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Development Plan

10 Marlo Road, Marlo

Reference – 16273

Version 10
10 November 2022

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
21/04/2022	16273	8	Development Plan	EGSC
15/04/2022	16273	9	Development Plan	EGSC
01/07/2022	16273	9	Development Plan	EGSC
10/11/2022	16273	10	Development Plan	EGSC

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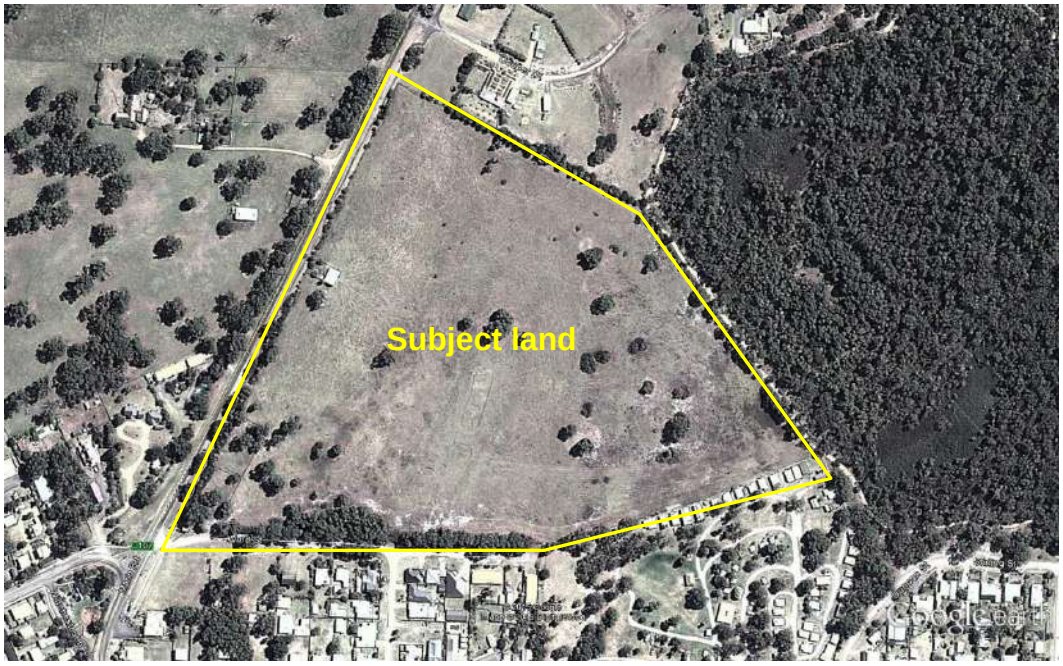
Contents

List of Figures

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 ceased on the land in recent years.

Overall remnant vegetation is considered to offer limited aesthetic and environmental value. A single mature tree located in the centre of the property has been identified as a feature from the proposed entry from Marlo Road. This single tree will be retained within a Reserve No. 5 between the two cul-de-sacs

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 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 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 and 4 and the adjoining allotments maintain consistent height, colour and materials. The fence will be constructed by the Developer and will be required to be maintained 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 5 in the centre of the site. The south-west portion of Reserve No. 1, the large reserve, will primarily serve to provide a bushfire buffer. Reserve No 1 will 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 shared path be constructed on one side of Perry Street between Ward Street and Marine Parade.

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 7 of 44

MGA94 ZONE 55

MARLO ROAD

PLANTATION RESERVE No.4

PLANTATION RESERVE No.2

RESERVE (UNENCUMBERED PUBLIC OPEN SPACE) 480m²

PROPOSED SHARED PATH TO CONNECT WITH EXISTING TRACK

EXISTING TRACK

RESERVE No.1 (ENCUMBERED PUBLIC OPEN SPACE) 1.415ha

RESERVE No.1 (UNENCUMBERED PUBLIC OPEN SPACE) 4750m²

RESERVE No.5 5152m²

RESERVE No.3 681m²

RESERVE No.6 800m²

ROAD

ROAD WIDENING

WARD STREET

PERRY ST

1 840m²	2 840m²	3 840m²	4 840m²
5 840m²	6 840m²	7 851m²	8 851m²
9 840m²	10 840m²	11 852m²	12 1200m²
13 800m²	14 800m²	15 800m²	16 800m²
17 800m²	18 800m²	19 800m²	20 844m²
21 756m²	22 756m²	23 504m²	24 506m²
25 553m²	26 548m²	27 840m²	28 840m²
29 1001m²	30 567m²	31 546m²	32 1212m²
33 1082m²	34 884m²	35 880m²	36 515m²
37 520m²	38 870m²	39 899m²	40 904m²
41 975m²	42 929m²	43 1105m²	44 1257m²
45 1265m²	46 800m²	47 805m²	48 805m²
49 801m²	50 945m²	51 997m²	52 1055m²
53 947m²	54 921m²	55 841m²	56 841m²
57 841m²	58 800m²	59 760m²	60 760m²
61 510m²	62 515m²	63 555m²	64 548m²
65 780m²	66 780m²	67 780m²	68 780m²
69 780m²	70 800m²	71 800m²	72 760m²
73 760m²	74 510m²	75 515m²	77 548m²
78 780m²	79 780m²	80 780m²	81 780m²
82 780m²	83 800m²	84 1672m²	85 1512m²
86 1361m²	87 1204m²	A 5272m²	

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SCALE (SHEET SIZE A1)	FIGURE 1
1 : 1000	
SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 2000	16273

VERSION 16 - DRAWN 21/04/2022

NOTATIONS

AREAS ARE APPROXIMATE ONLY
DIMENSIONS ARE SUBJECT TO SURVEY

PROPOSED SUBDIVISION

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

LOT 2 - LP144829

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

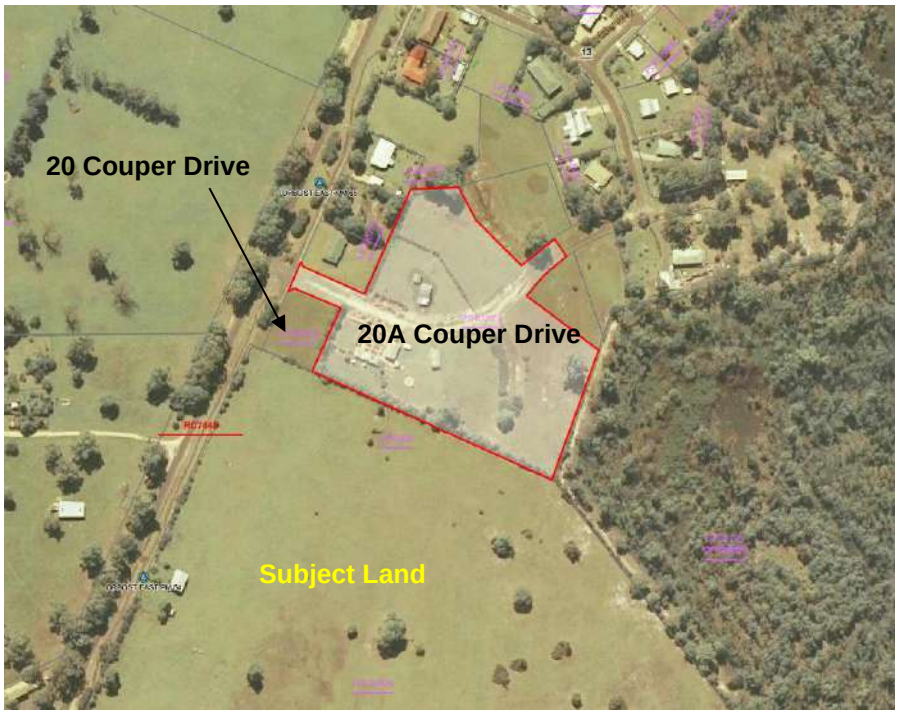
The Marlo State Forest (the State Forest) adjoins the eastern boundary of the subject land and is heavily vegetated. A gravel trail for cyclists and pedestrians has been established and appears well maintained. Vegetation on the northern side of the trail appears to be regularly maintained, presumably 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.

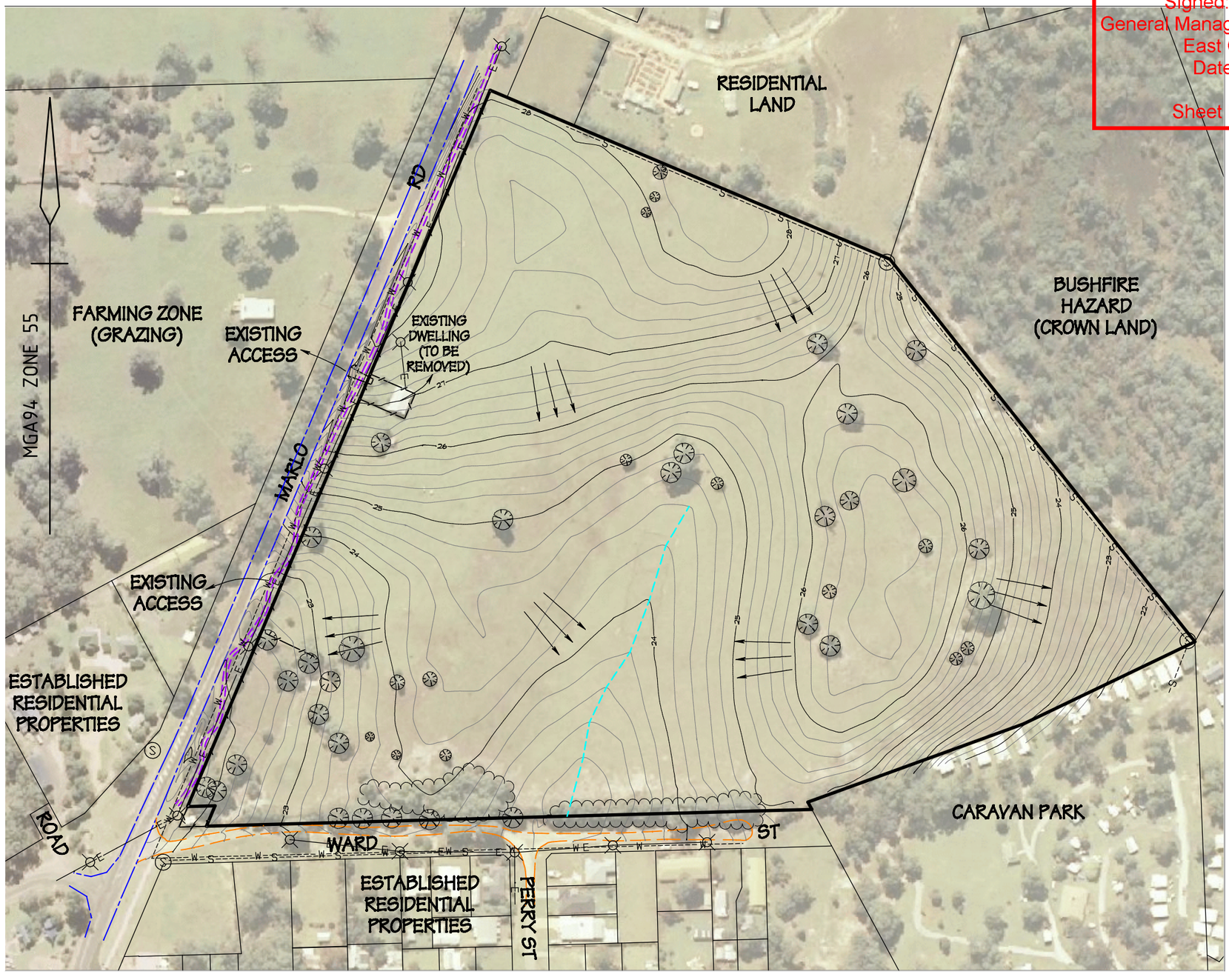


Aerial view of 20A Couper Drive, Marlo north of the subject land

A comprehensive Site Analysis Plan is contained in Figure 2.

FIGURE 2 SITE ANALYSIS PLAN

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 9G (PART)
LOT 2 - LP144829



- 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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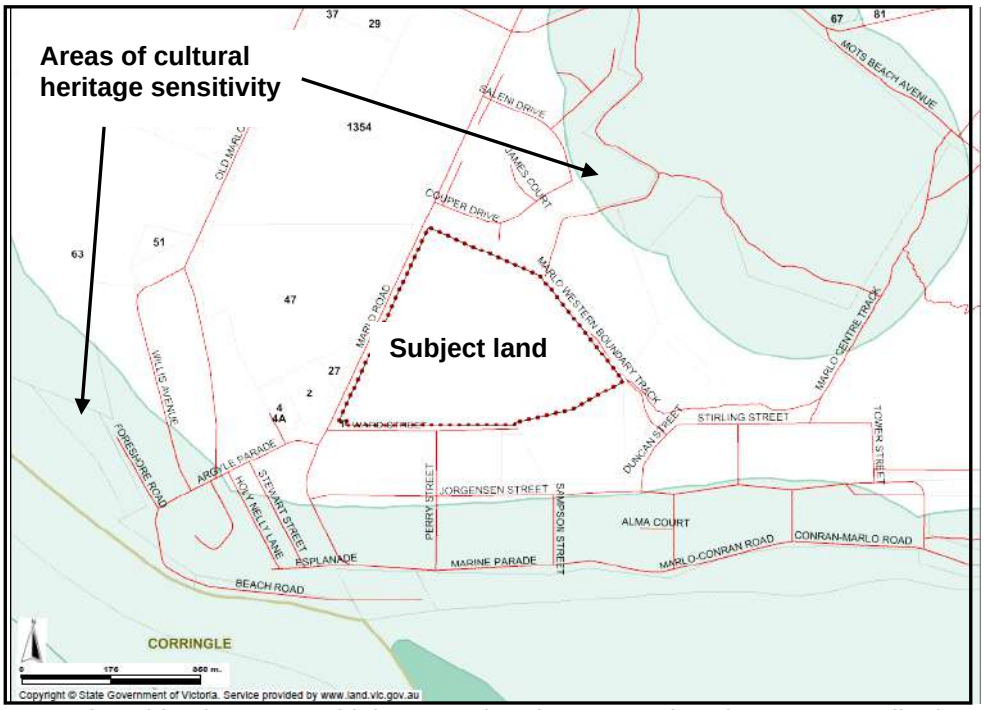
FILENAME: N:\Jobs\16000-16999\16200-16299\16273 Grech\16273 Site Analysis V2.pro

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 and 4 are proposed for the purpose of retaining the roadside screen planting in single ownership and management. Reserves 2 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.

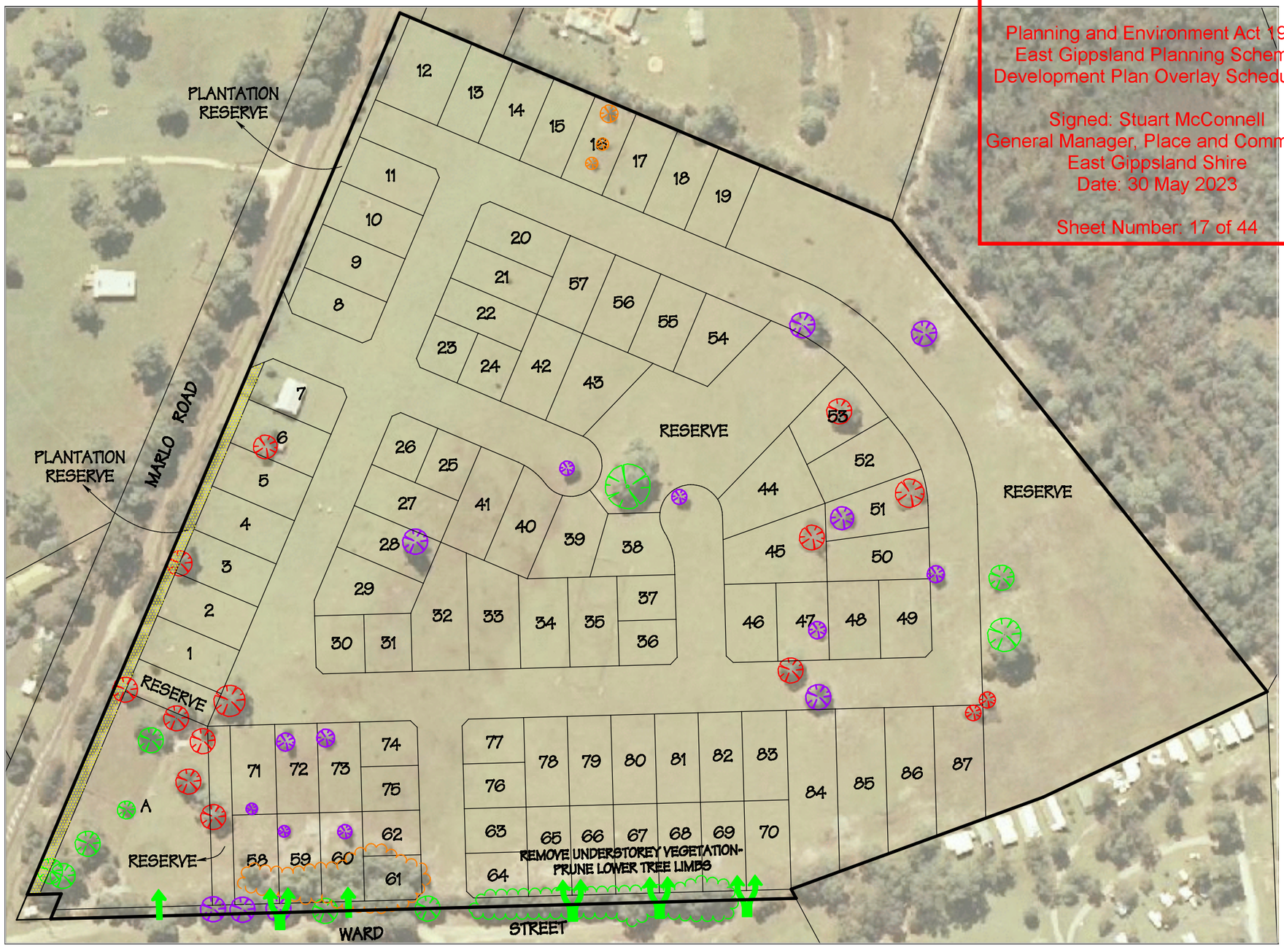
Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 17 of 44

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

MICHAEL & KATHERINE GRECH
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FILENAME: 16273 Veg Management V7.pro

NOTATIONS

SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 2000	16273
	VERSION 7 - DRAWN 02/02/2022

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 six 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 1.89ha. 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 provides 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 No. 1.

Figure 4: Proposed Reserves

Proposed pedestrian connections to existing train in Crown Land

Reserves 2 and 4 will provide for landscape planting adjacent to Marlo Road. Reserves 2 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 two 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 and 4 and the adjoining allotments have a consistent height, colour and materials. It is proposed a horizontal timber paling style fence to a height of 1.8m be constructed as part of Stage 3 and Stage 4 at full cost to the Developer. The fence will be constructed from durable native timber with a natural finish.

Image of horizontal paling timber style fence

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 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 3 and Stage 4 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 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 prescribed 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 defendable 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 reduced.

Reserve 1 has a total area of 1.89ha of which 4750m² at the south–west corner of the reserve is outside the area of defendable space and not encumbered by stormwater drainage infrastructure. The south-west corner retains sufficient area for an informal recreation facilities and therefore provides an area of unencumbered public open space equivalent to 3.48 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 50m². Reserve 5 has an area of 5152m² being with an unencumbered area of 5102m² being equivalent to 3.74 percent of the area of the subject land.

The combined contribution of Reserve 1 and Reserve 5 for public open space is 7.22 percent of the subject land. The combined area of unencumbered public open space will exceed the standard requirement of 5 percent prescribed by 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 throughout the development 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 two raingardens at selected locations and a grassed swale in Reserve No. 6 (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 3.

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 23 of 44

FOR DISCUSSION PURPOSE ONLY

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

N

MARLO ROAD

ROAD

STAGE 1

STAGE 2

STAGE 3

STAGE 4

STAGE 5

RESERVE

LOT A

EXISTING TRACK

DETENTION TANK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

DETENTION TANK 69m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

RAIN GARDEN 50m² APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DETENTION TANK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

RAIN GARDEN. (SIZE AND LOCATION DETERMINED IN DETAIL DESIGN)

DRAINAGE OUTFALL INTO EXISTING DRAINAGE NETWORK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

WARD STREET

PERRY STREET

JORGENSEN STREET

LEGEND:

- INDICATIVE STORMWATER & FLOW DIRECTION
- INDICATIVE STORMWATER PIT
- INDICATIVE TANK DETENTION (UNDERGROUND)
- INDICATIVE RAIN GARDEN
- INDICATIVE DETENTION TANK (3.0KL MINIMUM DETENTION)
- HD — INDICATIVE HOUSE DRAIN
- INDICATIVE PROPERTY FLOW DIRECTION
- 10 — EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- SWD — EXISTING STORMWATER
- D — D — EXISTING SWALES

CROSSCO ENGINEERING & ENVIRONMENTAL CONSULTANTS

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Bairnsdale Vic 3875

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M & K GRECH

10 MARLO ROAD, MARLO.

DRAINAGE STRATEGY PLAN

DRAWING No.

1918/006-H

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

DATE: 16 MARCH 2022

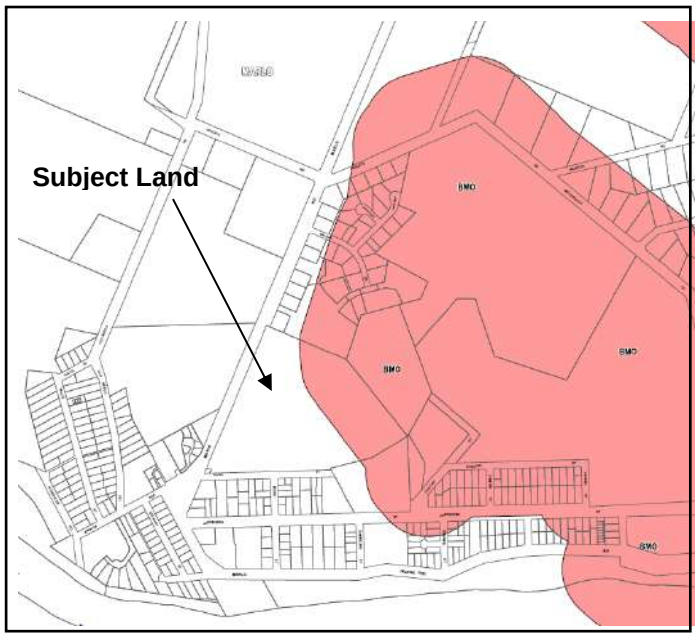
CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-006.dwg

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.

