Pty. Ltd
Appendix 4:	Stormwater Management Plan Crossco Consulting Pty. Ltd
Appendix 5:	Plan of Re-establishment and Features Crowther & Sadler Pty. Ltd.

APPENDIX 1:

Environmental Management Plan

**Proposed Multi lot residential subdivision
10 Marlo Road, Marlo**

**Town Planning Report -
Environmental Management Plan
(East Gippsland Planning Scheme DPO7)**

Prepared for:
M&K Grech

Prepared by:
**Crossco Consulting Pty Ltd
PO Box 858
Bairnsdale Vic 3875**



Document revision

Version	Date	Prepared by	Comments
Final	31/08/2015	M Supplitt	Distribution: Client, C&S (Rev A drawings)
Final	29/10/2015	Crossco	Distribution: C&S (Rev B drawings)
Rev A	02/08/2016	M Supplitt	Distribution: C&S (Rev C drawings)
Rev B	17/11/2016	M Supplitt	Distribution: C&S (Rev D drawings)

Notice:

This Environmental Management Plan:

- 1. Has been prepared by Crossco Consulting Pty Ltd for M&K Grech.***
- 2. Is for the use of M&K Grech in seeking planning approval for the proposed subdivision on land subject to East Gippsland Planning Scheme DPO7.***
- 3. Is for the use of East Gippsland Shire in assessing any planning application submitted by M&K Grech or on their behalf for the proposed development of land subject to East Gippsland Planning Scheme DPO7.***

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1 Background

Crossco Consulting Pty Ltd has been engaged by M & K Grech to prepare an Environment Management Plan to accompany a development plan for consideration of the East Gippsland Shire Council to develop land at 10 Marlo Road, Marlo (site).

The site is subject to the East Gippsland Shire Planning Scheme (EGSPS) DPO7, which requires and Environment Management Plan be submitted as follows:

An Erosion Management Plan prepared by a suitably qualified person that:

- *Details the extent of all earthworks*
- *Details the means to stabilise disturbed areas*
- *Identifies the means by which soils prone to erosion will be managed*
- *Includes appropriate measures for erosion mitigation*
- *Identifies any impacts of the proposed residential development*
- *Includes a Vegetation Management Plan which addresses Victoria's Native Vegetation Management – A Framework for Action*

2 Objective

This Erosion Management Plan outlines the minimum erosion control requirements necessary for the construction of subdivisional infrastructure and dwellings.

The objective of this Plan is to prevent soil erosion and control sedimentation by adoption of the following key principles:

- Implementation of sensible site planning and compliance with construction specifications
- Diversion of up-slope water from the construction site
- Minimisation of site disturbance
- Rationalisation of movement by construction vehicles
- Installation of sediment traps/controls along low-side of construction site
- Rationalisation of stockpile location
- Protection of stockpiles from erosion
- Minimise waste from wash-down and tile/brick cutting
- Minimisation of stormwater runoff from the construction site
- Reduce the erosive energy of stormwater leaving or diverted around the construction site
- Minimisation of building waste and debris
- Regular maintenance of all erosion control structures
- Prompt rehabilitation of all disturbed areas

This Plan considers erosion caused by water and wind.

3 Project Overview

3.1 Location

The site is located at Marlo, which is adjacent to the mouth of the Snowy River in East Gippsland.

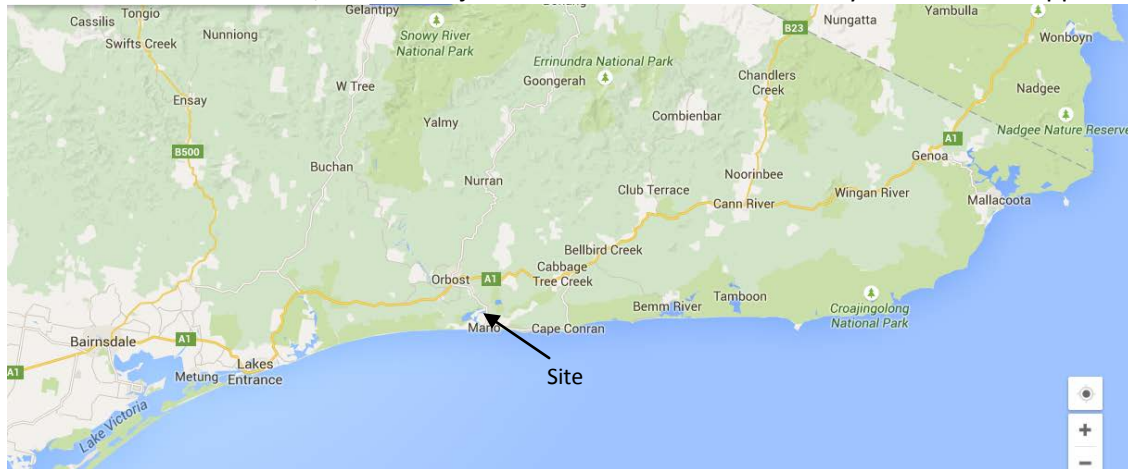


Figure 1: Locality Plan

3.2 Site Description & Topography

The site is located within the township of Marlo, with existing adjacent development to the north and south. Figure 2 shows the location of the site and surrounding existing development.



Figure 2: Site Overview

The site varies in elevation from a maximum of 28.5m AHD to a minimum of 22m AHD.

Figure 3 provides an overview of the topography of Marlo, showing the land grading to the west toward the Brodribb River and south toward the mouth of the Snowy River. The contours are at 10m intervals and indicate that the site is reasonably flat (a total fall of 10m over 360m from north to south), however Crossco Drawing 1918/001-D at Appendix 1 provides more accurate picture and shows that there is some undulations within the site.

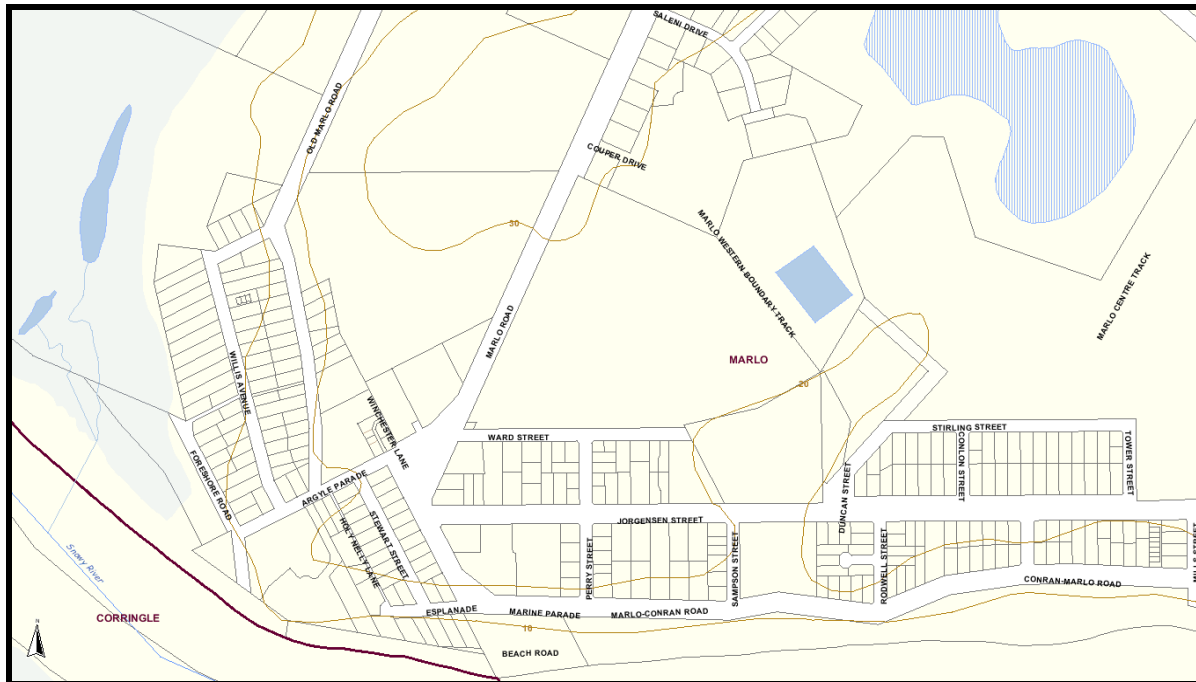


Figure 3: Marlo Topography¹

There are two ridgelines through the property in roughly a north-south direction as shown on Crossco Drawing 1918/001-D at Appendix 1:

1. To the east of the property, with land to the east of this ridge falling to the south-east at approximately 1:20 (V:H) and land to the west falling to the south-west at 1:25 (V:H).
2. To the west of the property, with land to the east of this ridge falling to the south-east at maximum grade of approximately 1:20 (V:H) and land to the west falling to the south-west at 1:30 (V:H).

The site generally slopes to the south.

3.3 Soils

The site is located within the Croajingolong² landform which comprises three component soils on plains, dunes and depressions respectively. The site is best described by the “plains” component:

On the plains the surface soils are very dark grey to black acidic sands with high amounts of organic matter. Below are paler acidic sands which in turn overlay dark coloured cemented sands or coffee rock. Coffee rock is an accumulation of organic-aluminium and or organo-sesquioxide complexes (iron and aluminium oxides) cemented sands and generally occurs before 1m.

An indication of soil morphology is provided in *Soils and landforms of Far East Gippsland*:

0-500mm	Black, loamy sand; clear change to:
500-600mm	Greyish brown; loamy sand; abrupt change to:
600-650mm	Dark brown; cemented sand; clear change to:
650-800mm	Yellowish brown mottled with light yellowish brown; clayey sand

¹ Reference: www.land.vic.gov.au

² Soils and landforms of Far East Gippsland, Department of Primary Industries, Farm Services Victoria, June 2011

3.4 Catchment Description

The site forms part of the Snowy River estuary catchment at Marlo.

The site is bounded by:

- to the north: existing low density residential development
- to the south: existing Ward Street and residential development. Not all existing allotments are developed
- to the west: Marlo Road and farmland
- to the east: walking trail and bushland / swamp

4 Site Inspection

The site was inspected on 15 July 2015.

No evidence of erosion or unstable soil conditions were identified during this site inspection. The site is well vegetated with grasses and has excellent ground cover.

5 Proposed Project

The project proposes the development of the 13.64 ha site at 10 Marlo Road, Marlo for residential purposes. The proposal creates 104 residential allotments (there is an existing dwelling on one proposed allotment), a 6,767m² future development site (Lot A), and a number of reserve areas as shown on Crowther and Sadler "Proposed Subdivision" Drawing 16273, Version 7 dated 05/10/2016.

5.1 Extent of earthworks

Earthworks proposed to develop all sites will be limited to:

- On proposed allotments: Dwelling and associated outbuilding construction, and on some allotments sewer and/or drainage
- Within proposed road reserves: Construction of roads, drainage, water, sewer, electricity, street lighting and communications
- Within existing road reserves: Construction of Marlo Road and Ward Street intersections respectively, upgrade of Ward Street

The extent of disturbed earth will be staged to provide services progressively to each stage in line with the Crowther & Sadler "Staging Plan" drawing No. 16273, Version 5 dated 05/10/2016.

The extent of earthworks by stage is illustrated in Crossco drawing No. 1918/005-D at Appendix 1. This drawing is based on an indicative infrastructure layout plan and may vary once preliminary design is undertaken. Preliminary design will to confirm for example, the depth of services and therefore extent of allotments that can drain to proposed sewerage infrastructure.

5.2 Stabilisation during construction

Erosion control requirements which can be adopted during construction will vary depending on the direction and steepness of the land, drainage conditions and proximity to drainage lines.

5.2.1 Civil Construction

Construction techniques will include:

- compaction of trenches to standards required (generally 98%) thereby minimising the risk of soils mobilised by water.
- limiting the extent of disturbed area and prompt revegetation of disturbed soil.
- erection and maintenance of silt fences in proximity to natural drainage lines.
- monitoring of site risks.
- design and site management to ensure trenches can be used where possible by more than one service to minimise extent of disturbed area.
- co-ordination of contractors during construction to minimise total construction period.
- consideration of seasonal preferences for construction.
- all vehicles working on the site to keep to defined access tracks and haul roads.
- water cart for dust suppression to be on-site and serviceable.
- management of stockpiles including prompt revegetation and location away from drainage lines and residences.
- earthworks contractor/s to provide a Construction Environment Management Plan (CEMP) for approval that will form part of any contractual obligations for civil construction.

5.2.2 Dwellings

Due to the gentle slope of the land and minimal external catchment the proposed construction of a dwelling will not present a significant erosion hazard. In line with best practice builders and contractors should be encouraged to ensure that erosion controls specified in this Plan are implemented.

Controls that should be adopted for development of dwellings include:

- Implement all erosion control structures.
- Install cut-off drains to divert upslope runoff away from the construction site
- Construct silt fences on **ALL** down slope sides of construction site.
- Cut & fill batters > 3.0 m long and steeper than 1H in 3V should be structurally retained.
- Utilise craneage and pumping for construction on steep erosion-prone slopes.
- Stormwater from all roofs and impervious areas should be connected to stormwater pipelines as soon as possible.
- Avoid stormwater discharge down steep slopes.
- Access to the building site should be by sealed constructed roadways only. There should be no access through, or disturbance of vacant land.

5.3 Management of erosion prone soils

Based on site observations, topography and previous construction undertaken in Marlo, soils on the site are not predicted to have a high risk of erosion (such as dispersive properties). It is not envisaged that chemical additives that can be used to “bind” erodible soils will be required at this site, but rather that the use of industry standards such as those outlined in EPA Publication 480 will achieve best practice outcomes. A copy of EPA Publication 480 is included at Appendix 2.

The primary management technique will be mulching and vegetation of soils, which is considered to be effective in most circumstances.

Ground cover provides the most effective means of preventing erosion. Consequently, sediment run-off and dust controls depend on retaining existing vegetation or revegetating and mulching disturbed areas as soon as possible.³

5.4 Erosion mitigation measures

Erosion mitigation measures proposed should be proportionate to the risk. The soil type, topography, site observations and previous construction undertaken in the vicinity of the site indicate that current industry best practice will provide an appropriate level of erosion mitigation.

The mitigation measures considered appropriate are outlined in Section 5.2.

5.5 Impact of Project

The proposed development of the site for residential purposes is not anticipated increase erosion risk either on the site or the precinct.

Additional stormwater generated from the site will be managed in accordance with standard industry requirements and discharged to the municipal stormwater system (refer to separate Stormwater Management Plan).

The peak impact will coincide with construction periods when soil particles could become mobilised in stormwater runoff or by wind and move from the site, by either the municipal drainage system and discharged to the Snowy River estuary or as dust. This could increase nutrient loads in the estuary, or cause smothering of water plants, or cause public nuisance. These potential impacts will be managed by employing the mitigation measures previously outlined in this Plan.

6 Conclusion

- Site inspection, topography, soil type and experience of other construction in Marlo provides evidence that any potential for erosion can be managed by employing best practice construction management techniques.
- Risk of erosion at this site is minimised by proposed Staging which limits the extent of disturbed area.
- Ground cover is a simple and effective erosion minimisation technique that will be effective at this site.

M Supplitt
17/11/2016



³ EPA Publication 480, Environmental Guidelines for Major Construction Sites, Environment Protection Authority Victoria, February 1996

Appendix

Appendix 1 – Crossco Drawings

Site Topography – Drawing 1918/001-D

Extent of earthworks by stage – Drawing 1918/005-D

FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS AN APPENDIX TO THE TOWN PLANNING REPORT DATED NOVEMBER 2016 FOR EAST GIPPSLAND SHIRE PLANNING SCHEME DP07 PREPARED FOR MICHAEL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT



LEGEND:

- 10 — EXISTING CONTOURS (1.0m INTERVAL)
- — — EXISTING EDGE OF SEAL
- W — — EXISTING WATERMAIN
- V — — EXISTING OVERHEAD ELECTRICITY



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M & K GRECH
10 MARLO ROAD,
MARLO.

SITE TOPOGRAPHY PLAN

DRAWING No.

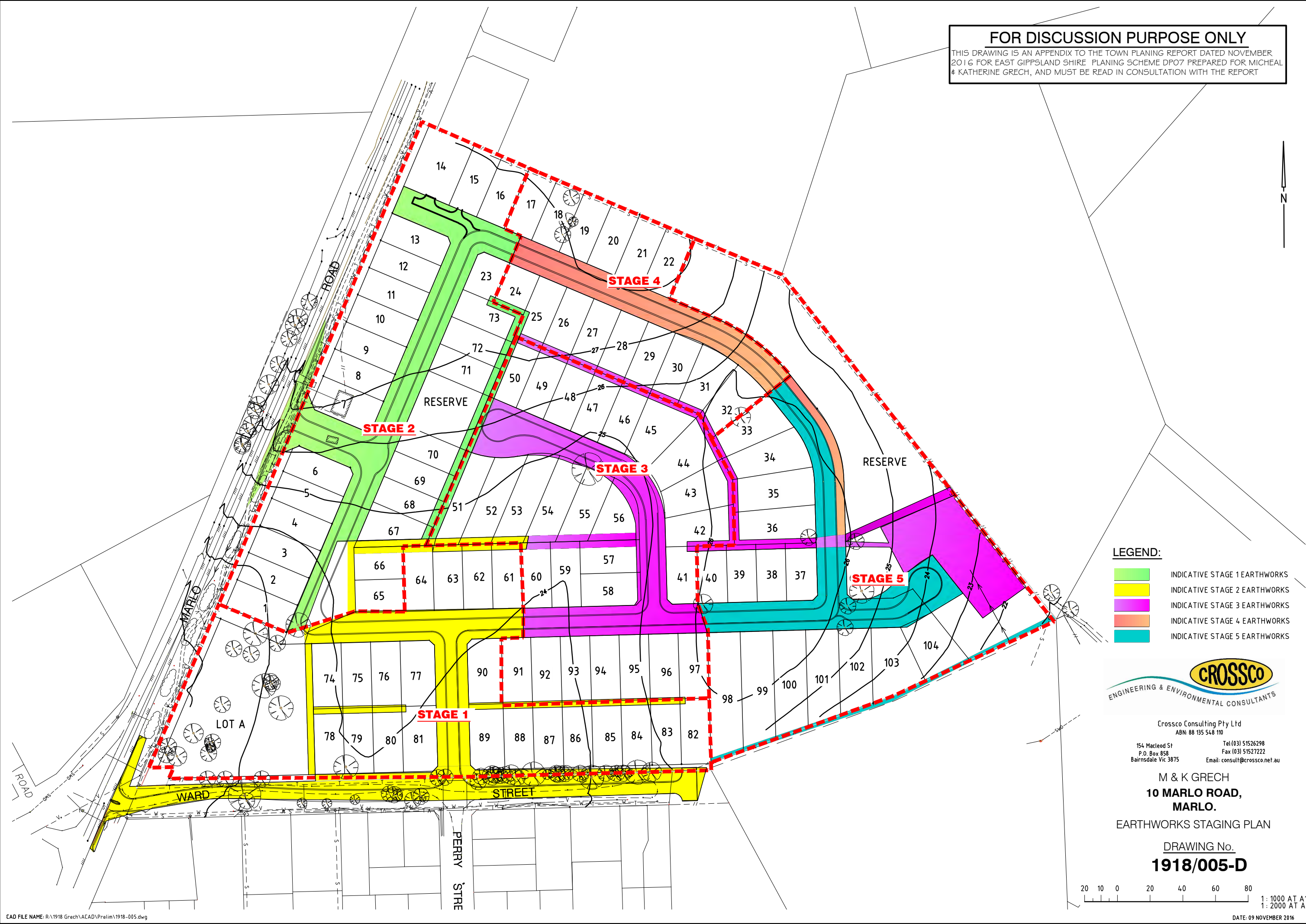
1918/001-D



1: 500 AT A1
1: 1000 AT A3

FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS AN APPENDIX TO THE TOWN PLANING REPORT DATED NOVEMBER 2016 FOR EAST GIPPSLAND SHIRE. PLANING SCHEME DPO7 PREPARED FOR MICHEAL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT



LEGEND:

- INDICATIVE STAGE 1 EARTHWORKS
- INDICATIVE STAGE 2 EARTHWORKS
- INDICATIVE STAGE 3 EARTHWORKS
- INDICATIVE STAGE 4 EARTHWORKS
- INDICATIVE STAGE 5 EARTHWORKS



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M & K GRECH
10 MARLO ROAD,
MARLO.

EARTHWORKS STAGING PLAN

DRAWING No.
1918/005-D



1: 1000 AT A1
1: 2000 AT A3

DATE: 09 NOVEMBER 2016

Appendix 2 – EPA Publication 480

EPA Publication

Downloaded from <http://www.epa.vic.gov.au>



Best Practice Environmental Management

**Environmental Guidelines for Major
Construction Sites**

Environmental Guidelines for Major Construction Sites

Environment Protection Authority
477 Collins Street, Melbourne
Victoria 3000 AUSTRALIA

February 1996

ISBN

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FOREWORD

Major construction projects, such as roads and freeways, are important to Victoria's economic development. During construction, however, such projects pose a significant risk to the environment, which must be addressed by developers and contractors.

Construction practices that fail to control pollution can cause damage to waterways and wetlands, kill fish, upset aquatic ecological systems and wildlife communities, and result in contamination of land and groundwater. The risk to the environment is particularly high when work is done near coastal areas, streams and creeks, or along a river valley. When construction occurs near built-up areas, poor practices may result in air and noise pollution which may cause annoyance and affect the health of neighbouring communities.

This document is designed to provide developers and contractors with guidelines on how to implement sound practices that minimise environmental impacts and eliminate health risks and nuisance to residents near a construction site.

There are also sound economic reasons for implementing good environmental practices during major construction projects. Excessive sedimentation of waterways can cause flooding, require expensive dredging of navigation channels downstream or reduce the capacity of downstream water storage units, destroy valuable wetlands, and reduce commercial and recreational fishing. On-site, loss of topsoil means importation of replacement topsoil at substantial cost. Where construction activities cause a nuisance, this places a cost on the community through loss of amenity.

Construction sites are constantly changing, and systems need to be in place to modify control measures to maintain their effectiveness. Therefore, frequent inspection and monitoring is required to continually check the effectiveness of measures.

I would encourage all companies involved in the design and construction of major roads and development projects to use these *Guidelines*.

Best Practice Environmental Management publications are produced by Environment Protection Authority (EPA) to encourage a pro-active approach to environmental management by industry.

EPA would be pleased to receive comments on these *Guidelines* from the construction industry and other interested parties.

Brian Robinson
Chairman
Environment Protection Authority

1 PURPOSE AND APPLICATION

The *Environmental Guidelines for major Construction Sites* provides a useful source document to help prepare and implement a environmental management plan for major constructions sites.

The purpose of these *Guidelines* is to provide developers, contractors and government agencies involved with commissioning or constructing freeways, major roads or major development projects with:

- information how to avoid and minimise environmental impact, which is preferable to the less cost-effective option of controlling or treating discharges to the environment, or undertaking remedial action.
- information on the likely impact of construction activities on the environment and how this is to be assessed
- guidelines for undertaking risk assessment and management
- a clear statement of environmental performance objectives for each segment of the environment
- suggested best practice environmental measures to meet the performance objectives based on available experience

The *Guidelines* provide contractors and developers with a framework within which due diligence obligations can be met and environmental damage can be avoided.

The *Guidelines* are not prescriptive or detailed. Application will require tailoring them to particular site conditions and making adjustments if the measures listed are inappropriate to the site.

Many of the measures proposed in the *Guidelines* are also applicable to smaller construction sites (less than five hectares) and should be used where appropriate to avoid and minimise impact from such activities.

The *Guidelines* do not refer to State legislation, regulations or environmental policies. Developers, contractors and subcontractor, when they are used, must make themselves aware of their legal obligations because they are responsible for compliance.

Legislative requirements and standards are minimum standards, and projects should endeavour to continually improve on these standards.

2 PRE-CONSTRUCTION PLANNING AND DESIGN

Integrating environment protection at the project planning stage ensures that measures to avoid and minimise pollution can be built into the project design and work schedule. This approach is more cost-effective than establishing controls once the project commences.

Once a site has been selected, it is necessary to conduct an environment assessment that identifies which parts of the environment may be vulnerable to damage from construction activities.

Making a risk assessment is a useful way in which to approach this aspect of site management. Environmental risk deals with the probability of an event causing an undesirable effect. There are three elements to consider when defining risk¹. They are:

- a time frame over which the risk or risks are being considered
- a probability of the occurrence of one or more events
- a measure of the consequences of those events

Based on the site assessment, project design information and the construction work program, a risk assessment of all aspects of the project can be executed. This assessment in turn leads to a strategy to manage all significant risks to the environment.

2.1 Environmental assessment

Understanding which segments of the environment are vulnerable is a prerequisite to identifying and managing environmental risks.

The assessment should not only consider the environmental impacts on a site, but whether or not off-site effects are possible.

An initial assessment of the site should be conducted to identify sensitive environmental areas or uses that require protection. These may include:

- sensitive or endangered flora and fauna
- aquatic plants and animals, if a natural waterway is affected
- groundwater recharge areas

Depending on whether or not the construction site is near houses, schools or hospitals, the impact of air discharges, noise and vibration on the health and amenity of adjacent residents will need to be included in the assessment.

Once the project has been approved, but before construction commences, it is important to initiate an environmental monitoring program to collect baseline data on all sectors of the environment.

¹ T. Beer & F. Ziolkowski, *Environmental risk assessment: an Australian perspective*, Supervising Scientist Report 102, 1995.

ENVIRONMENTAL ASSESSMENT

Objective

To identify or obtain information on any relevant environmental impact that the construction project may cause.

Suggested measures

- Identify sensitive environmental areas or uses that may be affected by construction activities.
- Identify whether residents adjacent to the site could be affected by pollution from construction activities or suffer reduced amenity.
- Monitor baseline air and water quality and ambient noise levels adjacent to the construction site.
- Conduct an assessment of expected noise levels from construction activities which may affect the surrounding community.
- Conduct a desk study to identify potentially contaminated sites in the construction area, and sample and analyse soils that are suspected of being contaminated before construction commences.

2.2 Risk assessment

Risk assessment is defined as the identification and characterisation of the nature of existing and potential adverse effects to humans and the environment resulting from exposure to environmental hazards.

Risk is a function of the probability of an event occurring and the degree of damage that would result should it happen.

Information from the environment assessment is required in order to conduct a risk assessment.

Details of the project design and the work program are also needed.

The assessment allows significant risks to be identified so that they can be targeted for action.

This initial risk assessment needs to be regularly reviewed. An ongoing risk assessment is therefore an integral part of the Environmental Management System (see section 3.1). This involves a review of existing risks and identification of new risks detected through the surveillance or monitoring program.

Risk assessment can be divided into six steps.

Information gathering

A risk assessment requires information about site conditions. This information is used in conjunction with information collected during the environmental assessment (see section 2.1).

The following information needs to be collected before construction commences:

- a map of soil types and their erosion potential
- climate, weather patterns and stream flows
- topography and natural geographic features (including whether site is in a floodplain)
- the construction schedule
- changes to the topography of the site during each stage of the project
- a map of existing vegetation identifying areas to be retained
- details of areas of cleared land at each stage of the development, and period of time that each section will be exposed
- changes to drainage and identification of sources of clean and contaminated stormwater

- calculation of stormwater flows within micro-catchments within the site, based on a one-in-two-year storm event (two-year ARI with intensity of six hours), for each stage of the project
- location of stockpiles, batters, haul roads and cuts
- nature and location of works that will occur within 50 metres of a natural waterway or other sensitive environmental area

Hazard identification

Hazard identification involves identifying activities that could lead to an adverse effect on the environment, impair human health, result in a nuisance, or decrease the amenity of residents adjacent to a construction site.

It is necessary to consider both direct and potential causes of hazard, which could cause water, air, land or noise pollution. Hazards may arise out of features of the site, or the nature of construction activities. For example, clearing vegetation from large areas and exposing erodible soil is a high-risk activity which may lead to dust generation and sediment run-off.

Proposed pollution prevention and control measures should be considered when identifying hazards, because if they fail, there will be an adverse impact on the environment.

Hazard analysis

Hazard analysis considers the likelihood of an environmental hazard being realised.

This analysis is based on previous experience, historical data for the failure rate of structures and systems, and includes the impact of site-specific conditions which may influence risk levels. For example, if large areas of land are cleared of vegetation, the probability of a stream crossing collapsing is low, while the potential for dust problems is high.

The level of risk is also a function of time. The longer a risk is allowed to continue, the more

likely it is that there could be an undesirable consequence.

Consequence analysis

Consequence analysis determines the effect on the environment should a risk be realised. For example, if a temporary river crossing should collapse it could be disastrous for a waterway. The failure of a sediment fence will have less impact on the river.

Two factors that should be considered in the consequence analysis are:

- significant long-term consequences, such as permanently altering the ecology of an environmental system
- significant short-term consequences, where the effects are temporary

The consequence analysis is independent of the probability of an event occurring.

Determining the overall risk

The overall risk is a function of the probability of a measure, structure or system failing, or of an event or activity causing environmental damage, and the magnitude of the environmental damage, should it fail.

Determining risk levels is an iterative process. The objective of the process is to reduce risk to acceptable levels by implementing an action plan.

Ranking

Wherever possible, risks should be quantified using scientific data, experience and judgement. Unfortunately, when risk assessment methodology is applied to construction activities, many risks cannot be quantified because of the lack of historical data. In addition, site-specific factors, such as site topography, have a major effect on risk levels.

The magnitude of the risk is either estimated or ranked in order of importance. Ranking

involves listing risks relative to one another, from high to low.

Ranking risks, based on uncertain and limited data, requires a high degree of judgement. It is therefore important that this step is conducted by an expert with experience in assessing risks on major construction sites.

Rankings need to be reviewed as actions are taken to eliminate or reduce the risk.

RISK ASSESSMENT

Objective

To identify and rank all potential risks that may arise from the construction of major projects.

Suggested measures

- Collect all relevant information needed to conduct a risk assessment of construction activities.
- Identify, assess and rank risks to all segments of the environment, human beings, nuisance and loss of amenity from plans of the proposed development.
- Once construction commences, review the risk assessment as risk management strategies are implemented, inspection or monitoring identifies new risks or when there are changes to the project.

2.3 Risk management

Risk management is the development of an action plan, including measures and strategies, which reduces significant risks to acceptable levels.

Risk management should be applied to pre-construction planning for the most cost-effective environmental outcomes.

Risk assessment and management should be continually updated during the construction phase.

Precautions and measures to prevent environmental problems are preferred to structural controls that either reduce or control risks.