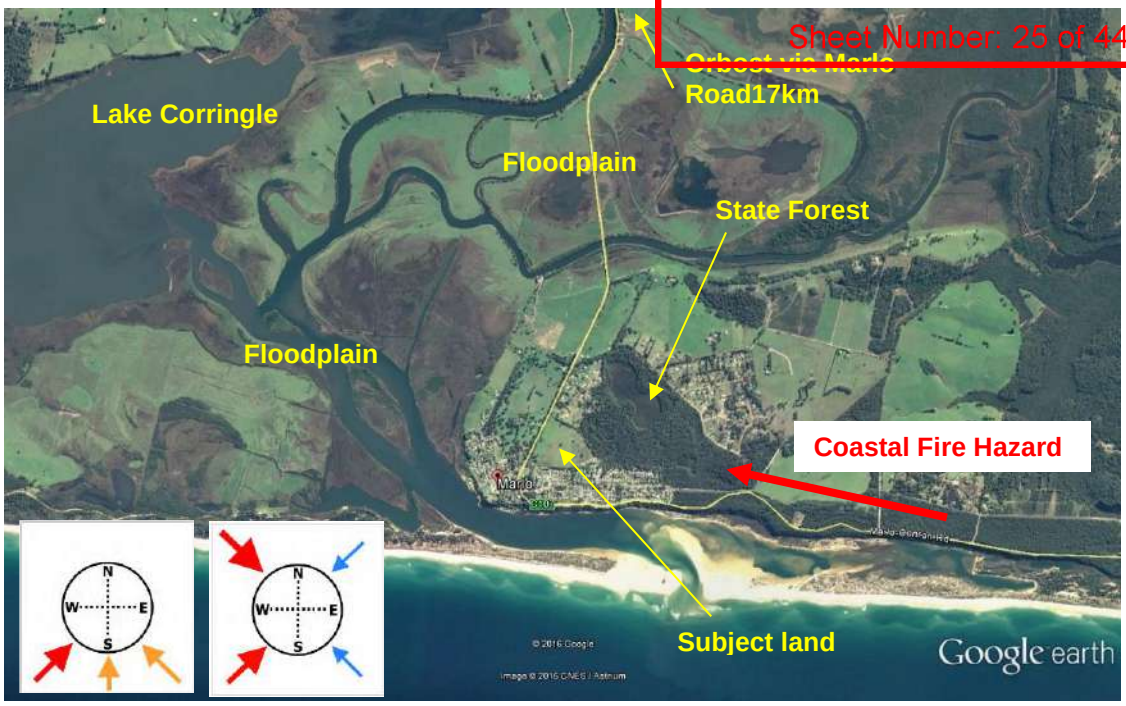


Figure 6: Bushfire Hazard Landscape Assessment

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 to 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 >0-5º.

View north at eastern end of the subject land

View west across subject land

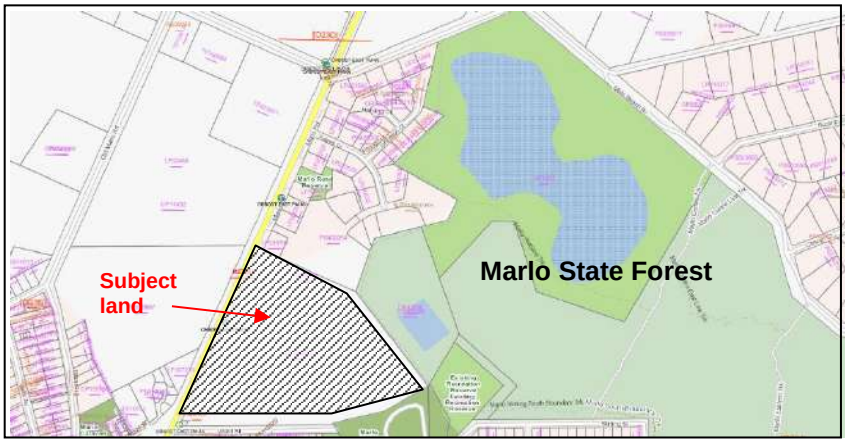
Land to the north and south of the subject land has been developed for residential purposes. Residential properties appear regularly maintained with minimal landscaping. Adjoining land to the north is considered to contain *Modified* vegetation.

Aerial image northern aspect (Saleni Drive neighbourhood)

Photo 1

Photo 2

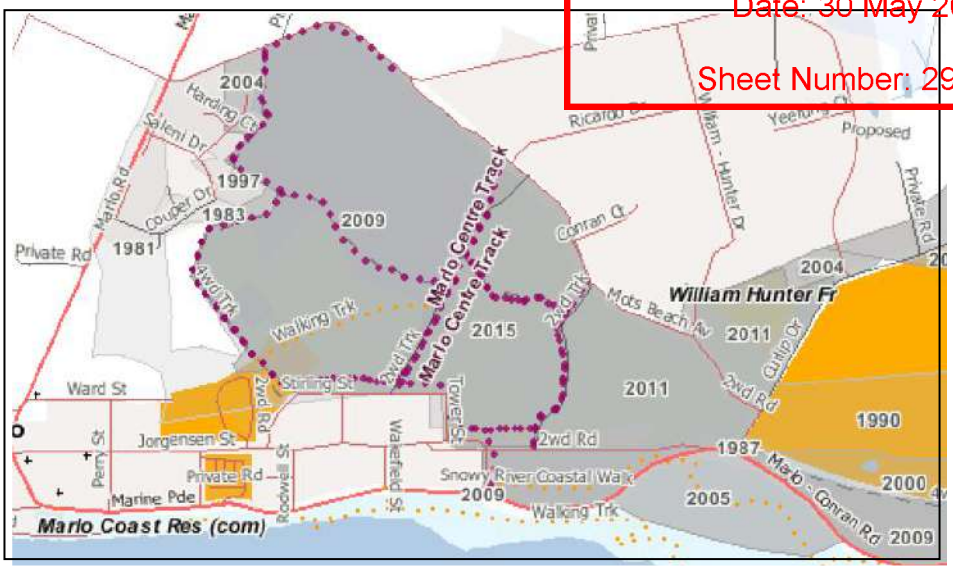
The Marlo State Forest (the State Forest) is located on the eastern boundary of the subject land which includes a network of trails and also contains a wetland in the north. Vegetation within the State Forest is comprised of Banksia Woodland EVC14 with extensive vegetation cover including canopy trees 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 No. 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*.

The retention and enhancement of landscaping adjacent to Marlo Road with the creation of Reserves 2 and 4 will not result in any substantive change in conditions from the current situation. The roadside verge in Marlo Road adjoining the subject land includes a pedestrian path. Grass within the verge is regularly maintained in a low fuel condition. The width of the sealed carriageway together with the maintained verge on the east side of the road will offer protection from the bushfire hazard (Grassland) located within the property on the west side of Marlo Road.

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 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 1-12 (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 to 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.

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.

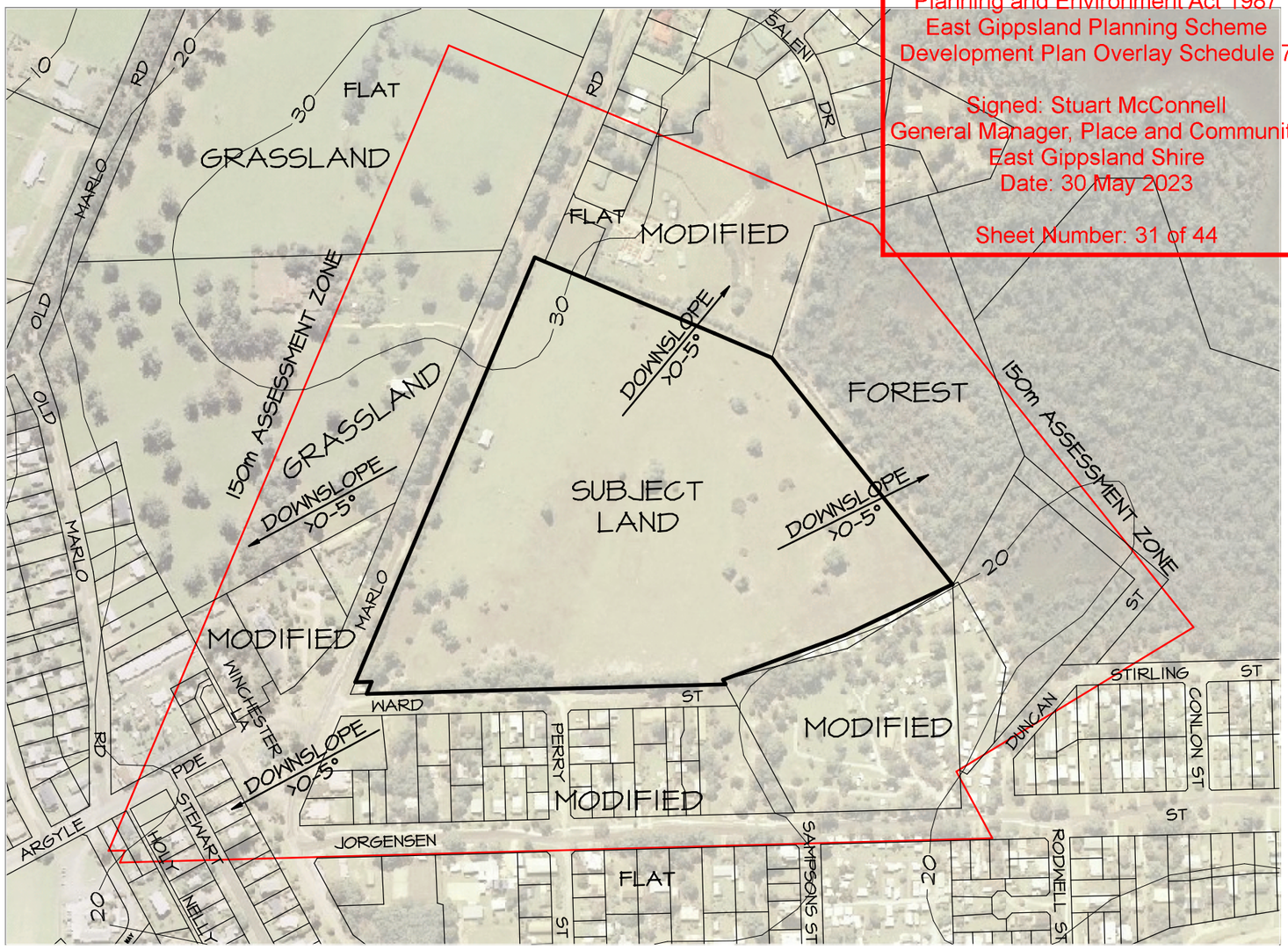
Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 31 of 44

MGA94 ZONE 55



	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

FIGURE 7

BUSHFIRE HAZARD SITE ASSESSMENT PLAN

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

LOT 1 - PS802727D

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FILENAME: 16273 BHSA V4.pro

SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 5000	16273
	VERSION 4 - DRAWN 14/11/2019

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 32 of 44

FIGURE 8

BUSHFIRE MANAGEMENT PLAN

SHEET 1 OF 2

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 9G (PART)
LOT 1 - PS802727D

LEGEND

- 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)	SURVEYORS REF.
1 : 2000	16273 VERSION 7 - 02/02/2022

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FILENAME: 16273 BMP V7.pro

BUSHFIRE MANAGEMENT PLAN

SHEET 2 OF 2

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 9G (PART)
LOT 1 - PS802727D

DEVELOPMENT STAGES 1-5 'BY DEVELOPER'

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.

RESERVE No. 1 'POST DEVELOPMENT'

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.

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

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 7 - 02/02/2022

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FILENAME: 16273 BMP V7.pro

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 the Department of Transport.
- 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 shared path 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 3).

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 shared path 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.

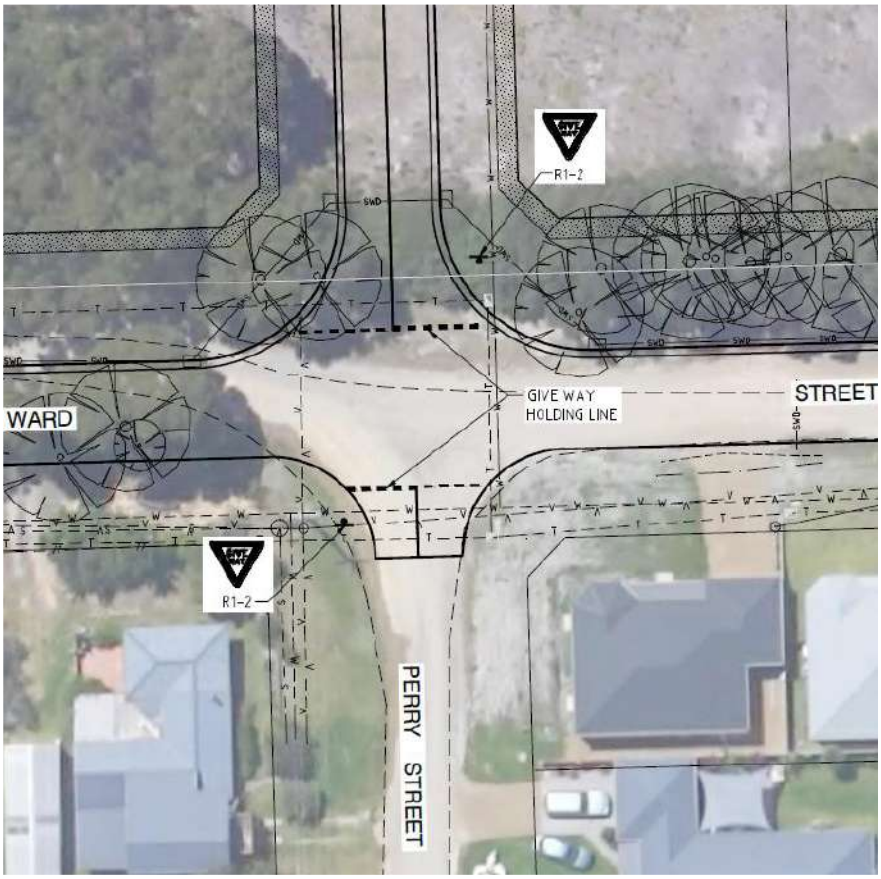
The upgraded intersection of Ward Street and Marlo Road must be designed and constructed to cater for traffic volumes anticipated by the development of the subject land. If possible, the intersection should be capable of being incorporated into the functional layout for the future roundabout however 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.

Item	Requirement	Response
1	*Upgrade of the intersection at Marlo Road, Ward Street*	Include conditions within a Planning Permit requiring detailed construction plans for the upgrade of the intersection of Ward Street and Marlo Road.
2	*Pedestrian access at Marlo Road*	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	*Proposed shared path on one side of Perry Street to provide connection from the subject land to the Esplanade.*	Include a condition within a Planning Permit for the construction of a 2.5m wide shared path on one side of Perry Street, between Ward Street and Marine Parade (the Esplanade). Construction of the pathway may be staged with the approval of Council.
4	*Detailed stormwater drainage design.*	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	*Public open space contribution*	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 *Subdivision Act 1988*. The public open space will comprise unencumbered land as Reserves vested in favour of East Gippsland Shire Council on the plan of subdivision for each stage.
6	*Construction of a fence consistent fence type and landscaping, adjacent to Marlo Road,*	Include a condition within a Planning Permit requiring construction of a horizontal timber paling style fence and landscape planning adjacent to Marlo Road as part of Stages 1 and 2 of the subdivision.
7	*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.*	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	*Implementation of Bushfire Management Plan*	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 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,

Item	Requirement	Response
9	*Reserve No. 1 Bushfire Buffer*	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	*Community Infrastructure Levy*	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. The Community Development Contribution will not be greater than prescribed by Section 46L of the Planning and Environment Act 1987.
11	Design and materials of new buildings to Council's satisfaction.	Include a permit condition that the owner enters into a section 173 agreement requiring that before any development occurs on Lots 1-12 inclusive and A, plans are submitted and approved by Council showing the design and materials of all proposed buildings and any development on these lots must comply with the approved plans to the satisfaction of Council.

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

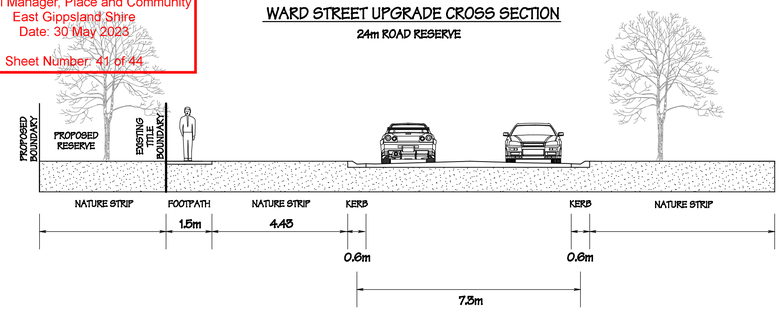
Sheet Number: 41 of 44

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)
- SHARED PATH
- GRAVEL FOOTPATH
- INFORMAL RECREATION FACILITY

WARD STREET UPGRADE CROSS SECTION

24m ROAD RESERVE



TYPICAL STREET CROSS SECTION

18m ROAD RESERVE

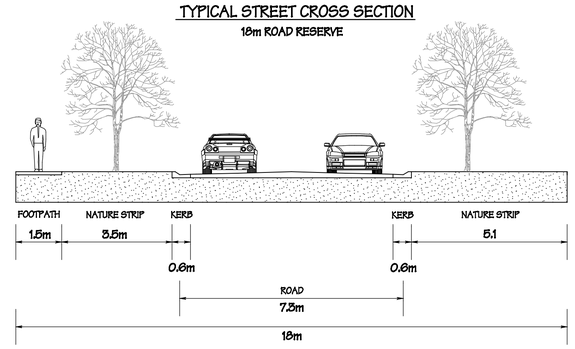


FIGURE 8

INFRASTRUCTURE PLAN

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 9G (PART)

LOT 1 - PS802727D

MICHAEL & CATHERINE GRECH
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FILENAME: 16273 Infrastructure Plan V6.pro

NOTATIONS

LEGEND

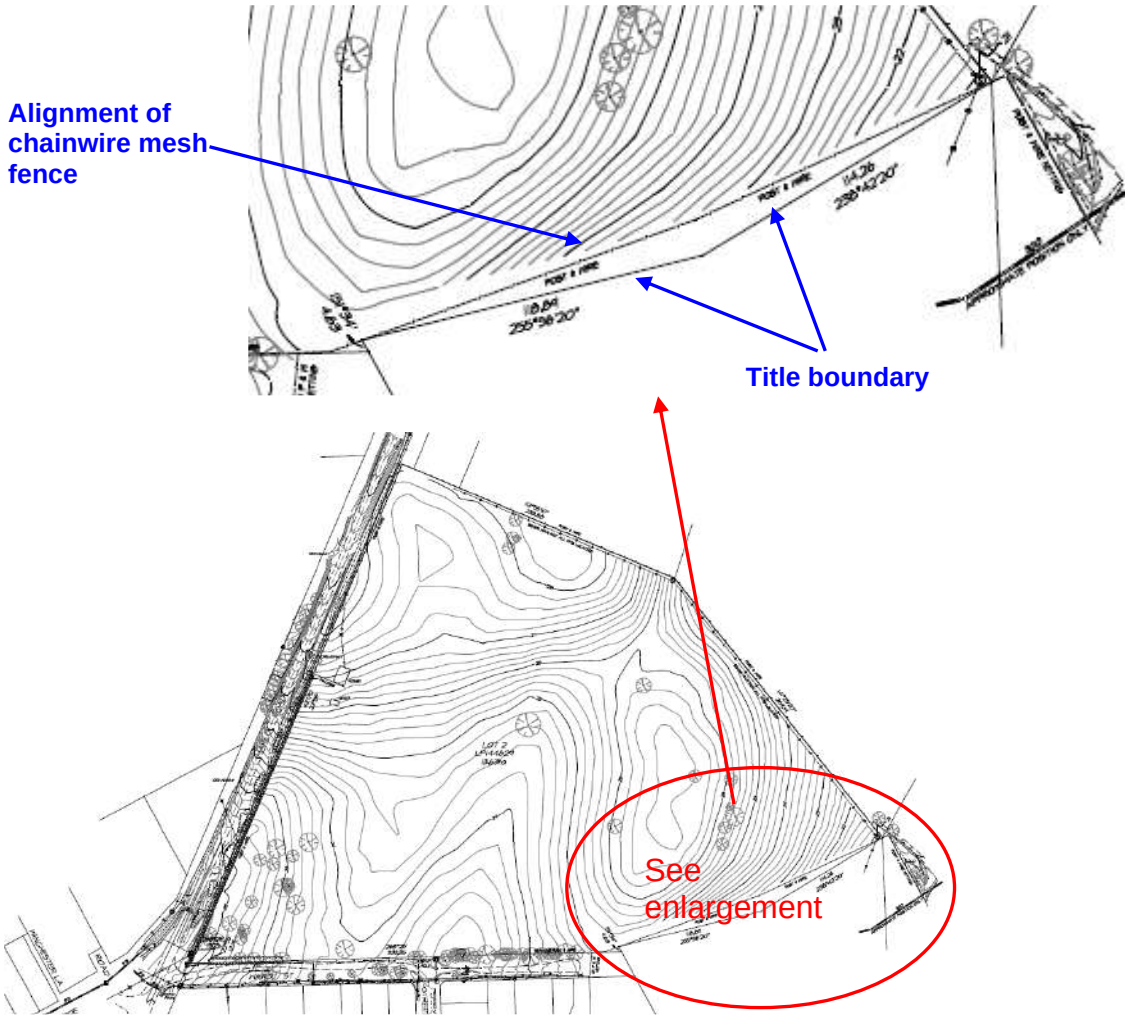
SCALE (SHEET SIZE A1)	SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 1000	1 : 2000	16273 VERSION 6 - 02/02/2022

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 will progress sequentially south to north (Stages 1 and 2) and then west to east (Stages 3, 4 and 5) 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.



Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 43 of 44

MGA94 ZONE 55

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5

MARLO ROAD
ROAD
RESERVE
WARD STREET
PERRY ST

MICHAEL & CATHERINE GRECH
10 MARLO ROAD, MARLO

Crowther & Sadler Pty. Ltd.
LICENSED SURVEYORS & TOWN PLANNERS
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FILENAME: Y:\16000-16999\16200-16299\16273 Grech\16273 Staging V9.pro

SCALE (SHEET SIZE A1)	FIGURE 9
1 : 1000	
SCALE (SHEET SIZE A3)	SURVEYORS REF.
1 : 2000	16273

VERSION 9 - DRAWN 21/12/2021

NOTATIONS

AREAS ARE APPROXIMATE ONLY
DIMENSIONS ARE SUBJECT TO SURVEY

STAGING PLAN

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

LOT 2 - LP144829

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Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number:1 of 134

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

R:/1918
Revision C, 24/03/2022

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)
Rev C	24/03/2022	M Supplitt	Distribution: C&S (incorporate Council resolution of 07/12/2021 including amended subdivisional layout)

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 (of Development Plan) 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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Figures

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-E at Appendix 1 provides more accurate picture and shows that there is some undulations within the site.

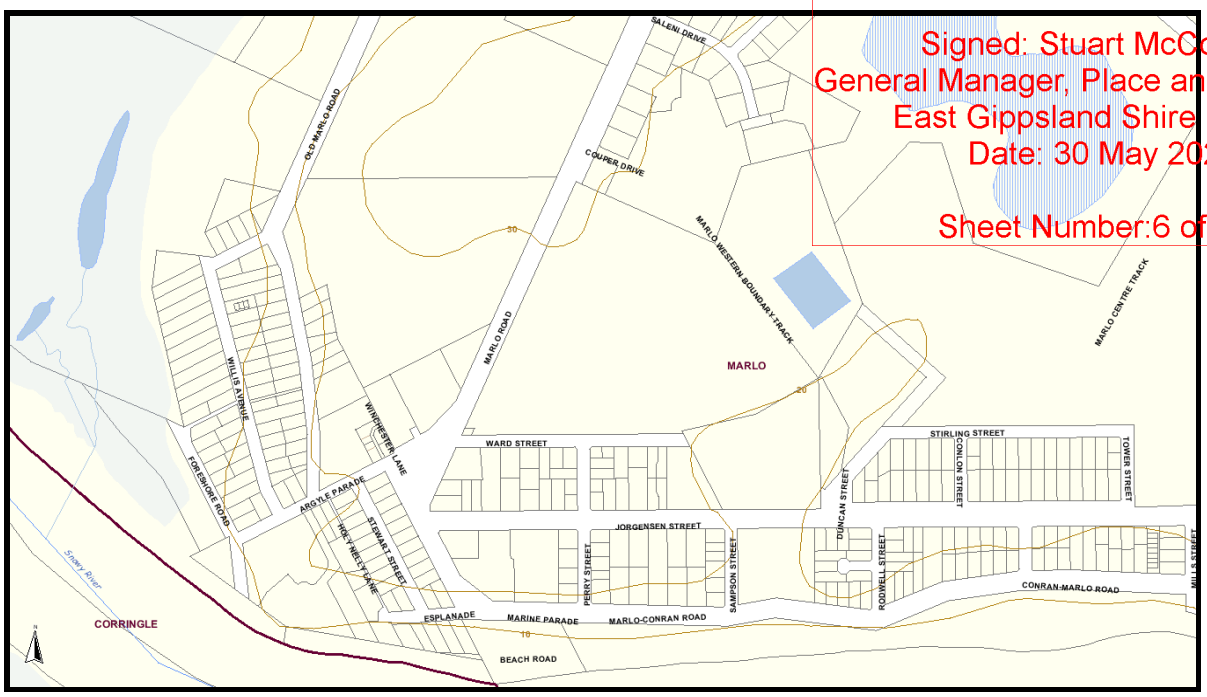

Figure 3: Marlo Topography[1]

There are two ridgelines through the property in roughly a north-south direction as shown on Crossco Drawing 1918/001-E 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 Croajingolong[2] 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 organise-sesquioxide completes (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 with Council on 15 July 2015. A number of subsequent informal inspections have been undertaken in the ensuing years.

No evidence of erosion or unstable soil conditions were identified during the initial 2015 or subsequent site inspections. 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 87 residential allotments in 5 stages (there is an existing dwelling on one proposed allotment), a 5,272m^2 future development site (Lot A), and a number of reserve areas as shown on Crowther and Sadler "Proposed Subdivision" Drawing 16273, Version 15 dated 10/11/2021.

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 9 dated 21/12/2022.

The extent of earthworks by stage is illustrated in Crossco drawing No. 1918/005-E at Appendix 1. This drawing is based on an indicative infrastructure layout plan and preliminary grading of pipes and may vary once preliminary design is undertaken. Preliminary design will 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 required to ensure that erosion controls specified in this Plan are implemented. EPA publication 1834 applies to "commercial and residential building" as well as civil construction and should be fully adopted and enforced for dwelling construction.

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 1834[3] will achieve best practice outcomes. A copy of EPA Publication 1834 is included at Appendix 2.

[3] Earlier versions of this report (201-2016) referenced EPA publication 480 which was superseded by EPA publication 1834 Nov 2020.

The primary soils management technique will be mulching and vegetation of soils, which is effective in most circumstances and consistent with EPA publication 1834:

> *Stabilise exposed soil where applicable with the appropriate structural materials and media for your project or activities (eg. stabilisation matting, rock armour or vegetation), with additional reinforcement to stabilise the base of a slope or embankment.*[4]

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 of civil infrastructure which limits the extent of disturbed area of soil.
- Ground cover is a simple and effective erosion minimisation technique that will be effective at this site.
- Compliance with EPA publication 1834 (as amended) during:
  - civil works construction is recommended.
  - commercial and residential building will reduce the risk of mobilisation of sediment and associated impairment to the constructed stormwater system.

M Supplitt
24/03/2022

[4] EPA Publication 1834, Environmental Guidelines for Major Construction Sites, Environment Protection Authority Victoria, November 2020

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number:10 of 134

Appendix

Appendix 1 – Crossco Drawings

Site Topography – Drawing 1918/001-E

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

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
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FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS PREPARED TO COMPLY WITH CLAUSE 43.04 OF THE PLANNING SCHEME DATED NOVEMBER 2016, AS AMENDED, FOR EAST GIPPSLAND SHIRE PLANING SCHEME DP07 PREPARED FOR MICHEAL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

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N

MARLO ROAD
ROAD
RESERVE
LOT A
WARD STREET
PERRY STREET
EXISTING TRACK

LEGEND:

- EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- EXISTING WATERMAIN
- EXISTING OVERHEAD ELECTRICITY

NOTE:

1. AERIAL INDICATIVE LOCATION ONLY

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Email: consult@crossco.com.au

M & K GRECH

10 MARLO ROAD,
MARLO.

SITE TOPOGRAPHY PLAN

DRAWING No.

1918/001-E

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-001.dwg

DATE: 16 MARCH 2022

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
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FOR DISCUSSION PURPOSE ONLY

THIS DRAWING IS AN APPENDIX TO THE TOWN PLANNING REPORT DATED NOVEMBER 2016, AS AMENDED, AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE. PREPARED FOR MICHEAL & KATHERINE GRECH, AND MUST BE READ IN CONSULTATION WITH THE REPORT

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

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N

STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5

RESERVE
LOT A
EXISITING TRACK
ROAD
WARD STREET
PERRY STREET

LEGEND:

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

NOTES:

1. REFER TO VEGETATION REMOVAL PLAN FOR FURTHER DETAILS REGARDING VEGETATION TO BE RETAINED/REMOVED.

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M & K GRECH
10 MARLO ROAD,
MARLO.
EARTHWORKS STAGING PLAN

DRAWING No.
1918/005-E

20 10 0 20 40 60 80
1 : 1000 AT A1
1 : 2000 AT A3

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-005.dwg

DATE: 16 MARCH 2022

Appendix 2 – EPA Publication 1834

Civil construction, building and demolition guide

Publication 1834* November 2020

*This replaces publications 480 released February 1996, 960 released September 2004, 981 released May 2005, Section 2 of 1254 released October 2008 and 1264 released November 2008.

VICTORIA State Government

EPA acknowledges Aboriginal people as the first peoples and Traditional custodians of the land and water on which we live, work and depend. We pay respect to Aboriginal Elders past and present.

As Victoria's environmental regulator, we pay respect to how Country has been protected and cared for by Aboriginal people over many tens of thousands of years.

We acknowledge the unique spiritual and cultural significance of land, water and all that is in the environment to Aboriginal people and Traditional custodians. We recognise their continuing connection to, and aspirations for Country.

Acknowledgements

Environment Protection Authority Victoria (EPA) gratefully acknowledges the construction companies, industry groups, local councils and government agencies that contributed to the development of this guide through various workshops and information sessions.

We thank everyone for their contribution and commitment to keeping Victoria prosperous and liveable by preventing and reducing harm from pollution or waste.

Disclaimer

The information in this publication is for general guidance only. It does not constitute legal or other professional advice and should not be relied on as a statement of the law. Because it is intended only as a general guide, it may contain generalisations.

You should obtain professional advice if you have any specific concern. EPA Victoria has made every reasonable effort to provide current and accurate information, but does not make any guarantees regarding the accuracy, currency or completeness of the information.

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Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Chapter 1: About this guide

This guide supports the civil construction, building and demolition industries to eliminate or reduce the risk of harm to human health and the environment through good environmental practice.

It is especially relevant if your work involves activities that include:

- land development
- commercial and residential building
- civil construction
- subdivision
- demolition
- decommissioning
- earthworks
- maintenance, repair and renovation of existing structures
- other construction trades.

This guide has been developed for people whose role involves site planning or environmental management in supporting activities and projects of all scales and complexity.

You can use this guide to help inform the decisions and steps you can take to eliminate or reduce risk. It contributes to your **state of knowledge** and is not a compliance document. See *Industry guidance: Supporting you to comply with the general environmental duty* (EPA publication 1741) for information about other kinds of resources that can contribute to your state of knowledge.

EPA developed this guide in consultation with construction companies, industry groups, local councils and government agencies.

Interim guide

This is an ***interim*** guide and will be updated.

Regulations to support the *Environment Protection Act 2017*[1] (**the EP Act**) will come into effect when new laws commence. The regulations will provide more details to support the EP Act.

For all EPA Victoria industry guidance, see: www.epa.vic.gov.au/for-business

1.1 Why is this guide important?

New environment protection laws will mean that anyone engaging in an activity posing a risk of harm to human health and the environment, from pollution or waste, must manage that risk to prevent harm as far as reasonably practicable (EPA publication 1856).

This **general environmental duty** applies to all Victorians. It means you will need to proactively assess and manage the risks of harm from your activities.

Eliminating or reducing risk is important because industry activities could impact, for example:

- **Air** – affecting human health and wellbeing; ecosystems and biodiversity; local amenity and aesthetic enjoyment; visibility; climate systems.

[1] As amended by the Environment Protection Amendment Act 2018.

- **Noise** – affecting people's sleep; communication, cognition and learning; domestic or recreational activities; tranquillity and enjoyment inside and outside.
- **Land** – affecting human health; buildings and structures; soil health and the integrity and biodiversity of ecosystems; production of food, flora and fibre; aesthetics.
- **Water and groundwater** – affecting water-dependent ecosystems and species; drinking water, agriculture and aquaculture; water-based recreation; industrial and commercial use; Traditional Owner cultural values; buildings and structures.

Assessing and controlling risk in a structured way will help you:

- prevent harm to human health and the environment
- comply with your legal obligations
- meet community expectations.

The laws also introduce new duties that are relevant to the civil construction, building and demolition industries. We look at these, and your general environment duty, in Chapter 2: Understanding your duties.

1.2 What does this guide cover?

This guide provides an overview of your duties under the EP Act, controls you can put in place to manage your risk and general information to help you manage your obligations associated with:

- **noise and vibration**, including scheduling works, community consultation, managing noise and vibration at the source, and managing noise using offsite controls
- **erosion, sediment and dust**, including managing stormwater flows, minimising dust, managing stockpiles and working within waterways
- **contaminated land and groundwater**, including identifying presence of contaminated land, and preventing contamination of stormwater and groundwater
- **chemical storage and handling**, including managing storage and handling of liquid and solid chemicals, spill response and cleanup, and managing volatile liquids
- **waste**, including managing different types of waste, storage, collection, transport and removal.

The information in this guide is not exhaustive. You can implement other controls not covered in this guide, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment, from pollution or waste, as far as reasonably practicable.

You may also need to seek additional or more tailored advice from a suitably qualified person or other trusted source if your activities are not covered, or are not adequately addressed, in this guide. It is your responsibility to determine who is suitably qualified to do this (see Work with an environmental consultant, EPA website).

As always, continue to consult other guidance to support your compliance activities under other laws and regulations.

1.3 How to use this guide

This guide follows a risk-based approach to preventing harm. Use this guide to help structure or guide the way you assess and control risk. The approach and steps you take to do this will depend on the scale and complexity of your project, as well as the nature of the risks you need to manage.

We encourage you to use this guide to inform how you:

Figure 1.1. How to use this guide.

Symbols used in this guide

Duty under the EP Act	Important point to note	Objective and controls to help you achieve an objective	Focus on additional definitions, explanations or examples	Further information

This guide replaces the following publications:

480	*Environmental guidelines for major construction sites* February 1996
960	*Doing it right on subdivisions: Temporary environmental protection measures for subdivision construction sites* September 2004
981	*Reducing stormwater pollution from construction sites* May 2005
1254	*Noise control guidelines* (Section 2) October 2008
1264	*Noise from large residential subdivision or urban development sites* November 2008

Glossary

Some words in this guide are linked to definitions. Position your cursor over an underlined word. **Ctrl + Click** will take you to the Glossary on p. 97.

Chapter 2: Understanding your duties

In this chapter we look at your duties under environment protection laws. It will help you understand your legal obligations and what is expected of you when managing environmental risk on your site.

New environment protection laws mean that anyone engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must eliminate or reduce that risk. The **general environmental duty** applies to all Victorians.

It is your responsibility to understand and assess your risks. This includes understanding how your activities can impact land, water and air quality, or cause harm from waste and excessive noise.

You also need to eliminate or reduce risk as far as reasonably practicable. You can do this by putting appropriate controls in place that are proportionate to the risk.

Your approach to managing risk will depend on the complexity and scale of your activities or project, as well as the nature of the risks you need to manage. We cover one approach to managing risk in Chapter 3: Managing your environmental risk.

- *Industry guidance: Supporting you to comply with the general environmental duty* (EPA publication 1741)
- *Environment Protection Act 2017*, sections 25–27

2.1 Duties relevant to the civil construction, building and demolition industries

Additional to your general environmental duty, the EP Act imposes the following obligations or **duties** relevant to the civil construction, building and demolition industries:

Table 2.1. Duties relevant to civil construction, building and demolition.

This duty	Means I have to…	Relevant to…
Duty to respond to harm Section 31	Restore an affected area if pollution or land contamination happens as a result of a leak, spill or other unintended deposit or escape of a substance. The person who engaged in the activity that resulted in the pollution incident must clean it up. It must be restored to the state it was in prior to the pollution event, as far as reasonably practicable. This duty applies regardless of fault.	Chapters 4 – 8: • Erosion, sediment and dust • Contaminated land and groundwater • Chemicals • Waste.
Duty to notify of incidents Sections 32–33	Notify EPA (1300 372 842) as soon as practicable after a pollution incident that causes or threatens material environmental harm occurs. Provide information about the: • nature of the incident • location • harm or threatened harm • circumstances in which it happened • proposed actions to deal with the incident. EPA will then provide you with further instructions.	Chapters 5 – 8: • Erosion, sediment and dust • Contaminated land and groundwater • Chemicals • Waste.

This duty	Means I have to…	Relevant to…
Duty to manage contamination Section 39	Minimise risks of harm to human health and the environment from contamination as far as reasonably practicable if you manage or control contaminated land (including vacant land and groundwater). This duty applies regardless of who caused the contamination or when it happened.	Chapter 6: Contaminated land and groundwater
Duty to notify of contaminated land Section 40	Notify EPA as soon as possible if the land you manage or control is contaminated above the thresholds set out in the regulations. This includes contamination to groundwater. This duty applies regardless who caused the contamination or when it happened. It applies as soon as you become aware, or ought to have been aware, of the contamination.	Chapter 6: Contaminated land and groundwater
Duties relating to waste Sections 133–135, 139, 140, 142, 143 and 3(1)	There are seven specific duties that apply when managing or controlling waste. These apply when you are depositing, transporting and receiving waste. Any waste produced must be taken to a place that is lawfully able to receive it.	Chapter 8: Waste

You will need to determine who is in management or control of the land on which your activities are being carried out, then refer to the EP Act to identify the duties relevant to you.

Note that further information on these duties will be in the regulations when new laws commence.

2.2 Who enforces environmental law?

EPA authorised officers have powers of entry. Council officers can also be authorised officers under the EP Act. This allows them to inspect businesses and premises, provide advice and guidance about compliance, and enforce environment protection laws.

Authorised officers who visit your business or site will consider issuing you with directions or remedial notice if they believe you are not fulfilling one or more duties. This notice will set out the steps you need to follow to comply with the relevant duty.

- **Directions** – may be issued verbally or in writing when there is an immediate risk of harm. You must follow these directions immediately.
- **Remedial notices** – may be issued if an authorised officer reasonably believes you are not complying with environment protection laws or where there is a harmful or unlawful situation.

  A remedial notice is a formal record of actions you need to take to comply with an obligation or address a risk of harm. They include:
  - Improvement notice – requires you to take action to remedy non-compliance.
  - Prohibition notice – requires you to stop action that has an immediate risk of harm.
  - Notice to investigate – requires you to investigate potential contamination or harm.
  - Environmental action notice – requires you to take action to clean up contamination.
  - Waste abatement notice – requires you to remove, dispose or restore a place affected by litter or waste.
- **Site management orders** – used for long-term management or rehabilitation of contaminated land or to undertake a broad range of actions to manage the risk of harm. You could be required under this order to, for example, install and maintain infrastructure, monitor contamination onsite and report on an ongoing basis.

Authorised officers will use this guide to support their assessments. It contributes to your state of knowledge and is not a compliance document.

Unlike similar environment protection laws in other states and territories, a breach of the general environmental duty could lead to criminal or civil penalties. Penalties for breaching the general environmental duty and other duties are set out in the EP Act.

Figure 2.1. An Officer for the Protection of the Local Environment on a site visit.

Compliance and enforcement

See Compliance and enforcement (EPA website)

Chapter 3: Managing your environmental risk

In this chapter we look at ways you can manage risk to help you meet your general environmental duty. This includes some suggested steps to follow and some tools you can use to support the risk management approach you decide to follow.

A well thought out approach to managing risk can help you:

- better identify, assess and control your risks
- prevent harm to human health and the environment
- comply with legal obligations
- meet community expectations.

Planning and managing risk on your site is an ongoing responsibility. Thinking about potential hazards, risks and controls that eliminate or reduce risk *before* you begin your project can help you put more effective controls in place. These may also be more cost effective for your business or project.

For example, good site planning may involve locating noisy works further away from nearby residences, or behind a noise barrier.

When planning, you should also consider the timing of your activities over the lifecycle of your project – risks may change as works onsite progress. Preparing project plans over the lifecycle of your project may help you identify risks and constraints. These can influence the controls you implement to eliminate or reduce environmental risk.

We look at many of the things you should consider in **planning your project** in Chapters 4 to 8 of this guide.

Risk management terms

- **Hazard** – something that could go wrong and can cause harm. In this guide, harm relates to pollution and waste, e.g. dust, noise, sediment.
- **Receptor** – something of value which can be harmed by hazards, including humans and the environment e.g. animals, vegetation and waterways. We use 'receptor' and 'receiver' interchangeably in this guide.
- **Risk** – the threat posed by a hazard to a receptor. Risk can be determined by understanding the likelihood and consequence of the harm.
- **Control** – a measure that can eliminate or reduce the hazard or risk.

3.1 Ways you can manage your risk

Following steps in a structured way will help you better understand the hazards and risks from your activities that could impact human health and the environment. It will also help you identify appropriate controls to put in place.

Assessing and controlling risk: a guide for business (EPA publication 1695) takes you through four steps to manage risk (see Figure 3.1). You can use a different risk management approach if it is more suited to your needs.

Figure 3.1. Four-step risk management process.

The actions you take at each step in this process may differ depending on the scale and circumstances of your activities and the nature of the risk.

Your actions should not stop at Step four. You should be continually running through these steps to ensure you are managing risk.

If your activities are simple to understand and manage, this might largely involve training staff and following appropriate procedures.

If you are a medium to large operator, you may already have your own approaches to managing risk in place, such as ISO 31000, Risk Management.

3.1.1 Step one: identify hazards

The first step in the risk management process is to identify your hazards (i.e. the activities that could cause harm).

This involves looking at your activities, gathering information about the site and its surrounding areas, and considering if the environment could be impacted.

Activities may include:

- vehicle, equipment and machinery use
- excavation
- management and transportation of waste and other materials
- chemical use
- dewatering.

3.1.2 Step two: assess risks

In this step you assess how the risks associated with each hazard you identified in step one could lead to harm, how severe that harm could be and the likelihood of it occurring.

Likelihood is the probability or chance that a hazard will cause harm. Likelihood is based on what is known, or should be known, about the hazard and the way circumstances and activities affect the hazard.

Consequence, or severity, relates to the degree of harm to human health and the environment that could occur as a result of a hazard.

To understand the **consequence** of a hazard causing harm, think about how pollution or waste resulting from your activities can reach and impact human health and the environment.

Some of the many ways pollution and waste can move through the environment include:

- **Water** – run-off from the site washing material into surrounding land, a nearby drain, or waterway.
- **Soil and groundwater** – contaminants leaching into the soil and groundwater, especially after rainfall.
- **Air** – wind-blown material creates litter and air borne dust, while noise pollution travels through the air reaching people offsite.

Figure 3.2. How pollution and waste from your activities can impact humans and the environment.

To establish the **likelihood** of the harm occurring, you should find out:

- if the hazard has already caused harm in the past at your site or at similar sites
- the frequency of the hazard (does it exist all the time or only sometimes)
- how changes in your activities may affect the hazard
- the possible behaviour of your staff or others when the hazard occurs
- about the controls currently in place and their effectiveness.

You may also want to rate the risks you identified as **high**, **medium** or **low** using a risk matrix. This can be a helpful ranking tool to inform your processes and systems.

3.1.3 Step three: implement controls

This step involves identifying the most appropriate controls to manage the risks you assessed at step two. You may need to implement multiple controls to minimise the risk of harm that a single hazard presents.

You can use a hierarchy of controls to help select appropriate controls. Aim to eliminate the hazard as the most preferred approach (see Figure 3.3).

Figure 3.3. Hierarchy for controlling hazard or risk.

See *Assessing and controlling risk: a guide for business* (EPA publication 1695) for more information about the hierarchy of controls.

Staff training

Staff training and procedures can help prevent pollution occurring and enable staff to respond quickly to a pollution incident.

It is a legal requirement under the EP Act s.25(4)(e) to provide information, instruction, supervision and training to staff to minimise risk of harm to human health and the environment. Training can improve the safety of your worksite and protect your business's reputation.

You should also make others onsite aware (e.g. through an induction process) of the environmental site hazards and train them on the precautions they need to take. This includes contractors, maintenance workers, administrative staff and visitors.

Table 3.1 provides some examples of training types you can consider for your project.

Table 3.1. Types of staff training that may assist you.

Training type	Description
Induction training	Provide induction training for site staff, contractors and visitors, informing them of the hazards and risks onsite, incident response procedures, and roles and responsibilities.
Toolbox sessions	Undertake tool-box sessions every day, prior to starting work for that day, where possible.
Procedures	Provide staff with documented procedures or instructions for: • undertaking specific activities onsite, including handling and storage of chemicals and waste • responding to incidents (small and major) • anything else where a procedure will help to reduce risk.
Training plan	Develop and implement a training plan, and review and update as required.

Roles and responsibilities

Defining roles and responsibilities of staff, contractors and visitors can ensure environmental risks are being managed by the most appropriate people, and that relevant training is undertaken.

Chapters 4 to 8 provide examples of controls that may help you manage risk to human health and the environment.

3.1.4 Step four: check controls

Monitoring controls once implemented will allow you to evaluate their effectiveness and identify any changes you may need to make to them and/or your risk assessment process.

Having a procedure in place to support this will help you maintain and improve your risk management practices.

Common activities to check the effectiveness of controls are:

- visual inspections (routine and non-routine)
- consulting with site workers
- environmental monitoring
- analysing near miss and incident reports
- test any administrative controls (e.g. drills) and offer refresher training
- test and maintain engineered controls.

Develop a verification process to ensure these activities have been completed. This process is generally undertaken by senior staff or site management. Some verification examples include:

- ensuring any standard operating procedures are up to date
- signoff/approval by management of visual inspections undertaken, within a register
- capturing and review of training requirements.

What makes a control effective?

Put simply, a control that is designed effectively + operating effectively = an effective control

Design effectiveness is a measure of the extent to which a control is designed to reduce the likelihood and/or the consequence of the hazard. The control should be designed to operate reliably and/or sufficiently frequently to reduce the hazard causing harm.

Operating effectiveness is established when a control is checked and can be demonstrated to have operated as designed, without interruption or failure throughout the period it was relied upon to achieve its objective. Operating includes a requirement that ensures those operating the control are adequately informed and trained.

The effectiveness of controls should be overseen by management and independently validated.

See *Assessing and controlling risk: a guide for business* (EPA publication 1695) for more information on the four-step risk management process.