Avoiding risks

The most effective approach is to avoid risk by modifying the design. Selecting a route that bypasses a sensitive environmental area, avoiding areas with high erosion potential, or retaining existing topography wherever practical rather than undertaking major land-shaping, are examples of risk avoidance.

Reducing risks

There are several strategies that can be implemented to reduce environmental risks.

For example, sequence works so that small sections of the site are worked on at any one time. If rehabilitation is commenced immediately works are completed, the risk of erosion, contaminated run-off and dust is reduced. Keeping haul roads to a minimum and routing them to avoid erodible areas, such as sloping terrain, will also help reduce dust and erosion problems. Another way of reducing risk is to avoid scheduling works on areas that pose a very high risk of erosion during periods when heavy rains and strong winds are expected.

These are some of the approaches that can be taken to reduce risk.

- Increase inspection, surveillance and monitoring frequency so that new or underestimated risks are quickly identified and managed, and any failures or imminent failures in controls are promptly identified and repaired.
- Implement a preventative maintenance program for pollution-control installations to reduce the risk of equipment failure.

- Implement contingency plans, such as ensuring that corrective action on a failing control measure is prompt. Such contingency plans will reduce the environmental impact of a hazard.

Controlling risks

It is possible to manage risks by installing control measures. For example, by constructing a sediment pond it is possible to trap silt and treat contaminated water. Paving haul roads to reduce the generation of dust is another control which can be adopted.

Large structural controls need to be planned and installed before construction commences. These include, but are not restricted to, sediment retention basins and artificial wetlands to treat contaminated stormwater, and structures to reduce water velocities.

As a general principle, various sediment interception and control devices should be installed as close to the source as possible. For example, install wheel washes and rumble grids to prevent dirt being taken off-site rather than instituting road sweeping.

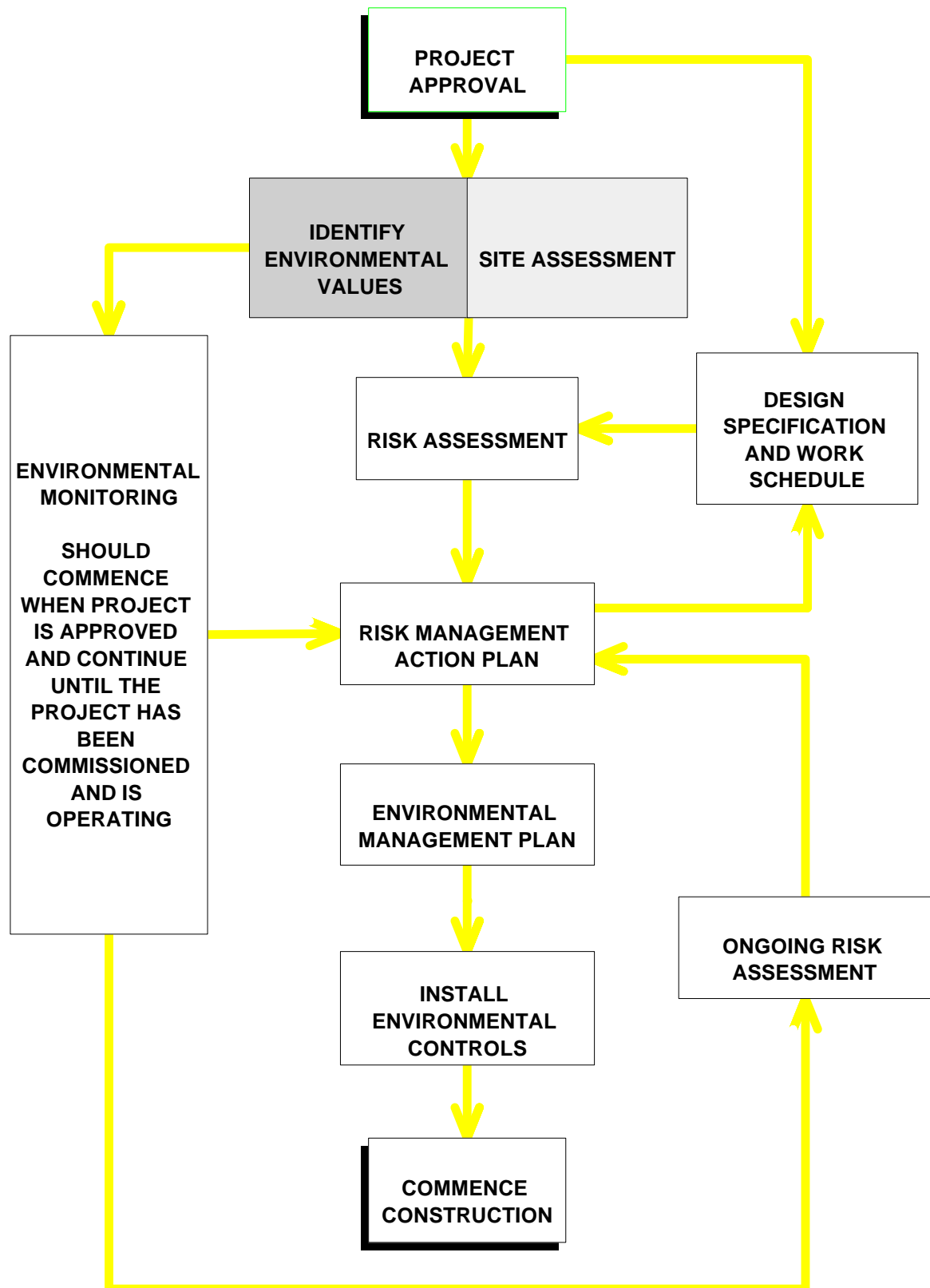
RISK MANAGEMENT

Objective

To implement risk management strategies to reduce all significant risks to the environment to acceptable levels.

Suggested measures

- Develop an action plan to manage all significant risks to the environment.
- Implement, wherever possible, risk management measures at the planning stage of the construction project.
- Select risk management options, in order of preference, based on avoiding risk, reducing risk and controlling risk.
- Identify major control structures, like sediment basins, stormwater diversion drainage and artificial wetlands, and install them before other construction activities commence.
- Install controls as close to the source of the problem as possible.



The relationship between risk assessment, the risk management action plan, the environmental management plan and monitoring

3 ENVIRONMENTAL MANAGEMENT PLAN

3.1 Environmental management plan

The environmental management plan contains all aspects of a project's environmental management, and should be prepared by the contractor before work commences on any construction project.

Once the environmental site and risk assessments, and risk management steps have been completed (see section 2), then implementation of risk management measures is achieved via the environmental management plan.

A pre-requisite for the environmental management plan is for the constructing company to have an environmental management system in place. The environmental management system establishes quality systems to ensure consistently high environment outcomes for the project as a whole. British Standard 7750², which has gained wide international acceptance, or the soon to be adopted ISO 14000 series³ should be used.

3.2 Best practice documents

The environmental management plan should contain best practice source documents which can be used to address significant environmental risks. These are generic, and should be applied to site conditions via the segment environmental control plan.

Sections 4 to 9 present some general principles upon which best practice can be based.

² British Standard Institute, Specification for environmental management systems, BS 7750, 1992.

³ International Standards Organisation, *Environmental management systems*, Draft International Standard ISO/DIS 14001 and 14004.

3.3 Segment environmental control plan

On large sites, it is normal to divide the area into segments. A control plan should be prepared for each segment. Segment boundaries are selected on the basis of natural features, the placement of sub-catchments, or association with different contractors.

A number of elements of the plan will be the same for each segment, such as hours of operation and controls on noise and emissions from vehicles. However, each segment may require area-specific controls.

The controls are taken from the action plan arising out of the risk management process (see section 2.3).

The main components of a segment environmental control plan are as follows:

Work scheduling

Actions taken to reduce or avoid environmental impact by rescheduling works, or prohibiting or limiting certain activities from times of the year when unfavourable climatic conditions exist, should be stated.

Land disturbance

Map the existing topography and changes to the landform of each segment, as construction progresses.

The map should identify critical areas for protection which may be easily erodible, such as highly erodible soils, steep slopes, haul roads, or bare areas.

Stormwater management

It is important to have accurate information about on-site drainage for each micro-catchment so that control devices are

adequately designed for the expected flow and load. Such information should be available for each change in landform that affects a micro-catchment.

Specifications for diversion drains and temporary stormwater controls to reduce on-site volumes should be included in the plan.

Control installations and measures

The plan should identify the position and design specification of structures and measures taken to control:

- sediment run-off
- dirt on roads
- noise and vibration
- dust

A schedule for installation of these controls should be included in the plan.

Soil stockpiles and batters

The plan should address how stockpiles and batters are to be managed.

It should include the location of all stockpiles, the interval before they are used, how they are to be stabilised, and what control measures are to be implemented while they are being stabilised.

For permanent batters and temporary or final slopes that have been cut during construction, the plan should indicate how these are to be stabilised and what control measures are to be implemented while stabilisation takes place.

Special operational precautions

When work is being done near an environmentally sensitive area, then special precautions should be identified in the plan

Contingency plans

Site-specific contingency plans are required for significant risks that have not been controlled. For example, the plan should include procedures for managing stormwater from intense storm events or repairing a control structure should it fail.

Rehabilitation

A rehabilitation plan should be developed as soon as possible after the design is finalised.

A schedule for stabilising and revegetating cleared areas should be given, and an ongoing program to maintain rehabilitated areas should also be included.

The site should be rehabilitated so that the impact on the environment is minimal.

Maintenance, inspections and surveillance

A maintenance and inspection program should be provided for all control structures and measures. Ongoing surveillance of the site is required to ensure that new risks are identified as they arise. This allows the environmental management plan to be adjusted to ensure that any new risks are adequately managed.

Ongoing risk assessment and management

Construction sites are continuously changing. It is therefore important that the initial risk assessment (see section 2.2) is updated for each segment. This needs to be integrated into the inspection program.

Updating the plan

The plan should be updated to address deficiencies identified by the monitoring or audit program and as new risks are identified through surveillance.

ENVIRONMENTAL MANAGEMENT PLAN

Objective

To develop an environmental management plan to reduce the adverse impact of construction activities on the environment.

Suggested measures

- A environmental management system should be in place, as a pre-requisite to preparing an environmental management plan.
- Prepare an environmental control plan for defined segments of the site for large sites, or a whole-of-site plan for smaller sites.
- The plan should implement the risk management action plan, include detailed specifications on site-specific controls and include a rehabilitation program in the plan.
- Base the measures in the plan on best practice.
- Update the plan to meet new risks or where inspections, monitoring or audit reveal that measures are ineffective.
- Update the plan to achieve ongoing improvement.

4 LAND DISTURBANCE

Large projects usually involve extensive land disturbance, involving removing vegetation and reshaping topography. Such activities make the soil vulnerable to erosion. Soil removed by erosion may become airborne and create a dust problem or be carried by water into natural waterways and pollute them.

Measures to address the impact of land disturbance on the environment should be included in the planning and design phase of the project, before any land is cleared.

These measures should be placed into the framework of the segment environment control plan (see section 3.3).

4.1 Erosion

When considering land disturbance and its consequences, priority should be given to preventative rather than treatment measures.

To develop effective erosion controls it is necessary to obtain information on the erosion potential of the site where soil disturbance is planned. Erosion potential is determined by the erodibility of the soil (type and structure), vegetative cover, topography, climate (rainfall and wind), and the nature of land-clearing. Erosion potential will also be affected by the type, nature and intensity of earthwork.

Erosion potential of rainfall can be calculated using the universal soil loss equation^{4,5}.

Conversion to SI metric units is given by Foster et al. (1981)⁶. The erosion potential of wind can also be calculated, and details are available in a paper by Israelsen et al. (1980)⁷.

Information on predicted soil losses from land disturbance should be used to plan and engineer control solutions.

Ground cover provides the most effective means of preventing erosion. Consequently, sediment run-off and dust controls depend on retaining existing vegetation or revegetating and mulching disturbed areas as soon as possible.

The following measures should be taken to minimise erosion:

- Keep land clearance to a minimum.
- Avoid wherever possible clearing areas of highly erodible soils and steep slopes which are prone to water and wind erosion.
- Revegetate and mulch progressively as each section of works is completed. The interval between clearing and revegetation should be kept to an absolute minimum.
- Coordinate work schedules, if more than one contractor is working on a site, so that there are no delays in construction activities resulting in disturbed land remaining unstabilised.

⁴ C. E. Israelsen, C. G. Clyde, J. E. Fletcher, E. K. Israelsen, F. W. Haws, P. E. Packer & E. E. Farmer, *Erosion Control during Highway Construction: Manual on Principles and Practices*, National Cooperative Highway Research Program Report 221, Transportation Research Board 1980.

⁵ R. J. Garvin, M. R. Knight & T. J. Richmond, *Guidelines for Minimising Soil*

Erosion and Sedimentation from Construction Sites in Victoria, TC-13, 1979.

⁶ G. R. Foster, D. K. McCool, K. G. Rendard & W. C. Moldenhauer, *Conversion of the Universal Soil Loss Equation to SI Metric Units*, J. of Soil and Water Conservation, p. 355-359 1981.

⁷ Israelsen et al. op. cit.

- Program construction activities so that the area of exposed soil is minimised during times of the year when the potential for erosion is high, for example during summer when intense rainstorms are common.
- Stabilise the site and install and maintain erosion controls so that they remain effective during any pause in construction. This is particularly important if a project stops during the wetter months.
- Keep vehicles to well-defined haul roads.
- Keep haul roads off sloping terrain wherever practical.
- Designed the slope of a cut to minimise the angle of incline.
- Cultivating the cut surface will increase infiltration of rainfall and decrease the velocity of water across the slope during rain and therefore reduce erosion.

MINIMISING EROSION

Objective

To minimise the quantity of soil lost during construction due to land-clearing.

Suggested measures

- Schedule measures to avoid and reduce erosion by phasing the work program to minimise land disturbance in the planning and design stage.
- Keep the areas of land cleared to a minimum, and the period of time areas remain cleared to a minimum
- Base control measures to manage erosion on the vulnerability of cleared land to soil loss, paying particular attention to protecting slopes.
- Mulch, roughen and seed cleared slopes and stockpiles where no works are planned for more than 28 days, with sterile grasses.
- Keep vehicles to well-defined haul roads.
- Rehabilitate cleared areas promptly.

4.2 Management of contaminated stormwater

Soil eroded during land disturbance can wash away and contaminate stormwater.

If contaminated stormwater enters a drainage line or stormwater drainage system, it will eventually discharge into an adjacent waterway and pollute it.

The type of sediment controls suitable for a particular situation depend on the nature of the site, in terms of such factors as rainfall patterns, soil type and topography. These factors need to be taken into account when

selecting appropriate controls and ensuring that designs are adequate.

There are a number of ways of minimising sediment run-off.

Reduce stormwater on the site

If uncontaminated water enters part of the site that has been cleared, it will quickly pick up sediment and need to be treated. Additional water may also add to the erosion potential, increasing the risk of pollution.

It is therefore desirable to divert clean stormwater away from those parts of the site where soil is to be exposed. This can be done by constructing diversion banks and intercept drains around the site while ensuring that the water discharging from such banks or drains is disposed of without causing erosion.

Wherever possible, the new stormwater drainage system should be installed before any land disturbance activities commence. If possible on-site inlets should not be connected until the site has been stabilised and rehabilitated. In this way, silt-laden stormwater cannot escape the site via this route and pollute surface waters. It will have to be treated on-site.

Water velocities

There is a direct relationship between the velocity of water flowing over exposed soil and the rate of erosion.

Installation of rock structures on the site to retard water flows is an effective measure to reduce erosion in areas where high water flows are expected.

It is desirable to minimise continuous slopes where flowing water can scour.

To prevent scouring, drainage lines may need to be lined or velocity-reducing structures, such as crushed rock or geotextile placed in the drainage line.

Slopes

Any natural drainage lines that discharge water on to the top of a slope should be directed to grassed areas by intercept drains. Otherwise water will run down the slope, eroding it. Perimeter banks or sediment fences should also be constructed at the toe of the slope to contain sediment run-off.

STORMWATER MANAGEMENT

Objective

To minimise the generation of contaminated stormwater.

Suggested measures

- Minimise the quantity of uncontaminated stormwater entering cleared areas.
- Establish cut-off or intercept drains to redirect stormwater away from cleared areas and slopes to stable (vegetated) areas or effective treatment installations.
- Reduce water velocities.

4.3 Designing erosion and sediment control devices

There are a large number of control devices that will suit most circumstances. These *Guidelines* are restricted to addressing the general principles behind erosion and sediment controls rather than providing detailed design specifications.

Most damage is done in the initial part of a storm, between 30 minutes and two hours into a storm, and during prolonged storms.

Designs of control structures, therefore, need to account for peak run-off flows.

Where it is not possible to schedule works to avoid times of the year when high rainfall is

expected, then additional controls may be required, such as installing extra sediment traps or enhancing the capacity of existing controls.

Sediment interception and settling

Sediment detention dams, ponds or basins hold sediment-contaminated run-off long enough for suspended sediment to settle out. Clarified water can then be discharged to stream.

Permanent structures that will provide ongoing sediment control, after a site has been rehabilitated, should be designed using a 50-year-recurrence interval. Examples of permanent structures are wetlands and major sediment detention dams.

Temporary sediment control structures should be designed to take predicted flows, based on a one-in-two-year storm (two-year ARI with intensity for six hours) and sub-catchment areas, while contingency plans should be in place to account for extreme storm events. Use the Universal Soil Loss Equation⁸ to estimate long-term average annual yield of sediment from small uniform sections of catchments. Run-off and sediment control structures should be designed and constructed to accept the expected peak flows and sediment loads.

Interception and chemical treatment

Fine colloidal clays suspended in run-off require a long time to settle, often exceeding the economic or practical detention storage capacity. Flocculants may need to be added to hasten settlement.

Residual flocculant in suspension should not be released if it degrades water quality or the aquatic habitat in natural waterways. Chemical sludge will require off-site disposal to a landfill licensed to accept such wastes.

Sediment filtering

Adequate controls should be placed on all drainage lines. Silt loads should be treated as close to their source as possible using effective sediment traps such as geotextile fences and straw bales.

In-stream controls

When the site is intersected by a stream, then in-stream controls such as a rock weir are required to reduce water velocity and trap sediment. Special precautions should be taken when cleaning behind a weir to ensure that trapped sediment is not resuspended.

Inspection, maintenance and cleaning

The effectiveness of sediment control devices depends on an adequate inspection, maintenance and cleaning program. Inspections, particularly during storms, will show whether devices are operating effectively (see section 9.1). Where a device proves inadequate, it should be quickly redesigned to make it effective.

⁸ C. E. Israelsen et al. op. cit.

SEDIMENT CONTROLS

Objective

To minimise the impact of contaminated stormwater on receiving waters.

Suggested Measures

- Install erosion and sediment control measures, if possible before construction commences.
- Identify drainage lines and install control measures to handle predicted stormwater and sediment loads generated in the mini-catchment.
- Design and install appropriate erosion and sediment run-off control measures appropriate to site conditions to handle a one-in-two-year storm event (two-year ARI with intensity of six hours), for temporary structures, and a one-in-fifty year storm event, for permanent structures.
- Establish an adequate inspection, maintenance and cleaning program for sediment run-off control structures.
- Ensure that contingency plans are in place for unusual storm events.
- Continually assess the effectiveness of sediment control measures and make necessary improvements.

There are a large number of erosion and sediment run-off control devices which are available. The selection and design will depend on site-specific considerations and it is beyond the scope of these to outline how to design such installations. Further information should be obtained directly from the references, which are listed below:

Auckland Regional Water Board, *Urban Earthworks - A Guide for Erosion*, Technical Publication no. 7, 1979.

Aveyard J M (ed.), *Design Manual for Soil Conservation Works*, Soil Conservation Service Technical Handbook no. 5, NSW Department of Soil Conservation and Land Management, 1982.

Department of Conservation and Land Management, *Urban Erosion and Sediment Control*, NSW, 1992.

NSW Department of Housing, *Soil and Water Management for Urban Development*, NSW, 1993.

Environment Protection Authority, *Construction Techniques for Sediment Pollution Control*, Publication no. 275, 1991.

Garvin, R. J., Knight M. R. & Richmond T. J., *Guidelines for Minimising Soil Erosion and Sedimentation from Construction Sites in Victoria*, TC-13, 1979.

Goldman, S. J., Jackson, K. & Bursztynsky, T. A., *Erosion and Sediment Control Handbook*, McGraw-Hill Book Company, 1986.

Highway Research Board, *Erosion Control on Highway Construction*, National Cooperative Highway Research Program, Synthesis of Highway Practice 18, 1973.

Pollution Control Authority, *Guidelines for Erosion and Sediment Control on Building Sites*, ACT, 1989.

Quilty, J. A., Hunt, J. S. & Hicks, R. W., *Urban Erosion and Sediment Control*, Soil Conservation Service Technical Handbook, no. 2, Soil Conservation Service of NSW, 1978.

Ransom M. J., *Control of Erosion on Construction Sites*, Department of Conservation, 1987.

Richards, D. L. & Middleton, L. M., *Best Management Practices for Erosion and Sediment Control*, Department of Transportation, 1978.

Rosewell, C.J. & Edwards, K., *SOILOSS - A Program to Assist in the Selection of Management Practices to Reduce Erosion*, Soil Conservation Service Technical Handbook, no. 11, NSW Department of Conservation and Land Management, 1988.

Scott & Furphy Pty Ltd, *Design Manual for Urban Erosion and Sediment Control*, National Capital Development Commission, 1988.

Water Resources Administration, *Maryland Standards and Specifications*, Maryland Department of the Environment, 1994.

4.4 De-watering work sites

After rain, pooled water is often pumped off-site. Often this water is contaminated with suspended sediment so it is essential that its disposal should not contribute to water pollution.

To remove water from the work area, the pump intake should be kept as close to the surface of pool as possible. Floating intakes should be used when the depth of water is sufficient. Care must be taken to avoid pumping from the bottom of ponds, and constant supervision is required during pumping operations to ensure this does not happen.

Treatment is required before discharging run-off to a natural waterway or stormwater system, where turbidity exceeds 30 NTU⁹ and is higher than upstream measurements. Hourly measurements of discharge water quality should be taken.

Contaminated water pumped off the site should, wherever possible, be directed to vegetated areas. Precautions should be made to ensure that such areas don't become waterlogged and have adequate capacity to effectively remove suspended solids.

Where vegetated areas are not available, then water should be directed to existing or specially provided sediment control structures.

Pumping to natural waterways should be supervised through the operations.

In urban areas it may be possible to discharge contaminated run-off to sewers. Such a discharge will require approval of the relevant sewerage authority.

⁹ NTU is an abbreviation of nephelometric turbidity units, which is a measure of light scattered as it passes through a solution. It is not directly related to suspended material, but is a good measure of the clarity of a water sample. It can easily be measured in situ, making it a convenient measurement when an on-the-spot decision needs to be made.

This option is of limited usefulness as de-watering the site will usually be required during or immediately after rainfall, when the sewers are also be near capacity and unable to accept any additional volume.

DE-WATERING WORK SITES

Objective

To ensure that de-watering operations do not result in turbid water entering natural waterways.

Suggested measures

- Treat contaminated water pumped into the stormwater system or a natural waterway to remove sediment if the turbidity exceeds 30 NTU.
- Ensure that the level of suspended solids in waters pumped into natural waterways never exceeds the regulatory water quality standard.
- De-water by pumping water, wherever practical, on to vegetated area of sufficient width to remove suspended soil, or to sediment control devices.
- Supervise all pumping and implement precautions to ensure that turbidity of pumped water is minimised.
- Monitor every hour during a pumping operation the turbidity of water pumped directly to a natural waterway or a drainage system discharging to a natural waterway .

4.5 Dust control

Many of the measures taken to reduce dust problems are the same as those taken to minimise erosion and sediment run-off.

Additional measures, not mentioned in the sections on erosion or sediment control, are outlined below.

- Prevent the generation of dust in preference to applying dust suppression measures.
- Ensure in the project schedule that the area of cleared land is minimised during the drier months of the year, when dust generation is at its greatest.
- Pave and water haul roads. The frequency of watering will be determined by weather conditions and the erodibility of the soil. If additives in the water are used to increase its dust suppression properties, the chemical should have no adverse environmental impact on adjacent water bodies.
- Water areas other than haul roads, if they are a source of dust.
- Ensure that smooth surfaces are deep ripped and left rough and cloddy to reduce the wind velocity at the soil surface.
- Construct wind fences if this is appropriate for the site.

As a contingency measure, in areas that do not have access to a reticulated water supply, water stored on-site should never be less than 2,000 litres per hectare of disturbed land surface.

Wherever watering is used to suppress dust, ensure it does not create contaminated run-off that will contaminate surface waters.

DUST CONTROL

Objective

To ensure there is no health risk or loss of amenity due to emission of dust to the environment.

Suggested measures

- Implement a dust prevention strategy, developed at the project planning stage.
- Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed.
- Install wind fences wherever appropriate.

4.6 Management of stockpile and batters

Stockpiles and batters are a potential source of dust and sediment run-off.

Additional controls to those covered previously are outlined below.

- Locate stockpiles away from drainage lines to where they are protected from wind.
- Minimise the number and size of stockpiles.
- Keep topsoil separate from underburden when stockpiling soil.
- Construct the stockpile with no slope greater than 2:1 (horizontal to vertical). A less steep slope may be required where the erosion risk is high.
- Mulch, roughen and seed with sterile grasses any batter or topsoil stockpile which is to be maintained for longer than 28 days.
- Treat underburden stockpiles in the same way, but check whether they need a layer of

topsoil to provide a media for grass seeds before seeding.

- Circle all unstabilised stockpiles and batters with silt fences or a drainage system that will collect and correctly dispose of contaminated water (see section 4.2).
- Locate stockpiles within ten metres of a waterway *only* if no other alternatives exist. This situation should be identified in the risk assessment.
- Hand water or install temporary sprinklers to suppress dust from unstabilised stockpiles and batters.
- Finish and contour any stockpiles located on a floodplain so as to minimise loss of material in a flood or rainfall event.

MANAGEMENT OF STOCKPILES AND BATTERS

Objective

To manage soil stockpiles so that dust and sediment in run-off are minimised.

Suggested measures

- Minimise the number of stockpiles, and the area and the time stockpiles are exposed.
- Keep topsoil and underburden stockpiles separate.
- Locate stockpiles away from drainage lines, at least 10 metres away from natural waterways and where they will be least susceptible to wind erosion.
- Ensure that stockpiles and batters are designed with slopes no greater than 2:1 (horizontal/vertical).
- Stabilise stockpiles and batters that will remain bare for more than 28 days by covering with mulch or anchored fabrics or seeding with sterile grass.
- Establish sediment controls around unstabilised stockpiles and batters.
- Suppress dust on stockpiles and batters, as circumstances demand.

4.7 Working in waterways and floodplains

The responsible drainage body must be consulted if there are any works that will impact on a waterway. Changes to the physical nature of a waterway require prior approval from the responsible drainage authority.

At the design stage, consider all options to avoid working in a natural waterway.

Procedures

Where it is not possible to avoid working in a stream, then additional precautions should be taken.

- Minimise the time during which work in a waterway is required, and the extent of works.
- Schedule works for the driest months of the year and the lowest flow of the waterway.
- Avoid times of the year when aquatic population may be under stress, such as during migration spawning, or when food may be scarce.
- Establish protocols to minimise downstream damage.
- Stabilise any disturbance to a levee or any other bank so that erosion is avoided.
- Measure turbidity continuously immediately downstream from the areas in which work is occurring, and modify work practices where continuous monitoring shows degraded water quality.
- If working in a concrete channel, use appropriate machinery to avoid damage to structures.

Stream crossings

If in-stream activities require construction of a stream crossing, it should be installed during low-water flows with downstream weirs in place to trap any released sediment.

Three types of access crossings may be considered.

- Culvert: this type of crossing may be effective in controlling erosion while in use, but will cause erosion during installation and removal.
- Ford: this type of crossing may only be used during periods of low flow. A ford is

not appropriate if construction will continue during wet periods of the year.

- Bridge: this type of crossing must be used for major waterways and for other waterways with high flows.

The crossing should be protected against erosion, both to prevent excessive sedimentation in the waterway, and to prevent washout of the crossing.

The crossing should be positioned perpendicular to the flow and located at the narrowest part of the stream. Damage to the stream bed and banks should be avoided. The crossing should be engineered to be stable under the expected vehicle loads. Drainage over the surface of the crossing and access road should have adequate controls to ensure that sediment run-off to the stream is minimised.

If a cofferdam is used, minimum downstream flows should be maintained that will sustain the aquatic ecology.

Stream crossings also act as sediment traps. Cleaning sediment out behind a crossing should follow the same procedure as for weirs.

Contingency planning

As mentioned in section 4.3, it is best practice to design pollution measures and controls to account for a one-in-two-year storm event (two-year ARI with intensity of six hours).

Contingency plans should also be in place for more intense storm events, particularly where works are planned to occur within a floodplain.

The contingency plan should consider the consequences on the environment of 5, 10, 20 and 100-year-frequency floods.

The contingency plan should address:

- methods to limit stormwater entering excavation areas
- enhancement of existing measures and installation of additional controls, when an intense storm event is forecast
- siting of construction facilities
- clean-up procedures, including disposal of excess water
- a flood warning system
- procedures for preventing the loss of spoil, fuel, chemicals or other materials that could adversely affect the environment
- notification of relevant authorities if unplanned incidents occur that could pose a risk to the environment

Reinstatement plan

Prior to works being undertaken on, near or within a waterway, a reinstatement plan should be prepared and submitted for approval to the responsible drainage authority. The plan should include:

- proposed changes to the waterway
- the impact on adjacent vegetation
- the type and form of flood protection works
- erosion and sediment run-off controls
- proposed methods for reinstatement of the waterway bed and banks
- a revegetation plan addressing a period of no less than 12 months and including proposed species and locations, methods for weed control and ongoing maintenance until a satisfactory level of established plants is achieved.

WORKING IN WATERWAYS AND FLOODPLAINS

Objective

To minimise stress on aquatic communities when working in a waterway.

Suggested measures

- Plan in-stream works so that the contact time is minimised.
- Establish special practices so that impacts on the waterway and disturbance of its banks are minimised.
- Stabilise banks and in stream structure so that they do not contribute to the sediment load.
- Maintain minimum flows to ensure the viability of aquatic communities and ensure that there are no barriers to the passage of fish up and downstream.
- Avoid times of the year when environmental damage is expected to be highest.
- Construct in-stream crossings during low flows, designed to be stable under expected vehicle loads and flow regimes, that do not contribute to the sediment load in the stream.
- Design crossings so that drainage off the crossing does not contribute sediment load to the stream.
- Prepare a contingency plan for high-rain events.
- Prepare a reinstatement plan if work in a stream is planned or the structure of a waterway will be altered.