Other resources to help you develop a risk management approach include Australian/New Zealand or International Standards, such as ISO 31000, Risk Management. This addresses risk across all business activities.

3.2 Optional tools to help you record the way you manage risk

Keeping records is not a legal requirement for most businesses but may help with your business planning. The records you keep can also demonstrate to EPA what steps you have taken to reduce or eliminate the risk of harm if a pollution incident occurs.

3.2.1 Risk register

You can use a risk register to record hazards, risks and controls. This may help ongoing management of your risks and can be used to document actions taken to check controls and any amendments made. Update and add information to your register progressively.

Signoff by senior management of the risk register, and any updates made, can demonstrate understanding of the risks across your business.

It could be more appropriate for your business to use another approach. A risk register is only one way of documenting hazards and risks – there are many other tools for capturing and supporting effective management of risk.

Risk register example

You can adapt Appendix 1: Risk register – completed example to suit your needs.

Other tools can be found in, for example: SA/SNZ HB 89 *Risk management – guidelines on risk assessment techniques*

A risk register, or other form of recording hazards and risks, would form the basis of an environmental management plan (EMP).

3.2.2 Environmental management plan

An EMP is a site or project-specific plan developed during project planning. It describes how activities onsite will be managed to minimise risk of harm to human health and the environment.

An EMP:

- summarises activities and hazards that may create a risk of harm
- identifies and documents suitable controls to manage the identified risks
- outlines the monitoring required to check controls are effective and verified
- includes a schedule and triggers for reviewing effectiveness of the EMP against your objectives (e.g. ensure you clean up spills as soon as possible) and any regulatory conditions (e.g. there is no pollution of land or groundwater on or beyond your site as a result of your activities)
- outlines the procedure for evaluating and updating the EMP (including controls).

Council and other government agency approval

Many Victorian councils require an EMP to be submitted and approved before site works commence. Other government agencies may have similar requirements. It is your responsibility to find out when an EMP is required.

Multiple EMPs may be required for:

- large work sites divided into smaller areas with different works (e.g. an EMP for each area within the site)
- projects which take place over multiple stages (e.g. an EMP for each stage of the project).

The size, scope and elements of an EMP will vary depending on the size and complexity of your project, and the requirements of the council or government agency.

What's in an EMP?

If you need to develop your own EMP template, see Appendix 2: Environmental management plan – structure outline. It contains some elements you can consider including.

What makes a good EMP?

- **Concise** – a concise EMP is more likely to be implemented onsite. Use short sentences, bullet points and plain English.
- **Site-specific not generic** – the hazards, risks and controls discussed in the EMP should be specific to the activities that will occur onsite in your project.
- **Dynamic** – update your EMP regularly to reflect current site activities, hazards and risks.
- **Visual –** use detailed and accurate site maps and figures.

3.3 Responding to an incident

An environmental incident is an event that may cause harm to human health and the environment. Inappropriate practices onsite, accidents or climatic events may result in an environmental incident.

Your incident response procedure should outline the steps required to deal with an event outside normal operating conditions (e.g. spills, fire). This will help ensure the event is managed safely – minimising the harm to site personnel, the environment, your business and nearby communities.

Your prompt response to an event will also reduce the impact it may have on human health and the environment.

Systems for recording incidents, their causes and trigger actions can also help you design and implement more effective controls. This can prevent other similar incidents from occurring in the future.

Where pollution has occurred, the **duty to respond to harm** (s.31) means you must restore the affected area to the state it was in before the incident occurred, as far as reasonably practicable.

The **duty to notify of an incident** (ss.32–33) means you must also notify EPA as soon as reasonably practicable after becoming aware of the pollution.

Chapter 4: Noise and vibration

This chapter discusses controls relating to:

- **normal working hours for your activities, including scheduling works during normal hours, consultation with affected people and managing noise**
- **justified unavoidable works that need to be conducted outside of normal work hours**
- **managing noise and vibration that cannot be eliminated or minimised by source controls.**

We look at managing construction noise and vibration for major infrastructure works, large construction sites and residential developments, and ways you can meet your general environmental duty. The maintenance or repair of an existing building is out of the scope of this guidance.

The **general environmental duty** (ss.25 – 27) applies to noise and vibration that presents a risk of harm to human health and the environment.

You are obliged under this duty to eliminate or reduce these risks as far as reasonably practicable. You can do this by putting controls in place that are proportionate to the risks and employing good environmental work practices.

The content in this chapter will replace these EPA publications:

- *Environmental guidelines for major construction sites* (publication 480)
- Section 2 of *Noise control guidelines* (publication 1254)
- *Noise from large residential subdivisions or urban development sites* (publication 1264)

4.1 Background

4.1.1 Construction related noise and vibration

Civil construction, building and demolition related noise can impact the health and wellbeing of people and animals (considered to be sensitive receivers) when not managed appropriately. Vibration may also interfere with scientific equipment or damage buildings and underground services.

You can identify and adopt actions to minimise noise and vibration risks in:

- planning
- site layout
- management, selection and maintenance of equipment
- noise reduction technology
- conduct of workers onsite.

The quality of your communication with those impacted, especially vulnerable groups, will help them reach a more positive acceptance of the noise and vibration and its impact. Vulnerable groups include the elderly, children, pregnant women and people suffering from long term illness or mental health.

Noise is unwanted sound or vibration which disrupts the acoustic environment and can impact health, sleep and daily living, learning, communication and relaxation.

Noise is a form of pollution which risks harming human health and the environment.

4.1.2 Site activities which may cause noise and vibration

Your activities can generate noise and vibration, regardless of the scale of your site. Activities that may cause noise and vibration include:

- demolition work
- site preparation works
- site cleanup and dismantling activities
- site works
- truck and vehicle movement/operation.

4.1.3 Why it's important to manage noise and vibration

Complaints about noise and vibration are some of the most common complaints that EPA, councils and businesses involved in civil construction, building and demolition receive.

Noise and vibration can pose a risk of harm to human health and the environment if it is too loud, continues too long, recurs frequently, suddenly increases in level, or includes disturbing sounds such as:

- impulses (banging, hammering)
- tones (squealing, screeching, humming)
- low frequency sound. This can be more intrusive than high frequency sound as it is less attenuated during propagation and when transmitting into buildings. Noise abatement measures are less effective at low frequencies.

As well as causing annoyance and immediate disturbance to people and animals, environmental noise and vibration is now recognised as a public health issue. It can have serious or long-term health impacts. These impacts may include:

- inability to sleep or reduced quality of sleep
- impaired communication
- reduced cognitive performance (e.g. reduced attention span, memory and concentration in people working and children studying)
- exacerbation of mental health problems (e.g. stress, anxiety and depression)
- changes to the natural behaviour of animals, which affects their ability to survive and reproduce (e.g. reduced ability to hear alarm calls warning of predators)
- discomfort caused by vibration.

In extreme cases, vibration may also result in damage to buildings and infrastructure.

Health and safety of workers

See WorkSafe Victoria for guidance on managing noise risk to the health and safety of workers onsite.

Other factors can also influence the risk of harm, such as:

- proximity of the noise to people
- time of day (e.g. late at night when most people are asleep)
- an individual's duration of exposure and sensitivity to the noise
- background noise levels (e.g. traffic noise which may mask other noises)
- construction fatigue, when people have already been, or will be exposed to impacts from one or several construction sites over a long period of time.

4.2 Planning your project

Under the general environmental duty, anyone who is engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must manage that risk. You need to do this by eliminating or reducing your specific risks as far as reasonably practicable (see Chapter 2: Understanding your duties). You can do this by putting appropriate controls in place.

The earlier you consider noise and vibration management in planning your project, the greater the opportunity is for you to identify effective controls.

Key aspects to consider when you are planning include:

- identifying people and sensitive environments (sensitive receivers) that could be affected by your activities
- carrying out appropriate engagement as early as possible
- avoiding the generation of noise and vibration
- facilitating construction during normal working hours, where possible
- reducing noise and vibration by using the most appropriate equipment and work practices for your activities
- choosing alternative equipment or methods that generate less noise or vibration
- maintaining equipment and vehicles according to manufacturer's instructions
- attenuating noise by obstructing the path between noise source and receiver
- mitigating offsite noise with measures such as respite offers and acoustic treatment
- considering alternatives if noise and vibration cannot be reduced through avoidance, reduction or attenuation.

4.2.1 Noise and vibration impact assessment

You can use a noise and vibration impact assessment to predict the characteristics of noise and vibration generated by planned works. This may need to be performed by an acoustic consultant during the project planning, construction documentation and post tender phases.

Engaging an acoustic consultant

An acoustic consultant will typically be a person who is eligible for membership of the Australian Acoustical Society. The business a consultant works for will typically be members of the Association of Australasian Acoustical Consultants.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

The outcomes of a noise and vibration impact assessment can be used to:

- inform the risk assessment process
- inform plans for managing noise
- predict the effects of implementing noise and vibration controls
- identify the need for noise and vibration monitoring, which can also determine the effectiveness of noise controls.

A noise and vibration impact assessment includes:

- identifying legislated obligations and statutory approvals
- identifying sensitive receivers which include residents, other people and sensitive environments who could be affected
- reviewing activities:
  - considering what works can be done during normal working hours and whether there are likely to be outside normal working hours works, and in particular at night
  - assessing construction or demolition equipment, methods and processes, including undertaking noise modelling as required and depending on the scale of your activities or project
  - considering alternative equipment, methods and processes (including works scheduling) to reduce noise impacts.

Noise and vibration impact assessments can also be useful when providing information to the community and people who could be affected by noise.

Figure 4.1. Be aware of your noise generating equipment.

4.3 Managing noise and vibration during working hours

You are expected to minimise noise and vibration at all times. Limiting times of operation of noisy equipment, vehicles and operations is an effective way of reducing noise and vibration impacts. Use the schedule in Table 4.1 to inform your project planning.

The primary way of minimising the likelihood of noise and vibration causing harm is to limit the frequency of occurrence and its duration. This applies especially when noise and vibration are likely to have a greater impact.

Table 4.1. Working hours schedule for construction, building and demolition noise.

☑	**Minimise noise and vibration as far as possible in any situation**
Normal working hours for all civil construction, building and demolition activities.	
AM → PM	**Monday to Friday, 7 am – 6 pm**
AM → PM	**Saturday, 7 am – 1 pm**
AM → PM	**Saturday, 9 am – 1 pm**
Normal working hours for: • works for commissioning or construction of **major infrastructure projects** • commercial and industrial construction and demolition sites • demolition works on an existing commercial or industrial site that is intended for residential redevelopment • construction works for **large-scale residential developments** in non-residential zones • commercial and industrial land subdivision.	Normal working hours for: • residential construction and demolition sites • residential or mixed-use development in **residential zones**, including urban infill and redevelopments • land preparation on infill and smaller residential developments • land preparation for residential subdivision, not including works to construct or upgrade a road • residential construction in a **large-scale fringe residential subdivision**, once the road servicing the residential development is complete.
Limited works apply on Saturday, 7 am – 9 am to: • land preparation and infrastructure works for a large-scale fringe residential subdivision **before** the road servicing of the future residential subdivision is completed. See Table 4.2.	Normal working hours for: • land preparation and infrastructure works for a large-scale fringe residential subdivision **after** the road servicing the residential development is complete.

Table 4.1. Continued

Minimise noise and vibration as far as possible in any situation			
Outside normal working hours for all civil construction, building and demolition activities:			
PM → PM	**Monday to Friday, 6 pm – 10 pm**		
PM → PM	**Saturday, 1 pm – 10 pm**	PM → PM	**Saturday, 1 pm – 8 pm**
AM → PM	**Sundays and public holidays, 7 am – 10 pm**	AM → PM	**Sundays and public holidays, 9 am – 8 pm**
Applies to: • works for commissioning or construction of **major infrastructure projects** • commercial and industrial construction and demolition sites • demolition works on an existing commercial or industrial site that is intended for residential redevelopment • construction works for **large-scale residential developments** in non-residential zones • commercial and industrial land subdivision. See section 4.4 for conditions to apply within these hours and for works outside these hours.		Working hours providing that the activities do not result in **unreasonable noise** for: • residential construction and demolition sites • residential or mixed-use development in **residential zones**, including urban infill and redevelopments • land preparation on infill and smaller residential developments • land preparation for residential subdivision • residential construction in a **large-scale fringe residential subdivision**. See section 4.4. No works to be conducted after 8 pm unless they are inaudible.	

In identifying the schedule relevant to a specific project from Table 4.1, the following definitions apply:

- **Major construction works** can include:
  - development of road, rail, tunnels, bridges, power facilities, residential estates and public facilities such as schools and hospitals
  - sewer replacement works
  - underground power cable laying
  - other public works requiring major excavation.
- **Residential zones** are defined in clause 32 of the Victoria Planning Provision.
- **Large-scale residential developments** are residential developments and mixed-use (residential/commercial) developments with four or more storeys above ground or two storeys below ground, under construction (no part is occupied as a residence while construction is underway).
- **Large-scale subdivisions** are subdivisions that include a new road or works to upgrade an existing road in the subdivision plan.

- **Large-scale fringe residential subdivisions** are *large-scale subdivisions* on:
  - any growth area (as defined in the *Planning and Environment Act 1987*) or Urban Growth Zone identified in any planning scheme (UGZ, as defined in clause 37.07 of the Victoria Planning Provisions)
  - undeveloped land within Metropolitan Melbourne which is covered by a metropolitan fringe planning scheme (as defined in the *Planning and Environment Act 1987*) and is zoned for residential development, or identified for future urban development in the Local Planning Policy Framework or in a reference or incorporated document.
  - undeveloped land outside Metropolitan Melbourne which is zoned for residential development, or identified for future urban development in the Local Planning Policy Framework or in a reference or incorporated document.

  Where relevant, you should check local or site provisions with council planners.
- **Metropolitan Melbourne** is identified as the Metropolitan Waste and Resource Recovery Region defined in the EP Act (ss. 6 (9))

Table 4.2. Limited works for land preparation and infrastructure works on large-scale fringe residential subdivisions on Saturday, 7 am – 9 am.

Minimise noise and vibration as far as possible in any situation		
Distance from nearest residential property	AM → AM	**Saturday, 7 am – 9 am**
< 35 m	• No works, unless inherently quiet	
35 m – 200 m	• No works, unless inherently quiet: – from 20 weeks after commencement or – once the section of road servicing the future residential premises is complete. • Limited works for land preparation and infrastructure works permitted: – during the first 20 weeks, and – before the road servicing the residential development is complete. • Limited equipment can be used: – earthmoving machinery that does not use an impacting, vibrating or rotating implement operated by hydraulic or pneumatic means – concrete dispensing trucks – self-propelled, single-drum vibrating rollers or non-vibrating compaction machinery. – Pile drivers and other noisier equipment not to be used (e.g. double-drum vibration roller and impacting tools and implements such as rock-breakers).	
> 200 m	• Any equipment other than pile drivers may be used.	

You are encouraged to further minimise overall impact by deferring starting hours.

Victorian Planning Provisions

See Planning Schemes Online on the Department of Environment, Land, Water and Planning website.

4.3.1 Scheduling works

Scheduling noisy activities when people nearby are least affected can reduce noise impact.

Schedule noisy activities at times that minimise potential harm

Controls to help you achieve this objective

- Schedule activities to minimise noise impacts. Aspects to consider include:
  - undertaking work during normal working hours
  - avoiding work when there are special events
  - scheduling work when neighbours/residents are not present
  - scheduling noisy works together to reduce the overall duration of exposure
  - scheduling noisy activities around times of high background noise to provide masking or to reduce the amount that noise from your activities intrudes above the background
  - scheduling noisy activities for less sensitive times, for example, delay a rock-breaking task to the later morning or afternoon
  - avoiding work that coincides with sensitive ecological processes, for example, during critical breeding season of species that rely on mating calls.
- Organise deliveries and access, with consideration given to:
  - combining loads to reduce noise and congestion in surrounding streets
  - optimising the number of vehicle trips to and from your site
  - maintaining vehicles in good condition
  - promoting good driving behaviour, to prevent sudden acceleration and unjustified use of engine brakes
  - consulting and informing potentially noise-affected residences regarding designated access routes to your site. Ensure drivers are aware and use nominated vehicle routes
  - providing onsite parking for staff and onsite truck waiting areas away from nearby people. Install bunding or walls to minimise noise for truck waiting areas
  - scheduling deliveries to nominated hours only.

4.3.2 Community information and consultation

Early engagement and consultation with community, from planning and throughout your project's development and construction, is key to minimising the impacts of noise. Early engagement also gives the community an opportunity to better prepare to cope with or avoid noise from your activities (e.g. they may like to plan time away from home).

The community is more likely to understand and accept noise generated by your activities if you provide information in an open and transparent manner and demonstrate how their views and opinions have been considered.

Consult and inform residents and other people who may be affected by noise

Controls to help you achieve this objective

- In the early stages of planning, identify and assess those potentially impacted by noise, then document and maintain the information for the duration of your project or activities.
- Engage community to keep them informed, for example community meetings with community and workers.
- Notify community before and during construction, communicating information such as:
  - dates and times (start and finish) when noise will be generated
  - why the noise is necessary
  - type of noise
  - measures to minimise noise volume, for example, installation of noise barriers
  - measures to minimise disturbance, for example, works scheduled to cease on certain days to provide residents with a break from the noise and discuss expected noise after implementation of management measures
  - contact details for information (the contact person should have a level of knowledge and responsibility that will enable them to provide a real-time response to queries and complaints)
  - what is happening now and what is happening next.

  Also consider:
  - using media such as a project-related website, letter box drops, meetings, individual contacts and notify in languages other than English where appropriate
  - following an agreed time period to contact community/residents regarding planned work outside normal working hours
  - offering alternative accommodation for affected residents when unavoidably noisy works will occur at night.
- Install and maintain a site information board at the front of your site with contact details, hours of operations, after hours emergency contact details, and regular information updates. Locate the board so it's visible from the outside boundary.
- Maintain a process for managing complaints.

People may be more likely to tolerate noise when you engage with them early and let them know:

- why the noise will be generated (e.g. construction of an essential infrastructure)
- the time of day they can expect the noise to take place
- the duration of noisy construction work (e.g. three weeks).

4.3.3 Noise source

Controlling noise at the source is one of the most effective methods of minimising noise impacts from your activities. Reducing noise at the source also improves conditions for workers.

Minimise noise generated by activities onsite

Controls to help you achieve this objective

- Undertake preparatory work offsite where there is low potential for impacting people (e.g. formwork, cutting or prefabrication of materials offsite prior to transporting to the construction site)
- Connect to the electricity grid as early as possible to avoid the use of diesel generators.
- Restrict areas where mobile plant can operate so that it is away from people who could be affected by noise.
- Locate site vehicle access and waiting areas away from people who could be affected by noise.
- Plan vehicle movements to avoid manoeuvres and idling at location nearest to nearby people.
- Use quieter equipment or methods. This may require considering:
  - buying or leasing quieter equipment
  - avoiding metal-to-metal and metal-to-stone contact
  - installing mufflers
  - reducing throttle and turning off equipment when not in use
  - placing things down rather than throwing
  - educating drivers to use driving practices that minimise noise.
- Use low-noise saw blades.
- Use electrical equipment rather than equipment driven by a diesel generator.
- Use low-noise emitting generators.
- Use effective alternatives to ‘beeper’ alarms (e.g. broadband alarms, proximity sensors).
- Avoid using reversing alarms by designing site layout to avoid reversing (e.g. drive-through for parking and deliveries).
- Maintain equipment by:
  - inspecting regularly and maintaining equipment to ensure good working order
  - checking machines with enclosures, including doors and door seals and that the door closes properly against seals
  - maintaining air lines on pneumatic equipment so they do not leak.
- Maintain vehicles by:
  - considering good working conditions of mufflers
  - securing loose parts that may rattle.
- Limit noise caused by people onsite. This may include procedures to:
  - avoid yelling and shouting onsite (note: if people onsite need to shout to hear each other over the site ambient noise, it is possible the noise level may be putting their hearing at risk)
  - minimising the use and volume of any electrical amplified sound-reproducing equipment, for example radios, stereos, televisions or public address systems.

- Plan transport and haulage routes to minimise the number of trucks/vehicles. Where there are large numbers of truck movements, consider truck route and truck waiting protocols (e.g. engines on/off and restart requirements).
- Implement substitute methods taking into consideration:
  - alternatives to rock-breaking work methods, such as hydraulic splitters for rock and concrete, hydraulic jaw crushers, chemical rock and concrete splitting, and controlled blasting such as penetrating cone fractures. The suitability of alternative methods should be considered on a case by case basis, including what potential risks they involve.
  - alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electrical generator located away from nearby people.

4.3.4 Vibration and regeneration noise source

Vibration and regenerated noise sources from your activities may include stationary plant, for example jackhammers, portable plant, mobile plant (such as earthmoving and ground impacting equipment), pile-drivers, tunnelling machines and activities, and blasting.

Controlling vibration at the source is the most effective approach to minimise vibration impacts from your activities and support the wellbeing of workers and nearby people.

Limit vibration and regenerated noise by onsite activities

Controls to help you achieve this objective

- Use alternative lower-impact equipment or methods (e.g. substitute impact piling with bored piling, grip jacking or the use of hammer cushion when driving steel piles that minimise the vibration).
- Use non-explosive demolition agents and/or chemical agents to facilitate concrete/rock breaking activities to reduce the noise generated.
- Substitute demolition methods not involving impact where feasible (e.g. use hydraulic rock splitters rather than rock breakers).
- Schedule the use of vibration-causing equipment such as jackhammers, demolition, earthmoving and ground-impacting operations at the least sensitive time of day.
- Routing, operating or locating high vibration sources as far away from people who could be affected by noise.
- Sequencing operations so that vibration-causing activities do not occur simultaneously.
- Isolate equipment causing vibration on resilient mounts.
- Isolate activities from adjoining structures.
- Maintain equipment in accordance with manufacturer's specifications.

4.3.5 Noise reduction between noise source and receiver

Blocking the path between the noise source and people who could be affected can reduce the potential noise impact.

Limit the level of noise reaching nearby people offsite

Controls to help you achieve this objective

- Plan to have as much distance as possible between plant, equipment or other noisy activities and people who could be affected by noise.
- Maximise shielding taking into consideration:
  - topography of the site (e.g. use of earth mounds as barriers)
  - existing structures, temporary buildings and material stockpiles
  - early construction of permanent walls so they can be used as early as possible as noise barriers
  - avoiding placing noise-producing equipment in locations where reflected noise will increase noise exposure or reduce the effectiveness of mitigation measures.
- Prioritise construction of structures such as buildings and walls that can contribute to shielding noise from the construction site.
- Obstruct the transmission path of sound (e.g. using acoustical walls or barrier, flexible noise barriers such as noise curtain or blankets, acoustic sheds or enclosures. See Figure 4.2 and Figure 4.3.
- Protect noise sensitive receivers (e.g. increasing window sound insulation by retrofitting acoustic glazing or suitable double glazing).

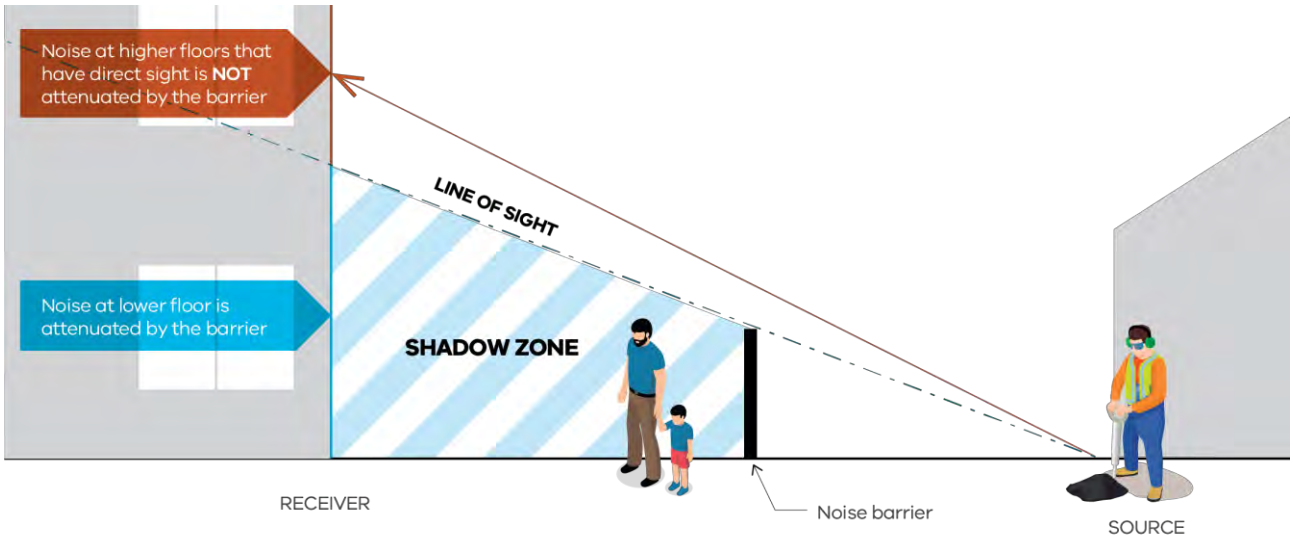


Figure 4.2. Line of sight and shadow zone created by a noise barrier.

Figure 4.3. Temporary noise barrier.
(photo courtesy of John Holland)

4.4 Managing noise and vibration outside normal working hours

Where relevant, works outside normal working hours (Sunday, public holidays, evening and night-time) should be done in accordance with local laws or with an approval.

Projects should aim to constrain works to normal working hours. Where necessary, works or activities outside normal working hours may occur for:

- **Low-noise impact works** – these are inherently quiet or unobtrusive, for example, manual painting, internal fitouts, and cabling. Low-noise works do not have intrusive characteristics such as impulsive noise or tonal movement alarms. The relevant authority must be contacted, and any necessary approvals sought.
- **Managed-impact works** – works where the noise emissions are managed through actions specified in a noise and vibration management plan (may be part of a broader environmental management plan), to minimise impacts on sensitive receivers. Managed-impact works do not have intrusive characteristics such as impulsive noise or tonal movement alarms.

  You must contact the relevant authority and seek any necessary approvals. A noise and vibration management plan may need to be prepared or reviewed by a suitably qualified acoustic consultant or practitioner (see Work with an environmental consultant, EPA website).
- **Unavoidable works** – are **works** which pose an unacceptable risk to life or property or a major traffic hazard and can be justified. Includes an activity which has commenced but cannot be stopped. You will need to demonstrate that planned unavoidable works cannot be reasonably moved to normal work hours. This requires additional consideration of potential noise and vibration generating activities and controls to minimise noise and vibration. These can be recorded within the noise and vibration management plan (may be part of a broader environmental management plan).

  You must contact the relevant authority and seek any necessary approvals for unavoidable works. You should notify affected sensitive receivers of the intended work, its duration and times of occurrence. A noise and vibration management plan may need to be prepared or reviewed by a suitably qualified acoustic consultant or practitioner to address unavoidable works (see Work with an environmental consultant, EPA website).

Examples of unavoidable works may include:

- the delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
- emergency work to avoid the loss of life or damage to property, or prevent environmental harm
- maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- tunnelling works including mined excavation elements and the activities that are required to support tunnelling works (i.e. spoil treatment facilities)
- rail occupations or works that would cause a major traffic hazard
- works where a proponent demonstrates and justifies a need to operate outside normal working hours such as work that once started cannot practically be stopped until completed such as concrete pouring or construction of diaphragm walls.

A site decision-making process may help you determine and justify works as unavoidable for your site.

Where work is not justified as 'low-noise impact works', 'managed-impact works' or 'unavoidable works', your activities should follow the normal working hours schedule in Table 4.1.

For any works outside normal works hours, it is essential you engage with the affected community before beginning works to explain the benefits and drawbacks of different scheduling, planning and remediation options.

Planned unavoidable night work may require approval by the relevant authority. There may be requirements in:

- Environment Performance Requirements (EPR) from Environment Effects Statements (EES).
- Planning or local laws. Local laws may be different and may require out of hours permits.

It is your responsibility to determine which approval you require, if any.

Where there is justified out of hours work, which includes low-noise impact works or managed impacts works, your activities are required to follow the outside normal working hours schedule (see Table 4.3).

Table 4.3. Outside normal working hours schedule and noise requirements.

Weekend/evening work hours	Night period
Noise level from non-residential construction at any residential premises not to exceed background noise by: • 10 dB(A) or more for up to 18 months after project commencement • 5 dB(A) or more after 18 months during the hours of: • 6 pm – 10 pm Monday to Friday • 1 pm – 10 pm Saturdays • 7 am – 10 pm Sundays and public holidays.	Noise inaudible (see definition below) within a habitable room of any residential premises during the hours of: • 10 pm – 7 am Monday to Friday • 10 pm – 7 am* Saturday, Sunday and public holidays *or 9 am based on the normal working hours Saturday schedule, see Table 4.1

Residential construction must not be audible between 8 pm to 7 am (Monday to Friday), 8 pm to 9 am on Saturdays, Sundays and public holidays or 7 am based on the normal working hours Saturday schedule (see Table 4.1). Any works during these times that are audible in a residence are not allowed.

What is inaudibility?

Inaudibility is the quality of not being perceptible by ear (i.e. cannot be heard) and cannot be measured in decibels (dB). The requirement for inaudibility relates primarily to adequate scheduling of works.

Adequate scheduling would mean, for example, undertaking noisy activities at less sensitive hours, and inherently quiet activities, that would be inaudible to people, in the night period.

Inaudibility *is not* meant to be a measurable criterion in dB.

To predict construction noise, a reference level set at background level +0 dB could be used as a suitable reference level for inaudible. Where this approach is used, apply adjustments to consider the potential character of the noise that increases its impacts (e.g. tonality, impulsiveness).

You should not use this approach for compliance purposes, but only to inform risk assessment regarding the scheduling of works.

4.4.1 Scheduling works outside normal working hours

Weekend and evening periods are important for community rest and recreation. They provide respite when noisy work has been conducted throughout the week. You should not usually schedule work during these times.

Apply similar controls to scheduling works for normal working hours (see Table 4.1) and the additional controls below for works outside normal working hours.

Minimise noise from any weekend, evening or night-time activities onsite

Controls to help you achieve this objective

- Plan *quieter* unavoidable work activities outside normal working hours.
- Schedule noisy unavoidable work when it is less likely to affect residents' sleep and for shorter periods, wherever possible.
- Schedule respite periods if unavoidable work is near residents. Consult with residents who may be most affected about restricting the number of nights per week and/or per calendar month when you undertake works.
- Stockpile material from unavoidable work activities that occur outside normal hours in, for example, an acoustic enclosure. Also restrict load-out to occur during normal working hours.
- Train all workers regarding unavoidable work activities that occur outside normal working hours.

4.4.2 Community information and consultation outside normal working hours

You should effectively manage noise impacts and consult with affected community before you begin work outside of normal working hours. Follow the same engagement process for normal working hours plus the additional controls identified below for outside normal working hours activities.

Consult and inform residents and other people who may be affected by outside normal working hours noise

Controls to help you achieve this objective

- Manage expectations of the community by explaining:
  - what will happen, with as much detail as possible
  - why unavoidable works are required outside normal working hours
  - the timing and nature of works that may affect them and details of any changes to construction work schedules
  - the criteria for qualification for offsite mitigation such as respite offers, acoustic treatment or alternative accommodation.
- Notify residents early so they can make plans to cope with the noise.

4.5 Reducing noise impact offsite

You might still find that people are impacted by noise generated from your activities, even after you have implemented controls onsite to prevent this from happening. In this case, you will need to consider putting offsite mitigation controls in place.

Limit noise impact offsite

Controls to help you achieve this objective

- Provide respite offers that reflect the level of impact, for example, movie tickets.
- Offer alternative accommodation where there is sustained noise impact (such as ongoing sleep disturbance over many nights) or where residents may have underlying health conditions that could be adversely impacted.
- Relocate affected residents if noise levels cannot be reduced sufficiently for the agreed period of construction activity.

Chapter 5: Erosion, sediment and dust

This chapter discusses controls to minimise:

- **soil erosion**
- **the generation and transport of sediment**
- **the generation and transport of dust.**

Civil construction, building and demolition activities and projects often involve land disturbance, including removing vegetation and reshaping topography resulting in soil erosion. Soil erosion produces sediment and dust, which can pose risks to human health and the environment if not properly managed.

Additional to your general environmental duty (ss.25–27), the EP Act includes these duties relevant to erosion, sediment and dust:

- duty to respond to harm (s.31)
- duty to notify of an incident (ss.32–33).

5.1 Background

5.1.1 Sediment and dust generated by erosion

Soil erosion is a natural process. Wind, rain and flowing water mobilises soil particles and transports them to a new location. Erosion caused by water can generate sediment, while erosion caused by wind can generate sediment and dust.

Human activities can exacerbate erosion, particularly if it is not managed appropriately.

See Erosion and sediment advice for businesses (EPA website).

5.1.2 Erosion, sediment and dust generation

Large amounts of sediment and dust can be generated from construction, building and demolition activities. When not managed appropriately, the generation of sediment and dust can impact the health and wellbeing of sensitive environments and receptors.

Activities that may lead to erosion and the generation of sediment and dust include:

- removal of vegetation onsite
- excavation, handling and stockpiling of soil
- movement of plant and equipment across exposed soil
- driving trucks and light vehicles on unsealed roads
- discharge of excess water
- uncovered stockpiles of soil and/or construction and demolition materials.

5.1.3 Potential impacts of sediment and dust

The generation and transport of sediment and dust should be prevented, where possible, for the following reasons:

- Sediment washed into the stormwater system may enter waterways, reducing water quality and impacting aquatic plants and animals.
- Sediment may contain contaminants, pathogens and pests that can impact aquatic and terrestrial ecosystems.
- If sediment migrates onto roads and footpaths it can increase the risk of vehicle accidents and pedestrian trips and slips.
- Dust may cause respiratory issues or eye irritation and infection in humans and animals, as well as nuisance and loss of amenity.
- Dust may also contain soil-bound contaminants, pathogens and pests that can impact sensitive receivers.
- Dust reduces visibility onsite and nearby, which may lead to other hazards.
- Dust may enter waterways resulting in sedimentation of waterways affecting the waterway health.
- Hazardous dusts (e.g. asbestos and crystalline silica) have the potential to cause or exacerbate a range of serious respiratory diseases such as asthma, asbestosis, chronic obstructive pulmonary disease and cancers of the respiratory system (e.g. mesothelioma and lung cancer).

5.2 Planning your project

You should consider the management of sediment and dust as part of your planning before you begin construction, building and demolition activities. It may be necessary to consider a sequence of multiple controls to manage sediment and dust. In most instances, the controls you implement to manage erosion and sediment will also likely help reduce dust impacts. Selected controls should be fit for purpose, installed correctly and maintained.

Prepare an erosion and sediment management plan, dust management plan or environmental management plan that addresses erosion, sediment and dust for your specific site before your activities begin. This helps you identify appropriate controls to take in managing the impacts (see Chapter 3: Managing your environmental risk and Appendix 2: Environmental management plan – structure outline).

If you choose to use a plan, it should be prepared by a suitably qualified person and be reviewed and updated to reflect the changes at your site.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

5.2.1 Factors to consider

The following factors may help you understand erosion, sediment and dust generation and should be considered when planning:

- the scale and nature of your activities
- topography of land and sloped areas with higher erosion potential
- structural stability of soil (some soil types are structurally unstable and more prone to erosion, and can collapse in water and lead to sedimentation of waterways)
- sediment suspension in water (coarse sediment such as sand readily settles in water and is easy to remove, whereas fine sediment such as clay generally remains suspended in water, making it more difficult to remove)
- existing vegetation cover and the ability of vegetation to protect against soil erosion and sediment transport
- rainfall that may increase erosion and sediment transport
- wind that may increase erosion and sediment and dust transport
- the sources and characteristics of dust and sediment from your site activities.

To understand the consequence of your activities it is important to identify and understand the nearby sensitive receivers.

See Bureau of Meteorology for information on rainfall intensity frequency duration, rainfall data and weather forecasts (short and long term). These can be helpful when scheduling your works.

5.2.2 Working within or adjacent to waterways

Works within or adjacent to a waterway or floodplain are challenging. There is the potential to create significant impacts to aquatic/riparian flora and fauna if not managed effectively. Consider all possible options to avoid works within, or adjacent to, a natural waterway or floodplain at the design stage.

Approvals and permits may be required by the relevant authority prior to undertaking works that:

- are in, or adjacent to, a waterway or floodplain
- result in disturbance or removal of riparian and aquatic vegetation
- include construction of permanent instream barriers
- require temporary instream barriers
- require instream sediment control measures.

For more information on how you can manage construction, building and demolition works within or near waterways, see Chapter 5: Erosion, sediment and dust Guidance sheet 1: Working within or adjacent to waterways.

5.3 Managing erosion, sediment and dust

5.3.1 Minimising soil erosion

It is important to minimise soil erosion during construction activities, as soil erosion produces sediment and dust. When you consider controls for erosion, it is essential you understand the way water flows across your site and the types of soil and vegetation present onsite.

Limit soil erosion from disturbed or unstable soil

Controls to help you achieve this objective

- Minimise clearance of vegetation and retain existing vegetation wherever possible, particularly along drainage lines and waterways, steep slopes and areas with unstable soils.
- Schedule ground disturbance activities, for example vegetation clearance and earthworks to periods of lower rainfall intensity and lower than average rainfall.
- Erect temporary fencing around vegetation to be retained prior to works commencing.
- Stabilise exposed soil where applicable with the appropriate structural materials and media for your project or activities (e.g. stabilisation matting, rock armour or vegetation), with additional reinforcement to stabilise the base of a slope or embankment.
- Manage vehicle movement to designated roads and access areas.
- Irrigate vegetation and grass, including retained vegetation and revegetated areas, particularly during drier months.
- Reinstate vegetation as soon as works in an area have finished (staged reinstatement). Maintain erosion controls until vegetation is considered to be established.
- Conduct post-installation maintenance of established controls and assess control effectiveness at regular intervals during the time the established controls are in place.

Figure 5.1. Slope stabilisation controls.
(photo courtesy of Regional Roads Victoria)

5.3.2 Managing sediment

Stormwater has the potential to enter waterways, potentially impacting the health of sensitive receptors and aquatic ecosystems.

Diverting stormwater away from exposed soil onsite helps to minimise erosion and reduce sediment and other pollutants reaching stormwater drains and waterways.

This section outlines controls to:

- manage the flow of stormwater onsite
- minimise sediment in stormwater flowing offsite.

Prevent sediment entering stormwater drains and waterways

Controls to help you achieve this objective

- Divert clean stormwater around the site, where possible.
- Avoid works during times of the year when aquatic animals are likely to be under pressure, particularly during migration or spawning.
- Install sediment fences around stockpiles to contain coarse soil and sediment (see Chapter 5: Erosion, sediment and dust Guidance sheet 2: Managing stockpiles).
- Minimise access by vehicles and people near waterways, restricting access to essential works only
- Manage truck and vehicle movements to limit the generation of sediment (see Chapter 5: Erosion, sediment and dust Guidance sheet 3: Managing truck and other vehicle movement).
- Direct the flow of Tturbid stormwater within a constructed lined channel or sediment basin where applicable to reduce the velocity of run-off water and encourage settling of coarse solids.
- Install primary, secondary and tertiary treatment control measures based on the site-specific hazards and level of risk in your project or activities. Confirm that your controls are designed and installed to adequately capture sediment loads from your activities. A sequence of controls, commonly referred to as a 'treatment train', may be needed if pollutants such as nutrients and fine sediment are encountered.
  - **Primary treatment controls** include physical screening of sediment in grassed swales, sediment basins, portable sedimentation tank and litter traps.
  - **Secondary treatment controls** consist of fine particle sedimentation and filtration in swales, infiltration trenches, filter bags, and porous paving.
  - **Tertiary treatment controls** include removal of nutrients and dissolved heavy metals in wetlands and bio-retention systems.

Figure 5.2. Portable sedimentation tank.
(photo courtesy of McConnell Dowell)

- Reduce the amount of sediment entering the stormwater pits and kerb inlets using screens, filter traps and silt socks (see Figure 5.2).
- Contain and remove concrete slurry from run-off in a suitable area and prevent it from entering stormwater networks and waterways.
- Monitor surface water quality regularly upstream and downstream from the works area to confirm effectiveness of established controls and where additional controls may be required.
- Treat and remove sediment from dewatering activities prior to discharge. Consider using primary, secondary and tertiary treatment controls for treatment.
- Conduct post-installation maintenance of established controls and assess control effectiveness at regular intervals while the established controls are in place.
- Remove accumulated sediment from your controls as required and manage in accordance with Chapter 6: Contaminated land and groundwater (note that surface run-off resulting in contamination of waterways is also discussed in this chapter).

See International Erosion Control Association – Australasia for information and resources on erosion and sediment control, and their influences on air, land and water quality.

The Best Practice Erosion and Sediment Control document provides comprehensive erosion, sediment and dust management practices.

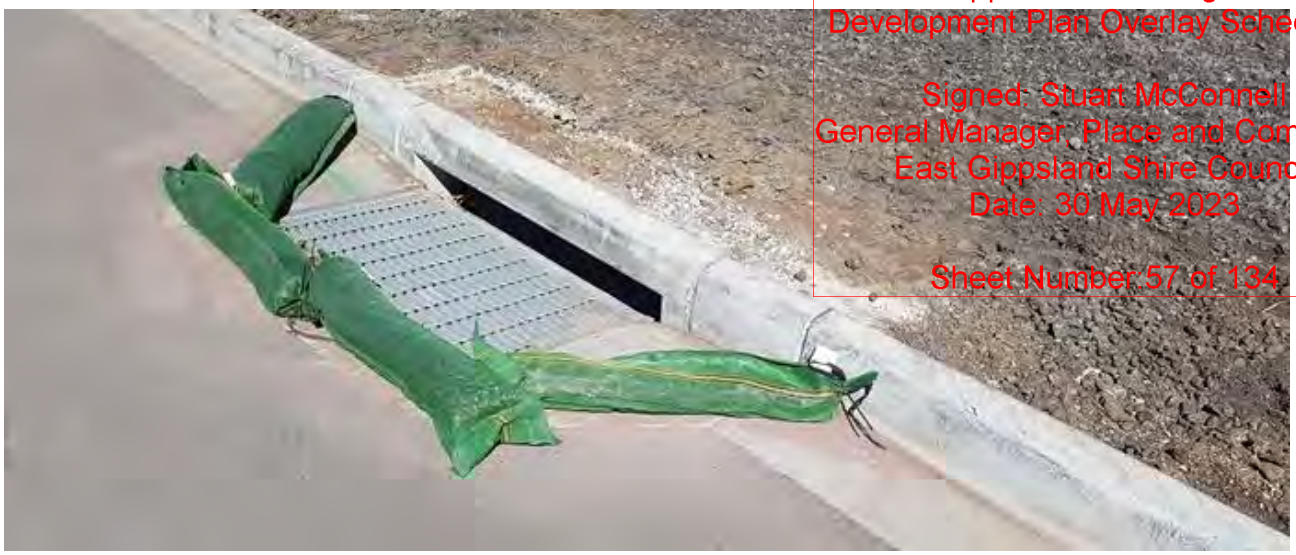


Figure 5.3. Silt sock in use to prevent sediment entering drain inlets.
(photo courtesy of McConnell Dowell)

Figure 5.4. Installed sediment basin.
(photo courtesy of McConnell Dowell)

5.3.3 Managing dust

A significant issue for civil construction, building and demolition activities is dust management. Consider how dust can be generated by understanding likely sources and characteristics. You should understand the proximity of sensitive receivers that may be impacted by dust.

Dust from your activities can result from exposed soil, uncovered stockpiles, vehicle movement and demolition activity. It can be particularly problematic during the drier summer months because high temperatures, strong winds and dry soil cause dust to become airborne.

Dust can impact human and animal respiratory and cardiovascular health and ecosystem health. It can contain soil-bound contaminants that may impact sensitive receivers. In addition, dust can cause nuisance and amenity issues. You should minimise dust as much as possible where nearby sensitive receivers are present.

Minimise the generation and transport of dust

Controls to help you achieve this objective

- Install sealed ground surfaces or use stabilised materials in high traffic areas.
- Schedule dust generating activities by avoiding adverse weather conditions, such as during hot and dry periods, high winds, and days with poor air quality.
- Manage stockpiles in a way that minimises dust generation (see Chapter 5: Erosion, sediment and dust Guidance sheet 2: Managing stockpiles).
- Manage truck and vehicle movements to limit dust generation (see Chapter 5: Erosion, sediment and dust Guidance sheet 3: Managing truck and other vehicle movement).
- Minimise dust generation at sources by considering appropriate physical and engineering controls for the situation and work activities.
- Suppress dust during concrete cutting and construction and demolition activities.
- Install shade cloth as a wind break to slow down winds and minimise wind carried dust.
- Suppress dust from construction activities such as rock breaking and drilling where appropriate with on-tool dust extraction and enclosure of activities.
- Temporarily stop works if dust is visibly discharging or emitting nuisance airborne particles beyond site boundaries. Resume works only when effective controls can be implemented, or weather conditions and air quality improve.
- Monitor air quality for dust (PM_{10}, particles with a diameter of 10 micrometres or smaller) with use of ambient dust monitoring equipment located onsite and offsite in the surrounding community to assist with identifying the effectiveness of implemented dust controls.
- Conduct post-installation maintenance of established controls (including dust monitoring equipment) and assess control effectiveness at regular intervals.

Figure 5.5. Dust suppression using water spray during demolition works. (photo courtesy of Kane Constructions)

Hazardous dust

See WorkSafe Victoria for more detail on hazardous dust, including:

- Safe concrete cutting and drilling
- Compliance code: Demolition
- Asbestos safety basics
- Crystalline silica: Safety basics

Chapter 6: Contaminated land and groundwater

This chapter outlines general information and controls to manage:

- **the identification and presence of existing contaminated land and groundwater**
- **potentially contaminated stormwater**
- **potentially contaminated groundwater during dewatering.**

Civil construction, building and demolition projects or activities often encounter contaminated land and groundwater. This can occur at any point during a project. Contaminated land and groundwater can cause harm to human health and the environment if not properly managed.

Understanding contaminated land and groundwater issues is complex and may require the services of a suitably qualified person. You will need to decide who is suitably qualified to do this.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

Additional to your general environmental duty (ss.25–27), the EP Act has duties relevant to contaminated land and groundwater:

- duty to manage contaminated land, including groundwater (s.39)
- duty to notify the EPA of contaminated land, including groundwater (s.40).

The controls in this chapter will support your duty to manage. This duty means you must minimise the risk of harm to human health and the environment from the contamination as far as reasonably practicable.