5 NOISE AND VIBRATION

While no specific statutory controls exist for noise from construction sites, all noise nuisance should be reduced wherever possible from vehicles, fixed machinery within the site, blasting, general construction activities, and from movements of vehicles servicing the site.

5.1 Operating hours

One of the most effective means of reducing noise nuisance from construction activities, where there are residents nearby, is to limit the times of operation of noisy equipment vehicles, and operations.

There are occasions when it is necessary to work beyond these times. Exceptions can be made in cases where an activity that has commenced cannot be stopped, such as a concrete pour, and deliveries may need to be made outside normal working hours to avoid a major traffic hazard.

Documentation justifying out-of-hours work should be maintained and authorised by site management. Local residents who are affected by such activities should be notified beforehand.

Even with such restricted hours, every effort should be made to reduce the noise of all site activities.

5.2 Vehicles and equipment

Noise from vehicles and powered machinery and equipment on-site should not exceed the manufacturer's specifications, based on the installation of a silencer. Equipment should be regularly serviced. Attention should also be given to muffler maintenance and enclosure of noisy equipment.

5.3 Traffic

There is a conflict between operational efficiency and local amenity, with regard to traffic flows in and out of a construction site. During normal business hours when traffic densities are high, deliveries of materials and large equipment can cause severe traffic snarls and even pose a danger to other vehicles. Out-of-hours deliveries will cause noise pollution from trucks moving past nearby houses.

5.4 Noise abatement

Depending on the location of the facility, suitable noise suppression or abatement measures may be required, such as the provision of earthen embankments or other noise screens.

5.5 Vibration

On road constructions, impact pile-driving may be used to establish a base for foundations. These operations can give rise to high levels of ground vibrations.

The magnitude of the nuisance created by vibrations depends on the nature of soils transmitting the vibration and the distance to the nearest building.

A British study¹⁰ has found that nuisance from ground vibration and building damage is unlikely to occur if the operation is conducted at distances greater than 50 metres.

¹⁰ D. J. Martin, *Ground Vibrations from Impact Driving during Road Construction*, Supplementary Report 544, Transport and Road Research Laboratory, 1980.

Complaints about air vibrations from blasting have been received from people 100 metres away from the activity.

NOISE AND VIBRATION

Objective

To ensure nuisance from noise and vibration does not occur.

Suggested measures

- Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site.
- Enclose noisy equipment.
- Provide noise attenuation screens, where appropriate.
- Where an activity is likely to cause a noise nuisance to nearby residents, restrict operating hours to between 7 am and 6 pm weekdays and 7 am to 1 pm Saturday, except where, for practical reasons, the activity is unavoidable.
- Noise should not be above background levels inside any adjacent residence between 10 pm and 7 am.
- Advise local residents when unavoidable out-of-hours work will occur.
- Schedule deliveries to the site so that disruption to local amenity and traffic are minimised.
- Conduct a study on the impact of ground vibration from construction activities, where these operations occur within 50 metres of a building and take appropriate action.
- Minimise air vibrations.

6 WASTE MINIMISATION

When choosing between waste minimisation options, the following hierarchy for waste management is preferred:

- (i) waste avoidance and/or reduction
- (ii) reuse
- (iii) recycling

Diverting the waste stream in these ways means that waste treatment and waste disposal options can be reduced.

Construction sites should pursue this hierarchy and seek out waste reduction opportunities.

To identify opportunities it is necessary to consider all aspects of the project and the wastes it generates.

Waste can be minimised by using improved technology, recycled or reused on-site, or by making purchasing decisions that favour recycled products.

Wherever possible, include performance measures and targets for reduction, reuse and recycling options in the environmental management plan.

Waste minimisation opportunities include:

- obtaining construction materials, paints, lubricants and other liquids in reusable packaging or containers
- using noise barriers made from recycled materials

- using overburden to construct temporary noise barriers.
- using contaminated water out of sediment dams for dust suppression and irrigating adjacent vegetated land
- sending waste concrete from demolition activities to a concrete recycler instead of landfill
- segregating and recycling solid wastes generated by construction activities, offices and mess-rooms
- collecting lubricating oil from the construction vehicle fleet and sending it to a recycler

WASTE MINIMISATION

Objective

To minimise the waste load discharged to the environment.

Suggested measures

- Carry out a waste minimisation assessment which examines opportunities for waste avoidance reduction, reuse and recycling.
- Reduce wastes by selecting, in order of preference, avoidance, reduction, reuse and recycling.
- Incorporate waste minimisation targets and measures into the environmental management plan.

7 CONTAMINATED MATERIAL AND WASTES

On large construction sites, it is possible that old tips will be uncovered or the land found to be contaminated. Where this occurs contaminated material or soil may need to be disposed of.

Disposal methods adopted depend on the nature of the material. To obtain this information, a comprehensive sampling and analysis program is required so that the correct route for disposal can be determined. For an old tip, sampling should also ascertain the odour levels, presence of methane, groundwater levels and leachate quality.

7.1 Solid inert wastes

Solid inert waste found on construction sites usually consists of building rubble, but may also include as demolition material, concrete, bricks, timber, plastic, glass, metals, bitumen, trees and shredded tyres. Such wastes should be reused, recycled, or disposed of to a landfill site licensed to take such wastes.

7.2 Putrescible wastes

Old tips that accepted municipal rubbish also contain putrescible wastes.

Putrescible wastes are defined as waste able to be decomposed by bacterial action. It usually consists of discarded food, domestic garbage, commercial wastes, grass and garden clippings and prunings.

As many old tips were not licensed by EPA it is possible that other wastes were buried, and the inspection and analytical program should be designed to detect other materials if they are present.

Old tips may also contain contaminated leachate and gases, such as methane and odorous sulphur gases.

The biological and chemical condition of the tip will depend on its age and contents.

Excavating putrescible wastes could give rise to the following problems:

- escape of methane and odorous landfill gases
- release of contaminated leachate
- production of litter
- prevalence of seagulls and vermin

Precautions will need to be taken during excavation to ensure that these problems are adequately controlled.

The controls for the excavation, disposal and rehabilitation of the remainder of the tip are outlined below:

- Contain, extract and treat or dispose of contaminated water to the sewerage system, provided the appropriate approvals from the appropriate water board have been obtained.
- Extract and flare landfill gases, if sufficient quantities are present.
- Control odours during excavation by minimising the working surface area and immediately covering with a clean fill. A deodoriser might also be needed to minimise emissions of malodorous gases to the atmosphere.
- Limit leachate generation by minimising infiltration or ingress of water into the landfill through installation of cut-off drains, banks or bunds around the excavation areas.

- Cap excavated areas with an impermeable material (0.5 metre minimum).

Transport of the excavated putrescible waste to a licensed landfill may also cause problems. Old putrescible wastes can be highly odorous, and additional measures may need to be taken, such as using sealed and covered containers.

7.3 Low-level contaminated soil

Old tips may contain soil contaminated with chemicals such as heavy metals and hydrocarbons. Construction sites may also intersect contaminated sites, with elevated levels of heavy metals, hydrocarbons or other toxic chemicals.

The classification of contaminated soil depends on the concentrations of the contaminants and their leachability, as described in an EPA information bulletin¹¹.

The bulletin describes levels of contaminants (Table 1) which define clean fill, and can therefore be disposed of without restriction.

The bulletin also describes levels of pollutants (Table 2) which define heavily contaminated soil. Disposal of prescribed wastes and heavily contaminated soil is discussed in section 7.4.

However, if contaminant concentrations and leachabilities are between the limits in Tables 1 and 2, the soil is classified as low-level contaminated and should be disposed of at an appropriately licensed landfill, with a letter of approval from EPA.

7.4 Prescribed wastes

If on-site materials that have to be excavated are prescribed waste, as defined by the *Environment Protection (Prescribed Waste) Regulations 1987*, it will need to be transported in accordance with the *Environment Protection (Transport) Regulations 1987* to a landfill licensed to accept such wastes.

It should be noted that care should be taken handling prescribed wastes, so that they do not pose a health risk to workers.

CONTAMINATED MATERIAL AND WASTES

Objective

To ensure that all contaminated material uncovered on a construction site are excavated and disposed of in an environmentally responsible manner.

Suggested measures

- Assay material uncovered on-site prior to disposal. If the wastes include putrescible wastes, then also analyse leachate and landfill gases.
- Excavate material in a manner which avoids off-site environmental problems.
- Seal remaining contaminated material or wastes, where only part of the tip has been excavated, to ensure that there is no off-site effect now or in the future.
- Transport odorous wastes in covered vehicles.
- Dispose of contaminated material in a landfill licensed to take the type of contaminated material or wastes uncovered.

¹¹ Environment Protection Authority, *Classification of Wastes*, Publication 448, 1995.

8 OTHER ENVIRONMENTAL ISSUES

8.1 Emergency procedures

Procedures should be in place, and staff trained to deal with any emergency, which could cause major environmental damage.

Adequate equipment, such as spill kits, should be kept on-site to deal with emergency spills.

The EPA should be contacted immediately an emergency occurs on (03) 9628 5777.

8.2 Air Quality

There are three potential sources of air pollution on construction sites. They are exhaust gases from vehicles and machinery and exhaust material from chippers. Dust was addressed in section 4.

AIR QUALITY

Objective

To ensure there is no health risk or loss of amenity due to emission of exhaust gases to the environment.

Suggested measures

- Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specifications.
- Smoke from internal combustion engines should not be visible for more than ten seconds

8.3 Litter

On construction sites, there are two main sources of litter, building material washed away during a storm and deposited into waterways, and rubbish thrown away by construction workers.

Litter is often caused by thoughtlessness of staff and the unavailability of suitable litter bins on the construction site.

LITTER

Objective

To ensure that all litter is disposed of in a responsible manner, and is not released into the environment.

Suggested measures

- Maintain a high quality of housekeeping and ensure that materials are not left where they can be washed or blown away to become litter.
- Provide bins for construction workers and staff at locations where they consume food.
- Conduct ongoing awareness with staff of the need to avoid littering.

8.4 Storage of chemicals and fuels

Although it may be necessary to store fuels and chemicals on project sites, this inevitably creates an environmental risk. Spills can severely pollute waterways and land.

Reducing the quantities of chemicals and fuel stored on-site to minimum practicable levels is desirable. Infrequently used chemicals should be ordered just before they are needed. It may be possible to use a mini-tanker to refuel vehicles, instead of relying on a central fuelling point.

There are several approaches that can be taken to reduce the risk of fuel spills. Steps could include designing storage units to prevent vehicles or fork-lifts puncturing tanks, fitting automatic cut-offs to fuel dispensers, and making units vandal resistant.

Installing bunds will prevent spilt fuel escaping and causing environmental damage. Bunds should be designed and installed in accordance with EPA guidelines¹².

Key design issues addressed in the guidelines are height of bund walls, construction material, vehicular access, and stormwater management. Roofed bunds are strongly preferred.

Should a spill occur, then it is necessary to have a contingency plan in place to deal with the clean-up. It should consider issues such as cleaning up spilled material on the site, containing and cleaning up spills which have entered waterways, disposal or reuse of recovered residues, and contacting key company and government agency personnel to advise them of the emergency.

STORING FUELS AND CHEMICALS

Objective

To ensure that fuel and chemical storage is safe, and that any materials that escape do not cause environmental damage.

Suggested measures

- Minimise fuels and chemicals stored on-site.
- Install bunds and take other precautions to reduce the risk of spills.
- Implement a contingency plan to handle spills, so that environmental damage is avoided.

8.5 Road cleaning

Some sites require vehicles to move on and off the site. It is possible that these vehicles will transport soil off the site and deposit it on the adjacent roads.

Prevention of soil being deposited on roads is preferable to cleaning them afterwards.

All points on the site where vehicles regularly leave should have rumble grids and wheel washes installed. In wet weather it may be necessary to hose mud off vehicle wheels as they traverse the grid.

All exits leading to the above mentioned controls should be paved with gravel. Top dress these paths periodically, and remove sediment from the wheel wash.

Where there is only occasional use of road crossings (twice a day or less), or where there is insufficient space on the site to install a rumble grid and wheel wash then (at least) daily road sweeping should be instituted. Care should be

¹² Environment Protection Authority, *Bunding Guidelines*, Publication 347, 1992.

taken to ensure that road sweeping does not give rise to dust problems.

The number of times a day that road cleaning occurs should be determined by the frequency of road usage and the state of the roads, which should be inspected often.

Installation of litter traps lined with filter cloth in side-entry pits will trap soil in stormwater spilt on roads during rain.

Where soil is being transported for off site disposal, then all loads should be covered.

KEEPING ROADS CLEAN

Objective

To ensure that roads are kept clean of soil.

Suggested measures

- Install wheel washes and rumble grids at all main road crossings.
- Ensure that the roads are swept at least once a day on uncontrolled road crossings when construction vehicles are travelling off the site.
- Install litter traps lined with filter cloth in all side-entry pits .
- Cover all loads of soil being taken off site for disposal.

Appropriate machinery must be used within concrete channels to avoid damage to structures.

8.7 Concrete batching plants

Sometimes very large construction projects will establish on-site concrete batching plants.

Plants need to be designed in accordance with EPA guidelines¹³.

Constructing a plant which is designed to have a throughput of greater than 100 tonnes per week will need an EPA works approval.

8.6 Protecting infrastructure

In built-up areas, care needs to be taken in working near existing infrastructure services such as drainage and sewerage pipes.

It is important to ensure that any existing drainage or sewerage pipes that intersect the construction site or are adjacent to it are not overstressed or damaged by movement or placement of construction plant or materials, or construction activities.

¹³ Environment Protection Authority *Concrete Batching Plants* Publication TG 204/91, 1991.

9 INSPECTIONS, MONITORING AND AUDITS

9.1 Inspections

The frequency of inspections depends on the risks posed to the environment by each construction activity or the nature of the site. These recommendations should be taken as minimum frequencies. The frequency of inspections, monitoring and auditing recommended below is based on experience of large freeway construction.

Installation	Possible problems	Frequency	Remedial action
Drainage	New drainage lines not controlled	At least once every two days in areas where earth-moving is occurring Weekly elsewhere	Install appropriate sediment controls on new drainage lines
Sediment controls, silt fences and traps	Not controlled effectively	Daily in dry weather Within first two hours of a storm [#] Three times a day during prolonged rainfall [#]	Remove sediment from trap Replace barrier or filter material Redesign installation Improve maintenance
Haul roads	Dust Soil on paved roads	At least daily	Pave haul roads with gravel or impervious sealant Install wheel wash and rumble grid Manually wash vehicle wheels Increase road cleaning frequency
Cut-off and diversion drains	Water not diverted away from sensitive areas	Weekly	Replace or repair damaged drains Redesign ineffective drains Relocate incorrectly placed drains

[#] See also table on monitoring requirements under the same heading.

Installation	Possible problems	Frequency	Remedial action
In-stream weirs	Ineffective during low flow	Weekly in dry weather	Educate sediment trapped behind weir
	Release of trapped sediment during storms	24 hours before forecast rain	Clean out behind weir if filled to 25% capacity
Stream crossings	Unstable	When in use, but no less than weekly	Stop use until installation has been redesigned
	Releasing sediment and soil into stream		
Vegetated buffer zones	Accidentally cleared	Weekly	Revegetate
			Review procedures to ensure no recurrence
Retardation and settlement basins and artificial wetlands	Sediments not effectively removed	Weekly	Redesign installation
			Increase retention times
			Add flocculants*
Stockpiles and bare slopes	Erosion	Weekly	Minimise exposure to run-off and action of wind
			Ensure stabilisation measures are effective
Unvegetated areas	Dust	Daily during dry weather	Increase use of water spray on unvegetated areas
			Protect untrafficked areas temporarily with mulch or geo-fabric blanket
Vehicles and machinery	Noise pollution	Initially when vehicle or machinery is introduced to the site and thereafter monthly	Ensure that mufflers and noise-shielding are effective
	Exhaust gases		Ensure that emission controls are effective and motors well maintained

* This option should be avoided wherever possible because it creates a problem with sludge removal.

Installation	Possible problems	Frequency	Remedial action
Chemical storage areas	Spills	Weekly	Clean-up contaminated area Improve bunding
Litter controls	Litter on and off-site	Daily on and off-site	Clean-up litter originating on-site Review number and placement of rubbish bins Ensure materials are not stored in such a manner that they could contribute to litter Speak to staff about the litter disposal

9.2 Monitoring

Regular monitoring of air and water and taking of noise measurements is required to determine whether standards, established by the Environmental Management Plan, are being complied with. This should commence before construction to provide a baseline against which data collected during construction can be compared.

Chemical measurements should be conducted by a laboratory registered by the National Association of Testing Authorities (NATA), and in situ measurements should be made under the supervision of a suitably qualified person from a NATA laboratory.

Monitoring should provide information on whether standards are being complied with and sensitive sections of the environment protected. The following recommendations should be treated as minimum monitoring requirements relating only to the direct impact of construction activities. Other monitoring programs may be required for major road projects to determine their future impact on traffic emissions.

Area of risk	Purpose	Monitoring activity	Remedial action
Noise	Determine whether a noise nuisance exists	As required by complainants at their homes Monitor noise continuously at a representative residence near construction activities	Review and enhance noise control measures
Air quality (dust)	Determine whether a dust nuisance exists	Daily during dry weather for dust deposits at locations that indicate impact on adjacent residents or at site boundary	Improve controls on dust emissions

Area of risk	Purpose	Monitoring activity	Remedial action
Water quality (chemical and biological)	Quantify downstream chemical and biological impact	Design chemical and biological monitoring program by regularly surveying upstream and downstream	Revise on-site controls if regulatory standards are breached
	Identify ineffective sediment control installations	sites, in consultation with water resource manager, to assess impact on stream ecology under all flow conditions	Revise risk assessment and management
		Install continuous monitors for turbidity* and flow	Identify and repair failed control installation
Sediment controls, silt fences and traps	Determine whether the installation is operating effectively	Measure turbidity on the input and output side of control devices during wet weather inspections (see inspection table in section 9.1)	Redesign control devices
Discharge from retention ponds, artificial wetlands and sediment dams	Determine whether retention structures are effectively removing sediment	Weekly for suspended solids, conductivity, pH and dissolved oxygen, and daily during rainfall	Redesign retention structures
River crossings	Determine whether crossings are stable	Measure turbidity up and down stream from the crossing when in use (see inspection table in section 9.1)	Stabilise structure
Pumping contaminated water to the stormwater system or natural waterway	Ensure that natural waters are not adversely affected by pump-out water	Measure turbidity every hour during pumping	Stop pumping if turbidity exceeds regulatory standards

* Continuous turbidity monitors should be installed where work is being done in a natural waterway or immediately adjacent (within 30 metres) of a waterway.

Area of risk	Purpose	Monitoring activity	Remedial action
Excavated material	Detect old fill material that may contain contaminated soil or rubble	Daily in areas being excavated	Analyse fill material suspected of being contaminated Remove contaminated material to a landfill licensed to accept the wastes (see section 7) and ensure that necessary approvals have been obtained

5.3 Auditing

Independent audits should be conducted on environmental performance and systems by experts in construction activities and environmental management. Different people can be used for each type of audit.

INSPECTIONS, MONITORING AND AUDITING

Objective

Conduct checks on significant environmental risks to ensure that they are adequately managed and control systems are operating effectively.

Suggested measures

- Establish a baseline monitoring program before construction commences.
- Prepare an inspection, monitoring and auditing program, designed to match the environmental risks.
- Ensure that remedial action is taken promptly when monitoring,, inspections or audit results reveal a problem in environment management.
- Ensure that all monitoring is conducted by a NATA registered laboratory, either directly, or under supervision.
- Arrange for regular independent audits of environmental performance and the environmental management system.

APPENDIX 1 CHECKLIST

This Checklist summarises the specific environmental issues that need to be addressed on construction sites. Provision is made in the list for the manager to check off each issue as it relates to the site. The issues are listed in the same order as they appear in the *Guidelines*.

Issue	Action taken	Section
Compliance with legislative requirements	Collect copies of all relevant legislation, regulations and government policy.	1
	Ensure management is aware of their requirements and implements due diligence systems to ensure compliance.	1
	Use documents collected to set minimum standards in the environmental management plan.	1
Pre-construction planning		
Environmental assessment	Assess all possible impacts that the project will have on the environment.	2.1
	Determine whether construction activities will intersect a contaminated site or old tip.	2.1
	Assess impact of the development on the amenity of adjacent residents.	2.1
	Commence monitoring all segments of the environment to determine background conditions.	2.1
Risk assessment information	Collect all relevant information on the site, and adjacent areas, that may be affected by the development.	2.2
	Collect relevant weather and climate information.	2.2
	Obtain design plans, work schedules and work programs that may contribute to environmental risk.	2.2
	Obtain map of site topography and generate maps of changes in topography, as a result of the development.	2.2
	Calculate stormwater flows in each micro-catchment for each phase of the development.	2.2
	Map changes of vegetative cover and the position of stockpiles and batters, as a function of time.	2.2
	Collect information on stream flows of any natural waterways that will be affected by the development.	2.2
Assessing and managing risks	Identify all hazards to the environment.	2.2

	Quantify hazards, wherever possible.	2.2
	Determine consequences of each hazard.	2.2
	Calculate total risk level for each hazard.	2.2
	Rank risks.	2.2
	Identify all significant risks.	2.3
	Develop an action plan to address all significant risks.	2.3
	Wherever possible seek to avoid risks or minimise them by modifying the project design or planned work program and schedule.	2.3
	Based on information of monitoring, inspection and surveillance, update risk assessment, management and the environmental management plan.	3.3
Pre-construction works	Install stormwater drainage system (particularly to divert stormwater around the site) and major sediment controls prior to the project's commencement.	2.3
Environmental management plan	Construction company must have an environmental management system in place before preparing the environmental management plan for the project.	3.1
Environmental management system	Ensure that all staff are adequately trained.	3.1
	Ensure that all procedures are written down.	3.1
	Ensure that control and quality assurance systems are in place to ensure effectiveness of the environmental management system.	3.1
	Prepare an environment management plan based on the risk management action plan.	3.1
Prepare plan	List special work procedures to avoid or reduce environmental harm.	3.2
	Map cleared areas, as a function of time.	3.2
	Map changes of landform as a function of time and identify control measures on the map and position of soil stockpiles and batters.	3.2
	Include any special operational procedures required to protect the environment in the work site manual.	3.2
	Ensure that written contingency plans have been prepared and adequately resourced.	3.2
	Ensure that best practice documents for the site are prepared and implemented.	3.2
	Document maintenance, inspection and surveillance schedule.	3.2

	Prepare a rehabilitation plan.	3.2
	Update plan, as required.	3.2
Land disturbance		
Erosion	Characterise erosion potential of the site during each phase of the development.	4.1
	Take action to minimise clearance of vegetation.	4.1
	Implement controls and re-schedule works to reduce erosion.	4.1
	Stabilise cleared areas as soon as possible.	4.1
	Avoid working on areas vulnerable to erosion, wherever possible.	4.1
Stormwater management	Reduce quantity of contaminated stormwater entering project site.	4.2
	Reduce water velocities, wherever possible.	4.2
	Reduce stormwater flows over bare slopes.	4.2
Erosion and sediment control devices	Design control devices to handle expected peak water flows.	4.3
	Treat intercepted water, if required, prior to discharge to the environment.	4.3
	Install control devices, as required.	4.3
	Install in-stream weirs, as required.	4.3
	Implement a maintenance and inspection schedule for control devices.	4.3, 9.1, 9.2
	Prepare contingency plan and ensure it is adequately resourced.	4.3
	Improve design of control measures, if they don't operate effectively.	4.3
De-watering work site	Establish procedures to ensure that contaminated water is not pumped into a natural waterway without adequate treatment.	4.4
	Ensure procedures are in place to ensure that pumping operations are supervised and monitored.	4.4
Dust control	Implement a dust prevention strategy.	4.5, 4.6
	Pave haul roads.	4.5
	Ensure adequate watering or treatment of areas that could give rise to dust.	4.5
Stockpiles and batters	Implement a management program to minimise erosion and sediment runoff from stockpiles and bare batters.	4.6
	Stabilise stockpiles and batters, if they are to remain bare for more than 28 days.	4.6
	Establish sediment controls around unstabilised stockpiles and batters.	4.6
Working in waterways and floodplains	Consult responsible drainage body for approval.	4.7

	Establish procedures to minimise impact on waterway.	4.7
	Design and construct stream crossings, if required, to minimise impact on the waterway.	4.7
	Ensure that written contingency plans have been prepared and adequately resourced.	4.7
	Prepare and submit a re-instatement plan to the relevant drainage authority for approval.	4.7
Noise and Vibration	Establish procedures that comply with limits on working hours.	5.1
	Implement procedures so that adjacent residents are advised of out of hours works.	5.1
	Regularly service machinery and vehicles.	5.2
	Reduce noise to acceptable levels.	5.2
	Schedule deliveries so that they do not cause impairment of local amenity.	5.3
	Install appropriate noise abatement structures, if required.	5.4
	Take measures to ensure that vibration does not impact on adjacent residents.	5.5
Waste minimisation	Implement a waste minimisation assessment.	6
	Set waste minimisation targets.	6
	Implement programs to reduce waste that needs to be disposed of.	6
Contaminated material and soil	Analyse material uncovered on site that could be contaminated or contain wastes.	7
	Establish procedures to excavate contaminated material or waste so as not to cause environmental problems, and seal remaining material.	7
	Establish and implement procedures for appropriate transport and disposal of contaminated material or waste.	7
Emergency procedures	Establish procedures for emergency situations.	8.1
Air Quality	Implement adequate maintenance regime for vehicle and machinery exhausts.	8.2
	Install controls on equipment or vehicles that are polluting the atmosphere.	8.2
Litter	Establish procedures to avoid the generation of litter.	8.3
	Install adequate litter bins on site.	8.3
	Implement staff awareness program.	8.3

Storage of chemicals and fuels	Establish procedures to minimise the quantities of chemicals and fuels required to be stored on site.	8.4
	Install bunding around storage areas.	8.4
	Implement adequately resourced contingency plans.	8.4
Road cleaning	Install wheel washes and rumble grids, as required.	8.5
	Implement a program for adequate cleaning of roads, if required.	8.5
	Install lined litter traps in side entry pits, if required.	8.5
	Ensure that trucks taking soil off site are covered.	8.5
Concrete batching plants	Obtain a Works Approval.	8.7
Inspections, monitoring and audits	Implement an adequate program of inspections, monitoring and audits.	9.1, 9.2, 9.3



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APPENDIX 2:

Habitat Hectares and Offset Requirement for proposed subdivision



Habitat Hectares Assessment and Offset Requirement for proposed subdivision 10 Marlo Road, Marlo



Final v2

Prepared For: Mr & Ms Grech

September 2015

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Cover Photo: 10 Marlo Rd, Marlo

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EXECUTIVE SUMMARY

Ethos NRM Pty Ltd has been engaged to assess proposed vegetation removal at 10 Marlo Road, Marlo associated with the subdivision of the property into 110 lots. State Policy for vegetation removal requires that the impacts on biodiversity from proposals to remove native vegetation are assessed according to the *Biodiversity Assessment Guidelines* (DEPI, 2013a), within the relevant risk-based pathway.

Removal of vegetation falls within the **HIGH** risk-based pathway. A 'high' risk pathway requires that the following tasks are undertaken:

- A habitat hectares assessment and mapping of vegetation extent and condition using GIS.
- A statement of how impacts on biodiversity from the removal of native vegetation have been minimised.
- Documentation of Habitat Importance scores of the native vegetation to be removed,
- Preparation of an offset strategy that details how a compliant offset will be secured.

Habitat Hectares Assessment was undertaken by Ethos NRM across the entire property. Field survey results recorded all sites within the East Gippsland Lowlands bioregion. Remnant vegetation patches recorded on the property were consistent with Lowland Forest (EVC 16) Ecological Vegetation Class (EVC). A total of 29 terrestrial flora species were recorded across the site (including 18 indigenous flora species and 11 exotic species). Two Lowland Forest Habitat Zones were identified on the site, separated by the condition and diversity of understorey vegetation.

Native vegetation removal, to enable subdivision of 10 Marlo Rd, comprises of both **remnant patches and scattered trees**. The following vegetation removal has been accounted for within this report;

- 24 scattered trees
- 0.12 ha of remnant vegetation
- equating to a total of 1.809 ha of native vegetation

Ethos NRM has been advised by the landholder that other areas of vegetation have been recently removed of which some included areas of regrowth, fence-line clearing and vegetation removal for personal firewood collection. In addition there were areas of recently removed native vegetation, which were not exempt from planning permit requirements, and this previously removed vegetation has been accounted for within this report.

The *Guidelines* require that where vegetation removal cannot be avoided, provision of offsets is required to compensate for the impacts on biodiversity. The determination of offsets relies on a purpose-built Native Vegetation Information Management Tool developed by DELWP. Model based data is used to assess the proportional impact of proposed vegetation removal on habitat for rare or threatened species. The offset test has been applied to the proposed vegetation removal associated with subdivision of 10 Marlo Road, Marlo and no specific offset for rare or threatened species were identified.

An assessment of the likely implications for removal or impacts to EPBC or FFG listed species has been undertaken, with regard to potential approval or permit requirements under these policies. No EPBC or FFG listed flora species or communities were recorded by Ethos NRM on the property, including those identified by the desktop search as having potential to occur. No significant impacts to EPBC or DELWP listed rare or threatened species are expected to occur as a result of removal of vegetation for the subdivision.

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Proposed vegetation loss and impacts to biodiversity has been minimised through retention of a portion of the existing remnant vegetation on the site, within a large allotment and reserve located on the property. Vegetation on the site is all of poor quality (as evident by the low Habitat Scores) and does not provide an important contribution to Victoria's biodiversity. This is evident by both the allocation of a General Offset requirement and no Specific Offsets and the low Strategic Biodiversity Score (0.236).

If a permit to remove vegetation removal is granted under the Guidelines, there is a requirement to offset the loss of vegetation and ensure a 'no net loss' outcome for biodiversity (DEPI, 2013a).

The Offset Requirement for removal of 1.809 ha of vegetation (including 24 scattered trees) is

- 0.137 General Biodiversity Equivalence Units (GBEUs)
- a minimum strategic biodiversity score of 0.188 and
- be within the East Gippsland Catchment Management Authority boundary (or East Gippsland Shire boundary).

The *Guidelines* also require that the offset is secured, to the satisfaction of the responsible or referral authority, before the native vegetation is removed (DEPI, 2013a), by either:

- A security agreement for the site including an onsite (Offset) management plan, or
- Evidence of a secured third party offset, e.g. Native Vegetation Credit Register extract.

Ethos NRM has confirmed that there are available vegetation offsets on the Native Vegetation Credit Register within the East Gippsland Catchment Management Area that can be purchased to meet offset obligations for this project. This is the Landholders preferred method for achieving offset obligations.

1 INTRODUCTION

Ethos NRM has been engaged to undertake a Habitat Hectares Assessment of proposed vegetation removal at 10 Marlo Road, Marlo, to enable a 110 lot subdivision. Recent vegetation removal has also occurred on the property beyond current planning exemptions and these areas of vegetation removal are also accounted for within this report.

Habitat Hectares assessment and quantification of the offset requirements for vegetation removal associated with the proposed subdivision has been undertaken in accordance with the *Biodiversity Assessment Guidelines* (DEPI, 2013a), herein referred to as the '*Guidelines*'. This report quantifies the vegetation loss in Habitat Hectares and the Offset Requirement in Biodiversity Equivalence Units (BEUs).

1.1 Site Location and Description

The property (Lot 2 – LP144829) is located on Marlo Road at the northern edge of the Marlo Township. To the north, west and south the property is surrounded by private land. Adjoining the property to the east is State Forest and to the south-east a Caravan Park. Ward Street runs along half of the southern property boundary.

The property comprises predominantly of introduced pasture species and scattered trees and shrubs. Historically the site has been subject to clearing and used for grazing. Several small clumps of native vegetation also exist along the fence-line boundaries. The property is largely flat with a gentle slope tending towards the eastern extent.

1.2 Objectives

The broad objectives of the Vegetation Assessment are to:

- identify and map vegetation types across the property,
- assess vegetation condition,
- describe the structural and floristic components of the vegetation on the property, including Ecological Vegetation Classes (EVCs),
- identify and describe any Rare or Threatened Species and Threatened Ecological Communities,
- quantify vegetation loss associated with the proposed subdivision in accordance with relevant legislative requirements,
- quantify offset requirements under current legislation.

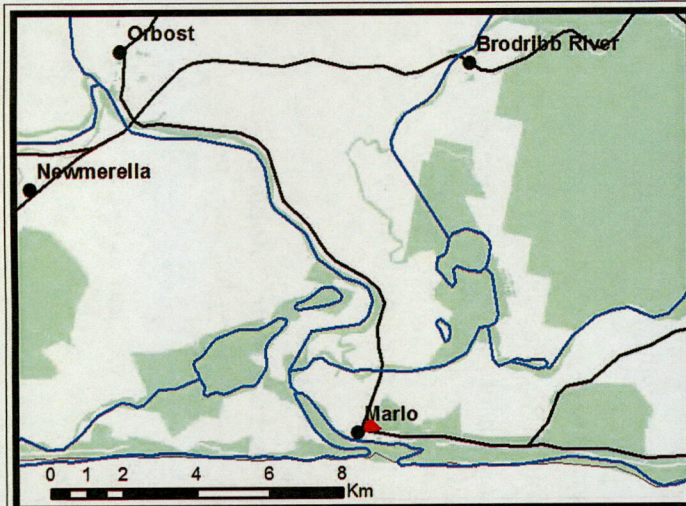


Figure 1.
Site Overview
10 Marlo Road, Marlo

Legend

- Towns
- Hydrology
- Roads
- Property Boundaries
- Site
- Public Land



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Version 2

Date: 8/09/2015

Coordinate System:
 GDA 94 MGA Zone 55

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2 POLICY AND LEGISLATIVE CONTEXT

2.1 Commonwealth Laws

2.1.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* is the Australian Government's environmental legislation which provides a legal framework to protect and manage nationally and internationally significant flora, fauna, ecological communities and heritage places, defined in the EPBC Act as Matters of National Environmental Significance.

If a proposed action has the potential to have a significant impact on a Matter of National Environmental Significance, then an EPBC Referral is required to determine whether approval will be required to undertake the activity (i.e. controlled action).

2.2 State Laws and Policy

Legislation relevant to native vegetation conservation and management in Victoria include the *Flora and Fauna Guarantee (FFG) Act 1988*, the *Planning and Environment Act 1987* and the *Catchment and Land Protection Act 1994*.

Relevant policy documents include the '*Permitted Clearing of Native Vegetation Biodiversity Assessment Guidelines*' (DEPI, 2013a) which is discussed in Section 2.3.

2.2.1 *Flora and Fauna Guarantee Act 1988*

The *FFG Act 1988* is the Victorian Government's legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. The FFG Act provides for the listing of threatened plant and animal species and ecological communities (Threatened List) and potentially threatening processes (Processes List). It also contains provisions for **protected flora**, which are not listed as threatened, but declared to be protected under Section 46 of the FFG Act.

2.2.2 *Catchment and Land Protection Act 1994*

The *Catchment and Land Protection (CALP) Act 1994* contains provisions relating to catchment planning, land management, noxious weeds and pest animals. The Act provides a legislative framework for the management of private and public land. It sets out the responsibilities of landowners declaring that they must take all reasonable steps to:

- avoid causing or contributing to land degradation which causes or could cause damage to land of another landowner
- protect water resources and conserve soil
- eradicate regionally prohibited weeds and prevent the growth and spread of regionally controlled weeds
- prevent the spread of and eradicate established pest animals.

2.2.3 *Planning and Environment Act 1987 (Local Government Regulations)*

Planning schemes contain provisions relating to the management of native vegetation, where a permit to remove, destroy or lop native vegetation may be required. The property is located within an area zoned GDRZ1. A Design and Development Overlay (DD011) and Development Plan Overlay (DP07) apply to the property. A permit is required to remove native vegetation unless exemptions apply.

2.3 Victoria's Native Vegetation Permitted Clearing Regulations

The *Permitted clearing of native vegetation – Biodiversity Assessment Guidelines* are incorporated into the Victorian Planning Provisions and guide how impacts on

biodiversity are considered when assessing an application for a permit to remove, lop or destroy native vegetation.

The *Guidelines* (DEPI, 2013a) adopt a risk-based approach to decision making and aim to:

- ensure a stronger focus on the value of native vegetation for state-wide biodiversity (no net loss to biodiversity),
- reduce the regulatory burden for landholders while at the same time providing upfront information about the value of native vegetation on their land, and
- improve decision making.

The *Guidelines* (DEPI, 2013a) define the assessment requirements for applications to remove vegetation through determination of **risk-based pathways**. The risk-based pathway is classified through two main factors; the map-based *Location Risk* identified by DELWP modelling and *Extent Risk* determined by the area of proposed native vegetation removal. The risk pathway will then dictate the level of detail and assessment required to accompany the application for removal of vegetation.

3 ASSESSMENT METHODOLOGY

The following steps have been undertaken to collect floristic information and quantify vegetation loss and offset requirements associated with vegetation removal to enable the proposed subdivision of 10 Marlo Road, Marlo;

- Desktop Investigation
- Determination of the Risk-based Pathway for assessment of application
- Field Survey – Habitat Hectares Assessment
- Biodiversity Assessment Report (Offset Requirements)

The results of the field survey and desktop investigations are detailed in following sections of this report.

3.1 Desktop Investigation

Desktop investigations of flora and fauna data were used to gather information on the site prior to undertaking vegetation assessments and preparation of this report. Ethos NRM has obtained data for the occurrence and description of bioregions, EVCs (Ecological Vegetation Class), rare or threatened flora, fauna and threatened ecological communities, from a number of sources including:

- Planning Maps on-line (DELWP, 2015b)
- EPBC on-line Protected Matters Search Tool (DoE, 2015)
- Victorian Biodiversity Atlas database (VBA, 2015)
- DELWP Interactive Maps – Biodiversity Interactive Maps
- DSE (DELWP) Ecological Vegetation Class Benchmark Descriptions (DEPI, 2015a)
- DSE (DELWP) Bioregion Descriptions (DEPI, 2015a)
- DELWP Native Vegetation Information Management tool (DELWP, 2015c)

3.2 Field Survey

Habitat Hectares Assessment survey in accordance with DELWP methodologies (DSE, 2004a) has been used to assess vegetation quality at the site. Vegetation on-site was assessed as planted (exotic and/or native species), pasture or 'native vegetation' in accordance with the *Guidelines* (DEPI, 2013a). Any native vegetation identified were mapped and categorised as a remnant patch or scattered trees.

The site was surveyed by two DELWP Accredited Native Vegetation Assessors on 21st July 2015. Full flora species lists were collected and areas of native vegetation or scattered trees were recorded on a GPS (see **Appendix 1**).

3.2.1 Habitat Hectare Methodology

Habitat Hectares Assessment culminates in determination of a Habitat Score for each habitat zone assessed. The habitat score of a habitat zone is calculated using ten components: large trees, tree canopy cover, understorey diversity and cover, weediness, recruitment, organic litter, logs, patch size, neighbourhood context and distance to core area. Each component is listed on a Vegetation Quality Field Assessment Sheet. The site is then scored according to the conditions and landscape context. Scores typically vary between 10 and 90, with extensive intact ('pristine') vegetation theoretically having a score of 100.

Habitat zones are delineated in the field and are based on similar vegetation quality and type (EVC), hence more than one survey sample point may occur within the same habitat zone where the quality and type of vegetation has been consistent. Habitat Hectare assessments are only undertaken in areas of vegetation which are considered 'remnant patches', that is, where the canopy layer is greater than 20% or where at least 25% of the total perennial understorey plant cover is native plants, as a proportion of total understorey cover (DEPI, 2013a).

A Habitat Hectare is a unit of measurement that combines quality (relative to a published Benchmark) and quantity (area) of a habitat zone (DSE, 2004a). The Habitat Hectare value (HHa) of a habitat zone is calculated by multiplying the habitat score by the area of the habitat zone (in hectares) which is proposed to be removed.

3.3 Taxonomy

Common and scientific names for terrestrial vascular plants within this report follow the Victorian Biodiversity Atlas (VBA) of the Department of Environment, Land, Water and Planning (DELWP).

3.4 Survey Limitations

The survey effort combined with information gathered from other sources is considered adequate to assess and quantify vegetation condition and flora values within the project site, to meet the objectives outlined in Section 1.2. However the following limitations/qualifications apply to this study;

- No assessment of the "regrowth" vegetation recently removed from the site has been undertaken by Ethos NRM due to the absence of any vegetation to assess and the difficulty in determining accurately this information from aerial imagery. Ethos NRM has relied on the landholder's advice that the recently removed vegetation adjoining the fence line was regrowth. Ethos NRM was however able to identify the recently removed 'scattered trees' (eucalypts) from aerial imagery, and these trees have been accounted for within this report.
- This vegetation assessment includes only vascular flora.
- Certain flora and fauna species are only readily identifiable onsite during periods of particular environmental and climatic conditions. Survey of the site was undertaken in late winter and there is potential that plants which flower outside of the survey period may not have been detected. Hence additional species that Ethos NRM did not detect may occur within the project site.
- A wallaby grass was only identified to genus level due to the lack of flowering material.
- Mapping of flora species and communities was undertaken with hand-held (uncorrected) GPS units and aerial photo interpretation. Accuracy of this mapping is therefore limited to the GPS unit which is generally (+/-6m). This degree of accuracy is considered adequate for the size and scale of the project (survey) area.

4 FIELD SURVEY RESULTS

4.1 Native Vegetation Recorded

4.1.1 Bioregion

The property is located within the East Gippsland Lowlands bioregion which broadly comprises of gently undulating terraces flanked by coastal plains, dunefields and inlets. Vegetation within this bioregion is commonly dominated by Lowland Forest with Damp Forest and Shrubby Dry Forest ecosystems interspersed throughout the foothills (DEPI, 2015a).

4.1.2 Ecological Vegetation Classes

DELWP EVC mapping (see **Appendix 2**) at the site indicates Riparian Forest (EVC 18) and Banksia Woodland (EVC 14) as occurring on the property.

Ethos NRM have reviewed the DELWP EVC mapping and on site and recorded Lowland Forest (EVC 16) as the only EVC present. Remnant vegetation, soil and site characteristics are consistent with the Lowland Forest EVC across the property.

Lowland Forest is described as a moderately tall eucalypt forest which grows on relatively fertile and reasonably well drained soils with a diverse range of understorey life forms and species present (DSE, 2004).

4.1.3 Habitat Score

Habitat Hectares assessment of remnant patches of native vegetation was undertaken and vegetation quality scored in accordance with the DELWP methodology. Two habitat zones were delineated on the property based on observed variation in vegetation type, cover, condition and other attributes. See **Appendix 3** for a copy of the Vegetation Quality Assessment Field Sheets.

4.1.4 Conservation Status

Bioregional Conservation Status describes how rare or threatened an EVC is within a bioregion, by comparing the current extent of an EVC compared to the predicted extent pre-European settlement (pre-1750). Within the East Gippsland Lowlands bioregion Lowland Forest (EVC 16) has a Conservation Status of Least Concern.

4.1.5 Vegetation Description Type and Condition

Small and isolated patches of vegetation consistent with the EVC 16: Lowland Forest were recorded on the site. Remnant vegetation comprised of degraded forest areas dominated by eucalypt canopy species and a diverse medium shrub layer. Two Lowland Forest Habitat Zones were identified on the site, distinguished by the condition and diversity of understorey vegetation (see Table 1). Habitat Zone B recorded a higher diversity and cover of understorey vegetation, than Habitat Zone A.

Table 1. Habitat Zones

Habitat Zone	EVC	Conservation Status	Habitat Score	Area
HZA	Lowland Forest (EVC 16)	Least Concern	25	0.05 ha
HZB	Lowland Forest (EVC 16)	Least Concern	42	0.07 ha

Southern Mahogany (*Eucalyptus botryoides*) and Yellow Stringybark (*Eucalyptus muelleriana*) was the dominant overstorey tree species recorded. A variety of small to medium sizes shrubs were also recorded including; Sallow Wattle (*Acacia longifolia*), Sunshine Wattle (*Acacia terminalis*), Sweet Pittosporum (*Pittosporum undulatum*), Burgan (*Kunzea ericoides*), Prickly Broom-heath (*Monotoca scoporia*) and Prickly Tea-tree (*Leptosemum continentale*). Several large old senescing Saw Banksias (*Banksia serrata*)

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were scattered within the paddock at the eastern extent of the property. Ground layer vegetation was highly modified and comprised of 90+% of introduced pasture species and weeds.

Ethos NRM recorded 18 indigenous flora species and 11 exotic flora species on the site (see **Appendix 1**). No flora species listed on the DELWP Rare and Threatened Flora Species of Victoria (DEPI, 2014a) were recorded on the site.

4.1.6 Scattered Trees

Scattered trees are defined as native canopy trees that do not form part of a remnant patch (DEPI, 2014a). Canopy tree species found within Lowland Forest EVC are eucalypts. Southern Mahogany (*Eucalyptus botryoides*) and Yellow Stringybark (*Eucalyptus muelleriana*) species were the two dominant canopy tree species recorded on the site.

A total of 35 scattered trees have been identified on the property of which twenty-six were recorded during the site survey and another nine identified off an aerial image (as recently removed).

In total 24 scattered trees are proposed be 'removed' for the planned subdivision. Nine have already been removed. Four of the 24 scattered trees are considered lost due to encroachment within tree-retention zones.

4.1.7 Planted Vegetation and Exotic Species

Planted vegetation was recorded along Marlo Road, adjoining the western property boundary. There were also several planted shrubs and understorey trees immediately surrounding the house. Under Clause 52.17 of the Planning Scheme, removal of planted native vegetation (which has not been government funded) is exempt from a permit and hence does not need to meet the requirements of the *Guidelines* (nor is an offset required).

The vegetation marked on **Figure 2** has been assessed by Ethos NRM as planted vegetation, hence there is no permit or offset requirement.



Figure 2.
Vegetation Assessment
10 Marlo Road, Marlo

Legend

- Roads
- Hydrology
- Property Boundaries
- ▭ Subdivision Layout
- ▨ Tree Retention Zones

Retained Vegetation

- Scattered Trees

Native Vegetation Removal

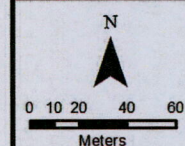
- Assumed Tree Removal (TRZ)
- Scattered Tree to be removed
- Recently removed Scattered Tree
- ▲ Understorey Regrowth - Removed
- ▲ Understorey Tree to be removed - Banksia

Fenceline Vegetation

- ***** Planted Understorey Vegetation
- ***** Planted Understorey Vegetation - to be removed
- ***** Native Vegetation Removal for Fenceline Replacement

Patches of Native Vegetation Removal

- ▨ Proposed Vegetation Removal
- ▨ Regrowth Removed (exempt from permit requirement)



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5 SIGNIFICANT FLORA, FAUNA AND ECOLOGICAL COMMUNITIES

Records of the known and likely presence of Rare and/or Threatened flora and fauna within 5km of the site have been sourced from both the Victorian Biodiversity Atlas (VBA, 2015) and the online EPBC Protected Matters Search Tool (DoE, 2015). The following sections include species listed as rare or threatened on DELWP's Advisory Lists, Victoria's *FFG Act 1988* and the Commonwealth *EPBC Act 1999*. An assessment of the likely implications for removal or impacts to EPBC or FFG listed species is also discussed, with regard to potential approval or permit requirements under these policies.

5.1 Environment Protection and Biodiversity Conservation Act 1999

An online EPBC Protected Matters Search was undertaken and the results identified the following Matters of National Environmental Significance within a 5km radius of the centre of the site (see **Appendix 6**).

Results of the EPBC Protected Matters Search included:

- 2 listed Threatened Ecological Communities (*Littoral Rainforest and Coastal Vine Thickets of Eastern Australia* and *Subtropical and Temperate Coastal Saltmarsh*);
- 52 threatened species of which 5 are threatened terrestrial flora species and threatened terrestrial fauna species;
- 44 listed Migratory species.

5.2 Flora and Fauna Guarantee Act 1988

Twenty-nine FFG listed species, comprising twenty-two fauna and seven flora taxa, have been recorded on the Victorian Biodiversity Atlas (VBA, 2015) within 5km of the site, see **Tables 2** and **3**. None of these species were recorded on site during field surveys by Ethos NRM, hence no permits are **required** from DELWP to remove **protected flora** from Crown Land.

5.3 DELWP Rare and Threatened Flora Species

Forty-three rare or threatened **flora** species listed on DELWP's *Advisory List of Rare or Threatened Plants in Victoria* (DEPI, 2014a) have been previously recorded on the Victorian Biodiversity Atlas (VBA, 2015) within 5km of the proposed overtaking lanes (refer to Table 5). Of these species, 27 are listed as 'rare', 13 'vulnerable' and 3 'endangered'. No threatened flora species were recorded by Ethos NRM during field assessment at the site.

Table 2. DELWP Rare and Threatened Flora records (VBA database)

Scientific Name	Common Name	Conservation Status	EPBC	FFG
<i>Ripogonum album</i>	White Supplejack	r		
<i>Libertia paniculata</i>	Branching Grass-flag	r		
<i>Eupomatia laurina</i>	Bolwarra	r		
<i>Dichondra sp. 1</i>	Silky Kidney-weed	r		
<i>Rubus X novus</i>	Hybrid Bramble	r		
<i>Hybanthus vernonii subsp. vernonii</i>	Erect Violet	r		
<i>Cladium procerum</i>	Leafy Twig-sedge	r		
<i>Corybas fimbriatus</i>	Fringed Helmet-orchid	r		
<i>Juncus revolutus</i>	Creeping Rush	r		

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Scientific Name	Common Name	Conservation Status	EPBC	FFG
<i>Ozothamnus argophyllus</i>	Spicy Everlasting	r		
<i>Muellerina celastroides</i>	Coast Mistletoe	r		
<i>Schoenus lepidosperma</i> subsp. <i>pachylepis</i>	Slender Bog-sedge	r		
<i>Stackhousia nuda</i>	Wiry Stackhousia	r		
<i>Caladenia aurantiaca</i>	Orange-tip Finger-orchid	r		
<i>Senecio spathulatus</i> var. <i>latifructus</i>	Dune Groundsel	r		
<i>Isolepis wakefieldiana</i>	Tufted Club-sedge	r		
<i>Leucopogon esquamatus</i>	Swamp Beard-heath	r		
<i>Glossodia minor</i>	Small Wax-lip Orchid	r		
<i>Euryomyrtus ramosissima</i> subsp. <i>prostrata</i>	Nodding Baeckea	r		
<i>Caladenia flavovirens</i>	Summer Spider-orchid	r		
<i>Corybas aconitiflorus</i>	Spurred Helmet-orchid	r		
<i>Bossiaea ensata</i>	Sword Bossiaea	r		
<i>Tetrarrhena turfosa</i>	Smooth Rice-grass	r		
<i>Pterostylis grandiflora</i>	Cobra Greenhood	r		
<i>Mitrasacme polymorpha</i>	Varied Mitrewort	r		
<i>Melaleuca armillaris</i> subsp. <i>armillaris</i>	Giant Honey-myrtle	r		
<i>Acronychia oblongifolia</i>	Yellow-wood	r		L
<i>Sicyos australis</i>	Star Cucumber	vu		
<i>Korthalsella rubra</i> subsp. <i>rubra</i>	Jointed Mistletoe	vu		
<i>Pterostylis alveata</i>	Coastal Greenhood	vu		
<i>Adiantum formosum</i>	Black Stem	vu		
<i>Scaevola calendulacea</i>	Dune Fan-flower	vu		
<i>Calystegia soldanella</i>	Sea Bindweed	vu		
<i>Pterostylis pedoglossa</i>	Prawn Greenhood	vu		
<i>Sambucus australasica</i>	Yellow Elderberry	vu		L
<i>Livistona australis</i>	Cabbage Fan-palm	vu		L
<i>Botrychium australe</i>	Austral Moonwort	vu		L
<i>Prasophyllum lindleyanum</i>	Green Leek-orchid	vu		
<i>Prasophyllum parviflorum</i>	Slender Leek-orchid	vu		
<i>Caladenia tessellata</i>	Thick-lip Spider-orchid	vu	VU	
<i>Acacia maidenii</i>	Maiden's Wattle	en		L
<i>Cryptostylis erecta</i>	Bonnet Orchid	en		L
<i>Cryptostylis hunteriana</i>	Leafless Tongue-orchid	en	VU	L

5.4 DELWP Threatened Fauna Species

Twenty-nine threatened **fauna** species listed on DELWP's *Advisory List of Threatened Vertebrate Fauna in Victoria* (DEPI, 2013b) have been recorded within 5km of the site, including; 11 endangered, 23 vulnerable, and 2 critically endangered fauna species (refer to Table 6). Of these, 22 species are listed under the FFG Act and 7 are listed under the EPBC Act. No threatened fauna species were recorded by Ethos NRM during field assessment at the site.

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Table 3. DELWP Threatened Fauna records (VBA database)

Scientific Name	Common Name	Conservation Status	EPBC	FFG
<i>Lissolepis coventryi</i>	Swamp Skink	vu		L
<i>Calamanthus pyrrhopygius</i>	Chestnut-rumped Heathwren	vu		L
<i>Pachyptila turtur</i>	Fairy Prion	vu	VU	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	vu	VU	L
<i>Hydroprogne caspia</i>	Caspian Tern	nt		L
<i>Anas rhynchotis</i>	Australasian Shoveler	vu		
<i>Biziura lobata</i>	Musk Duck	vu		
<i>Aythya australis</i>	Hardhead	vu		
<i>Tringa nebularia</i>	Common Greenshank	vu		
<i>Actitis hypoleucos</i>	Common Sandpiper	vu		
<i>Nannoperca sp. 1</i>	Flinders Pygmy Perch	vu		
<i>Pseudophryne semimarmorata</i>	Southern Toadlet	vu		
<i>Hirundapus caudacutus</i>	White-throated Needletail	vu		
<i>Tringa stagnatilis</i>	Marsh Sandpiper	vu		
<i>Numenius madagascariensis</i>	Eastern Curlew	vu		
<i>Limosa limosa</i>	Black-tailed Godwit	vu		
<i>Pseudemoia rawlinsoni</i>	Glossy Grass Skink	vu		
<i>Numenius phaeopus</i>	Whimbrel	vu		
<i>Arenaria interpres</i>	Ruddy Turnstone	vu		
<i>Ardea modesta</i>	Eastern Great Egret	vu		L
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	vu		L
<i>Sternula albifrons sinensis</i>	Little Tern	vu		L
<i>Thinornis rubricollis rubricollis</i>	Hooded Plover	vu		L
<i>Lewinia pectoralis pectoralis</i>	Lewin's Rail	vu		L
<i>Calidris ferruginea</i>	Curlew Sandpiper	en		
<i>Egretta garzetta nigripes</i>	Little Egret	en		L
<i>Tyto novaehollandiae novaehollandiae</i>	Masked Owl	en		L
<i>Ardea intermedia</i>	Intermediate Egret	en		L
<i>Pezoporus wallicus wallicus</i>	Ground Parrot	en		L
<i>Oxyura australis</i>	Blue-billed Duck	en		L
<i>Xenus cinereus</i>	Terek Sandpiper	en		L
<i>Calidris tenuirostris</i>	Great Knot	en		L
<i>Botaurus poiciloptilus</i>	Australasian Bittern	en	EN	L
<i>Sternula nereis nereis</i>	Fairy Tern	en	VU	L
<i>Litoria raniformis</i>	Growing Grass Frog	en	VU	L
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	nt	VU	L
<i>Tringa brevipes</i>	Grey-tailed Tattler	cr		L
<i>Anthochaera phrygia</i>	Regent Honeyeater	cr	CR	L

5.5 Potential Impact on Significant Species

None of the EPBC listed flora or fauna species identified by the Protected Matters search were recorded within the site during field survey by Ethos NRM. Whilst there is potential for use of the area for foraging by mammals and birds, there are no known records of these species within the site. A large percentage of the fauna species listed are birds which occupy coastal environments. Given that the proposed area of vegetation removal comprises of scattered trees and poor quality small remnant patches of vegetation, the site is considered to provide limited important habitat for these EPBC-listed species, and hence it is highly unlikely that there will be significant impacts.

DELWP (VBA, 2015) records of EPBC species within 5km of the study area include 2 listed flora and 7 listed fauna species. None of these species were recorded on site, nor was there suitable habitat identified during site inspection. Habitat importance is assessed under the *Guidelines* through the Specific Offset test and no specific offsets have been provided for proposed vegetation removal. This supports the low value of the site as habitat for rare or threatened species.

No significant impact is predicted on any rare or threatened flora or fauna species as a result of vegetation removal associated with the proposed subdivision at 10 Marlo Rd, Marlo.

6 VEGETATION REMOVAL

6.1 Victoria's Native Vegetation Permitted Clearing Regulations

State Policy for vegetation removal requires that the impacts on biodiversity from proposals to remove native vegetation are assessed according to the *Guidelines* (DEPI, 2013a), within the relevant risk-based pathway. The risk-based approach comprises of two main factors; extent risk and location risk. These factors determine the pathway an application is assessed through. Extent risk relates to the amount of vegetation proposed to be removed. Location risk is based on DELWP modelling which maps the strategic landscape value of a site.

The risk-based pathway is determined by combining the extent risk and location risk of proposed native vegetation removal. Three risk-based pathways for applications for a permit to remove native vegetation exist; **low, moderate and high risk**. These pathways dictate the detail of information, including whether detailed on-site vegetation condition assessment (Habitat Hectares), which is required to be provided with an application, and the decision guidelines for assessment of that application (DELWP, 2015a).

6.1.1 Identification of the Risk-based Pathway and Application Requirements

Preliminary examination of the online DELWP *Native Vegetation Information Management (NVIM) Tool Location Risk Map* indicated that the majority of the site was within Location Risk A and a small area within Location Risk B. The combined Risk-based pathway was confirmed to be **HIGH** by the DELWP '*Biodiversity impact and offset requirements report*' which is provided in **Appendix 4**. Habitat Hectares assessment is required for this proposal in accordance with the *Guidelines*.

The risk-based pathway for this project is **HIGH**.

The requirements for applications under the **High Risk** pathway as detailed in the *Biodiversity Assessment Handbook – Permitted clearing of native vegetation* (DEPI, 2013a), include:

- A habitat hectares assessment and mapping of vegetation extent and condition using GIS,
- A statement of how impacts on biodiversity from the removal of native vegetation have been minimised,
- An assessment of whether the proposed removal of native vegetation will have an impact on biodiversity from the proposed use or development,
- The Habitat Importance scores of the native vegetation to be removed,
- An offset strategy that details how a compliant offset will be secured.

6.1.2 Minimising impacts on biodiversity from the removal of native vegetation

Total avoidance of vegetation removal has not been possible for subdivision of the property into 110 allotments. However reasonable steps have been undertaken to minimise impacts to proposed native vegetation removal, through location and design of the project including:

- Retention of remnant vegetation and scattered trees within a large allotment to the south-west of the property.
- Retention of a small area of scattered remnant vegetation within a Reserve located to the east of the property.
- Retention of 4 scattered trees which are considered 'lost' due to encroachment on TRZs.

The DELWP (2015a, p.34) assessment handbook states in some instances "...minimisation is unreasonable at the site level because the native vegetation makes a very low contribution to biodiversity (such as no specific offset required, low strategic biodiversity score) or because retained native vegetation would have limited long term prospect of retaining biodiversity value. This would be an acceptable statement."

Hence, attempting to further minimise impacts on biodiversity, within the context of this site is impractical as the remnant vegetation at this site is not of high quality (as evident by the low Habitat Scores) and does not provide an important contribution to Victoria's biodiversity. This is evident by both the allocation of a General Offset requirement and no Specific Offsets and the low Strategic Biodiversity Score (0.236). Consideration of minimisation of impacts on biodiversity from removal of native vegetation is less important at this site due to the low contribution of vegetation to Victoria's biodiversity.

6.2 Vegetation Assessment

The field assessment of the study site undertaken by Ethos NRM identified that **native vegetation is present**, as defined by the *Guidelines* (see below). Both **Scattered Trees** and **remnant patches** of native vegetation representative of the EVC Lowland Forest (EVC 16) within the East Gippsland Lowlands bioregion were recorded on site.

Native vegetation is defined in the Victoria Planning Provisions as:

'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses.'

A **remnant patch** of native vegetation is either:

- an area of vegetation where at least 25% of the total perennial understorey plant cover is native
- any area with three or more native canopy trees* where the canopy foliage cover is at least 20% of the area

A **scattered tree** is:

- a native canopy tree* that does not form part of a remnant patch

*A **canopy tree** is a mature tree that is greater than 3 meters in height and is normally found in the upper layer of the relevant vegetation type.

Definitions from Section 2.2, page 5 of the *Guidelines* (DEPI, 2014a).