Information about how to identify and assess contaminated land will support your duty to notify. This duty means you must notify EPA as soon as possible if the land you manage has become contaminated with certain wastes or chemical substances.

See Manage contaminated land (EPA website) for more information about your duties.

6.1 Background

6.1.1 Causes of contaminated land and groundwater

Land and groundwater can become contaminated by sources such as waste and chemical substances. These can cause a change in the land's characteristics and pose a risk to human health and the environment.

Contamination is typically present as a result of past or current industrial, agricultural or commercial activities that involve the handling, storage and/or movement of liquids, chemicals and/or wastes.

Sometimes contamination can spread from the site where the contaminating activity occurred and impact adjacent properties. This typically occurs via:

- contaminated soil blowing off a site as dust
- contaminated surface water run-off
- infiltration of surface contaminants to groundwater
- contaminated groundwater flowing offsite.

6.1.2 When does contaminated land and groundwater pose a risk of harm?

A conceptual site model (CSM) is a useful tool that can help you evaluate harm to human health and the environment. A CSM is a visual representation showing:

- **source** of contamination
- **pathways** through which it could spread
- **receptors** it could impact. Receptors include humans and the environment (e.g. animals, vegetation and waterways).

A source, pathway and receptor must be present for contamination to cause harm.

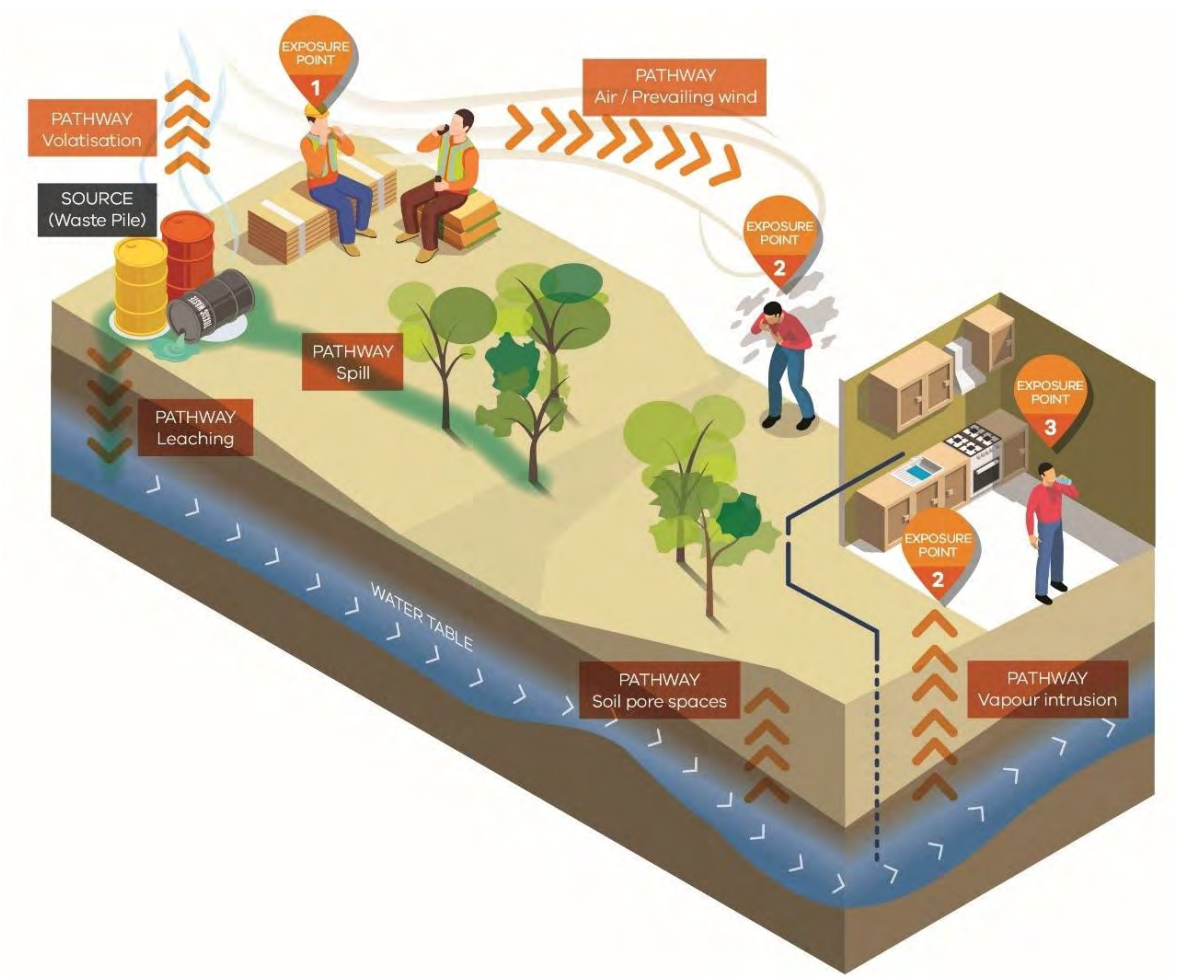


Figure 6.1. Conceptual site model.

The CSM above illustrates six potential pathways that can expose people to contamination, demonstrated as 'exposure points':

- **Exposure point 1: Direct contact** – e.g. a site worker is in direct contact via skin (dermal) with contaminated soil.
- **Exposure point 2: Inhalation** – e.g. site workers or a member of the public might inhale vapours or contaminated dust. Inhalation exposure can also be from vapours that have migrated indoors (vapour intrusion).
- **Exposure point 3: Ingestion** – e.g. some of the chemical may percolate down through the soil, dissolve into groundwater and flow offsite. Contaminated groundwater may be extracted from a bore used for drinking water and ingested by a member of the public or animals. Soil can also be ingested by children and by others when unwashed vegetables are eaten. Vegetables can also absorb contaminants through the soil.

6.2 Planning your project

6.2.1 Identifying potential land and groundwater contamination

Identifying potential land and groundwater contamination before starting your activities is important to ensure contamination is appropriately managed during works. This will reduce impacts on human health and the environment.

Knowing the current and past activities of your site and of nearby properties can provide an indication of potential contamination and related infrastructure that exists onsite. You can identify these activities via a desktop study, for example, by:

- searching relevant databases, websites and other sources of information about a site
- requesting information from relevant authorities.

- Landata provides historical aerial photos
- The planning department of the relevant council
- VicPlan for planning information
- Dial Before You Dig referral service
- Victorian Landfill Register
- Victoria Unearthed – brings together site information from sources including
  - Sands and McDougall business directories, also available from the State Library of Victoria
  - EPA Priority Sites Register
  - EPA groundwater quality restricted use zone
  - EPA licensed sites
  - Environmental audits
- Environmental audit overlays

The desktop study can inform a preliminary site investigation. This aims to identify potential contamination based on existing infrastructure and visual and olfactory signs of contamination being present (see Table 6.1). It can be completed as part of your planning activities. The desktop study and preliminary site investigation are commonly referred to as a Phase 1 assessment.

Depending on the actual or potential contamination identified, a detailed site investigation, commonly referred to as a Phase 2 assessment, may be required. This involves undertaking sampling for laboratory analysis to identify the type and concentration of contamination. This should be undertaken by a suitably qualified person (see Work with an environmental consultant, EPA website).

Table 6.1. Indicators of potential contamination (note: this is not an exhaustive list).

Indicators of potential contamination	
Infrastructure indicative of potentially contaminating activities	Aboveground storage tanks
	Evidence underground storage tanks might be onsite: fuel bowsers or tank dip/fill/vent points
	Old drums / chemical storage
	Triple interceptor traps
	Vehicle hoists
	Electrical transformers
	Livestock dips
	Dilapidated buildings which contain asbestos
	Treated pine, which may contain arsenic
	Pit lids
Visual/olfactory signs of potential contamination	Areas of scalded/bare earth
	Soil that appears different to naturally occurring soil (evidence of imported fill)
	Staining or unusual colour on soil
	Unusual colours, oil or a 'sheen' on surface water, including areas of pooling
	Odours (e.g. resembling petrol, solvents, decomposing rubbish or 'rotten egg')
	Piles of soil and partially excavated areas
	Ash and cinders, rubbish or demolition rubble in soil
	Fragments of suspected asbestos-containing materials such as fibre cement sheeting
	Dead or stressed vegetation

The purpose of assessing potentially contaminated land and groundwater is to determine:

- if an audit is required based on the potential for land or groundwater to be contaminated and the proposed use, taking past land uses into consideration
- if land or groundwater is contaminated and the extent of the contamination
- if the land or groundwater is contaminated, can the contamination be managed, or is remediation required to make it suitable for the current or future land use?

Contaminated land and groundwater should be assessed in accordance with guidance produced by the National Environment Protection Council. The assessment of contaminated land and groundwater is typically considered during an application for a planning permit prior to construction.

Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) details the recommended staged approach to assessing contaminated land.

6.2.2 Managing commonly encountered issues - asbestos and acid sulfate soils

Information is provided in Table 6.2 for two commonly encountered contaminants: asbestos in soil and acid sulfate soils. Other commonly occurring contaminants are listed in section 8.3.

Table 6.2. Ways of managing asbestos and acid sulfate soils.

Asbestos in soil	Acid sulfate soils
Asbestos was historically used in numerous products, including fibre cement pipes, fibre cement sheeting, vinyl tiles, brake linings and pipe lagging. Asbestos is often encountered on the soil surface or within fill during civil construction, building and demolition projects. Asbestos poses a risk of harm to human health if asbestos fibres are inhaled into the lungs.	Acid sulfate soils are naturally occurring. When acid sulfate soils are disturbed and exposed to air and water, sulfuric acid is produced. Sulfuric acid corrodes steel and concrete structures and, if it is washed into waterways, negatively impacts aquatic plants and animals.
Managing asbestos in soil If asbestos is suspected or identified in soils onsite, seek advice from a suitably qualified person. For advice on this, see Work with an environmental consultant (EPA website).	**Managing acid sulfate soils** Undertake a desktop assessment of the likelihood of encountering acid sulfate soils, in accordance with *Acid sulfate soil and rock* (EPA publication 655). If the desktop assessment indicates the likely presence of acid sulfate soils, seek advice from a certified professional soil scientist or a suitably qualified person. Manage acid sulfate soils in accordance with advice from the soil scientist or consultant.
See Waste Guidance sheet 6: Hazardous waste for disposal of soil containing asbestos.	See Waste Guidance sheet 6: Hazardous waste for disposal of acid sulfate soils.

6.2.3 Considerations if dewatering groundwater

Dewatering contaminated groundwater can pose risks to human health and the environment. As a result of dewatering, contaminated groundwater that is present on a site has the potential to spread. It can also draw contaminated groundwater from surrounding areas onto the site.

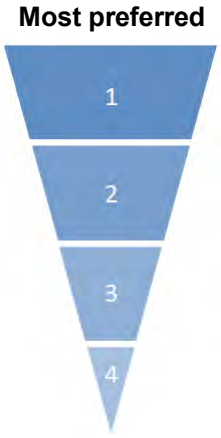
If groundwater dewatering is proposed, use the resources in the box below to conduct a desktop risk assessment of the potential for groundwater contamination onsite and nearby properties. If you suspect groundwater is contaminated, seek advice from a suitably qualified person to ensure these risks are understood and properly managed.

Assessing the likelihood of groundwater contamination

- EPA Groundwater Quality Restricted Use Zone Maps (EPA website) for information about groundwater contamination onsite or nearby that is known to the EPA.
- Environmental auditing (EPA website) or Victoria Unearthed.

6.2.4 Remediation of contaminated land and groundwater

If you need to remediate contaminated land and groundwater, your remediation strategy should reflect the order of preference below. This is also consistent with the waste hierarchy (see section 8.2.1).



1. Ongoing management requirements must be appropriate if onsite management of contaminated land and groundwater is proposed. They should be within the context of current and future land use and done in accordance with an appropriate EPA permission.
2. Contaminated land and groundwater should be remediated and reused onsite rather than reused offsite.
3. Contaminated land and groundwater should be remediated so it is suitable for reuse offsite, without the need for ongoing management.
4. Sending contaminated soil to landfill is the least preferred option.

You can save significant costs if you don't have to engage someone to transport and deposit your waste at a place lawfully able to accept it, and can instead remediate contaminated land and groundwater to reuse onsite.

See Chapter 8: Waste for more information about managing waste onsite.

Remediation technologies

Several soil remediation technologies are available in Victoria. See:

- *Industrial waste resource guidelines – soil remediation technologies in Victoria* (EPA publication IWRG 622)
- *Thermal treatment technologies* (EPA publication 1402)

6.2.5 Removal of contaminated materials

Contaminated materials, including soil and groundwater, need to be taken to a place that is lawfully able to receive it.

6.2.6 Environmental audit overlay

An Environmental Audit Overlay (EAO) is a planning tool councils and other planning authorities apply. It is used to signal that a site is potentially contaminated and requires an environmental audit be conducted prior to the land being approved for a 'sensitive use' e.g. developing housing and schools. An EAO is provided in the Victoria Planning Provisions and planning schemes.

By applying the overlay, the planning authority is not preventing the commencement of the assessment and approval process for a project. However, it may prevent planning permits being issued until an environmental audit has been completed.

6.2.7 Environmental audits

Under the new laws, environmental audits may proceed in two stages:

1. Preliminary risk screen assessments (PRS).
2. Environmental audits.

The purpose of the PRS is to assess the likelihood of the presence of contaminated land and determine whether an environmental audit is required. PRS and environmental audits must be completed by EPA-appointed environmental auditors.

Environmental auditing and auditors

EPA's website has further information about:

- Environmental auditing
- Environmental auditors

6.3 Managing contaminated soil

Contaminated soil may pose a risk to human health or the environment if it:

- becomes airborne as dust
- creates contaminated run-off which could seep into groundwater or is washed into waterways as sediment
- creates offensive odours
- is mixed with uncontaminated soil that is intended for other uses.

Excavate and handle contaminated soils to prevent harm to human health and the environment

Controls to help you achieve this objective

- Avoid exposing or excavating contaminated soil until it is necessary to do so. Stockpile contaminated soil separately to clean soil.
- Implement the controls in Chapter 5: Erosion, sediment and dust Guidance sheet 2: Managing stockpiles when stockpiling contaminated soil to prevent:
  - contaminants from vapourising
  - stockpile erosion from wind and water
  - generation of dust and sediment
  - contaminated run-off.
- Erect temporary fencing and signage around contaminated soil to prevent site workers from unnecessary contact with contaminated soil.
- Consider using odour covers such as tarps for soils generating offensive odours (see odour guidance, EPA website).
- Arrange for analysis of contaminated soil to identify contaminants of potential concern in accordance with EPA Industrial Waste Resource Guidelines (see below). Analysis will determine to what extent soil is contaminated and inform decisions about management, treatment or reuse onsite. A suitably qualified person can advise on identification, sampling and analysis of contaminants of potential concern.

- Seek advice from a suitably qualified person on the most suitable way to manage contaminated soil (e.g. containment, treatment or disposal). The consultant may prepare a soil management plan to include in the environmental management plan (see Chapter 3: Managing your environmental risk and Appendix 2: Environmental management plan – structure outline).
- Manage contaminated soil in accordance with the consultant's advice and the waste hierarchy.
- When new environment protection laws come into effect, you will have options in some instances to contain and use soil with lower levels of contamination within a site.
- See section 8.6 for information on removing contaminated soil offsite.

See EPA Industrial Waste Resource Guidelines:

- *Soil sampling* (EPA publication IWRG 702)
- *Soil hazard categorisation and management* (EPA publication IWRG 621)

6.4 Managing potentially contaminated stormwater

Stormwater that encounters contaminated soil may become contaminated and pose risks to human health and the environment, particularly waterways.

Limit the generation and disposal of contaminated stormwater to prevent harm to human health and the environment

Controls to help you achieve this objective

- Avoid generating contaminated stormwater by diverting stormwater away from areas of exposed contaminated soil. Implement the controls in section 5.3.2.
- Capture potentially contaminated stormwater in a sediment basin or portable sedimentation tank and prevent it from leaving site.
- Erect temporary fencing and signage around areas where potentially contaminated stormwater is stored to prevent site workers from unnecessary contact with water.
- Implement odour control measures, such as use of tarps and containers, for contaminated stormwater that generates offensive odours (see odour guidance, EPA website).
- Arrange for potentially contaminated stormwater to be analysed for the chemicals or substances known to contaminate the site. Analysis will determine to what extent stormwater is contaminated and inform decisions about management, treatment or reuse onsite.
- Seek advice from a suitably qualified person on the most suitable way to manage contaminated stormwater.
- Manage contaminated stormwater in accordance with the consultant's advice and the waste hierarchy (see Chapter 8: Waste).

See EPA Industrial Waste Resource Guidelines for further detail on *Sampling and analysis of waters, wastewaters, soils and wastes* (EPA publication IWRG 701).

6.5 Managing contaminated groundwater during dewatering

If not managed appropriately, dewatering contaminated groundwater, as part of dewatering activities, poses potential risks of harm to human health and the environment. This is described in section 6.2.3.

Manage pumping of contaminated groundwater to prevent harm to human health and the environment

Controls to help you achieve this objective

- Avoid extracting contaminated groundwater wherever possible.
- If volatile and combustible chemicals are present in groundwater, monitor air quality during dewatering to ensure a safe atmosphere is maintained.
- Use suitable storage vessels when dewatering.
- Erect temporary fencing and signage around the dewatering pumps and the water storage vessel to prevent site workers from unnecessary contact with contaminated water.
- Arrange for groundwater to be analysed. An analysis will determine to what extent groundwater is contaminated and inform decisions about management, treatment or reuse onsite.
- Seek advice from a suitably qualified person on the most suitable way to manage contaminated groundwater.
- Manage contaminated groundwater in accordance with the consultant's advice and the waste hierarchy (see section 8.2.1).

See section 5.3.2 on managing dewatering activities onsite to help prevent sediment from entering waterways.

6.6 Managing unexpected contamination or contamination 'hot spots'

You can sometimes still discover unexpected contamination during civil construction, building and demolition activities after an environmental assessment has been conducted.

Unexpected contamination can originate from, for example:

- buried drums or underground storage tanks
- buried rubbish
- ash and cinders
- fragments of asbestos-containing material in soil.

Manage unexpected contamination to prevent harm to human health and the environment

Controls to help you achieve this objective

Develop a procedure to implement onsite should you encounter unexpected contamination. Your procedure should cover the following:

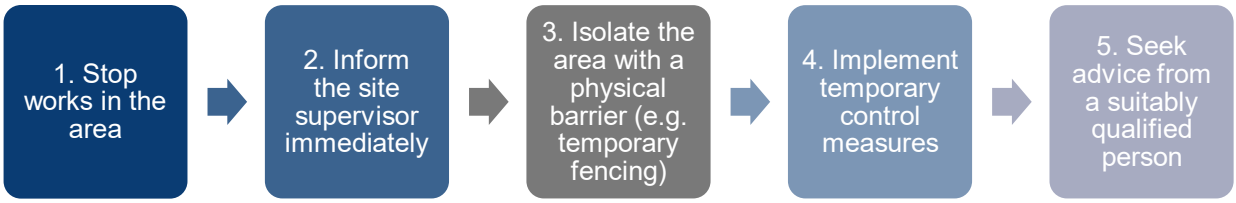


Figure 6.2. Steps to include in your procedure for unexpected contamination.

6.7 Collection and removal of contaminated material

Contaminated material, including soil and water, needs to be taken to a place that is lawfully able to receive it. See section 8.6 for information on waste collection and removal.

Chapter 7: Chemicals

This chapter outlines controls to minimise the risks associated with chemical storage and handling, spill response and cleanup, and storage and handling of volatile liquids.

Chemicals are often used in civil construction, building and demolition activities and projects. It is the responsibility of site managers to ensure that chemicals used onsite are stored and handled appropriately to reduce the risks of spills and leaks and potential impacts to human health and the environment.

Additional to your general environmental duty (ss.25–27), the EP Act has duties relevant to your storage and handling of chemicals:

- duty to respond to harm (s.31)
- duty to notify of an incident (ss.32–33).

7.1 Background

Civil construction, building and demolition sites commonly use chemicals, such as

- curing compounds
- sealers
- paints
- paint thinners
- fuel
- flocculant
- coagulants
- waterproofing chemicals
- water repellents
- adhesives
- primers
- cleaning agents
- hot tar.

Poor chemical management can impact human health and the environment in many ways, including:

- contamination of land, ground and surface waters
- loss of plant and animal life
- emission of odour and toxic vapours
- direct exposure to hazardous chemicals, resulting in skin irritation, respiratory distress, injury and illness.
- excessive nutrients in waterbodies (the addition of some chemicals can cause eutrophication)
- combustion and fire risk.

7.2 Planning your project

It is important to plan for onsite chemical management as part of your project planning before starting your activities. Chemical management includes storage, handling, waste removal and spills response.

When planning your activities or project, you should consider:

- the types, characteristics and volumes of chemicals you require
- how chemicals will be managed, including storage and spill response procedures
- collection and removal options for chemical waste (see Chapter 8: Waste).

Identifying and assessing the risks associated with onsite chemical storage and handling will help you determine the appropriate management controls for chemicals onsite (see Chapter 3: Managing your environmental risk).

7.3 Chemical storage and handling

Inappropriate chemical storage and handling could result in spills and leaks, potentially contaminating air, land and waterways, and causing harm to human health and the environment.

Prevent spills and leaks of chemicals from onsite storage and handling practices

Controls to help you achieve this objective

Follow good management practices by:

- storing chemicals in a dedicated, well-ventilated storage area (see Figure 7.1)
- clearly labelling all containers
- implementing systems to ensure incompatible materials are not stored or handled together, as identified by Safety Data Sheets (SDS) (formerly referred to as Material Safety Data Sheets or MSDS)
- maintaining an inventory that lists all chemicals stored onsite, the quantities and their locations
- not storing chemicals in empty food and drink containers
- ensuring lids are secured on containers
- monitoring and maintaining primary containment systems (e.g. storage containers, tanks and pipes).

When selecting a storage site:

- avoid locations:
  - next to stormwater inlets, drainage lines, waterways, and sensitive receivers such as vegetation and animal habitat
  - without secondary containment systems (e.g. bunding)
  - with potential for direct water pollution or land contamination (e.g. in or on structures that are built over water such as boat sheds, jetties, pontoons)
  - on bare ground or unsealed surfaces.
- choose locations:
  - at least 10 m away from sensitive receivers (e.g. waterways, vegetation or animal habitats)
  - with sealed surfaces
  - with suitably designed and maintained secondary containment and covered roofing to exclude rainwater contact.
  - Check if there are additional requirements for storing and handling specific chemicals.

Figure 7.1. Incorrect chemical storage onsite.

Handle and dispose of chemicals appropriately by:

- using the appropriate personal protective equipment (PPE) for worker safety
- keeping current SDS of the chemicals in a location accessible to all staff and emergency services and informing workers of their availability and location
- purchasing smaller quantities and safer chemicals (e.g. granular products instead of dusty powders, water-based products, more dilute chemicals)
- minimising spills and splashes by using safe pouring or decanting techniques e.g. fitting drip collectors to containers with taps, and decanting over a collection tray
- for mobile bowsers onsite, ensuring that the bowsers have a valve or a tap that either closes off automatically or is lockable to prevent leaks
- disposing of any unused chemicals in an appropriate manner (contact your local council, local landfill, chemical waste disposal company or EPA Victoria for specific advice).