Table 4 details the quantity of vegetation removal at the property associated with the planned subdivision. An area of 0.12 ha of remnant vegetation and 15 scattered trees is proposed to be removed. Another 9 scattered trees have previously been removed and are included in the vegetation removal and offset calculations for this report. See **Figure 3** for illustration of areas of vegetation removal and **Appendix 5** for photos.

Table 4. Vegetation Removal Summary

Quantity	Remnant Patch or Scattered Tree	Is a permit and offset required?	Status
0.046 ha	HZA Remnant Patch	Yes	Proposed Removal
0.074 ha	HZB Remnant Patch	Yes	Proposed Removal
15 trees*	Scattered Tree	Yes	Proposed Removal
9 trees	Scattered Tree	Yes	Recently Removed

*Includes 4 Scattered Trees lost due to encroachment within Tree Retention Zones

6.2.1 Habitat Hectares

Calculation of the quality of the patches of native vegetation proposed for removal has been determined by Habitat Hectare Assessment undertaken by Ethos NRM, which provides a Habitat Score. Scattered Trees have been recorded by Ethos NRM and DELWP have attributed a standard Habitat Score of 0.2 and area of 0.07 hectares per tree.

Spatial data summarising the extent and condition of the vegetation proposed to be removed was provided to DELWP for confirmation of the risk-based pathway. The site DELWP *Biodiversity impacts and offset requirements report* is attached as **Appendix 4**. The DELWP report also details the offset calculations for vegetation removal.

Vegetation removal at 10 Marlo Rd, Marlo comprises of a total area of 1.809 hectares, of which 0.12 ha is remnant vegetation and 24 scattered trees (or approximately 1.68) . The total area of vegetation removal (including scattered trees) equates to 0.38 Habitat Hectares. Habitat Hectares is a unit measure of the quality of vegetation x the area of vegetation.

**24 Scattered Trees + 0.12 ha Lowland Forest =
1.809 Hectares or 0.38 Habitat Hectares of Vegetation Removal**

6.2.2 Tree Retention Zones – Vegetation Loss

Potential impacts to retained vegetation have been assessed for the planned subdivision of the property. All retained vegetation must be adequately protected during construction, due to potential impacts from compaction and excavation close to tree roots. The measure used to protect retained vegetation are *Tree Retention Zones (TRZs)*, which are defined as a radius around a Scattered Tree based on the size (diameter) of the tree, and must be demonstrated in an application to remove vegetation. Any retained trees which cannot be adequately protected during construction resulting from the proposed development must be assumed to be lost (DELWP, 2015a).

TRZs are calculated as a radius of 12 times the diameter at breast height, from a minimum of 2 metres up to a maximum of 15 metres (DELWP, 2015a). These zones have been calculated for all retained Scattered Trees across the study site based on measured DBH of each tree. Subdivision of the property will result in four Scattered Trees being considered 'lost' or 'removed' due to encroachment within the TRZs, see **Figure 3**. These Scattered Trees are accounted for within **Table 4 – Vegetation Removal Summary**.

6.2.3 Exempt Vegetation Removal

There are certain circumstances where a permit is not required to remove, destroy or lop native vegetation including;

- Construction and/or maintenance of boundary fence – exemptions apply to the removal, destruction and lopping of native vegetation to a maximum width of 4m
- Regrowth – exemptions apply to the removal, destruction or lopping of native regrowth to the minimum extent necessary and if the native regrowth is naturally established or regenerated on land which has been previously lawfully cleared and is less than 10 years old and is on land that is used or maintained for crop raising or extensive animal husbandry purposes (DEPI, 2013c).
- Reasonable amounts of timber collected for personal use by the property owner for firewood, fencing and buildings or hobbies (excluding standing living or dead trees with a trunk diameter of greater than or equal to 40cm measured at 1.3m above ground level) on properties greater than 10ha in size.
- Planted vegetation removal (which has not been government funded) is exempt from a permit and hence does not need to meet the requirements of the *Guidelines* (nor is an offset required).

Ethos NRM has been advised by the landholder that some areas of vegetation recently removed along the southern fence-line is in accordance these exemptions, including areas of regrowth, fence-line clearing and firewood collection. Other areas of vegetation removed which were not exempt from planning permit requirements have been included within this report (see **Table 4** and the following sections). Refer to **Figure 2** for areas of vegetation which have been removed and are exempt from planning permit requirements.



Figure 3. Vegetation Removal Site Plan 10 Marlo Road, Marlo

Legend

- - - Contours (20m interval)
- Hydrology
- Roads
- Property Boundary
- ▤ Subdivision Layout

Scattered Tree Removal

- Assumed Tree Removal (TRZ)
- Scattered Tree to be removed
- Recently removed Scattered Tree

Patches of Native Vegetation Removal

- Habitat Zone A
- Habitat Zone B

N

0 10 20 40 60
Meters

ETHOS NRM

Map Produced by: Ethos NRM,
PO Box 204, Baimsdale, Victoria 3875.
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info@ethosnrm.com.au www.ethosnrm.com.au

1:3,000

Version 2

Date: 8/09/2015

Coordinate System:
GDA 94 MGA Zone 55

Note: this map is not intended for surveying purposes. Ethos NRM and its employees do not guarantee that this map is without flaw of any kind or that it is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequences which may arise from you relying on any information in this publication.

7 OFFSET REQUIREMENTS

7.1 Determination of Offset Requirements

The determination of offsets relies on a purpose-built *Native Vegetation Information Management* Tool developed by DELWP. Following calculation of the Habitat Hectares (quality x quantity) of vegetation to be removed the mapped vegetation is assessed against DELWP models to determine the type, quantity and attributes of the offset required.

Offsets under the *Guidelines* comprise of:

- **general biodiversity equivalence units** and/or
- **specific biodiversity equivalence units**

Ethos NRM provided DELWP with a GIS (ESRI format) shape-file of the area of proposed vegetation removal with attributed site condition data. A report on the vegetation removal was supplied by DELWP and is provided in **Appendix 4**.

Whilst desktop searches for records of rare or threatened flora and fauna species have been undertaken by Ethos NRM, the **Guidelines** methodology relies on model based data to assess the proportional impact of proposed vegetation removal on habitat for rare or threatened species. The specific-general offset test measures on a case-by-case basis the proportion of habitat, against a threshold, each significant species will lose if the removal of native vegetation is permitted. This offset test has been applied to the proposed vegetation removal at 10 Marlo Rd, Marlo and no specific offset for rare or threatened species was identified.

The offset requirements calculated by DELWP for the Project, under the *Guidelines*, consists entirely of *General Biodiversity Equivalence Units* (GBEUs) and includes:

- **0.137 General Biodiversity Equivalence Units (GBEUs) with a minimum Strategic Biodiversity Score of 0.188** for removal of 1.809 hectares of vegetation.
- **All offsets are required to be achieved within the East Gippsland Catchment Management Authority or East Gippsland Shire region.**

7.2 Offsetting Native Vegetation Losses

Where vegetation removal cannot be avoided, provision of offsets is required to compensate for the impacts on biodiversity; the purpose of an offset is to achieve a 'no net loss' in the contribution made by native vegetation to Victoria's biodiversity.

Offsets are achieved through the long-term protection, enhancement and management of the quality and quantity of native vegetation. Offsets can be achieved on private land owned by the proponent or a third party, or by purchasing a Native Vegetation Credit from the DELWP Native Vegetation Credit Register.

A formal agreement is required in all instances to secure the ongoing protection and management of the nominated offset site.

7.3 Offset Attributes

When a general offset is required the offset secured must meet the *minimum strategic biodiversity score and vicinity* attributes.

The offsets for the proposed vegetation removal at 10 Marlo Rd, Marlo must:

- have a minimum strategic biodiversity score of 0.188 and
- be within the East Gippsland Catchment Management Authority boundary (or East Gippsland Shire boundary).

7.4 Offset Strategy

Ethos NRM has confirmed that there are available vegetation offsets on the Native Vegetation Credit Register within the East Gippsland Catchment Management Area that can be purchased to meet offset obligations for this project. **Table 5** details the required offset and Offset Requirement.

Table 5. Offset Requirement

Offsets Required	Unit / Measure
General Offsets	0.137 GBEUs
Minimum Strategic Biodiversity Score	0.188
Vicinity	East Gippsland Catchment Management Authority or East Gippsland Shire area

At the time of preparing this report purchase of offsets from the Native Vegetation Credit Register is the preferred method by the Landholder to achieve their offset obligations.

7.4.1 Timing

A compliant offset **must be secured**, to the satisfaction of the responsible or referral authority, **before the native vegetation is removed** (DEPI, 2013a), by either:

- A security agreement for the site including an onsite (Offset) management plan, or
- Evidence of a secured third party offset, e.g. Native Vegetation Credit Register extract.

8 REFERENCES

- DELWP, 2015a **Biodiversity Assessment Handbook – Permitted Clearing of Native Vegetation**. Victorian Government Department of Environment, Land, Water and Planning, May 2015.
- DELWP, 2015b. **Planning Property Report online tool**. www.dpcd.vic.gov.au/planning Accessed on 7 July 2015. Victorian Government Department of Environment, Land, Water and Planning.
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- DEPI, 2013a. **Permitted clearing of native vegetation Biodiversity Assessment Guidelines**. Victorian Government Department of Environment and Primary Industries, Melbourne, September 2013.
- DEPI, 2013b. **Advisory List of Threatened Vertebrate Fauna in Victoria - 2013**. Victorian Government Department of Environment and Primary Industries, East Melbourne.
- DEPI, 2013c. **Native Vegetation Exemptions – Fact Sheet**. Victorian Government Department of Environment and Primary Industries, East Melbourne.
- DEPI, 2014a. **Advisory List of Rare or Threatened Plants in Victoria - 2014**. Victorian Government Department of Environment and Primary Industries.
- DEPI, 2015a. **Ecological Vegetation Class Benchmark Descriptions**. <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/evc-benchmarks> Viewed 17/7/2015. Victorian Government Department of Environment and Primary Industries.
- DoE 2015. **EPBC on-line Protected Matters Search Tool**, EPBC Protected Matters Report. Report created 30/7/15. Department of Environment.
- DSE 2004 **EVC 16: Lowland Forest - East Gippsland Lowlands bioregion**. Victorian Government Department of Sustainability and Environment April 2004.
- Viridans, 2015a. **Wild Animals of Victoria on the Web**, Viridans Biological database 2015, Viridans Pty Ltd, Victoria.
- Viridans, 2015b. **Wild Plants of Victoria on the Web**, Viridans Biological database 2015, Viridans Pty Ltd, Victoria.

VBA, 2015 Data Source (DELWP)

Data Source: 'Victorian Biodiversity Atlas', © Victorian Government, Department of Environment, Land, Water and Planning (Data Publication date: 26/6/15).

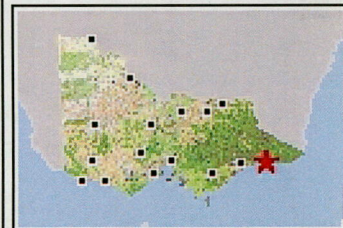
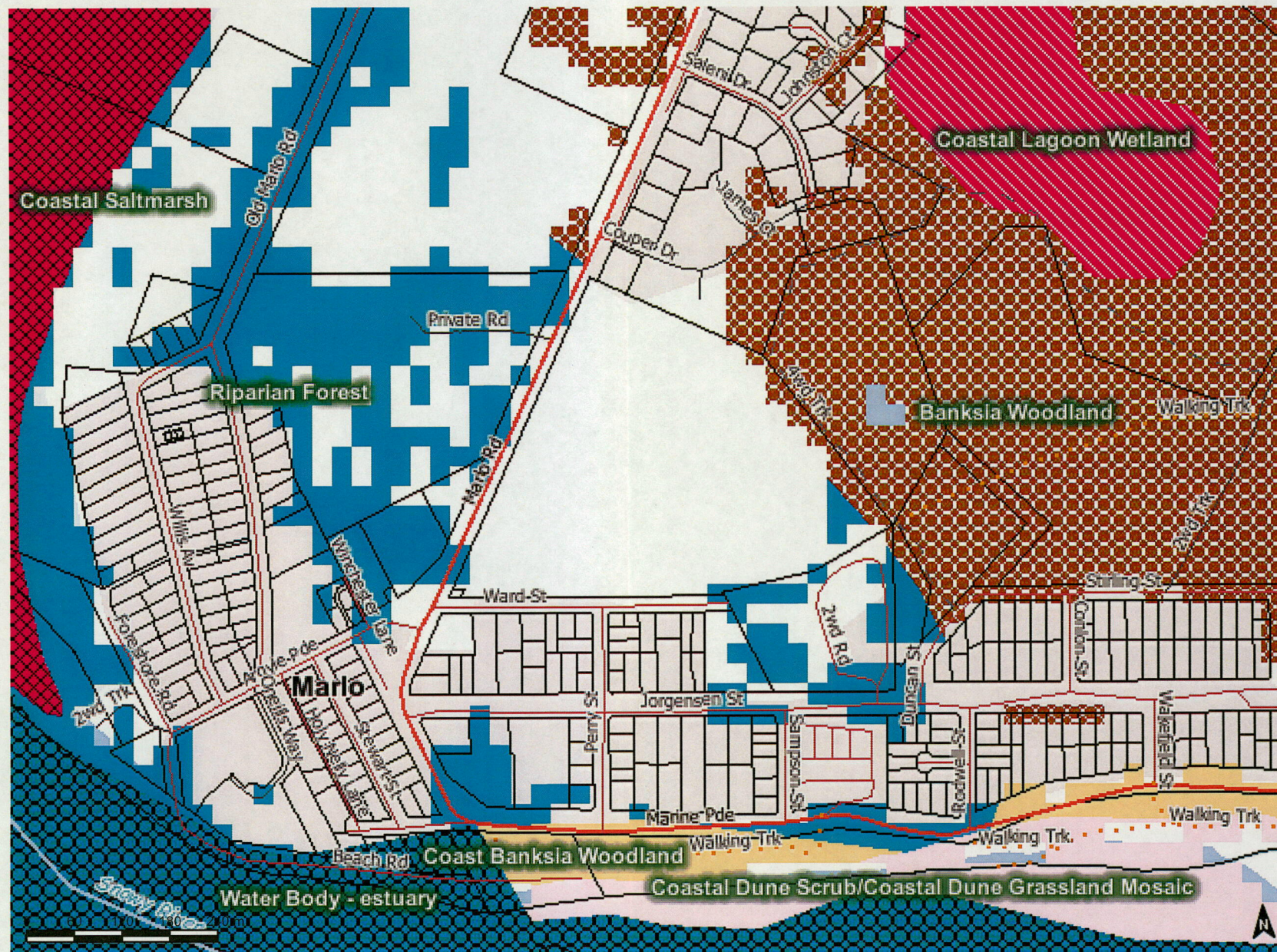
9 APPENDICES

9.1 Appendix 1: Flora Species List

The following species were recorded by Ethos NRM at 10 Marlo Rd, Marlo on 21/7/15.

Scientific Name	Common Name	Introduced Species
<i>Eucalyptus botryoides</i>	Southern Mahogany	
<i>Pteridium esculentum</i>	Bracken	
<i>Monotoca scoparia</i>	Prickly Broom-heath	
<i>Pittosporum undulatum</i>	Sweet Pittosporum	
<i>Kunzea ericoides</i>	Burgan	
<i>Eucalyptus muelleriana</i>	Yellow Stringybark	
<i>Leptospermum laevigatum</i>	Coast Tea-tree	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	
<i>Austrodanthonia sp.</i>	Wallaby Grass	
<i>Banksia serrata</i>	Saw Banksia	
<i>Banksia marginata</i>	Silver Banksia	
<i>Gonocarpus teucrioides</i>	Germander Rاسpwort	
<i>Acacia longifolia</i>	Sallow Wattle	
<i>Hibbertia aspera subsp. aspera</i>	Rough Guinea-flower	
<i>Leptospermum continentale</i>	Prickly Tea-tree	
<i>Patersonia glabrata</i>	Leafy Purple-flag	
<i>Acacia terminalis</i>	Sunshine Wattle	
<i>Dillwynia glaberrima</i>	Smooth Parrot-pea	
<i>Pennisetum clandestinum</i>	Kikuyu	Yes
<i>Rubus fruticosus spp. agg.</i>	Blackberry	Yes
<i>Coprosma repens</i>	Mirror Bush	Yes
<i>Holcus lanatus</i>	Yorkshire Fog Grass	Yes
<i>Hypochaeris radicata</i>	Flatweed	Yes
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Yes
<i>Sporobolus africanus</i>	Paramatta Grass	Yes
<i>Cynodon dactylon var. dactylon</i>	Couch	Yes
<i>Solanum nigrum</i>	Blackberry Nightshade	Yes
<i>Trifolium repens var. repens</i>	White Clover	Yes
<i>Anagallis arvensis</i>	Scarlet Pimpernel	Yes

9.2 Appendix 2: EVC Map (DELWP)



- ROADS**
- Freeway
 - Highway
 - Main Road
 - Secondary Road
 - Local Road
 - 2WD (Unsealed)
 - 4WD Only
 - Walking or Cycle Track
- WATERCOURSES**
- Watercourse
- UNNAMED DRAINAGE LINES**
- Unnamed drainage line
- APPROVED PARCELS**
- Approved parcel
- ECOLOGICAL VEGETATION CLASSES**
- 18 Riparian Forest
 - 1167 Water Body - estuary
 - 9 Coastal Saltmarsh
 - 11 Coastal Lagoon Wetland
 - 1 Coastal Dune Scrub/Coastal Dune Grassland Mosaic
 - 2 Coast Banksia Woodland
 - 14 Banksia Woodland
- WATERBODIES**
- Watercourse Area
 - Permanent Waterbody
 - Wetland Area
 - Inundation Area
 - BUILT UP AREAS

Disclaimer: This map is a snapshot generated from Victorian Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

9.3 Appendix 3: Habitat Hectare Sheets

Vegetation Quality Field Assessment Sheet

Version 1.3 - October 2004

Department of
Sustainability and
Environment

Site Name/No. H2 A

Location 10 mario rd
mario

Date 21/7/15

Assessor(s) K. Spencer

Map Name/No.

AMG

Tenure Private

EVC lowland Forest

Bioregion East Gippsland
Lowlands

'Site Condition Score'

Large Trees

Score

5

Category & Description	% Canopy Health*		
	> 70%	30-70%	< 30%
None present	0	0	0
> 0 to 20% of the benchmark number of large trees/ha	3	2	1
> 20% to 40% of the benchmark number of large trees/ha	4	3	2
> 40% to 70% of the benchmark number of large trees/ha	6	5	4
> 70% to 100% of the benchmark number of large trees/ha	8	7	6
≥ the benchmark number of large trees/ha	10	9	8

Large trees are defined by diameter at breast height (dbh)
- see EVC benchmark.

* Estimate proportion of an expected healthy canopy cover that is present (i.e. not missing due to tree death or decline, or mistletoe infestation).

Tree Canopy Cover

Score

3

Category & Description	% Canopy Health*		
	> 70%	30-70%	< 30%
< 10% of benchmark cover	0	0	0
< 50% or > 150% of benchmark cover	3	2	1
≥ 50% or ≤ 150% of benchmark cover	5	4	3

Tree canopy is defined as those canopy tree species reaching ≥ 80% of mature height - see EVC benchmark description.

* Estimate proportion of an expected healthy canopy cover that is present (i.e. not missing due to tree death or decline, or mistletoe infestation).

Lack of Weeds

Score

4

Category & Description	'high threat' weeds*		
	None	≤ 50%	> 50%
> 50% cover of weeds	4	2	0
25 - 50% cover of weeds	7	6	4
5 - 25% cover of weeds	11	9	7
< 5% cover of weeds**	15	13	11

* proportion of weed cover due to 'high threat' weeds - see EVC benchmark for guide.

'High threat' weed species are defined as those introduced species (including non-Indigenous 'natives') with the ability to out-compete and substantially reduce one or more Indigenous life forms in the longer term assuming on-going current site characteristics and disturbance regime.

The EVC benchmark lists typical weed species for the EVC in the bioregion and provides an estimate of their 'invasiveness' and 'impact'. In general, those weed species considered to have a high impact are considered high threat regardless of their invasiveness.

** If total weed cover is negligible (<1%) and high threat weed species are present then score '13'.

Understorey Life forms

LF Code from EVC benchmark	# spp observed / Benchmark spp.	% cover observed / Benchmark % cover	Present (✓)	Modified (✓)
IT	1 / 3	1 / 5	✓	✓
T	0 / 2	- / 10	X	-
MS	4 / 10	5 / 30	✓	✓
SS	3 / 6	5 / 15	✓	✓
PS	0 / 2	- / 5	X	-
LH	0 / 1	- / 1	X	-
MH	0 / 6	- / 10	X	-
LFG	0 / 2	- / 10	X	-
LNG	0 / 1	- / 5	X	-
MTG	0 / 6	- / 10	X	-
MNG	0 / 2	- / 5	X	-
GF	1 / 3	5 / 10	✓	✓
SC	0 / 3	- / 5	X	-
BL	- / na	< 1 / 10	✓	✓
	1	1	5 / 14	5 / 5

For life forms with benchmark cover of < 10%, considered 'present' if

- any specimens are observed.

Present

For life forms with benchmark cover of ≥ 10%, considered 'present' if

- the life form occupies at least 10% of benchmark cover.

For life forms with benchmark cover of < 10%, then considered substantially 'modified' if the life form has either:

- < 50% of the benchmark species diversity; or
- no reproductively-mature specimens are observed.

Modified

(apply only where life form is 'present')

For life forms with benchmark cover of ≥ 10%, then considered substantially 'modified' if the life form has either:

- < 50% of benchmark cover; or
- < 50% of benchmark species diversity; or
- ≥ 50% of benchmark cover due largely to immature canopy specimens but the cover of reproductively-mature specimens is < 10% of the benchmark cover.

Understorey

Score

5

Category & Description	Score
All strata and lifeforms effectively absent	0
Up to 50% of life forms present	5
≥ 50% to 90% of lifeforms present	10
• of those present, ≥ 50% substantially modified	15
• of those present, < 50% substantially modified	15
≥ 90% of lifeforms present	15
• of those present, ≥ 50% substantially modified	20
• of those present, < 50% substantially modified	20
• of those present, none substantially modified	25

Version 1.3 October 2004

3

Score

Category & Description			High diversity**	Low diversity**
No evidence of a recruitment 'cohort'*	within EVC not driven by episodic events		0	0
	within EVC driven by episodic events^	clear evidence of appropriate episodic event	0	0
		no clear evidence of appropriate episodic event	5	5
Evidence of at least one recruitment 'cohort' in at least one life-form	proportion of native woody species present that have adequate recruitment*	< 30%	3	1
		30 - 70%	6	3
		≥ 70%	10	5

* high diversity defined as $\geq 50\%$ of benchmark woody species diversity.

Score

Category & Description	Dominated by native organic litter	Dominated by non-native organic litter
< 10% of benchmark cover	0	0
< 50% or > 150% of benchmark cover	3	2
≥ 50% or ≤ 150% of benchmark cover	5	4

Woody species recorded in habitat zone

[illegible]

Score

Category & Description	Large logs present ^a	Large logs absent ^a
< 10% of benchmark length	0	0
< 50% of benchmark length	3	2
≥ 50% of benchmark length	5	4

absent if large log length is < 25% of EVC benchmark log length.

'Landscape Context Score'

Sopre

Category & Description	
< 2 ha	1
Between 2 and 5 ha	2
Between 5 and 10 ha	4
Between 10 and 20 ha	6
≥ 20 ha, but 'significantly disturbed'*	8
≥ 20 ha, but not 'significantly disturbed'*	10

Score

Distance	Core Area not significantly disturbed*	Core Area significantly disturbed*
> 5 km	0	0
1 to 5 km	2	1
< 1 km	4	3
contiguous	5	4

* defined as per RFA 'Old Growth' analyses.

Score

Radius from site	% Native vegetation	Weighting
100 m	/	0.03
1 km		0.04
5 km		0.03

subtract 2 if the neighbourhood is 'significantly disturbed'

Add Values and 'round-off'

Multiply % native vegetation x Weighting for each radius from the zone (eg. 40% x 0.03 = 1.2); then add values to obtain final Neighbourhood Value.

Final Habitat Score

	'Site Condition Score'							'Landscape Context Score'	Total
Score	5	3	4	5	3	0	0	/	25
Component	Large Trees	Tree Canopy Cover	Lack of Weeds	Understorey	Recruitment	Organic Litter	Logs	Patch Size Neighbourhood Distance to Core Area	100

Vegetation Quality Field Assessment Sheet

Version 1.3 - October 2004

Department of
Sustainability and
Environment

Site Name/No. HZ B

Location 10 marlo Rd
marlo

Date 21/7/15

Assessor(s) R. Spencer

Map Name/No. _____

AMG _____

Tenure Private

EVC Lowland Forest

Bioregion East Gippsland
lowlands

'Site Condition Score'

Large Trees

Score

3

Category & Description	% Canopy Health*		
	> 70%	30-70%	< 30%
None present	0	0	0
> 0 to 20% of the benchmark number of large trees/ha	3	2	1
> 20% to 40% of the benchmark number of large trees/ha	4	③	2
> 40% to 70% of the benchmark number of large trees/ha	6	5	4
> 70% to 100% of the benchmark number of large trees/ha	8	7	6
≥ the benchmark number of large trees/ha	10	9	8

Large trees are defined by diameter at breast height (dbh)
- see EVC benchmark.

* Estimate proportion of an expected healthy canopy cover that is present
(i.e. not missing due to tree death or decline, or mistletoe infestation).

Understorey Life forms

LF Code from EVC benchmark	# spp observed / Benchmark spp	% cover observed / Benchmark % cover	Present (✓)	Modified (✗)
IT	1 / 3	10 / 5	✓	✓
T	2 / 2	5 / 10	✓	✗
MS	10 / 10	40 / 30	✓	✗
SS	6 / 6	20 / 15	✓	✗
PS	1 / 2	2 / 5	✓	✗
LH	0 / 1	- / 1	✗	-
MH	0 / 6	- / 10	✗	-
LTG	0 / 2	- / 10	✗	-
LNG	0 / 1	- / 5	✗	-
MTG	3 / 6	10 / 10	✓	✗
MNG	0 / 2	- / 5	✗	-
GF	1 / 3	5 / 10	✓	✓
SC	0 / 3	- / 5	✗	-
BL	- / na	< 1 / 10	✗	-
	1	1		
	1	1	7 / 14	2 / 7

For life forms with benchmark cover of < 10%, considered 'present' if
• any specimens are observed.

For life forms with benchmark cover of ≥ 10%, considered 'present' if
• the life form occupies at least 10% of benchmark cover.

For life forms with benchmark cover of < 10%, then considered substantially 'modified' if the life form has either:
• < 50% of the benchmark species diversity; or
• no reproductively-mature specimens are observed.

Modified (apply only where life form is 'present')
For life forms with benchmark cover of ≥ 10%, then considered substantially 'modified' if the life form has either:
• < 50% of benchmark cover; or
• < 50% of benchmark species diversity; or
• ≥ 50% of benchmark cover due largely to immature canopy specimens but the cover of reproductively-mature specimens is < 10% of the benchmark cover.

Tree Canopy Cover

Score

3

Category & Description	% Canopy Health *		
	> 70%	30-70%	< 30%
< 10% of benchmark cover	0	0	0
< 50% or > 150% of benchmark cover	③	2	1
≥ 50% or ≤ 150% of benchmark cover	5	4	3

Tree canopy is defined as those canopy tree species reaching ≥ 80% of mature height - see EVC benchmark description.

* Estimate proportion of an expected healthy canopy cover that is present
(i.e. not missing due to tree death or decline, or mistletoe infestation).

Lack of Weeds

Score

7

Category & Description	'high threat' weeds*		
	None	< 50%	> 50%
> 50% cover of weeds	4	2	0
25 - 50% cover of weeds	7	6	4
5 - 25% cover of weeds	11	9	⑦
< 5% cover of weeds**	15	13	11

* proportion of weed cover due to 'high threat' weeds - see EVC benchmark for guide.

'High threat' weed species are defined as those introduced species (including non-indigenous 'natives') with the ability to out-compete and substantially reduce one or more indigenous life forms in the longer term assuming on-going current site characteristics and disturbance regime.

The EVC benchmark lists typical weed species for the EVC in the bioregion and provides an estimate of their 'invasiveness' and 'impact'. In general, those weed species considered to have a high impact are considered high threat regardless of their invasiveness.

** if total weed cover is negligible (<1%) and high threat weed species are present then score '13'.

Understorey

Score

15

Category & Description	Score
All strata and lifeforms effectively absent	0
Up to 50% of life forms present	5
≥ 50% to 90% of lifeforms present	10
• of those present, ≥ 50% substantially modified	
• of those present, < 50% substantially modified	⑮
≥ 90% of lifeforms present	15
• of those present, ≥ 50% substantially modified	
• of those present, < 50% substantially modified	20
• of those present, none substantially modified	25

Vegetation Quality Field Assessment Sheet

Version 1.3 October 2004

Recruitment

Score

6

Category & Description			High diversity*	Low diversity*
No evidence of a recruitment 'cohort'*	within EVC not driven by episodic events		0	0
	within EVC driven by episodic events^	clear evidence of appropriate episodic event	0	0
		no clear evidence of appropriate episodic event	5	5
Evidence of at least one recruitment 'cohort' in at least one life-form	proportion of native woody species present that have adequate recruitment*	< 30%	3	1
		30 - 70%	6	3
		≥ 70%	10	5

* 'cohort' refers to a group of woody plants established in a single episode (can include suppressed canopy species individuals).

^ refer to EVC benchmark for clarification.

* treat multiple eucalypt canopy species as one species.

* high diversity defined as ≥ 50% of benchmark woody species diversity.

Organic Litter

Score

3

Category & Description	Dominated by native organic litter	Dominated by non-native organic litter
< 10% of benchmark cover	0	0
< 50% or > 150% of benchmark cover	3	2
≥ 50% or ≤ 150% of benchmark cover	5	4

Species Recruitment

Woody species recorded in habitat zone	Adequate Recruitment
Eucalypt canopy (combined species)	✓
Prickly Broom Heath	✓
Pittosporum	✓
Burcra	✓
Coast Tea-tree	✓
Sand Banksia	x
Silver Banksia	x
Prickly Tea-tree	x
Sunshine Wattle	x
Sallow Wattle	x
Rough Green-flower	x
Smooth Parrot-pea	x
number of woody spp. in EVC benchmark (55 and taller)	19

Logs

Score

0

Category & Description	Large logs present*	Large logs absent*
< 10% of benchmark length	0	0
< 50% of benchmark length	3	2
≥ 50% of benchmark length	5	4

Large logs defined as those with diameter ≥ 0.5 of benchmark large tree dbh.

* present if large log length is ≥ 25% of EVC benchmark log length.

absent if large log length is < 25% of EVC benchmark log length.

'Landscape Context Score'

Patch Size

Score

Category & Description	
< 2 ha	1
Between 2 and 5 ha	2
Between 5 and 10 ha	4
Between 10 and 20 ha	6
≥ 20 ha, but 'significantly disturbed'	8
≥ 20 ha, but not 'significantly disturbed'	10

* 'significantly disturbed' defined as per RFA 'Old Growth' analyses eg. roading, coupes, grazing etc. - effectively most patches within fragmented landscapes.

Distance to Core Area

Score

Distance	Core Area not significantly disturbed*	Core Area significantly disturbed*
> 5 km	0	0
1 to 5 km	2	1
< 1 km	4	3
contiguous	5	4

* defined as per RFA 'Old Growth' analyses.

Neighbourhood

Score

Radius from site	% Native vegetation*	Weighting
100 m		0.03
1 km		0.04
5 km		0.03
subtract 2 if the neighbourhood is 'significantly disturbed'		
Add Values and 'round-off'		

* to nearest 20%.

Multiply % native vegetation x Weighting for each radius from the zone (eg. 40% x 0.03 = 1.2); then add values to obtain final Neighbourhood Value.

Final Habitat Score

'Site Condition Score'							'Landscape Context Score'		Total
Component	Large Trees	Tree Canopy Cover	Lack of Weeds	Understorey	Recruitment	Organic Litter	Logs	Patch Size	
Score	3	3	7	15	6	3	0	5	42

9.4 Appendix 4: DEPI Biodiversity Impact and Offset Report

Biodiversity impact and offset requirements report

This report **does not represent an assessment by DELWP** of the proposed native vegetation removal. It provides additional biodiversity information to support moderate and high risk-based pathway applications for permits to remove native vegetation under clause 52.16 or 52.17 of planning schemes in Victoria.

Date of issue: 24/08/2015
Time of issue: 12:35 pm

DELWP ref: ETH_0038

Project ID	GRE_MAR_V2
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Summary of marked native vegetation

Risk-based pathway	High
Total extent	1.809 ha
Remnant patches	0.120 ha
Scattered trees	24 trees
Location risk	B
Strategic biodiversity score of all marked native vegetation	0.236

Offset requirements if a permit is granted

If a permit is granted to remove the marked native vegetation, a requirement to obtain a native vegetation offset will be included in the permit conditions. The offset must meet the following requirements:

Offset type	General offset
General offset amount (general biodiversity equivalence units)	0.137 general units
General offset attributes	
Vicinity	East Gippsland Catchment Management Authority (CMA) or East Gippsland Shire Council
Minimum strategic biodiversity score	0.188 ¹

See Appendices 1 and 2 for details in how offset requirements were determined.

NB: values presented in tables throughout this document may not add to totals due to rounding

¹ Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Biodiversity impact and offset requirements report

Next steps

Any proposal to remove native vegetation must meet the application requirements of the high risk-based pathway and it will be assessed under the high risk-based pathway.

If you wish to remove the marked native vegetation you are required to apply for a permit from your local council. Council will then refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

The biodiversity assessment report from NVIM and this biodiversity impact and offset report should be submitted with your application for a permit to remove native vegetation you plan to remove, lop or destroy.

The Biodiversity assessment report generated by the tool within NVIM provides the following information:

- The location of the site where native vegetation is to be removed.
- The area of the patch of native vegetation and/or the number of any scattered trees to be removed.
- Maps or plans containing information set out in the *Permitted clearing of native vegetation – Biodiversity assessment guidelines*
- The risk-based pathway of the application for a permit to remove native vegetation

This report provides the following information to meet application requirements for a permit to remove native vegetation:

- Confirmation of the risk-based pathway of the application for a permit to remove native vegetation
- The strategic biodiversity score of the native vegetation to be removed
- Information to inform the assessment of whether the proposed removal of native vegetation will have a significant impact on Victoria's biodiversity, with specific regard to the proportional impact on habitat for any rare or threatened species.
- The offset requirements should a permit be granted to remove native vegetation.

Additional application requirements must be provided with an application for a permit to remove native vegetation in the moderate or high risk-based pathways. These include:

- A habitat hectare assessment report of the native vegetation that is to be removed
- A statement outlining what steps have been taken to ensure that impacts on biodiversity from the removal of native vegetation have been minimised
- An offset strategy that details how a compliant offset will be secured to offset the biodiversity impacts of the removal of native vegetation.

Refer to the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* and for a full list and details of application requirements.

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This publication may be of assistance to you but the State of Victoria and its employees do not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for any error, loss or other consequence which may arise from you relying on any information in this publication.

Obtaining this publication does not guarantee that an application will meet the requirements of clauses 52.16 or 52.17 of the Victoria Planning Provisions or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of clauses 52.16 or 52.17 of the Victoria Planning Provisions.

Biodiversity impact and offset requirements report

Appendix 1 – Biodiversity impact of removal of native vegetation

Habitat hectares

Habitat hectares are calculated for each habitat zone within your proposal using the extent and condition scores in the GIS data you provided.

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
1-1-S1	0.200	0.070	0.014
2-2-S2	0.200	0.070	0.014
3-3-S3	0.200	0.070	0.014
4-4-S4	0.200	0.070	0.014
5-5-S5	0.200	0.070	0.014
6-7-S7	0.200	0.070	0.014
7-8-S8	0.200	0.070	0.014
8-9-S9	0.200	0.070	0.014
9-10-S10	0.200	0.070	0.014
10-11-S11	0.200	0.070	0.014
11-12-S12	0.200	0.070	0.014
12-13-S13	0.200	0.070	0.014
13-14-S14	0.200	0.070	0.014
14-15-S15	0.200	0.070	0.014
15-16-S16	0.200	0.070	0.014
16-17-S17	0.200	0.070	0.014
17-18-S18	0.200	0.070	0.014
18-19-S19	0.200	0.070	0.014
19-20-S20	0.200	0.070	0.014
20-21-S21	0.200	0.070	0.014
21-22-S22	0.200	0.070	0.014
22-23-S23	0.200	0.070	0.014
23-26-B	0.420	0.074	0.031
24-25-A	0.250	0.012	0.003
25-24-S24	0.200	0.070	0.014
26-28-S25	0.200	0.070	0.014
27-27-A	0.250	0.034	0.008
TOTAL			0.380

Biodiversity impact and offset requirements report

Impacts on rare or threatened species habitat above specific offset threshold

The specific-general offset test was applied to your proposal. The test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the specific offset threshold. The threshold is set at 0.005 per cent of the total habitat for a species. When the proportional impact is above the specific offset threshold a specific offset for that species' habitat is required.

The specific-general offset test found your proposal does not have a proportional impact on any rare or threatened species' habitats above the specific offset threshold. No specific offsets are required. A general offset is required as set out below.

Clearing site biodiversity equivalence score(s)

The general biodiversity equivalence score for the habitat zone(s) is calculated by multiplying the habitat hectares by the strategic biodiversity score.

Habitat zone	Habitat hectares	Strategic biodiversity score	General biodiversity equivalence score (GBES)
1-1-S1	0.014	0.257	0.004
2-2-S2	0.014	0.100	0.001
3-3-S3	0.014	0.273	0.004
4-4-S4	0.014	0.243	0.003
5-5-S5	0.014	0.242	0.003
6-7-S7	0.014	0.264	0.004
7-8-S8	0.014	0.159	0.002
8-9-S9	0.014	0.318	0.004
9-10-S10	0.014	0.295	0.004
10-11-S11	0.014	0.241	0.003
11-12-S12	0.014	0.242	0.003
12-13-S13	0.014	0.244	0.003
13-14-S14	0.014	0.100	0.001
14-15-S15	0.014	0.243	0.003
15-16-S16	0.014	0.243	0.003
16-17-S17	0.014	0.228	0.003
17-18-S18	0.014	0.100	0.001
18-19-S19	0.014	0.279	0.004
19-20-S20	0.014	0.286	0.004
20-21-S21	0.014	0.249	0.004
21-22-S22	0.014	0.228	0.003
22-23-S23	0.014	0.228	0.003
23-26-B	0.031	0.321	0.010
24-25-A	0.003	0.226	0.001
25-24-S24	0.014	0.259	0.004

Biodiversity impact and offset requirements report

Habitat zone	Habitat hectares	Strategic biodiversity score	General biodiversity equivalence score (GBES)
26-28-S25	0.014	0.235	0.003
27-27-A	0.008	0.251	0.002

Mapped rare or threatened species' habitats on site

This table sets out the list of rare or threatened species' habitats mapped at the site beyond those species for which the impact is above the specific offset threshold. These species habitats do not require a specific offset according to the specific-general offset test.

Species number	Species common name	Species scientific name
10045	Lewin's Rail	<i>Lewinia pectoralis pectoralis</i>
10050	Baillon's Crake	<i>Porzana pusilla palustris</i>
10187	Eastern Great Egret	<i>Ardea modesta</i>
10197	Australasian Bittern	<i>Botaurus poiciloptilus</i>
10215	Hardhead	<i>Aythya australis</i>
10217	Musk Duck	<i>Biziura lobata</i>
10220	Grey Goshawk	<i>Accipiter novaehollandiae novaehollandiae</i>
10226	White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>
10230	Square-tailed Kite	<i>Lophoictinia isura</i>
10238	Black Falcon	<i>Falco subniger</i>
10246	Barking Owl	<i>Ninox connivens connivens</i>
10498	Chestnut-rumped Heathwren	<i>Calamanthus pyrrhopygius</i>
10598	Painted Honeyeater	<i>Grantiella picta</i>
11061	Common Dunnart	<i>Sminthopsis murina murina</i>
11280	Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>
12283	Lace Monitor	<i>Varanus varius</i>
13117	Brown Toadlet	<i>Pseudophryne bibronii</i>
13125	Southern Toadlet	<i>Pseudophryne semimarmorata</i>
13930	Martin's Toadlet	<i>Upéroleia martini</i>
500438	Variable Bossiaea	<i>Bossiaea heterophylla</i>
501295	Spotted Gum	<i>Corymbia maculata</i>
502145	Giant Honey-myrtle	<i>Melaleuca armillaris subsp. armillaris</i>
502709	Maroon Leek-orchid	<i>Prasophyllum frenchii</i>
504940	Veined Spear-grass	<i>Austrostipa rudis subsp. australis</i>
505337	Austral Crane's-bill	<i>Geranium solanderi var. solanderi s.s.</i>

Biodiversity impact and offset requirements report

Appendix 2 – Offset requirements detail

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset.

To calculate the required offset amount required the biodiversity equivalence scores are aggregated to the proposal level and multiplied by the relevant risk multiplier.

Offsets also have required attributes:

- General offsets must be located in the same Catchment Management Authority (CMA) boundary or Local Municipal District (local council) as the clearing and must have a minimum strategic biodiversity score of 80 per cent of the clearing.²

The offset requirements for your proposal are as follows:

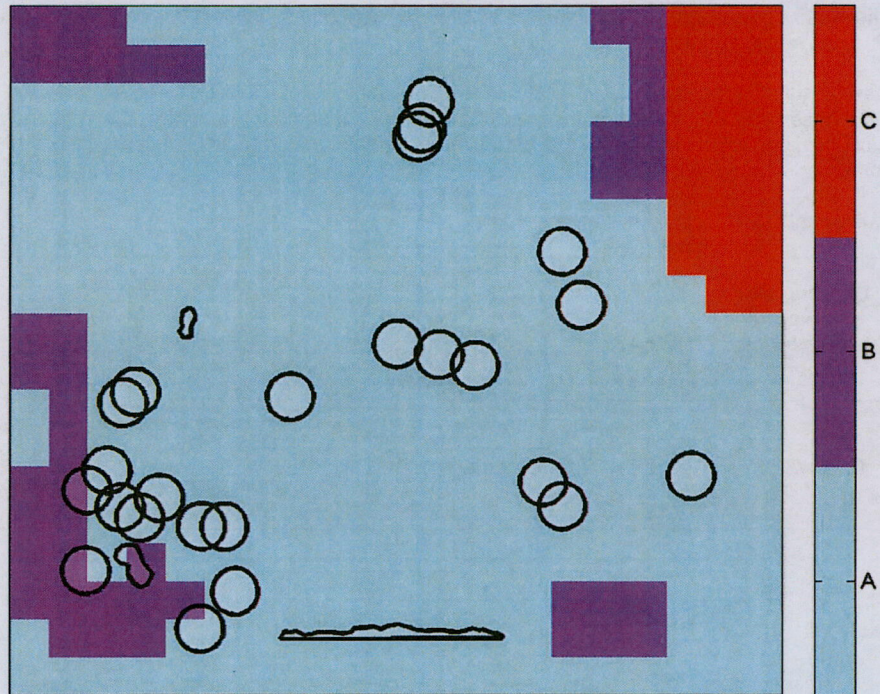
Offset type	Clearing site biodiversity equivalence score	Risk multiplier	Offset requirements	
			Offset amount (biodiversity equivalence units)	Offset attributes
General	0.091 GBES	1.5	0.137 general units	Offset must be within East Gippsland CMA or East Gippsland Shire Council Offset must have a minimum strategic biodiversity score of 0.188

² Strategic biodiversity score is a weighted average across habitat zones where a general offset is required

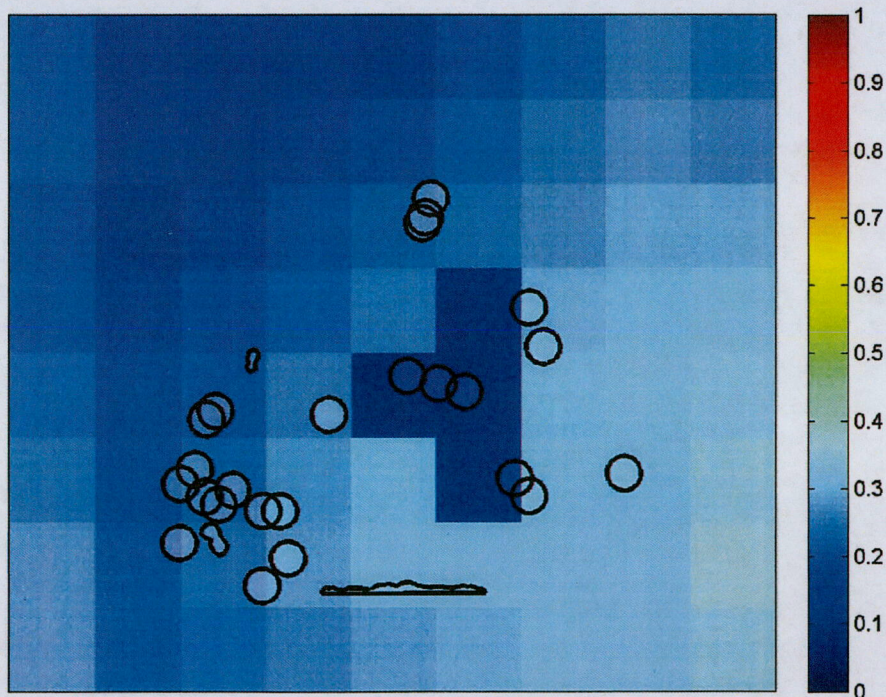
Biodiversity impact and offset requirements report

Appendix 3 – Images of marked native vegetation

1. Native vegetation location risk map



2. Strategic biodiversity score map



Biodiversity impact and offset requirements report

3. Aerial photograph showing marked native vegetation



Biodiversity impact and offset requirements report

Glossary

Condition score This is the site-assessed condition score for the native vegetation. Each habitat zone in the clearing proposal is assigned a condition score according to the habitat hectare assessment method. This information has been provided by or on behalf of the applicant in the GIS file.

Dispersed habitat A dispersed species habitat is a habitat for a rare or threatened species whose habitat is spread over a relatively broad geographic area greater than 2,000 hectares.

General biodiversity equivalence score The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to Victoria's biodiversity. The general biodiversity equivalence score is calculated as follows:

$$\text{General biodiversity equivalence score} = \text{habitat hectares} \times \text{strategic biodiversity score}$$

General offset amount This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

$$\text{Risk adjusted general biodiversity equivalence score} = \text{general biodiversity equivalence score clearing} \times 1.5$$

General offset attributes General offset must be located in the same Catchment Management Authority boundary or Municipal District (local council) as the clearing site. They must also have a strategic biodiversity score that is at least 80 per cent of the score of the clearing site.

Habitat hectares Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares can be calculated for a remnant patch or for scattered trees or a combination of these two vegetation types. This value is calculated for each habitat zone using the following formula:

$$\text{Habitat hectares} = \text{total extent (hectares)} \times \text{condition score}$$

Habitat importance score The habitat importance score is a measure of the importance of the habitat located on a site for a particular rare or threatened species. The habitat importance score for a species is a weighted average value calculated from the habitat importance map for that species. The habitat importance score is calculated for each habitat zone where the habitat importance map indicates that species habitat occurs.

Habitat zone Habitat zone is a discrete contiguous area of native vegetation that:

- is of a single Ecological Vegetation Class
- has the same measured condition.

Biodiversity impact and offset requirements report

Highly localised habitat

A highly localised habitat is habitat for a rare or threatened species that is spread across a very restricted area (less than 2,000 hectares). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species. Highly localised habitats have the highest habitat importance score (1) for all locations where they are present.

Minimum strategic biodiversity score

The minimum strategic biodiversity score is an attribute for a general offset.

The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed. Where a specific and general offset is required, the minimum strategic biodiversity score relates only to the habitat zones that require the general offset.

Offset risk factor

There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity.

To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.

Risk factor for general offsets = 1.5

Risk factor for specific offset = 2

Offset type

The specific-general offset test determines the offset type required.

When the specific-general offset test determines that the native vegetation removal will have an impact on one or more rare or threatened species habitat above the set threshold of 0.005 per cent, a specific offset is required. This test is done at the permit application level.

A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have an impact on any habitat for any rare or threatened species above the set threshold of 0.005 per cent. All habitat zones that do not require a specific offset will require a general offset.

Proportional impact on species

This is the outcome of the specific-general offset test. The specific-general offset test is calculated across the entire proposal for each species on the native vegetation permitted clearing species list. If the proportional impact on a species is above the set threshold of 0.005 per cent then a specific offset is required for that species.

Specific offset amount

The specific offset amount is calculated by multiplying the specific biodiversity equivalence score of the native vegetation to be removed by the risk factor for specific offsets. This number is expressed in specific biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

***Risk adjusted specific biodiversity equivalence score
= specific biodiversity equivalence score clearing × 2***

Biodiversity impact and offset requirements report

Specific offset attributes Specific offsets must be located in the modelled habitat for the species that has triggered the specific offset requirement.

Specific biodiversity equivalence score The specific biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to the habitat of the relevant rare or threatened species. It is calculated for each habitat zone where one or more species habitats require a specific offset as a result of the specific-general offset test as follows:

$$\text{Specific biodiversity equivalence score} \\ = \text{habitat hectares} \times \text{habitat importance score}$$

Strategic biodiversity score This is the weighted average strategic biodiversity score of the marked native vegetation. The strategic biodiversity score has been calculated from the *Strategic biodiversity map* for each habitat zone.

The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

Total extent (hectares) for calculating habitat hectares This is the total area of the marked native vegetation in hectares. The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree. This information has been provided by or on behalf of the applicant in the GIS file.

Vicinity The vicinity is an attribute for a general offset. The offset site must be located within the same Catchment Management Authority boundary or Local Municipal District as the native vegetation to be removed.

9.5 Appendix 5: Photos of areas of vegetation removal

Plate 1. Habitat Zone A – near dwelling



Plate 2. Habitat Zone B – southern property boundary



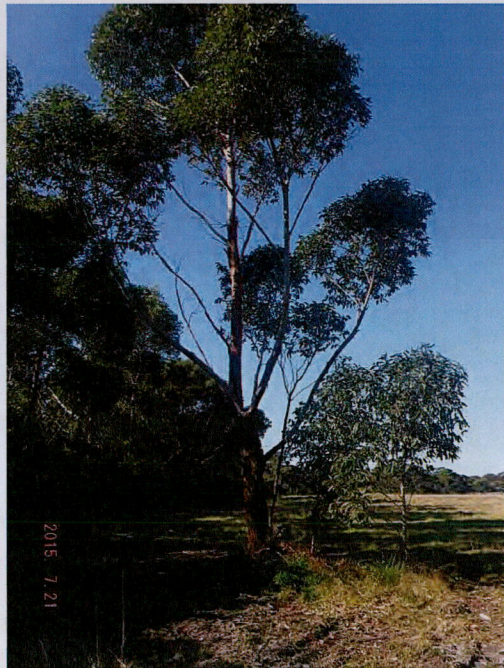
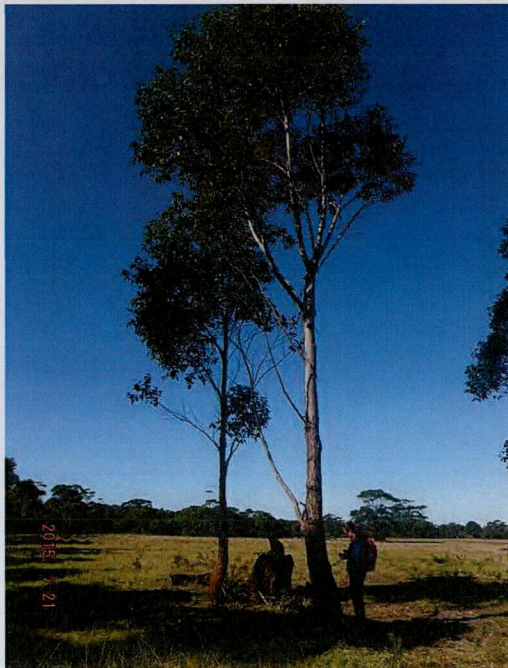
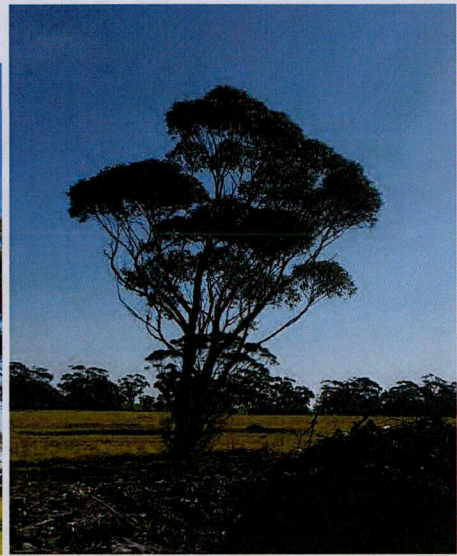
Plate 3. Scattered Trees to be removed on western boundary adjoining Marlo Rd.



Plate 4. Canopy Tree assumed loss due to encroachment in TRZ



Plate 5. Scattered Trees within paddock to be removed





9.6 Appendix 6: EPBC Protected Matters Search



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 30/07/15 13:51:03

[Summary](#)

[Details](#)

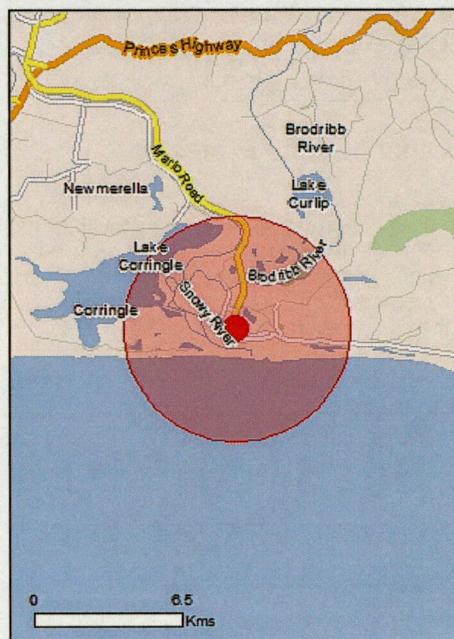
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

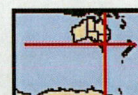
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[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	52
Listed Migratory Species:	44

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	71
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	6
Regional Forest Agreements:	1
Invasive Species:	35
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	1

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Diomedea epomophora epomophora Southern Royal Albatross [25996]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora sanfordi Northern Royal Albatross [82331]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans antipodensis Antipodean Albatross [82269]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans exulans Tristan Albatross [82337]	Endangered	Species or species habitat may occur within area
Diomedea exulans gibsoni Gibson's Albatross [82271]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato) Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta salvini Salvin's Albatross [82343]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris impavida Campbell Albatross [82449]	Vulnerable	Species or species habitat may occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Fish		
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		

Name	Status	Type of Presence
Heleioporus australiacus Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
Litoria littlejohni Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (Eastern) [68050]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Potorous longipes Long-footed Potoroo [217]	Endangered	Species or species habitat likely to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat known to occur within area
Pseudomys fumeus Konoom, Smoky Mouse [88]	Endangered	Species or species habitat likely to occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Plants		
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat known to occur within area
Dianella amoena Matted Flax-lily [64886]	Endangered	Species or species habitat may occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-	Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
orchid [9704]		within area
Thelymitra matthewsii		
Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Sharks		
Carcharodon carcharias		
Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Diomedea antipodensis		
Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea dabbenena		
Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
Diomedea epomophora (sensu stricto)		
Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans (sensu lato)		
Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni		
Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi		
Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli		
Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca		
Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes		
Flesh-footed Shearwater, Fleshy-footed		Foraging, feeding or

Name	Threatened	Type of Presence
Shearwater [1043]		related behaviour likely to occur within area
Sternula albifrons		
Little Tern [82849]		Breeding known to occur within area
Thalassarche bulleri		
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto)		
Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita		
Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini		
Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata		
Pygmy Right Whale [39]		Species or species habitat may occur within area
Carcharodon carcharias		
Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Lagenorhynchus obscurus		
Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus		
Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
<u>Megaptera novaeangliae</u> Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
<u>Orcinus orca</u> Killer Whale, Orca [46]		Species or species habitat may occur within area
<u>Rhincodon typus</u> Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
<u>Hirundapus caudacutus</u> White-throated Needletail [682]		Species or species habitat known to occur within area
<u>Merops ornatus</u> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<u>Monarcha melanopsis</u> Black-faced Monarch [609]		Species or species habitat known to occur within area
<u>Myiagra cyanoleuca</u> Satin Flycatcher [612]		Species or species habitat known to occur within area
<u>Rhipidura rufifrons</u> Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
<u>Ardea alba</u> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<u>Ardea ibis</u> Cattle Egret [59542]		Species or species habitat may occur within area
<u>Gallinago hardwickii</u> Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
<u>Gallinago megala</u> Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
<u>Gallinago stenura</u> Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
<u>Numenius minutus</u> Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
<u>Pandion cristatus</u> Eastern Osprey [82411]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<u>Apus pacificus</u> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<u>Ardea alba</u> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<u>Ardea ibis</u> Cattle Egret [59542]		Species or species habitat may occur within area
<u>Catharacta skua</u> Great Skua [59472]		Species or species habitat may occur within area
<u>Diomedea antipodensis</u> Antipodean Albatross [64458]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<u>Diomedea dabbenena</u> Tristan Albatross [66471]	Endangered*	Species or species habitat may occur within area
<u>Diomedea epomophora (sensu stricto)</u> Southern Royal Albatross [1072]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<u>Diomedea exulans (sensu lato)</u> Wandering Albatross [1073]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
<u>Diomedea gibsoni</u> Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
<u>Diomedea sanfordi</u> Northern Royal Albatross [64456]	Endangered*	Foraging, feeding or related behaviour likely to occur within area
<u>Gallinago hardwickii</u> Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
<u>Gallinago megala</u> Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
<u>Gallinago stenura</u> Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
<u>Haliaeetus leucogaster</u> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<u>Halobaena caerulea</u> Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
<u>Hirundapus caudacutus</u> White-throated Needletail [682]		Species or species habitat known to occur

Name	Threatened	Type of Presence
Lathamus discolor Swift Parrot [744]	Endangered	within area Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat may occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Breeding known to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta (sensu stricto) Shy Albatross, Tasmanian Shy Albatross [64697]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross [64459]	Vulnerable*	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable	Species or species habitat known to occur within area
Fish		
Heraldia nocturna Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
Hippocampus abdominalis Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area
Hippocampus breviceps Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
Hippocampus minotaur Bullneck Seahorse [66705]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Histiogamphelus briggsii Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area
Histiogamphelus cristatus Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
Hypsognathus rostratus Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area
Kaupus costatus Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area
Kimblaeus bassensis Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area
Leptoichthys fistularius Brushtail Pipefish [66248]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Mitotichthys semistriatus Halfbanded Pipefish [66261]		Species or species habitat may occur within area
Mitotichthys tuckeri Tucker's Pipefish [66262]		Species or species habitat may occur within area
Notiocampus ruber Red Pipefish [66265]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Solegnathus robustus Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Stipecampus cristatus Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Brodribb River F.F.R	VIC
First and Second Islands F.R.	VIC
Lake Corringale W.R	VIC
Lake Curlip W.R.	VIC
Snowy River H.R	VIC
William Hunter F.R	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
East Gippsland RFA	Victoria

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana,		Species or species

Name	Status	Type of Presence
Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Lycium ferocissimum African Boxthorn, Boxthorn [19235]		habitat likely to occur within area Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area

Nationally Important Wetlands		[Resource Information]
Name	State	
Lower Snowy River Wetlands System	VIC	
Snowy River	VIC	

Key Ecological Features (Marine)	[Resource Information]
Key Ecological Features are the parts of the marine ecosystem that are considered to be important for the biodiversity or ecosystem functioning and integrity of the Commonwealth Marine Area.	

Name	Region
Upwelling East of Eden	South-east

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-37.79305 148.53609

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- [Natural history museums of Australia](#)
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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APPENDIX 3:

Traffic Management Plan

**Proposed Multi lot residential subdivision
10 Marlo Road, Marlo**

**Town Planning Report -
Traffic Management Plan
(East Gippsland Planning Scheme DPO7)**

Prepared for:
M & K Grech

Prepared by:
**Crossco Consulting Pty Ltd
PO Box 858
Bairnsdale Vic 3875**

Document revision

Version	Date	Prepared by	Comments
Final	31/08/2015	M Supplitt	Distribution: Client, C&S
Final	29/10/2015	Crossco	Distribution: C&S (Rev B drawings)
Rev A	02/08/2016	M Supplitt	Distribution: C&S (Rev C drawings)
Rev B	17/11/2016	M Supplitt	Distribution: C&S (Rev D drawings)
Rev C	11/11/2019	M Supplitt	Distribution: C&S updated drawings
Rev D	20/12/2019	M Supplitt	Distribution: C&S insert updated drawing 1918-004F showing shared crossovers at Ward Street
Rev E	20/02/2020	M Supplitt	Distribution: C&S insert updated drawing 1918-004G showing access to Balance Lot A

Notice:

This Traffic Management Plan:

- 1. Has been prepared by Crossco Consulting Pty Ltd for M&K Grech.***
- 2. Is for the use of M&K Grech in seeking planning approval for the proposed subdivision on land subject to East Gippsland Planning Scheme DPO7.***
- 3. Is for the use of East Gippsland Shire in assessing any planning application submitted by M&K Grech or on their behalf for the proposed development of land subject to East Gippsland Planning Scheme DPO7.***

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1 Background

Crossco Consulting Pty Ltd has been engaged by M & K Grech to prepare a Traffic Management Plan to accompany a development plan for consideration of East Gippsland Shire Council to develop land at 10 Marlo Road, Marlo (site).