Implement secondary containment to contain leaks or spills from the primary container, or if transfer mechanisms fail. Secondary containment can include:

- bunds – raised impermeable barriers forming the perimeter of secondary containment areas (e.g. walls, speed humps, guttering, curbing, flexible rubber barriers constructed with robust, impermeable, UV and chemical resistant material or lined with such material)
- encasement – storage containers with built-in (integral) secondary containment (e.g. encasing plastic pipes that carry liquid within a larger pipe which drains to a collection sump, placing drums inside larger, sealed plastic drums during transport by forklift)
- grading of sealed surface areas to form a contained area, either as part of a building or an external structure.

Establish and maintain a designated refuelling/maintenance area, and consider:

- establishing plant storage and refuelling areas in a location where they will not need to be relocated during the construction activities
- locating plant storage and refuelling areas at least 10 m away from drains, waterways and other sensitive receivers, in an area where there is minimal risk of collision with vehicles or equipment
- minimising the quantities of oil and fuel onsite
- using and storing fuel storage containers and equipment (e.g. buckets, funnels, smaller containers) within secondary containment – a bunded area on an impervious surface (see Figure 7.2)
- regularly maintaining the pipes, valves and shut-off mechanisms used in the refuelling area

- locking fuel storage tanks when not in use to prevent unauthorised access and to reduce the risk of vandalism.
- keeping a spill kit within 10 m of the plant storage and refuelling areas (see section 7.4).

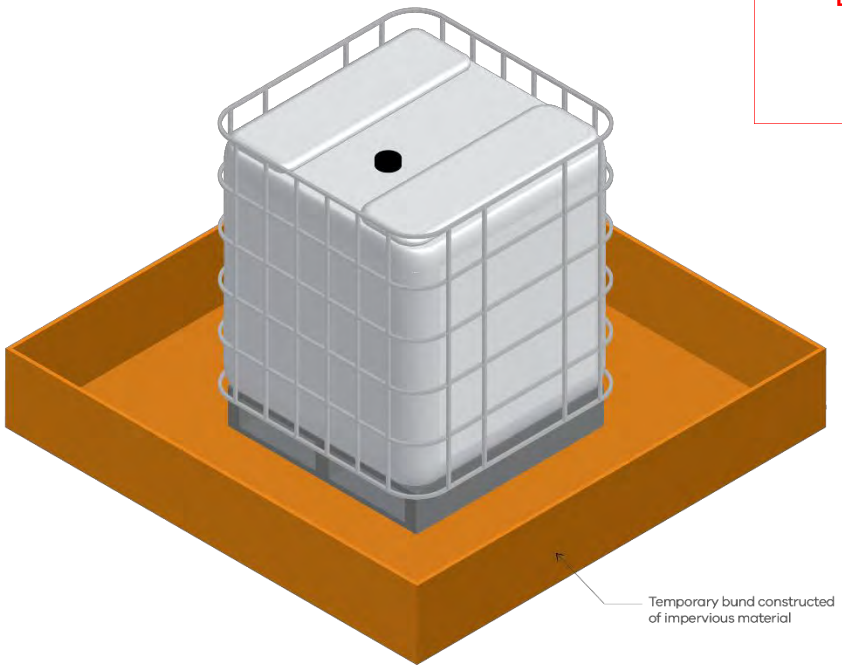


Figure 7.2. Bunded area with an impervious surface.

Secondary containment

See *Liquid storage and handling guidelines* (EPA publication 1698) and *Solid storage and handling guidelines* (EPA publication 1730) for more information.

This guidance includes design considerations such as calculating the volume required for a secondary containment area and material selection.

7.4 Spill response and cleanup

Appropriate spill response ensures that all spills are contained and do not spread around the site or beyond the site boundary, impacting the surrounding environment. Spill response includes containment, cleanup and disposal.

Promptly clean up and limit the spread of spills and leaks to prevent pollution

Controls to help you achieve this objective

- Ensure employees are trained in the use of spill response equipment.
- Clean up spills as soon as they occur.
- Maintain the following spill response equipment:
  - spill kits containing absorbent material appropriate to the type of chemical(s) being used onsite (see Figure 7.3)
  - an appropriate number of recovery drums/containers compatible with the chemicals which may be put in them
  - neutralisers for any acids/bases
  - equipment to block stormwater inlets
  - drains, booms
  - portable pumps, retention tanks
  - fire extinguishers
  - drain seals to cover drains in event of a spill occurring
  - safety equipment for the workers involved in cleanup activities.

Figure 7.3. Example of a spill kit contents.

- Maintain the following spill response infrastructure:
  - site containment systems e.g. absorbent socks
  - retention pits
  - rollover bund where chemicals are stored or handled, including the refuelling area.
- Locate spill response equipment and infrastructure in an accessible location.
- Locate spills kits within 10 m of the chemical storage area.
- Ensure the spill kit selected for the site is designed to treat the types of chemicals that are stored on that site.

Figure 7.4. Containment and cleanup of a spill.

Figure 7.5. Drain seal (left) and rollover bund (right).

Appropriately dispose of absorbent material and other materials (e.g. soil) that become contaminated through a spill or cleanup activity.

See Chapter 8: Waste for information on collection and removal of waste, including contaminated spill response material.

7.5 Storage and handling of volatile liquids

Paint, adhesives and fuel are examples of volatile liquids that cause odour and can pollute the air. You should know which of the chemicals you store, use or produce, could volatilise during normal operating or weather conditions.

Some of these chemicals may generate an odour which will help you detect a leak through vaporisation, while others may be odourless.

Prevent vaporisation of chemicals to minimise odours and air pollution

Controls to help you achieve this objective

- Eliminate the use of volatile organic compounds from your process or substitute with a less volatile alternative.
- Install vapour recovery equipment or other measures for minimising losses of volatile components to the surrounding air, such as the installation of after burners or carbon filters.
- Regularly maintain your ventilation and exhaust systems.
- Ensure solvents are collected by a licensed hazardous waste disposal contractor.
- Seal chemical containers and keep them in a well-ventilated storage area, away from direct sunlight and hot areas.
- Carry out any spray-painting activities using hazardous chemicals in well maintained spray booths, except when it is not possible (e.g. painting a building). Where a spray booth is not possible, use fans and natural fresh air, and a local exhaust ventilation system to capture solvent vapours.
- Keep an inventory of volatile liquids and refer to the SDS to ensure they are stored and handled appropriately.

Relevant Australian Standards

See Standards Australia and the Globally Harmonised System (GHS) for further chemical management guidance.

Standards are regularly reviewed by Standard Australia technical committees.

Chapter 8: Waste

This chapter discusses controls relating to:

- **minimising waste using the waste hierarchy**
- **managing different types of waste**
- **storing waste materials onsite**
- **waste collection, transport and disposal**
- **maintaining waste records**
- **reducing illegal dumping.**

Civil construction, building and demolition activities generate waste. If not managed appropriately, this waste may harm human health and the environment through contamination of soil, air, groundwater and surface waters.

Additional to your general environmental duty (ss.25–27), the EP Act has duties relating to:

- depositing, receiving and transporting waste
- investigating alternatives to waste disposal
- managing specific types of waste
- responding to harm (s.31)
- notification of an incident (ss.32–33)
- notification of contaminated land (s.40).

See Waste duties (EPA website) for more information.

What is waste?

Waste is unwanted or surplus material including any solid, liquid or gas, irrespective of its potential use or value.

See Part 2 of the EP Act for the full definition of waste.

8.1 Background

Waste generated from or encountered during civil construction, building and demolition activities can include:

- excavated material such as rock and soil
- waste asphalt, bricks, concrete, plasterboard, timber, vegetation
- asbestos, acid sulfate soils and contaminated soil
- litter
- chemical waste
- washdown and other contaminated waters.

When not managed appropriately, waste can:

- cause pollution to water, land and air
- adversely impact ecological systems
- pose a human health risk
- be visually unappealing.

8.2 Planning your project

You should consider the management and disposal of waste before you begin activities. As part of your planning, consider:

- the types, characteristics and volumes of waste you may generate
- how wastes may be managed, including storage onsite
- waste removal options, waste contractors (including waste transporters and receivers) and accredited waste consigners.

Preparing a waste management plan or environmental management plan that addresses waste management before your activities begin can help you identify appropriate controls to eliminate or reduce the risks of harm from waste, particularly if your site activities are complex (see Chapter 3: Managing your environmental risk and Appendix 2: Environmental management plan – structure outline).

The plan should be prepared by a suitably qualified person and be reviewed and updated to reflect any changes at your site.

Help to manage your waste

An accredited consigner is an approved professional appointed by EPA who has knowledge on how to lawfully manage specific types of waste and can help you manage your waste.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant to manage your waste.

8.2.1 Waste hierarchy

When planning, you should use the waste hierarchy to support your waste management decisions. The waste hierarchy (Figure 8.1) outlines an order of preference for managing waste, with avoidance being the most preferred option and disposal the least.

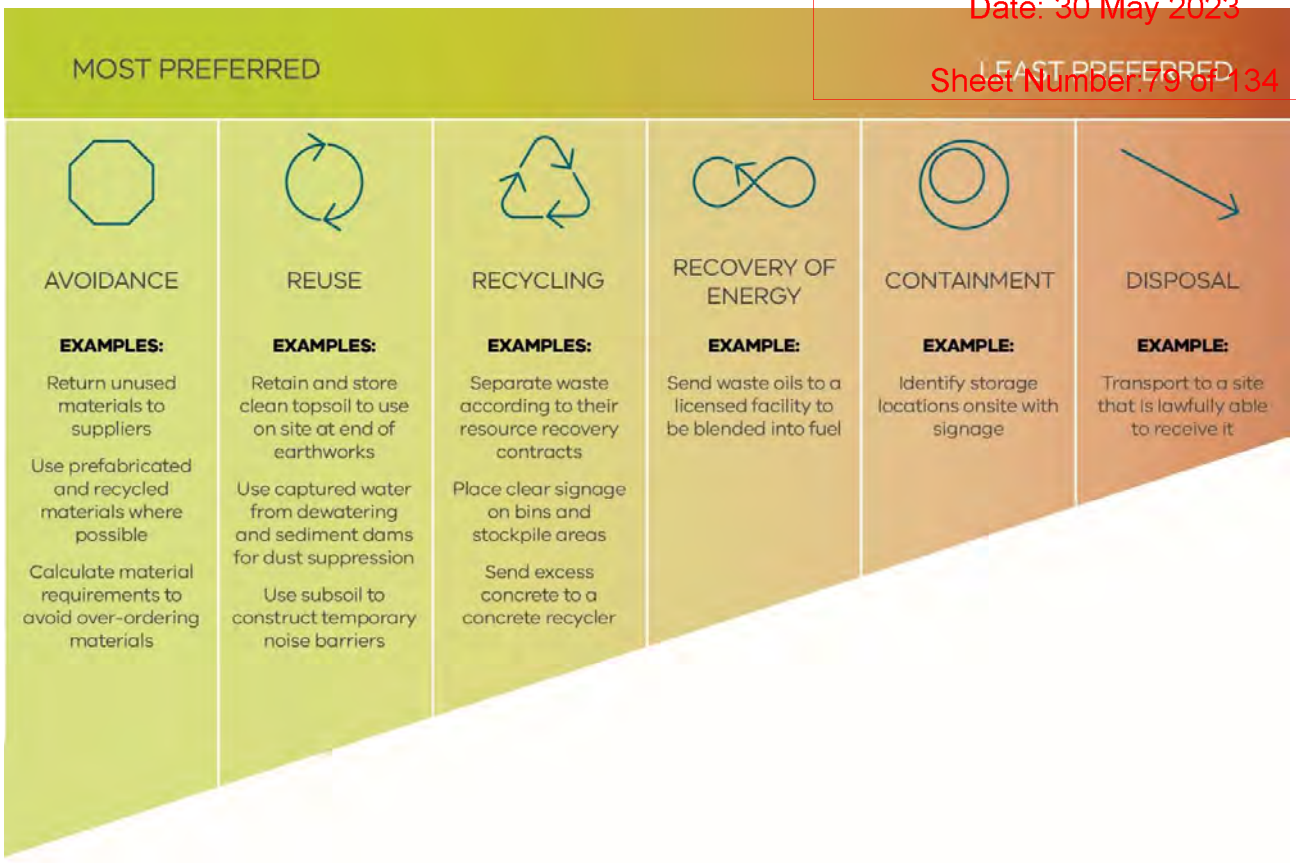


Figure 8.1. Waste hierarchy.

A waste minimisation assessment can identify opportunities for you to avoid, reuse and recycle waste. It can ultimately result in less waste being disposed and this can minimise costs to your project.

Incorporating the waste hierarchy into your site environmental management plan can help you stay on track with your efforts to minimise waste (see Chapter 3: Managing your environmental risk and Appendix 2: Environmental management plan – structure outline).

8.3 Waste types and management

Table 8.1 looks at common waste types generated from civil construction, building and demolition. You can then refer to the corresponding guidance sheet listed in the column on the right for information about controls you can put in place to manage your impact and reduce the risk from that waste type.

Prevent waste from polluting the environment

Table 8.1. Common waste types generated during civil construction, building and demolition activities.

Waste type:	Description:	For controls see:
Litter	Includes a variety of solid and putrescible wastes such as building material, general rubbish, packaging material, prunings and discarded food and is often caused by lack of awareness of staff and unavailability of suitable bins.	Waste Guidance sheet 4: Litter
Surplus excavated material	Excavated material becomes surplus when it cannot be used by the project because of its physical, chemical or biochemical characteristics and location, and more material being available than is required.	Waste Guidance sheet 5
Contaminated soil	Soil that is contaminated with chemicals, such as heavy metals and hydrocarbons, which includes pre-existing contamination at a site.	Chapter 6: Contaminated land and groundwater
Hazardous wastes	Wastes that have a known risk to human health and the environment, including asbestos, polychlorinated biphenyls, lead, and acid sulfate soils.	Waste Guidance sheet 6
Masonry and other solid materials	Consists of building rubble, concrete, bricks, timber, plastic, glass, metals, bitumen, trees, and e-waste.	Waste Guidance sheet 7
Drilling mud	The liquid or sludge residue generated during drilling or non-destructive hydro-excavation of soil or earth.	Waste Guidance sheet 8
Historic buried waste	Unknown waste, including closed landfill or illegal dumping grounds, uncovered during excavation works on construction sites. It can contain masonry and other solid material waste, hazardous waste and putrescible waste.	Waste Guidance sheet 9
Sewage	Sewage generated onsite from workers.	Waste Guidance sheet 10
Wastewater	Water that has been ‘used’ or is ‘surplus’ water (i.e. cannot be used by the project).	Waste Guidance sheet 11

8.4 Storing waste material onsite

You might need to temporarily store waste until you can send it offsite to a place that is lawfully able to receive it (e.g. a waste and resource recovery facility or landfill for disposal) or until you can determine a location onsite for its reuse, treatment or containment.

Implementing the following general controls will assist you with storing waste on your site.

Controls to help you store waste material onsite

- Identify opportunities for reducing and reusing waste, following the waste hierarchy (see Figure 8.1).
- Identify appropriate locations for storing wastes onsite, depending on the type of waste (see the guidance sheets listed in Table 8.1 for further information on managing specific types of waste).
- Store incompatible wastes separately e.g. chlorine and benzene. Some wastes have the potential to react with another and create a fire risk.
- Store wastes in both primary and secondary containment areas, where possible, particularly hazardous wastes. See Chapter 7: Chemicals for information on primary and secondary containment.
- Prevent any liquid wastes (including dry wastes that become wet) leaching from skip bins or other waste storage containers – ensure there are no holes or damage. Consider using an impervious liner to prevent leaking.
- Implement controls in section 5.3.2 when managing surface run-off after rain events and section 6.4 for managing potentially contaminated stormwater.
- Implement the controls in Chapter 5: Erosion, sediment and dust Guidance sheet 2: Managing stockpiles, when stockpiling waste materials.
- Where waste is generating offensive odours, identify and implement appropriate odour controls such as odour covers e.g. tarps over stockpiles to reduce odours emissions, or store waste in a container, where possible.
- Clearly label waste storage areas and containers to ensure accurate sorting and ease of collection by a particular service provider (for recycling, recovery or disposal).
- Determine the length of time the waste will be stored in that location, and whether the storage locations are appropriate for that length of time.
- Use tarps or lidded bins so waste cannot be blown or washed away.
- Place lids or covers on waste containers.
- Lock bins to prevent illegal use by unauthorised people.
- Ensure staff are trained in the management of waste onsite.

For containment and storage of specific types of waste commonly generated by civil construction, building and demolition activities, see the Waste guidance sheets referenced in Table 8.1.

8.5 Stockpiling

Stockpiling wastes may be appropriate depending on the type and characteristics of the waste (e.g. solidity, chemical composition and contamination levels), site location and weather conditions it may be exposed to. Stockpiles may be used to store waste temporarily for collection and transport to a site that is lawfully able to receive it.

See Chapter 5: Erosion, sediment and dust Guidance sheet 2: Managing stockpiles, and guidance sheets referenced in Table 8.1 for information on stockpiling wastes and contaminated soils.

8.6 Waste collection and removal

Some wastes, particularly contaminated wastes, need to be collected and transported by an authorised contractor, such as one holding a relevant EPA permission, to help ensure it is taken to a site that is lawfully able to receive it.

Any person (including a waste generator, transporter or receiver) who dumps or allows for waste to be taken to a place that cannot lawfully accept it faces heavy penalties if prosecuted. You may be required to pay cleanup costs as well as the cost of taking that waste to a lawful place.

Contact your local council or regional waste management group to find a site that is lawfully able to receive your industrial waste, such as a landfill, transfer station or recycling facility.

Implementing the following general controls may assist you to manage collection and removal of your waste.

Controls to help you manage collection and removal of waste

- Operate vehicles transporting waste material onsite in a manner to prevent loss of materials during loading, transport and unloading activities.
- For waste that cannot be reused or cannot be stored onsite, engage a waste transporter to collect this waste and transport it to a site that is lawfully able to receive it.
- For certain types of liquid and solid wastes, engage an authorised transporter to take the waste to a site that is lawfully able to receive it and meet the waste tracking requirements detailed in the EPA Interaction Portal: https://portal.epa.vic.gov.au/irj/portal
- Record all your onsite and offsite waste (see section 8.7).
- Transport odorous waste in covered vehicles.
- Waste receipt dockets from a lawful place can demonstrate that waste from your site is going to the right place – ask the waste transporter for this.

8.7 Maintaining waste records

Recording and maintaining information about your waste and how it is managed can help you to demonstrate your waste management practices.

EPA may ask you at any time to supply information about your wastes. There are penalties if you supply false or misleading information.

It is recommended you keep a record of:

- location (include source location, and storage locations), type and quantity of wastes
- date and quantity of waste transported and received
- registration number of the waste transporter's vehicle
- waste receipt dockets from the lawful place to which waste was taken to
- waste assessment and categorisation reports, including sampling methodologies and plan, and laboratory analysis reports, for potentially harmful materials such as contaminated soil
- written procedures and plans for managing waste, including handling and storage procedures, and incident response plans
- development applications, including waste management plans or environmental management plans addressing waste
- site assessments including contaminated site assessments, and environmental and geotechnical studies.

Waste transport certificates need to be submitted online via the EPA Interaction Portal for certain types of wastes. This enables EPA and industry to better monitor the movement of waste.

Leaving waste on private or public land that is not lawfully able to accept it is **illegal**. Illegal dumping is a crime.

As a waste generator, you are legally responsible for ensuring waste is taken to a facility that can lawfully receive it. Waste receipt dockets from an approved waste disposal facility are your only guarantee that waste from your site is going to the right place.

You cannot rely on the word of others. If a quote for managing waste is cheaper than expected, find out why. The waste transporter, sub-contractor or waste facility manager may be avoiding costs by illegally dumping the waste – and enforcement action may be taken against you.

Call EPA on 1300 372 842 (1300 EPA VIC) or your local council to report suspected illegal dumping.

See Report illegal waste disposal (EPA website) for more information.

Guidance sheets: Erosion, sediment and dust

These guidance sheets provide further detail on controls discussed in Chapter 5: Erosion, sediment and dust.

Contents

The controls in these guidance sheets are *examples or options only*.

You can implement other controls not covered in these sheets, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment as far as reasonably practicable.

You may also need to seek additional or more tailored advice if your activities are not covered or are not adequately addressed in these guidance sheets.

The actions you take and the controls you decide to implement must comply with your general environmental duty (ss.25–27) and other duties under the EP Act.

See Chapter 2: Understanding your duties for more information.

Guidance sheet 1: Working within or adjacent to waterways

Works within or near waterways arise when an activity changes the existing condition of a waterway or riparian area.

Works within a waterway can consist of:

- constructing a waterway crossing such as a bridge or culvert
- removing debris or material that is restricting waterway flow
- planting vegetation on embankments
- removing invasive vegetation
- rehabilitating wetlands.

Ensure you have obtained the appropriate permits from the relevant authority before conducting any works within a waterway.

Step one: identify hazards

Common hazards associated with works within a waterway include:

- increased erosion and sediment release into waterways and riparian areas
- increased waterway flow
- uncontrolled release of chemicals, hydrocarbons and waste by vehicles and construction equipment.

Step two: assess risks

To help assess the risk of generating environmental impacts from works within or adjacent to waterways, you can:

- consider the size, scale, and location of the proposed works
- understand the physical properties and soil characteristics of the waterway and riparian zone in the area of works
- assess the seasonal variations in waterway flow
- identify the impacts of construction techniques and methods for works within or near a waterway. Due to the size and scale of larger construction vehicles, unwanted erosion and sediment can be generated if construction equipment and vehicles are not managed appropriately
- understand the loading impacts of excavators, plant equipment and vehicles on soils and embankments
- identify entry and exit points and the limitations of access for construction works
- consider the chemical properties of lubricating oils used by excavators and plant equipment
- consider potential impacts to nearby sensitive receivers including aquatic ecosystems and riparian habitat.

Step three: implement controls

Consider implementing the following controls, appropriate for your activities, to limit the impacts to waterways and riparian areas at your site:

- Follow and comply with all permit and approval requirements obtained for your works.
- Minimise the duration of works within a waterway or floodplain.
- Schedule works to occur during drier months of the year and lowest flow of the waterway.
- Avoid works during times of the year when aquatic animals are likely to be under pressure, particularly during migration or spawning.
- Stabilise waterways to minimise erosion using non-invasive grass, vegetation, stabilisation matting or rock armour.
- Design and construct rock filter dams, modular sediment barriers, or silt curtains (see Figure 1) to assist in the reduction of sediment entering the waterway downstream.
- Minimise access by vehicles and people to the waterway, restricting access to essential works only and prevent access to unstable areas.
- Reduce the movement of sediment by encouraging deposition in specific areas of the waterways considering the size of the waterways using one or a combination of:
  - working on one bank
  - creating new channels/channel works
  - discharge pipes into creeks.
- Remove excavated material and debris from the project site or place it in a stable area above the high-water level of the waterway, or as far as possible from the waterway.
- Use bio-degradable lubricants and oils on excavators and plant equipment that work within or adjacent to waterways.
- Prevent livestock from accessing the waterway. If livestock are prevented from accessing a waterway, provide an alternative water supply.
- Monitor surface water quality regularly upstream and downstream from the works area. If monitoring shows a change in water quality, stop the works. Confirm if works are the cause of these changes, assess for any adverse impacts on aquatic ecosystem and modify work practices.
- Develop contingency measures for works within a waterway or floodplain. Your contingency measures should consider the consequences to the environment allowing for recurrence intervals of potential floods, and address:
  - methods to prevent water entering excavations
  - controls to be implemented when a storm event is forecast
  - measures to ensure that waterways and floodplains retain sufficient flood detention capacity to moderate peak water flows
  - a flood warning system
  - clean up procedures, including disposal of excess water
  - notification of relevant authorities if unplanned incidents occur that could pose a risk to the environment (see section 3.1.3).