The site is subject to the East Gippsland Shire Planning Scheme (EGSPS) DPO7, which requires Traffic Management Plan be submitted as follows:

A Traffic Management Plan including:

- Describes the internal road network including traffic volumes, pedestrian and cyclist pathways and internal road hierarchy.
- Identifies appropriate linkages to adjoining land.

2 Site Overview

2.1 Location

The site is located at Marlo, which is located adjacent to the mouth of the Snowy River in East Gippsland.

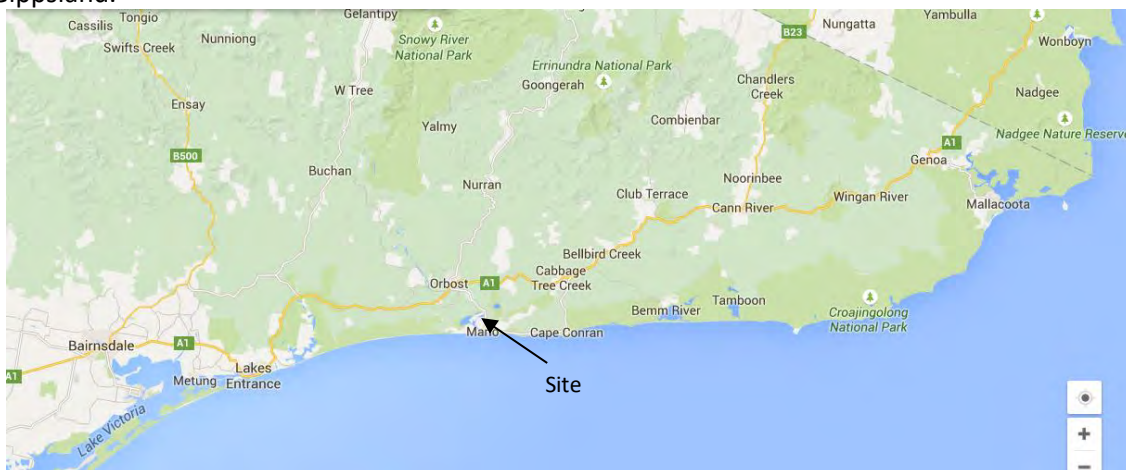


Figure 1: Locality Plan

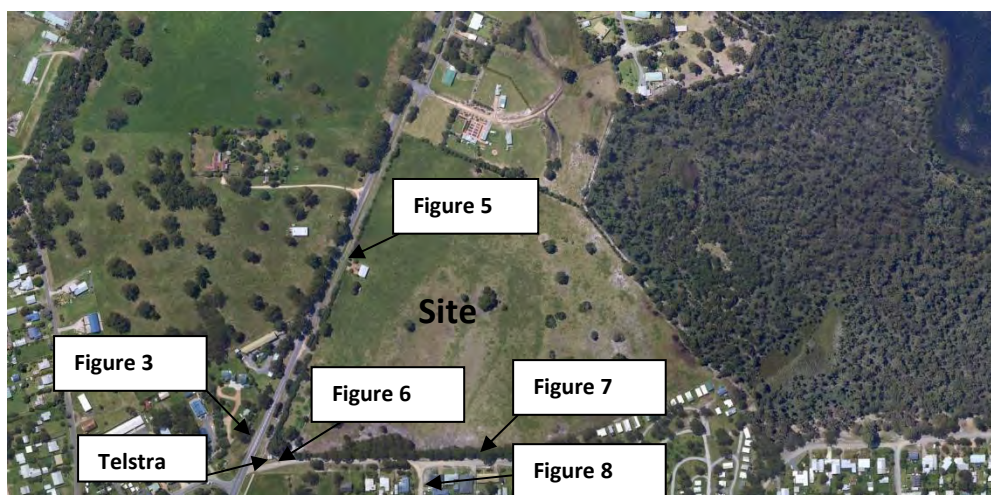


Figure 2: Site Aerial

3 Existing Traffic Infrastructure

Crossco Drawings 1918/002-D and 1918/003-D at Appendix 1 shows existing traffic infrastructure in the vicinity of the site.

A site inspection was undertaken on 15 July 2015 and the following photographs taken which indicate the condition of existing traffic infrastructure. The photographs were taken from the positions indicated on Figure 2.



Figure 3: Marlo Road

Figure 3 shows Marlo Road, and is taken from the west side of Marlo Road looking to the north.
Note:

- the culvert under the road.
- pavement marking which can also be seen in Figure 4.
- no shoulder on Marlo Road



Figure 4: Aerial Marlo Road / Ward Street



Figure 5: Marlo Road & Walking Track

Figure 3 shows Marlo Road, and is taken from the east side of Marlo Road looking to the south toward Marlo adjacent to the existing dwelling at proposed Lot 7. Note:

- the location of the 60 km/h signs immediately adjacent to the proposed intersection with Marlo Road.
- pavement marking in the distance at Ward Street intersection
- walking track to the left
- proximity of trees and embankment on the west side of Marlo Road
- no shoulder on Marlo Road



Figure 6: Marlo Road / Ward Street Intersection

Figure 3 shows Marlo Road / Ward Street intersection, and is taken from the north side of Ward Street adjacent to the existing Telstra installation. Note:

- vehicle travelling south along Argyle Parade
- gravel surface on Ward Street extend to edge of seal on Marlo Road
- a number of electricity poles / light posts / pole stay in proximity to the intersection
- turning moves are uncontrolled



Figure 7: Ward Street / Perry Street intersection



Figure 8: Perry Street

Figure 3 shows the Ward Street and the intersection with Perry Street, and is taken from Ward Street east of the intersection with Perry Street. Note:

- gravel road
- no formed drainage
- existing vegetation in the road reserve

Figure 3 shows Perry Street and the intersection with Ward Street, and is taken from Perry Street. Note that Perry Street is a gravel road with no formal drainage or footpath.



Figure 9: Marlo Road to south

Figure 3 is taken from google maps street view and is taken adjacent to the existing dwelling at proposed Lot 7. Of note is:

- the existing 60km/h signs as shown in Figure 5.
- driveway to the existing dwelling.
- batter and vegetation on the west side of Marlo Road.
- no gravel shoulder.

In summary the existing nearby public roads can be described as follows:

Marlo Road	VicRoads managed road Classified "Arterial" road (C107) Sealed surface Traffic Lane width: varies 2.9m – 3.2m (if constructed now 3.5m would be required) Shoulder grassed
Ward Street	Council managed road Gravel surface Road width: varies 4.4m – 4.8m

4 Proposed Project

The project proposes the development of the 13.64 ha site at 10 Marlo Road, Marlo for residential purposes. The proposal creates 104 residential allotments (there is an existing dwelling on one proposed allotment), a 5,973m² future development site (Lot A), and a number of reserve areas as shown on Crowther and Sadler Drawing 16273, Version 9 dated 08/11/2019.

5 Access / Egress

5.1 Vehicle

Vehicle access / egress is proposed to be taken from:

- a new intersection to be constructed at Marlo Road, and
- an upgraded intersection at Ward Street / Marlo Road, and
- Ward Street / Perry Street intersection which will be reconfigured to be a controlled four-way intersection (currently uncontrolled T intersection as Perry Street terminates at Ward Street).

5.1.1 Marlo Road New Intersection

Crowther & Sadler, Town Planners, advise that a preliminary discussion regarding the proposed project and intersections has been undertaken with VicRoads and this Traffic Management Plan is premised on the outcomes of the discussion but subject to VicRoads confirmation and final approval.

Marlo Road is a declared public road administered by VicRoads. At the location of the site Marlo Road is classified as an “arterial road” (C107).

No access to allotments is proposed from Marlo Road.

The following Traffic Volume data has been provided by VicRoads on 6 August 2015:

- Annual Average Daily Traffic (AADT) 950
- Growth rate 1.9%
- Trucks AADT 30
- Peak traffic flow (two way) of approximately 380

Completion of proposed Stage 2 requires the construction of a new intersection with Marlo Road. Based on the traffic volume data this intersection as a minimum the following treatment is required in accordance with AusRoads Guide to Road Design:

- Rural basic right turn (BAR)
- Rural basic left turn (BAL)

The intersection will be designed and constructed in accordance with VicRoads requirements and it is anticipated consistent with VicRoads practice, that this would be included as a condition of any planning permit issued for the development. Notwithstanding the minimum requirements noted above, VicRoads has indicated (pers comm Crossco) that based on current conditions including speed zone, the requirements for the layout of the intersection may be:

- Channelised right turn (CHR)
- Left turn slip lane

A conceptual intersection layout is included at Appendix 3 illustrating the intersection layout. VicRoads has indicated may be acceptable, subject VicRoads requirements at the time formal approval of the intersection is sought from VicRoads.

5.1.2 Ward Street

Proposed Stage 1 (refer to Crowther and Sadler “Staging Plan” Version 9 dated 08/11/2019) requires the upgrade of Ward Street including new intersection and upgrade of the existing Marlo Road intersection.

Ward Street is an existing public road administered by East Gippsland Shire Council.

Completion of proposed Stage 1 requires a new intersection to be constructed from the site opposite the current termination of Perry Street at Ward Street, to Council’s satisfaction.

It is noted that any change to the intersection of Ward Street and Marlo Road will require VicRoads approval as VicRoads administers Marlo Road. As shown in Figure 6 and Figure 7 above, Ward Street is a gravel road.

Vehicle movements per day (vmpd) once the site is developed are assumed to be generated from:

- existing Ward Street allotments (14)
- proposed Stage 1, Stage 3, Stage 5, Lot A (66)

Assuming 10 vehicle movements per day $((14+66) \times 10)$ a total of 800 vmpd could be anticipated in Ward Street.

Based on the estimated vmpd Ward Street could be conservatively classified an “Access Street – Level 1”¹

Construction of Ward Street is proposed to be undertaken including:

- kerb and channel to north side
- all-weather seal
- drainage (refer to Stormwater Management Plan)
- footpath to north side
- Ward Street is proposed to terminate at the east end in a T-head allowing for garbage truck turns to Council’s satisfaction

A concept intersection layout is included at Appendix 3 illustrating a proposed “Give Way” control at Perry Street, with Ward Street retaining right of way.

5.1.3 Ward Street / Marlo Road Intersection

The Ward Street / Marlo Road intersection is proposed to be improved to current intersection design standards, with turning movement remaining unrestricted. That is, the intersection is proposed to be upgraded and allow for all turning movements currently allowed legally at the intersection.

As Marlo Road is a VicRoads managed road, the intersection design will require VicRoads approval and is proposed to be upgraded to VicRoads requirements which as a minimum is anticipated to include:

- kerb and channel at Ward Street (east side of intersection)
- all-weather seal
- drainage
- a splitter island with pedestrian refuge at Ward Street (refer to Crossco Drawing No 1918/014-B included at Appendix 3 for indicative layout)

¹ East Gippsland Planning Scheme Clause 56.06

5.1.4 Legal Agreement

We are advised that the existing S173 Legal Agreement (AJ819739B) which in part prescribes upgrade requirements and cost for Ward Street is to be removed from the property. We have therefore ignored the provisions of the agreement in addressing the traffic engineering issues for Ward Street.

5.2 Pedestrian

Pedestrian links and shared pathways are proposed as shown on Crossco Drawing 1918/004-G included at Appendix 1.

The shared pathways are proposed to be 2.5m wide.

All internal roads are proposed to include a 1.5m wide concrete footpath.

A footpath is proposed on the north side of Ward Street as part of the upgrade of this street.

The footpaths and/or shared pathways proposed link to the existing sealed shared trail along the east side of Marlo Road and to the existing concrete footpath to the south of the Marlo Road / Ward Street intersection.

5.3 Bicycle

Pedestrian links and shared pathways are proposed as shown on Crossco Drawing 1918/004-G included at Appendix 1. The shared pathways are proposed to be 2.5m wide asphalt paths allowing for bicycles and pedestrians, and link to the existing sealed trail on the east side of Marlo Road.

It is understood that the East Gippsland Shire Council Bicycle Strategy (1999) has been superseded by the East Gippsland Trails Strategy (July 2012). This document does not provide any specific guidance regarding the provision for bicycles beyond what is proposed.

It is noted that Council does not support the development of a shared path between Orbest and Marlo (*Snowy River Shared Path*)².

6 Internal Road Network

6.1 Planning Scheme

The road classifications and requirements of Clause 56.06 have been considered along with Council's adopted IDM Version 4.3, September 2014.

Crossco Drawing 1918/004-G shows the internal road network and indicative traffic control measures.

6.2 West Entry Road (new Marlo Road intersection)

A 24m wide road reserve is proposed to allow for a landscaped entry within the road reserve with feature planting. There is no provision for car parking on the entry road and parking will be discouraged.

The entry road is proposed to be surfaced with a 30mm asphalt wearing course.

² EGSC Council Meeting Minutes 7 April 2015.

6.3 Internal Roads

Internal roads will be constructed to the standard of Access Street – Level 1 as per Clause 56.06 of the East Gippsland Planning Scheme. The cross-sections included in Crossco Drawing 1918/004-G illustrates the proposed footpath, traffic lane and verge widths.

The internal roads are proposed to be developed progressively as each stage is required. It is noted that some infrastructure (such as drainage) is required to be constructed through future stages, however roads are not proposed to be constructed in advance of the development of each Stage.

All internal roads are proposed to be surfaced with a 30mm asphalt wearing course.

6.3.1 Classification

Table 1 provides a summary of Clause 56.06 and current IDM requirements for the internal road network, along with the proposed design responses illustrated in Crossco Drawing 1918/004-G.

Table 1: Internal road compliance

	Clause 56.06	IDM	Proposed	Compliant with Clause 56.06 & IDM
Classification	Access Street – Level 1	Access Street	Access Street – Level 1	Yes
Traffic volume	1000 vpd to 2000 vpd	1000 veh/day max	Max 790 vmpd	Yes
Carriageway width	5.5m with 1 hard standing verge parking per lot	7.3m Parking provision within carriageway	7.3 – includes parking within carriageway	Yes
Road Reserve		16m	18m	Yes
Verge width	4m each side	3.5m both sides	Varies minimum 4m both sides	Yes
Kerb	Semi-mountable rollover or flush	B2, SM2 or modified SM2	SM2-M	Yes
Footpath width	1.5m both sides	Both sides	1.5m one side	Yes ⁽¹⁾
Cycle path provision	Carriage way designed as a shared zone and appropriately signed	No separate cycle provision	No separate cycle provision	Yes

(1) Council approved variation in lieu of Developer contribution for footpath construction in Perry Street (ref. IDM clause 1.7).

6.3.2 Internal Road Termination

The layout of the subdivision has been designed such that there is one road that terminates at a cul-de-sac which will be designed with a minimum radius of 10m as required for Residential Court Bowls at Table 2 of the current IDM.

There are two locations where lot access is via a 4m wide road (Access Lane category) being access to:

- Lots 14 and 15 at the north-west of the proposed subdivision, and
- Lots 102, 103 and 104 at the south-east of the proposed subdivision.

This is regarded as acceptable given the small number of lots to be accessed.

6.4 Garbage Collection

Allotments can be provided with garbage collection services at the allotment frontage, with the exception of proposed:

- Lots 14 and 15 which will be required to leave bins adjacent to proposed Lot 16 or 13 for collection.
- Lots 102, 103 and 104 which could leave bins adjacent to the proposed reserve to the north subject to the collection service preferred location.

6.5 Hierarchy

Indicative traffic control measures and road hierarchy are shown on Crossco Drawing 1918/004-G. Within the site the internal “loop” road has been designed to retain right-of-way.

Entry Road from Marlo Road:

- STOP and pavement marking at exit on to Marlo Road
- GIVE WAY and pavement marking at intersection with internal “loop” road (internal road has right-of-way)

Internal “loop” Road:

- has right-of-way at all intersections

Central cul-de-sac:

- GIVE WAY and pavement marking at intersection with internal “loop” road (internal “loop” road has right-of-way)

Proposed Lots 107-108:

- GIVE WAY and pavement marking at intersection with internal “loop” road (internal “loop” road has right-of-way)

Ward Street / Perry Street / Access road:

- GIVE WAY and pavement marking at intersection with internal “loop” road (internal “loop” road has right-of-way)
- GIVE WAY and pavement marking at intersection with Ward Street (Ward Street has right-of-way)
- GIVE WAY and pavement marking at Perry Street intersection with Ward Street

Ward Street / Marlo Road intersection:

- GIVE WAY and pavement marking at intersection with Marlo Road

This indicative hierarchy and associated control measures are subject to final design requirements of VicRoads and Council and may therefore vary.

7 Conclusion

- Stage 1 requires the upgrade of Ward Street and the Ward Street / Marlo Road intersection in accordance with VicRoads requirements.
- Stage 2 of the development requires the construction of a new intersection with Marlo Road in accordance with VicRoads requirements.
- Internal roads are to be to the standard of Access Street - Level 1 with the exception of approximately 35 lineal metres of Access Lane servicing proposed Lots 14 and 15 and approximately 50 lineal metres Access Lane servicing proposed Lots 102, 103 and 104.
- Footpaths are proposed on one side of all internal streets, and the Developer will contribute to the construction of a footpath on one side of Perry Street.
- Internal streets terminate at a cul-de-sac with a radius of 10m.

M Supplitt
20/02/2020



Appendix

Appendix 1 – Drawings

Site Topography – Drawing 1918/001-D

Existing Traffic Infrastructure – 1918/002-D & 1918/003-D

Road Infrastructure Layout Plan – 1918/004-G

FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS AN APPENDIX TO THE TOWN PLANNING REPORT DATED NOVEMBER 2016 FOR EAST GIPPSLAND SHIRE PLANNING SCHEME DP07 PREPARED FOR MICHAEL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT



LEGEND:

- 10 EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- W EXISTING WATERMAIN
- V-A EXISTING OVERHEAD ELECTRICITY



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M & K GRECH
10 MARLO ROAD,
MARLO.

SITE TOPOGRAPHY PLAN

DRAWING No.

1918/001-D



1: 500 AT A1
1: 1000 AT A3



FOR DISCUSSION PURPOSE ONLY
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- LEGEND:**
- 10 — EXISTING CONTOURS (1.0m INTERVAL)
 - ==== EXISTING EDGE OF SEAL
 - - - - EXISTING WATERMAIN
 - V - A - EXISTING OVERHEAD ELECTRICITY



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M & K GRECH
10 MARLO ROAD,
MARLO.

EXISTING TRAFFIC INFRASTRUCTURE
SHEET 1 OF 2

DRAWING No.
1918/002-D

0 10 20 40 60 80
1 : 1000 AT A1
1 : 2000 AT A3
DATE: 09 NOVEMBER 2016

FOR DISCUSSION PURPOSE ONLY

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LEGEND:

- 10 — EXISTING CONTOURS (1m INTERVAL)
- — — EXISTING EDGE OF SEAL
- W — — EXISTING WATERMAIN
- V — — EXISTING OVERHEAD ELECTRICITY

CROSSCO
ENGINEERING & ENVIRONMENTAL CONSULTANTS

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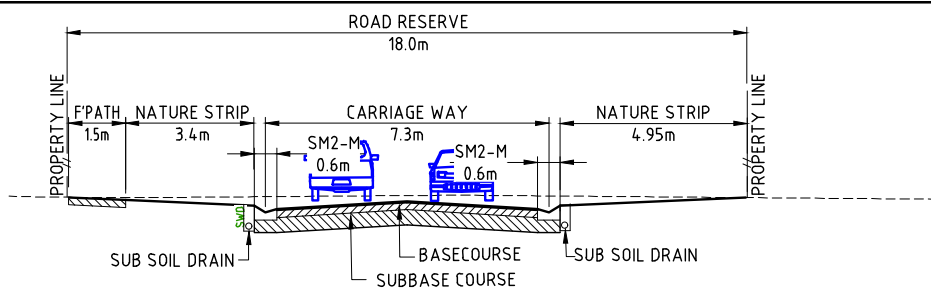
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SHEET 2 OF 2

DRAWING No.
1918/003-D

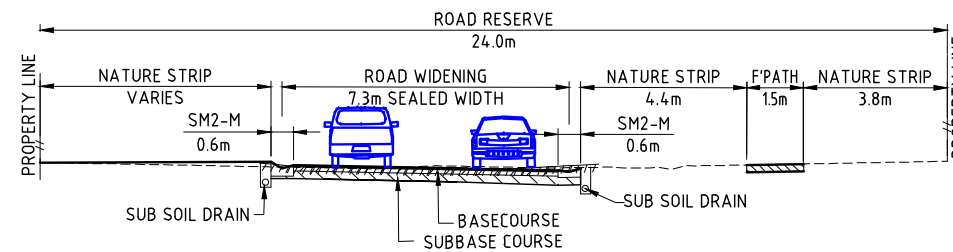
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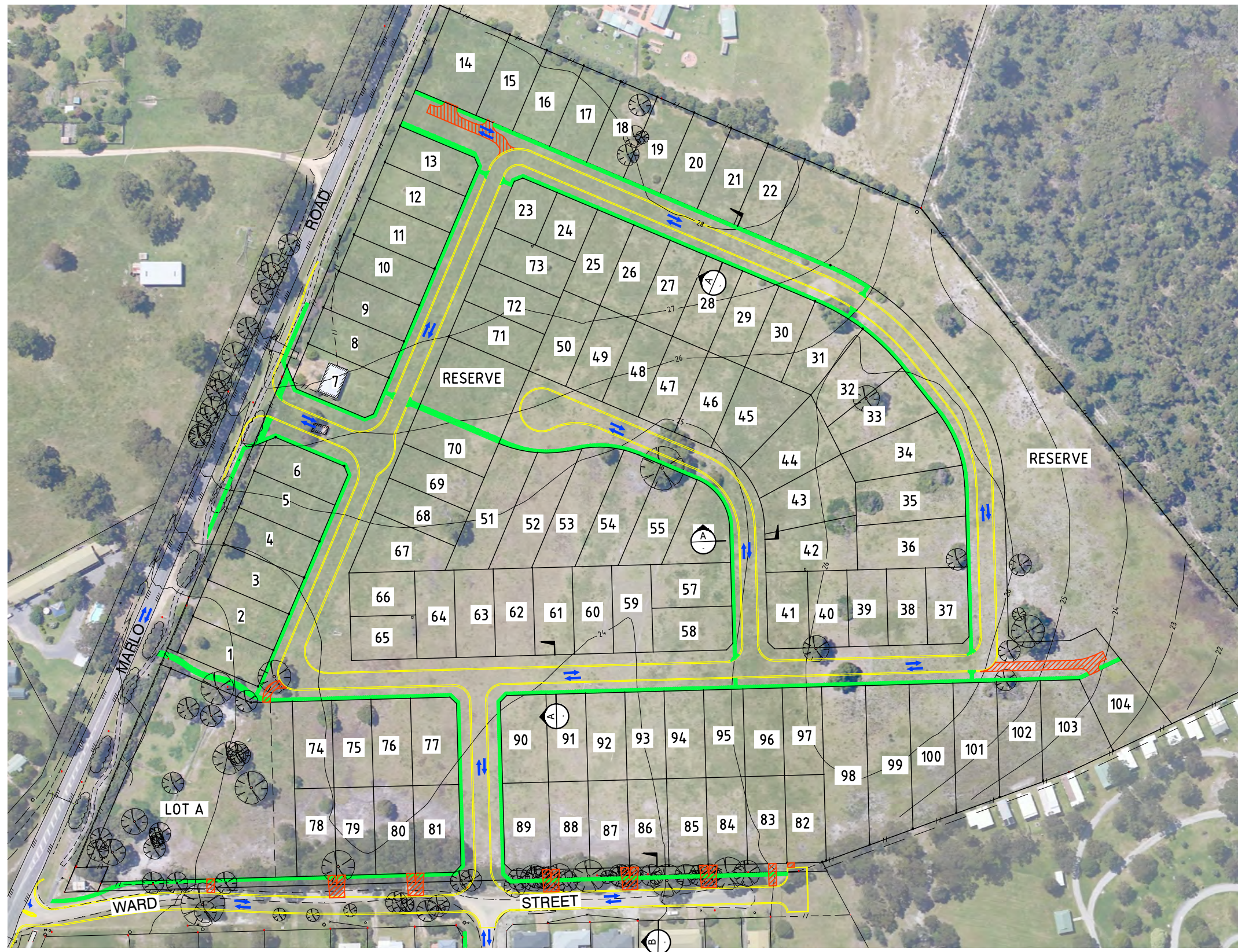
DATE: 09 NOVEMBER 2016



SECTION A
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1:200 A3



SECTION B
SCALE 1:100 -
1:200 A3

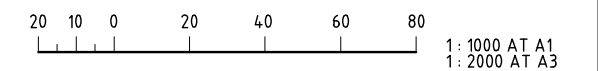


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LEGEND:

- INDICATIVE ROAD ALIGNMENT
- INDICATIVE FOOTPATH
- ▨ INDICATIVE DRIVEWAYS
- TRAFFIC DIRECTION
- 10 EXISTING CONTOURS (0.2m INTERVAL)
- EXISTING EDGE OF SEAL

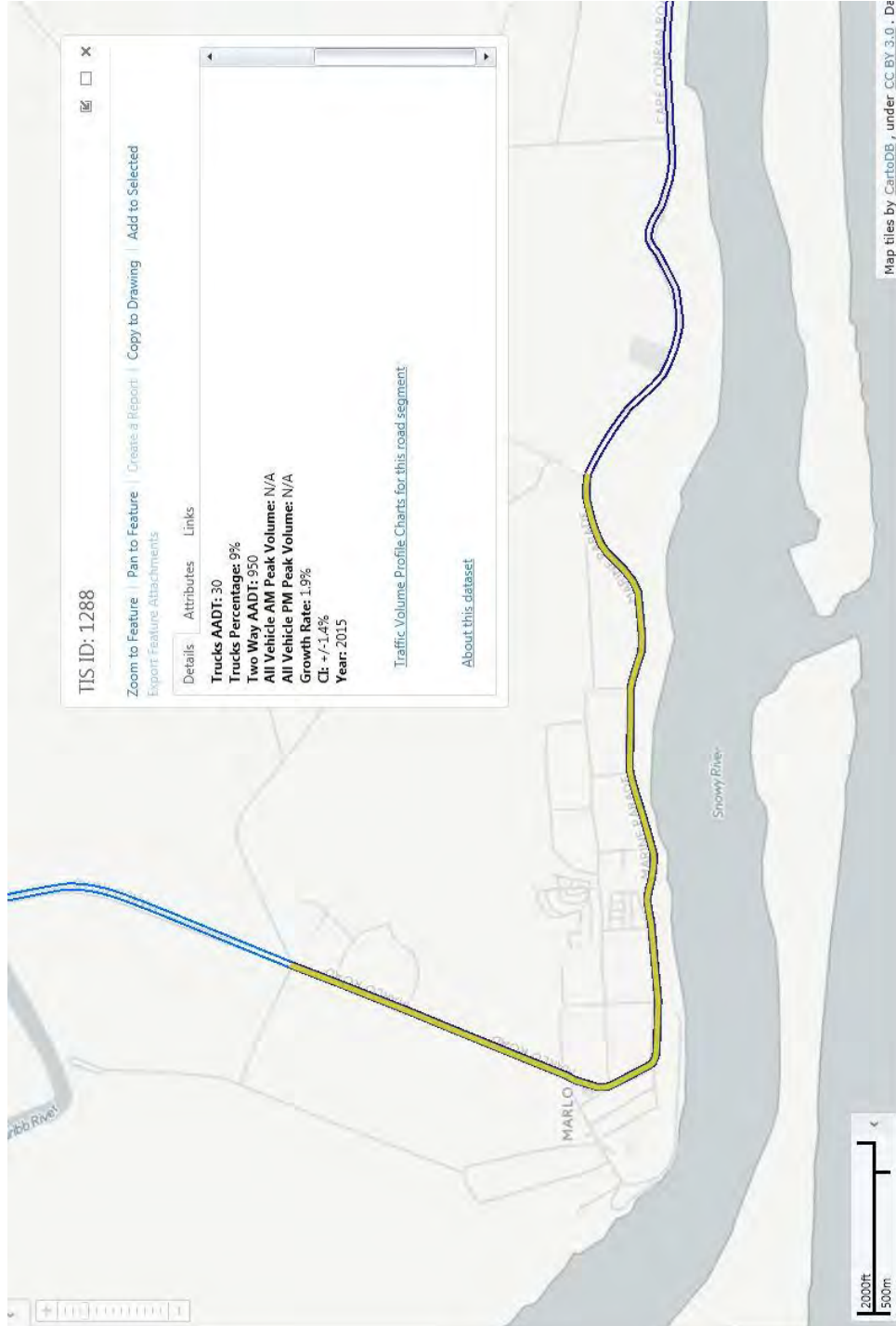


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M & K GRECH
10 MARLO ROAD, MARLO
ROAD INFRASTRUCTURE LAYOUT PLAN

DRAWING No.
1918/004-G

Appendix 2 – VicRoads Traffic Data





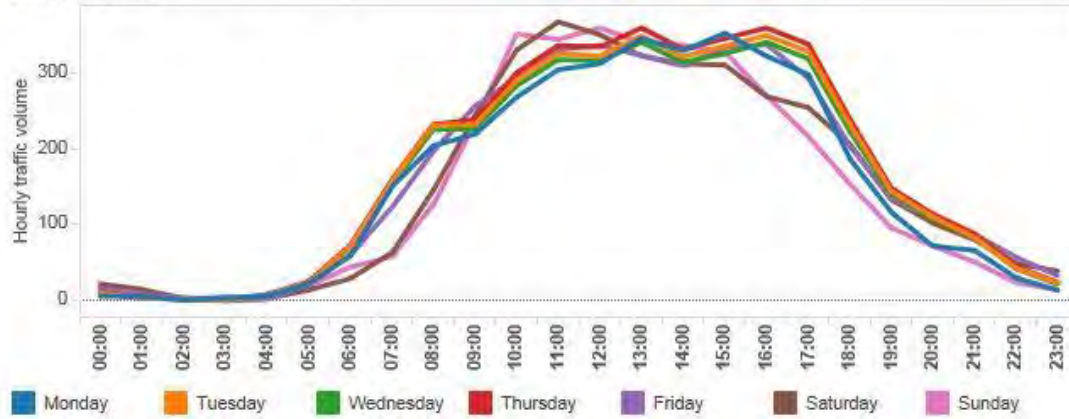
Traffic Profiles

MARLO ROAD btwn HEALEYS ROAD & UNNAMED

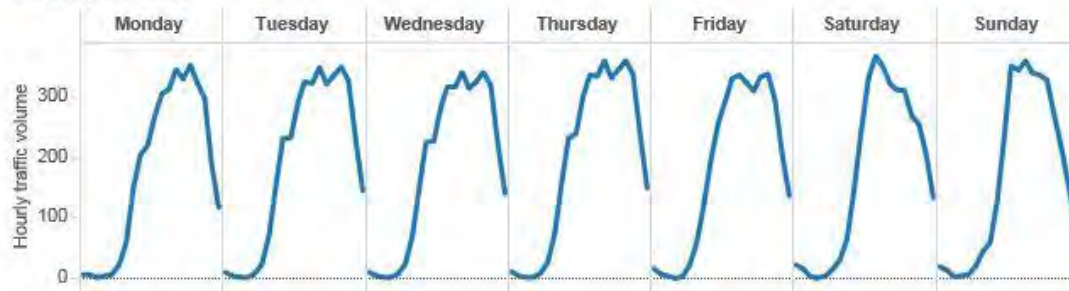
Daily Profile

Direction: (All)

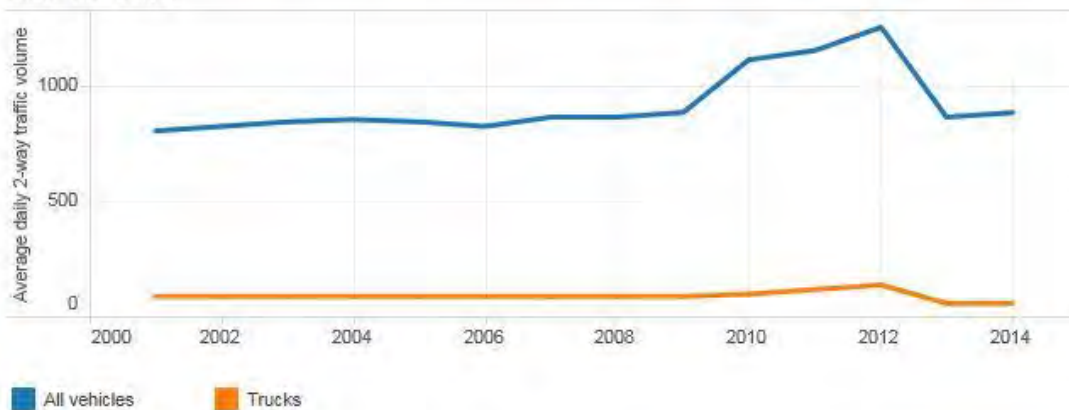
Period Type: (All)



Weekly Profile



Last 10 Years



Undo

Redo

Reset

+ a b | e a u

more by this author



Share



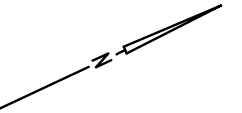
Download

Appendix 3 – Conceptual Intersection Layout

Marlo Road – Crossco Drawing 1918/015-A

Marlo Road / Ward Street – Crossco Drawing 1918/014-B

Ward Street – Crossco Drawing 1918/013-B



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M & K GRECH
10 MARLO ROAD, MARLO
CONCEPTUAL MARLO ROAD
INTERSECTION LAYOUT

DRAWING No.
1918/015-A

DATE: 11 NOVEMBER 2019





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CONCEPTUAL WARD ST & MARLO RD
INTERSECTION LAYOUT

DRAWING No.

1918/014-B

10 5 0 10 20
1: 500

A4 SCALE



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CONCEPTUAL WARD ST & PERRY ST
INTERSECTION LAYOUT

DRAWING No.

1918/013-B



APPENDIX 4:

Stormwater Management Plan

**Proposed Multi lot residential subdivision
10 Marlo Road, Marlo**

**Town Planning Report -
Stormwater Management Plan
(East Gippsland Planning Scheme DPO7)**

Prepared for:
M & K Grech

Prepared by:
**Crossco Consulting Pty Ltd
PO Box 858
Bairnsdale Vic 3875**

Document revision

Version	Date	Prepared by	Comments
Final	31/08/2015	M Supplitt	Distribution: Client, C&S
Final	29/10/2015	Crossco	Distribution: C&S (Rev B drawings)
Rev A	02/08/2016	M Supplitt	Distribution: C&S (Rev C drawings)
Rev B	17/11/2016	M Supplitt	Distribution: C&S (Rev D drawings)
Rev C	11/11/2019	M Supplitt	Distribution: C&S. Update drawings

Notice:

This Stormwater Management Plan:

- 1. Has been prepared by Crossco Consulting Pty Ltd for M&K Grech.***
- 2. Is for the use of M&K Grech in seeking planning approval for the proposed subdivision on land subject to East Gippsland Planning Scheme DPO7.***
- 3. Is for the use of East Gippsland Shire in assessing any planning application submitted by M&K Grech or on their behalf for the proposed development of land subject to East Gippsland Planning Scheme DPO7.***

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1. Background

Crossco Consulting Pty Ltd has been engaged by M & K Grech to prepare a Stormwater Management Plan to accompany a development plan for consideration of East Gippsland Shire Council to develop land at 10 Marlo Road, Marlo (site).

The site is subject to the East Gippsland Shire Planning Scheme (EGSPS) DPO7, which requires and Stormwater Management Plan be submitted as follows:

A Stormwater Management Plan including:

- *Details of stormwater management measures.*
- *Details of how the development will comply with best practice environmental management for urban stormwater.*
- *Any other matters as required by the responsible authority and the relevant water authority.*

This plan considers the management of stormwater at the developed site.

2. Site Overview

2.1 Location

The site is located at Marlo, which is located adjacent to the mouth of the Snowy River in East Gippsland.

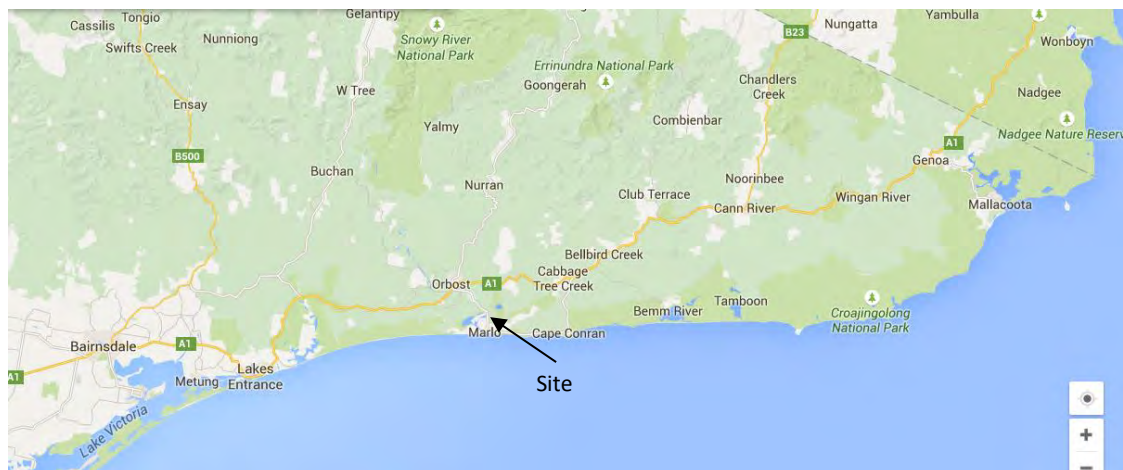


Figure 1: Locality Plan

Figure 2 provides an overview of the location of the site in relation to existing development at Marlo. The waterways associated with the town are also shown.



Figure 2: Aerial Overview

2.2 Site Drainage



Figure 3: Marlo Topography¹

Figure 3 provides an overview of the topography of Marlo, showing the land grading to the west toward the Brodribb and Snowy Rivers, and south toward the Snowy River. The contours are at 10m intervals and indicate that the site is reasonably flat (a total fall of 10 m over 360m from north to south), however Crossco Drawing 1918/001 at Appendix 1 provides a more accurate picture and shows that there is some undulations within the site.

¹ Reference: www.land.vic.gov.au

There are two ridgelines through the property in roughly a north-south direction as shown on Crossco Drawing 1918/001 at Appendix 1:

1. To the east of the property, with land to the east of this ridge falling to the south-east at approximately 1:20 (V:H) and land to the west falling to the south-west at 1:25 (V:H).
2. To the west of the property, with land to the east of this ridge falling to the south-east at maximum grade of approximately 1:20 (V:H) and land to the west falling to the south-west at 1:30 (V:H).

The site generally slopes to the south.

3. Existing Stormwater Infrastructure

3.1 Municipal Infrastructure

Crossco Drawing 1918/006-G at Appendix 1 shows the location of existing municipal stormwater drainage infrastructure in the vicinity of the site.

3.2 Site Inspection

During the site inspection on 15 July 2015 it was noted that:

1. There was no apparent municipal drainage infrastructure in Ward Street or Perry Street. House drains in Perry Street were observed to discharge to the edge of the Perry Street which is a gravel road.



Figure 4: Perry Street house drain



Figure 5: Perry Street house drain



Figure 6: Ward / Perry Street intersection



Figure 7: Ward Street

The Ward Street road formation has been graded with a minimal crown at some locations to provide some modest drainage of the road surface. There is no formal drainage.



Figure 8: Ward Street house drain outfall

Figure 8 shows the most recent house drain arrangement to be constructed at Ward Street, which comprises a ribbed HDPE pipe under the road to drain stormwater to the north away from the residences and into a beached area. The beached area relies on infiltration to remove stormwater.

2. The culvert under Marlo Road was substantially blocked with sediment and grass and could not be functioning as designed.



Figure 9: Marlo Road culvert outlet (west side)



Figure 10: Marlo Road culvert inlet (east side)

3. Marlo Road



Figure 11: Marlo Road

Some pooling of water is evident at the edge of Marlo Road at the culvert.

4. Proposed Project

The project proposes the development of the 13.64 ha site at 10 Marlo Road, Marlo for residential purposes. The proposal creates 104 residential allotments (there is an existing dwelling on one proposed allotment), a 5,973m² future development site (Lot A), and a number of reserve areas as shown on Crowther and Sadler “Proposed Subdivision” Drawing 16273, Version 9 dated 08/11/2019.

5. Construction Phase Stormwater Management

The peak potential risk associated with poor stormwater management will coincide with construction periods when sediments could become mobilised in stormwater runoff from the site, enter the municipal drainage system and discharged to the Snowy River estuary. This could increase nutrient loads in the estuary or cause smothering of water plants. These potential impacts will be managed by employing the mitigation measures outlined in the Environmental Management Plan referenced by this report.

Risks during the construction periods include:

- Litter
- Mobilised sediment from disturbed ground
- Fuels and oil
- Cement, emulsions and primers, water from cleaning (eg. paints, concrete, tiling)

The construction techniques outlined in the Environmental Management Plan include both civil construction and dwellings. Both activities require attention during construction to minimise the risk of stormwater contamination.

6. Developed Phase Stormwater Management

6.1 Planning Scheme

The East Gippsland Planning Scheme at:

Clause 19.03-3S states that *Planning must consider as relevant number of policy documents including:*

Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO, 1999)

Clause 56.07-4, Standard C25 states that:

The urban stormwater management system must be:

-
- *Designed to meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater – Best Practice Environmental Management Guidelines (Victorian Stormwater Committee 1999) ...*

Council's requirements are able to be complied with and will be incorporated into the detailed design phase of the project. It is anticipated that the detailed design will require the consent of Council prior to construction commencing.

6.2 Proposed Drainage Outfall

Stormwater generated at the site is proposed to be collected in the two catchments identified on Crossco Drawing No 1918/006-G at Appendix 1. Each sub-catchment will outfall the site and joins the existing municipal stormwater system in compliance with Council requirements at the locations indicated on Crossco Drawing No 1918/006-G:

1. West sub-catchment: discharge to proposed stormwater pipe in Ward Street and then to existing Municipal infrastructure to south of Ward Street / Marlo Road intersection.
2. North and East sub-catchment: via detention tank in proposed reserve to the east of proposed Lot 104, and outfall to Municipal drainage system located in Caravan Park to the south.

6.3 Site Detention and Treatment

Stormwater discharging from the allotments is proposed to be retarded to ensure flows do not exceed pre-development flow rates in accordance with Council requirements. Stormwater is proposed to be retarded using a combination of the following strategies which will be confirmed during detailed design of each Stage:

- | | |
|--------------------|--|
| Allotment level | - Rainwater tanks with detention. Figure 12 provides an example of a rainwater tank for an allotment that includes detention of 1500 litres. The required detention for each allotment at this site will be determined during detailed design. |
| During development | - Detention may also be provided by Stage by provision of a detention basin on undeveloped land on the site.
For example stormwater generated by the development of proposed Stage 1 could be retarded by the construction of a temporary detention or infiltration basin on Proposed Lot A. |
| Post construction | - Refer to Appendix 1, Crossco Drawing 1918/006-D which illustrates the proposed developed stormwater management system: <ul style="list-style-type: none"> o West – a raingarden is proposed to be constructed and incorporated into landscaping between proposed Lots 70 and 71. o South-east a raingarden and detention tank are proposed to provide treatment and retard flow. o South-west a linear raingarden is proposed to provide treatment and retard flow. |

Drawing 1918/006-D includes both detention and treatment calculation outputs, demonstrating that post-construction that a stormwater management system can be constructed that meets Council requirements.

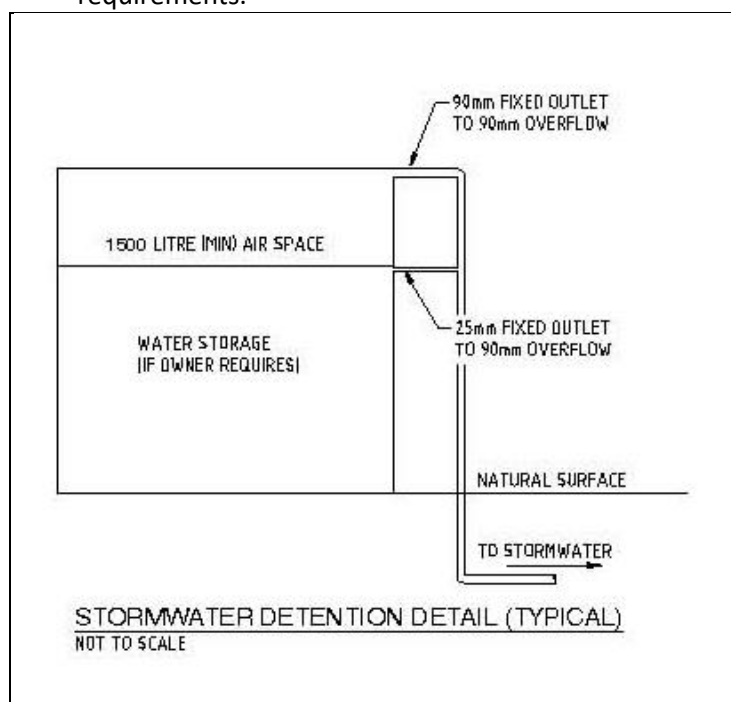


Figure 12: House Tank Example with Detention

It is proposed that prior to statement of compliance for each individual stage, an Agreement in accordance with Section 173 of the *Planning and Environment Act 1987* be executed which will provide that:

- the development of a dwelling on each lot must include a rainwater tank having a minimum detention capacity of 1,500 litres.
- the rainwater tank must collect all rainwater runoff from the roof of the dwelling.

7. Conclusion

- Proposed drainage of the site can be managed in three sub-catchments, draining to existing municipal drainage infrastructure located to the south-east and south-west of the site respectively.
- The construction phase stormwater management proposed will enable management of stormwater pollution during the construction phase.
- The stormwater generated from the developed site will be treated, retarded and discharged from the site in accordance with Council requirements. Council has indicated a preference for rainwater tanks on allotments with detention capacity.
- The stormwater network proposed will provide a significant improvement in stormwater management in the precinct including dwellings at:
 - Ward Street
 - Ward Street / Marlo Road intersection
 - Marlo Road adjacent to the site
 - and subject to final design level, potentially some existing allotments at Perry Street could drain to Ward Street

M Supplitt
11/11/2019



Appendix

Site Topography – Drawing 1901/001-D

Drainage Strategy Plan – Drawing 1901/006-G

Stormwater Management Plan – Drawing 1918-012D

FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS AN APPENDIX TO THE TOWN PLANNING REPORT DATED NOVEMBER 2016 FOR EAST GIPPSLAND SHIRE PLANNING SCHEME DP07 PREPARED FOR MICHAEL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT



LEGEND:

- 10 EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- W EXISTING WATERMAIN
- V - A EXISTING OVERHEAD ELECTRICITY



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M & K GRECH
10 MARLO ROAD,
MARLO.

SITE TOPOGRAPHY PLAN

DRAWING No.

1918/001-D









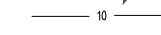
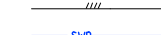




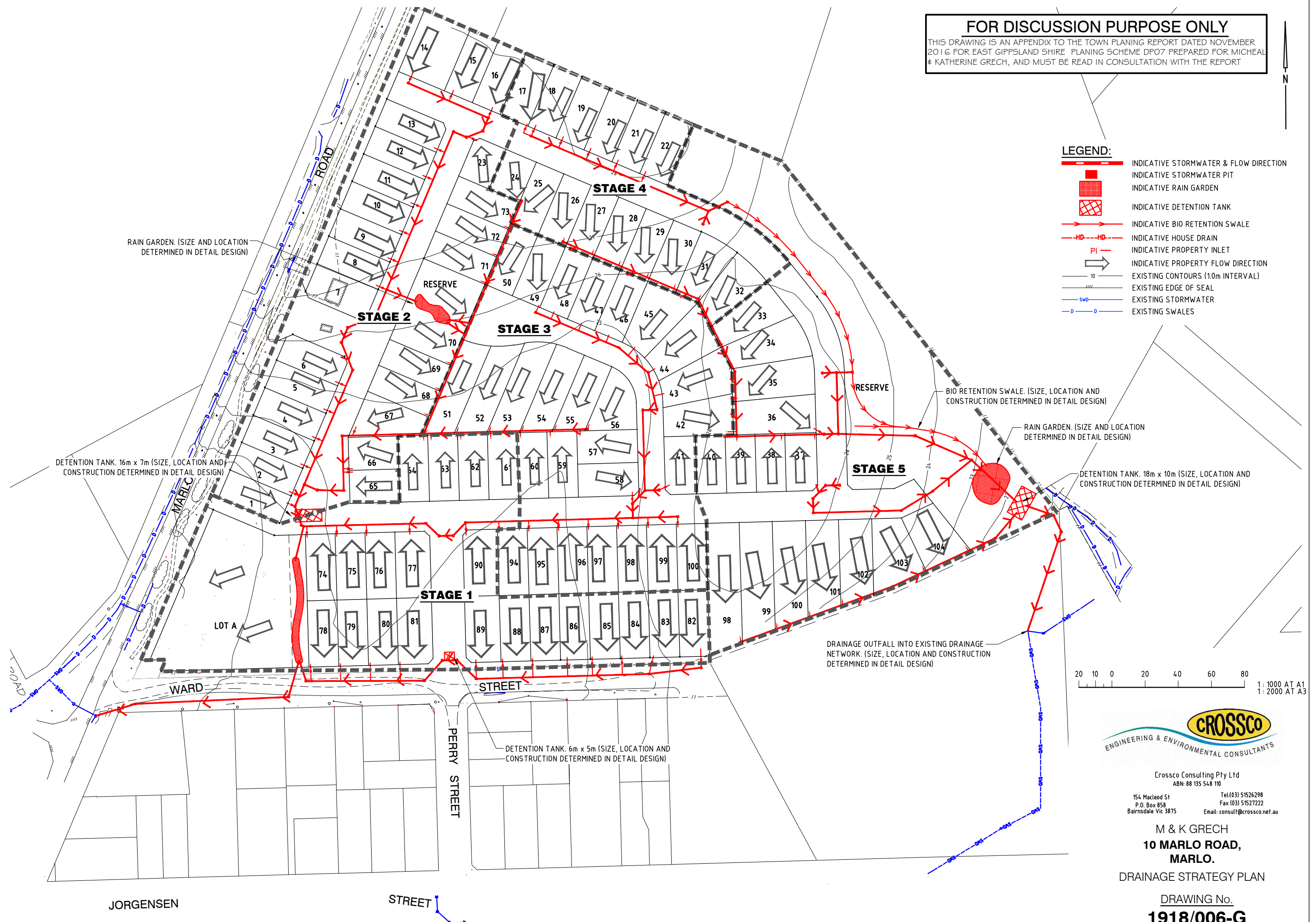
1: 500 AT A1
1: 1000 AT A3

FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS AN APPENDIX TO THE TOWN PLANING REPORT DATED NOVEMBER 2016 FOR EAST GIPPSLAND SHIRE PLANING SCHEME DPO7 PREPARED FOR MICHEAL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT

LEGEND:

-  INDICATIVE STORMWATER & FLOW DIRECTION
-  INDICATIVE STORMWATER PIT
-  INDICATIVE RAIN GARDEN
-  INDICATIVE DETENTION TANK
-  INDICATIVE BIO RETENTION SWALE
-  INDICATIVE HOUSE DRAIN
-  INDICATIVE PROPERTY INLET
-  INDICATIVE PROPERTY FLOW DIRECTION
-  EXISTING CONTOURS (1.0m INTERVAL)
-  EXISTING EDGE OF SEAL
-  EXISTING STORMWATER
-  EXISTING SWALES



20 10 0 20 40 60 80
1: 1000 AT A1
1: 2000 AT A3

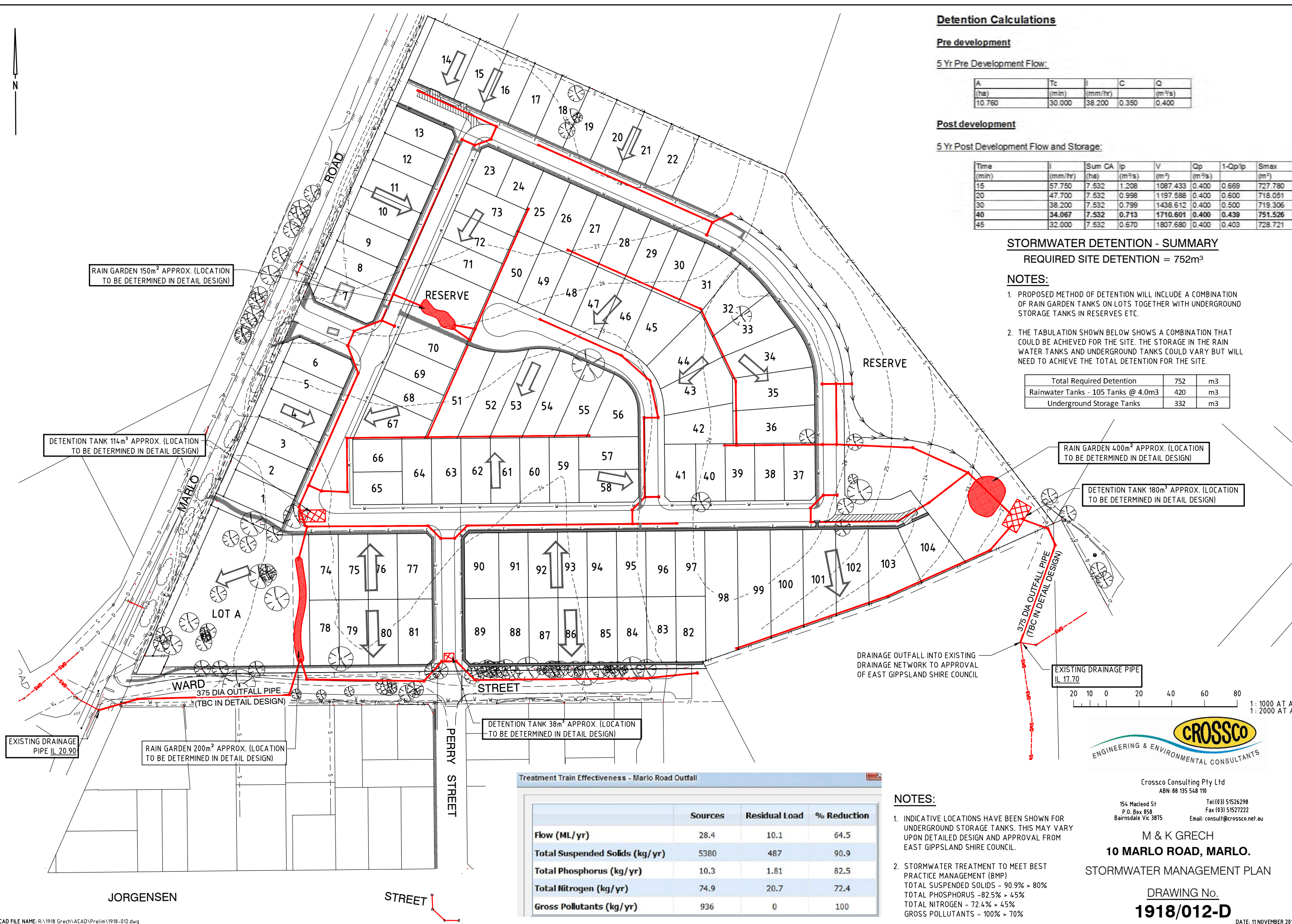


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M & K GRECH
10 MARLO ROAD,
MARLO.
DRAINAGE STRATEGY PLAN

DRAWING No.
1918/006-G

DATE: 11 NOVEMBER 2019



Detention Calculations

Pre development

5 Yr Pre Development Flow:

A	Tc	I	C	Q
(ha)	(min)	(mm/hr)		(m³/s)
10.760	30.000	38.200	0.350	0.400

Post development

5 Yr Post Development Flow and Storage:

Time	I	Sum CA	Ip	V	Qp	1-Qp/Ip	Smax
(min)	(mm/hr)	(ha)	(m³/s)	(m³)	(m³/s)		(m³)
15	57.750	7.532	1.208	1087.433	0.400	0.669	727.780
20	47.700	7.532	0.998	1197.588	0.400	0.600	718.051
30	38.200	7.532	0.799	1438.612	0.400	0.500	719.306
40	34.067	7.532	0.713	1710.601	0.400	0.439	751.526
45	32.000	7.532	0.670	1807.680	0.400	0.403	728.721

STORMWATER DETENTION - SUMMARY

REQUIRED SITE DETENTION = 752m³

NOTES:

1. PROPOSED METHOD OF DETENTION WILL INCLUDE A COMBINATION OF RAIN GARDEN TANKS ON LOTS TOGETHER WITH UNDERGROUND STORAGE TANKS IN RESERVES ETC.
2. THE TABULATION SHOWN BELOW SHOWS A COMBINATION THAT COULD BE ACHIEVED FOR THE SITE. THE STORAGE IN THE RAIN WATER TANKS AND UNDERGROUND TANKS COULD VARY BUT WILL NEED TO ACHIEVE THE TOTAL DETENTION FOR THE SITE.

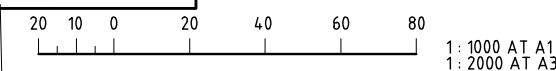
Total Required Detention	752	m3
Rainwater Tanks - 105 Tanks @ 4.0m3	420	m3
Underground Storage Tanks	332	m3

RAIN GARDEN 400m² APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DETENTION TANK 180m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DRAINAGE OUTFALL INTO EXISTING DRAINAGE NETWORK TO APPROVAL OF EAST GIPPSLAND SHIRE COUNCIL

EXISTING DRAINAGE PIPE IL 17.70



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STORMWATER MANAGEMENT PLAN

DRAWING No.
1918/012-D

DATE: 11 NOVEMBER 2019

Treatment Train Effectiveness - Marlo Road Outfall

	Sources	Residual Load	% Reduction
Flow (ML/yr)	28.4	10.1	64.5
Total Suspended Solids (kg/yr)	5380	487	90.9
Total Phosphorus (kg/yr)	10.3	1.81	82.5
Total Nitrogen (kg/yr)	74.9	20.7	72.4
Gross Pollutants (kg/yr)	936	0	100

NOTES:

1. INDICATIVE LOCATIONS HAVE BEEN SHOWN FOR UNDERGROUND STORAGE TANKS. THIS MAY VARY UPON DETAILED DESIGN AND APPROVAL FROM EAST GIPPSLAND SHIRE COUNCIL.
2. STORMWATER TREATMENT TO MEET BEST PRACTICE MANAGEMENT (BMP)
TOTAL SUSPENDED SOLIDS - 90.9% > 80%
TOTAL PHOSPHORUS - 82.5% > 45%
TOTAL NITROGEN - 72.4% > 45%
GROSS POLLUTANTS - 100% > 70%

APPENDIX 5:

Plan of Re-establishment and Features



WARNING
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN

NOTATIONS		
RE-ESTABLISHMENT DATUM MGA94 VIDE PS717022T		
HEIGHTS ARE TO AHD - DATUM VIDE PM 358 (RL12.305m)		
CONTOUR INTERVAL : 0.2m		
DATE OF SURVEY : 16/07/2015		
Crowther & Sadler Pty Ltd. LICENSED SURVEYORS & TOWN PLANNERS 162 MACLEOD STREET, BAIRNSDALE, VIC., 3875 TELEPHONE (03) 5182 5011	SURVEYORS REF. 16664	SCALE @ A1 1 : 1000

Legend of Features
○ Electricity Pit
✕ Stop Valve
□ Telecom Pit
✕ Electricity Pole
✕ Light Pole
⊙ Sewerage Manhole
△ Water Meter
■ Fire Plug
△ Top
○ Sign
■ Grated Pit
CAD FILENAME: N:\Jobs\16000-16999\16600-16699\16664 Grech\16664 Feat v1.pro

PLAN OF RE-ESTABLISHMENT & FEATURES
PARISH OF ORBOST EAST SECTION C CROWN ALLOTMENT 9 ^B (PART) CAT VOL 9546 FOL 023
MICHAEL GRECH 10 MARLO ROAD, MARLO