- Plan reinstatement measures that may include:
  - proposed changes to the waterway including temporary short-term bypass pumping or temporary diversion channels
  - impacts to existing vegetation
  - erosion and sediment controls
  - proposed methods for reinstatement of the waterway bed and banks
  - a revegetation plan, including proposed species and locations, methods for weed control and ongoing maintenance until native species have established.

Figure 1. Engineered silt curtain installed to prevent migration of sediment for construction works within a waterway.

Step four: check controls

Monitoring controls you put in place can help you to ensure they operate effectively and as planned. For the management of works within or adjacent to waterways, this could include:

- regularly monitoring the strength and effectiveness of waterway stability measures (non-invasive grass, vegetation, stabilisation matting or rock armour) and reinforcing the installed stability measures as required
- regularly monitoring the strength and effectiveness of rock filter dams, modular sediment barriers, and floating silt curtains and performing maintenance to the associated controls and reinforcing the infrastructure as required
- monitoring the variations in waterway flow throughout the project
- monitoring the operation and effectiveness of bypass pumping and diversion channels.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness of controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 2: Managing stockpiles

Sediment and dust can be generated from unmanaged stockpiles.

Stockpiles in civil construction, building and demolition activities can include:

- excavated soils
- structural soils and backfill material
- demolition and waste materials stockpiles.

Photo courtesy of Kane Constructions.

Step one: identify hazards

Uncontrolled release of dust and sediment into the environment from stockpiling soil, construction, building and demolition materials.

Step two: assess risks

To help assess the risk of sediment and dust transport from stockpiling, you can:

- identify key stockpiling areas on your site
- understand how sediment and dust on site can be transported offsite and into the environment
- consider nearby sensitive receivers.

Step three: implement controls

The controls below may assist you to manage your stockpiles to prevent potential adverse impacts to the environment.

- Design and designate an area for stockpiles before site works commence. Locate stockpiles away from residential areas, other sensitive receivers and in a location where they are protected from prevailing wind.
- Shape stockpiles, taking into consideration width to height ratio, nature of stockpiled material, location, access and available area for the stockpile. Limit stockpile heights based on stability, manageability, dust and amenity impacts. More gentle slopes may be required for unstable soils.
- Divert stormwater away from stockpiles using a catch drain or earthbank.
- Cover small stockpiles with tarpaulins or stabilisation matting (see Figure 2). Anchor covers to prevent them from blowing away.
- Contour stockpiles within floodplains to minimise erosion during high rainfall events.

- Minimise period of stockpile inactivity. For stockpiles to be left inactive for longer periods, establish vegetation or grass. Subsoil stockpiles may require an outer layer of topsoil to assist grass establishment.
- Surround stockpiles with sediment control fences to minimise run-off of material. Remove sediment when it is halfway up the sediment control fence, return the material to the stockpile and consider implementing additional controls for effective management.
- Use machinery to contour or scarify the surface of stockpiles to assist in the reduction of run-off velocity and erosion.
- Suppress dust from small stockpiles using water or chemical dust suppressants, applying using a water truck or hand-held hose.

Figure 2. Covered stockpile.
(photo courtesy of McConnell Dowell)

Step four: check controls

Monitor controls you put in place to ensure they operate effectively and as planned. For the management of stockpiles, this could include:

- Measuring and monitoring the size and geometry of the stockpiles. Adjust the height and dimensions of stockpiles as required to attain the desired stability and to control dust and amenity impacts.
- Monitoring of stormwater catchment diversion controls. Ensure catch drains and earthbanks are adequately diverting stormwater.
- Removing accumulated stockpile material adjacent to sediment control fences and reinforce fences as required.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness of controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 3: Managing truck and other vehicle movement

On civil construction, building and demolition sites, vehicles regularly travel on unsealed surfaces and roads containing soil and mud, resulting in the generation and transport of sediment and dust.

Trucks and trailers that haul soil and other materials without a cover can lose materials in transport and generate sediment and dust.

Step one: identify hazards

Uncontrolled release of dust and sediment into the environment from vehicle movement.

Step two: assess risks

To help assess the risk of sediment and dust generation from truck and vehicle movements, you can:

- identify the planned movement and traffic routes of vehicles on your site and develop a traffic management plan
- identify entry and exit points, and high traffic areas on your site
- understand how sediment and dust onsite can be transported offsite and into the environment
- consider nearby sensitive receivers.

Step three: implement controls

Consider implementing the following controls to limit the sediment and dust generation at your site:

Manage site access

- Minimise site access to limit the impact from vehicles to roads.
- Stabilise site entry and exit points with a sealed road, aggregate or road base.
- Divert surface water run-off away from site access points so sediment is not washed or tracked offsite.

Manage road use

- Minimise the number of access roads used by vehicles.
- Seal roads with asphalt or a spray seal, or stabilise with aggregate, gravel or road base. Aggregate or gravel may need to be replaced periodically.
- Locate unsealed roads to avoid erodible areas of the site, such as sloping terrain or unstable soils.
- If roads are not stabilised or sealed, minimise dust using water or chemical dust suppressants.
- Provide sealed or stabilised car parks for site workers to park their vehicles.
- Restrict vehicles to defined roads and site entry and exit points. Fence the site to prevent vehicles bypassing designated site access points.
- Limit vehicle speeds onsite to minimise the generation of dust. Ensure roads are signposted and site workers are aware of designated speed limits.

Machinery hygiene

- Avoid and minimise mud, soil and dust entering on site from incoming trucks and vehicles.
- Identify and assess invasive plants that may be present and the feasibility of controlling the spread.
- Avoid driving in areas that may contain invasive plants and maintain clean machinery on site.

Manage dirt and mud on access roads/routes

- Cover trucks transporting loose materials with fitted canopies. Ensure all loads are covered before trucks leave site.
- Remove soil from the rim of trucks before they leave site. Place scraped material in a location where it won't be washed offsite. This control may only be suitable on projects with a small number of vehicles leaving site.
- Install rumble grids at site exit points to shake soil off trucks, taking care not to position them in or over a drainage line. Ensure the road between rumble grids and the site exit is stabilised and with adequate distance and wheel rotations (recommended minimum three-wheel rotation).
- Submerge rumble grids in water so tyres are washed as the truck crosses the rumble grid. Prefabricated rumble grid/wheel baths are available for purchase or hire. Drain and replace the water in the wheel bath periodically. Water from wheel baths should be treated as 'waste' and managed in accordance with the waste hierarchy (see section 8.2.1).
- Minimise use of a wheel wash or hand-held hose to wash vehicle tyres due to the large volume of wastewater generated. If a wheel wash or hand-held hose is used, treat the water as 'waste' and manage in accordance with the waste hierarchy, preferably capturing and treating the water (see section 8.2.1).
- Clean sediment off roads as soon as possible. This can be undertaken using a broom and shovel, water or street sweeper. Treat the water as 'waste' and manage in accordance with the waste hierarchy, preferably capturing and treating the water (see section 8.2.1).

Step four: check controls

Controls you put in place to prevent or mitigate risks must be monitored to ensure they operate effectively and as planned. For the management of truck and vehicle movement, this could include:

- monitoring of site entry and exit points and performing maintenance as required
- monitoring the driver compliance of speed limits and the canopy use on trailers
- monitoring of the condition and effectiveness of rumble grids and periodically removing built-up sediment and soil from under the rumble grids.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness of controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheets: Waste

These guidance sheets provide further detail on controls discussed in Chapter 8, Waste.

Contents

The controls in these guidance sheets are *examples or options only*.

You can implement other controls not covered in these sheets, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment as far as reasonably practicable.

You may also need to seek additional or more tailored advice if your activities are not covered or are not adequately addressed in these guidance sheets.

The actions you take and the controls you decide to implement must comply with your general environmental duty (ss.25–27) and other duties under the EP Act.

See Chapter 2: Understanding your duties for more information.

Guidance sheet 4: Litter

Litter onsite can generally comprise of:

- building material which is small enough in size or weight to be blown away in windy conditions or washed away during a storm and deposited into waterways
- general rubbish thrown away by construction workers.

Litter commonly includes solid wastes and putrescible wastes and is often caused by staff and the unavailability of suitable bins on the construction site.

Some litter can be particularly hazardous and is considered ‘dangerous litter’, such as glass, cigarette butts, and greasy rags.

Step one: identify hazards

Uncontrolled release of litter into the environment.

Step two: assess risk

To help assess the risk of litter entering the environment, you can:

- Identify the potential sources of litter on your site.
- Understand how litter generated onsite can travel offsite and into the environment.
- Consider nearby neighbours, drains and local waterways.

Litter can block stormwater drains, impact the environment by contaminating local waterways and eventually the coast, and can create an amenity issue.

Step three: implement controls

Implementing the following controls may assist you with managing your litter onsite:

- Ensure materials are not left where they can be blown or washed away.
- Provide covered litter or skip bins:
  - Small bins are suitable for small rubbish like paper, food wrapping and drink containers that may be blown off site.
  - Skips with a closable lid are suitable for larger items like cardboard boxes, plastic wrapping and polystyrene (see Figure1).

Figure 2. Example of a recycling skip bin.

- Provide small litter bins for construction workers and staff at locations where they consume food or beverages.
- Provide separate recycling bins for recyclable litter.
- Arrange for an authorised contractor to collect skip bins to prevent overflow and transport to a site that is lawfully able to receive it.
- Collect scattered litter on the site daily, or whenever litter is observed on the site.
- Install temporary fencing around the site to help prevent litter from being carried offsite.
- Store waffle pods (used in some concrete pouring activities) in ‘scrap bags’, i.e. which are large transparent bags, and secure to the site fencing or other structure as appropriate. Arrange for collection of the waffle pods by an authorised contractor for it to be taken to a lawful place where it can be recycled.
- Notify staff of importance of litter avoidance via onsite induction or other training activities (see section 3.1.3).

Note: council bins may not be used on some building sites. You should check this with your local council.

Step four: check controls

Controls you put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of litter, this could include:

- inspecting litter bins during daily site walks
- emptying the litter bin regularly and not allowing bins to overflow
- checking for litter generally.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness of controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 5: Surplus excavated material

Excavated material becomes surplus if:

- the physical, chemical or biochemical characteristics of the material prevents it from being used by the project
- there is more material available than required for the project
- it is located too far from where it is required to make its use practical.

Note surplus excavated materials are considered a waste unless reclassified as clean fill (see Step three) or determined suitable to be used onsite.

We look at surplus water from dewatering activities in Chapter 5: Erosion, sediment and dust and Chapter 6: Contaminated land and groundwater.

Step one: identify hazards

Uncontrolled release of surplus excavated material into the environment.

Step two: assess risk

To help assess the risk of surplus excavated material entering the environment, you can:

- identify the potential sources and locations of excavated material on your site – this can be undertaken through an assessment of soil, including determining the site history and soil sampling.
- understand how surplus excavated material generated onsite can leave the site and impact the environment
- consider nearby neighbours, drains and local waterways.

Excavated material has the potential to block stormwater drains and reduce water quality, which can harm human health and the environment.

Step three: implement controls

Implementing the following controls may assist you with managing your surplus excavated material on your site:

- Remove construction and demolition waste such as concrete, bricks, pipe and organic matter from or near excavated material, to maximise clean fill material classification so it may be used onsite as fill. See *Waste classification assessment protocol* (EPA publication 1827) which will take effect with new environment protection laws.
- Stockpile surplus excavated material separately to any clean fill (see section 6.3).
- Where excavated material has been identified as having naturally elevated levels of metals or other contaminants, seek approval from EPA before using it as fill material. Use excavated material onsite for site filling / levelling as appropriate and authorised.

Step four: check controls

Controls you put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of surplus excavated material, this could include reviewing the effectiveness of how surplus excavated material is stored onsite.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness controls, see Chapter 3: Managing your environmental risk of the guide and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 6: Hazardous waste

Hazardous wastes have a known risk to human health and the environment. Some hazardous wastes resulting from civil construction, building and demolition activities include asbestos, polychlorinated biphenyls (PCBs), lead, and acid sulfate soils (ASS).

Per-and poly-fluoroalkyl substances (PFAS) are an environmental contaminant of concern which may pose a risk to human health and the environment.

Asbestos

Asbestos is a group of naturally occurring fibrous silicate minerals that were commonly used in the production of insulation and construction materials such as cement sheeting and piping due to its thermal and chemical stability.

It was also used in the manufacture of vinyl floor tiles, electrical components, brake linings, disc pads, paints and sealants, and a variety of other materials, for a wide variety of industrial, manufacturing, building and construction applications. When disturbed, the materials may release asbestos fibres which if breathed in can cause a range of health problems including asbestosis, lung cancer and mesothelioma.

A ban on use of certain types of asbestos in Victoria was introduced in 1992, with a total ban introduced in 2003. Buildings constructed or refurbished in Australia prior to these bans may contain asbestos materials.

For more information, see WorkSafe Victoria's *Asbestos: A handbook for workplaces*.

PCBs (Polychlorinated biphenyls)

PCBs are a stable group of chemical substances that do not degrade easily and are resistant to temperature changes, acids and alkalis.

PCBs may be encountered in old electrical equipment including transformers, capacitators, fluorescent light fittings, concrete caulking compounds, and a range of other products that take advantage of its chemical stability. Due to the serious health concerns associated with PCBs and their persistence in the environment, the importation and manufacture of PCBs in Australia has been banned since the 1960s.

PCB exposure can lead to human health affects including cancer, liver damage, neurological and immunological changes.

Lead

Lead is likely to be present in older structures, occurring in paint, old water pipes and other plumbing fittings, sheet lead, solders, lead flashing, lead light windows and glass. One of the major sources of lead in the environment are lead-based paints which are commonly used on window frames, doors, skirting boards, kitchen and bathroom cupboards, exterior walls, gutters and fascia and metal surfaces. Lead-based paint in good condition is usually not a problem, except in places where painted surfaces are subject to friction or impact such as windows and doors.

Exposure to lead through inhalation or consumption can result in harm to the brain and nervous system, particularly with unborn babies and young children, with symptoms including fatigue and poor coordination, depending on the type of exposure.

ASS (Acid sulfate soils)

ASS are naturally occurring and contain elevated levels of metal sulphide minerals. They typically occur in coastal areas, and inland waterways, wetlands and drainage channels which are waterlogged and have saline and anaerobic properties, as well as in mine spoil. When exposed to air, acid and heavy metals such as arsenic and aluminium can be mobilised and leach into the environment, contaminating groundwater and surface waters, posing a risk of harm to human health and the environment, and engineering works. However, ASS can be generally considered safe and harmless when not disturbed.

PFAS (Per-and poly-fluoroalkyl substances)

PFAS are a group of chemicals manufactured since the mid-20th century that have historically been used in firefighting foams and other industrial and consumer products including mist suppressants, non-stick cookware and food packaging. There are many types of PFAS, including perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS). PFAS can build up in food chains and may pose a risk to human health and the environment.

PFAS residues may be present in construction materials and therefore wastewater generated through construction and demolition also has the potential to contain PFAS. In addition, PFAS residues can be present in soil, sediments, groundwater and landfill leachate due to historical industrial activities.

While scientific research continues to be undertaken, EPA, consistent with federal guidelines from the Environmental Health Standing Committee (enHealth), takes a precautionary approach and advises people to reduce their exposure to PFAS. EPA's *Interim position statement on PFAS* (EPA publication 1669) reflects the most up-to-date information from the 2019 enHealth Guidance Statement and is supported by additional assessments by EPA.

Duty holders should familiarise themselves with their overarching obligations under the EP Act and supporting regulations, along with EPA Position Statements as issued from time to time. More information can be found at www.epa.vic.gov.au/for-community/environmental-information/pfas/pfas-and-epas-role.

Step one: identify hazards

Entry of hazardous wastes into the environment.

Step two: assess risk

To help assess the risk of hazardous wastes entering the environment, you can:

- Identify the potential sources of hazardous waste on your site.
  - For asbestos, prior to demolition works, review any asbestos registers and consider the location, quantity and condition of asbestos present and identify a suitable method for demolition.
  - For buildings suspected of containing PCBs or lead-based paints, sampling may be required prior to demolition.

  - If ASS is present, undertake risk identification and assessment in accordance with the *Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soils* (DSE 2010), available at www.marineandcoasts.vic.gov.au/coastal-management/information-for-coastal-managers.
  - If PFAS is present, undertake risk identification and assessment in accordance with the PFAS National Environmental Management Plan.
- Understand how hazardous waste generated onsite can travel offsite and into the environment via waterways, soil, groundwater or the air.
- Consider nearby neighbours, drains and local waterways that may be impacted if hazardous wastes were to enter the environment.

Step three: implement controls

Implementing the following controls may assist you with managing your hazardous wastes onsite:

Asbestos

- Take all reasonable steps to minimise the risks of handling, transporting and disposing of materials containing asbestos.
- Ensure those handling, transporting and disposing of materials containing asbestos are authorised to do so.
- For guidance relating to managing asbestos during demolition work, see WorkSafe Victoria.
- Notify WorkSafe Victoria before any asbestos removal work is carried out, as they may issue licenses which place restrictions on removal of specific types of asbestos-containing material or asbestos-contaminated dust.
- Ensure your asbestos waste is taken to a site that is lawfully able to receive it. This is not only the asbestos removalist's responsibility – it is also your responsibility (see section 8.6).

PCBs

- Equipment or parts containing PCBs must be placed into a sealed container which is then stored in a marked secondary sealable metal container (e.g. steel drum) containing absorbent (e.g. diatomaceous earth) until it can be taken to a site that is lawfully able to receive it.

Lead

- Minimise the generation of lead dust and fumes, including by cleaning work areas before and after demolition activities.
- Do not sand or burn off lead-based paint.
- For guidance relating to lead management prior to and during demolition, refer to WorkSafe Victoria.

Acid sulfate soils

- Prepare an ASS management plan for the site, including measures to:
  - avoid and minimise disturbance
  - prevent oxidation
  - neutralise acidity
  - dispose offsite.
- Restrict where possible the disturbance and excavation of ASS.

- Where excavation is required, ensure that treatment pads consisting of a clay liner and bund are present to manage the excavated soil.
- Add bagged lime, at appropriate levels, to excavated material onsite prior to backfilling.
- Collect acidic surface water using drains or shallow basins and treat before discharging.
- If removing and disposing of ASS offsite, either:
  - prepare an EMP addressing ASS, to be submitted to EPA Victoria for approval
  - dispose of at a lawful place that already has an EPA-approved EMP for managing ASS.
- See *Acid sulfate soil and rock* (EPA publication 655) for further information on management of ASS.

PFAS

- Isolate PFAS-contaminated materials from the surrounding environment by providing appropriate barrier systems such as a primary (upper) and secondary (lower) composite liner, a primary leachate collection system and a secondary leachate detection and collection system
- For management of contaminated water, see Guidance sheet 11: Wastewater.
- Refer to the PFAS National Environmental Management Plan (NEMP), applicable Position Statements issued by EPA and regulatory obligations under the EP Act 2017.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of hazardous waste, this could include:

- inspecting hazardous waste containers to ensure they are sealed and free of cracks or leaks
- undertaking offsite monitoring to ensure hazardous wastes are not entering the environment - this may involve monitoring water quality upstream and downstream of the project site for chemicals which are present in the onsite hazardous waste.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 7: Masonry and other solid material wastes

Masonry and other solid material wastes found on civil construction, building and demolition sites consists of:

- building rubble
- concrete
- asphalt
- bricks
- timber
- plastic
- glass
- metals
- bitumen
- trees
- shredded tyres
- e-waste (EPA website).

Step one: identify hazards

Entry of masonry and other solid material waste into the environment.

Step two: assess risk

Masonry and other solid material wastes have the potential to block stormwater drains and contaminate land and local waterways.

To help assess the risk of masonry and other solid material wastes entering the environment, you can:

- identify the potential sources of masonry and other solid material wastes on your site
- understand how masonry and other solid material wastes generated onsite can be transported offsite and into the environment
- consider nearby neighbours, drains and local waterways.

Step three: implement controls

Implementing the following controls may assist you with managing masonry and other solid material waste generated from your activities:

- Store solid waste in a designated stockpile area or waste bin (sorted by type of solid waste) until a sufficient quantity has accumulated for removal.
- Have the waste taken to a site lawfully able to take that waste, which may include waste and resource recovery facilities and landfills.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of masonry and other solid waste material wastes, this could include:

- regularly inspecting rubble and other solid waste material stockpiles to ensure they are of appropriate dimensions, and that they are secured with tarps, fencing or other appropriate methods to prevent loose material from falling
- inspecting rubble and other solid material waste bins during daily site walks for any overflow or incorrect sorting
- inspecting the site to identify any masonry and other solid material waste that have not been placed in the correct storage location.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness controls, see Chapter 3: Managing your environmental risk of the guide and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 8: Drilling mud

Drilling mud is the liquid or sludge residue generated during drilling through soil or earth. It may comprise of a mixture of:

- naturally occurring rock and soil including sand, silt, gravel and clay
- naturally occurring organic matter including tree roots, grass and shrubs
- water and drilling fluid (which primarily consists of water and may also contain non-synthetic additives such as bentonite).

Drilling mud may also contain contaminants from within the soil and groundwater being excavated / drilled or as a result of the drilling process.

Step one: identify hazards

Entry of drilling mud into the environment.

Step two: assess risk

To help assess the risk of drilling mud entering the environment, you can:

- Identify where drilling mud is being generated and stored on your site.
- Understand how drilling mud generated onsite can move offsite and into the environment.
- Consider nearby neighbours, drains and local waterways.

Drilling mud has the potential to pollute land and, in particular, waterways. This can harm human health and the environment.

Step three: implement controls

Implementing the following controls may assist you with managing drilling mud generated from your activities:

- Ensure that additives or contaminants (for example, oil lubricants) are not introduced during the drilling or excaveation operation.
- If use of oil-based additives cannot be avoided, use biodegradable oils where possible.
- Contain the drilling mud temporarily in pits or sumps onsite, or in clearly labelled drums.

- Have the drilling mud taken to a site that is lawfully able to receive it or remediate onsite depending on level of contamination (see Chapter 6: Contaminated land and groundwater).
- Consider any viable reuse options of the mud dependent on its level of contamination e.g. fill material, composting, road construction.
- Dewater the drilling mud naturally or allow to air-dry, or direct to a dewatering facility.
- If the drilling mud can remain safely onsite (see Chapter 6: Contaminated land and groundwater), you should develop and implement an ongoing management plan for the drilling mud. This can be incorporated into the site environmental management plan.
- Transport the drilling mud in a vehicle that is safe, secure and leak-free, with no contaminated residue in the tanker / tanker trailer.
- See section 8.7 on keeping drilling mud management records.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive it.

Classification of drilling mud

For information on classification of drilling mud, see *Waste classification assessment protocol* (EPA publication 1827) which will take effect with new environment protection laws. This will help you ensure it is properly managed and goes to a place that is lawfully able to receive it.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of drilling mud, this could include:

- inspecting drilling mud storage areas and containers to ensure there are no leaks or run-off
- regularly reviewing the management plan for drilling mud, to ensure controls are updated based on their effectiveness.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 9: Historic buried waste

Historic buried wastes may become uncovered during excavation works on construction sites.

These wastes are often associated with closed landfills or illegal dumping grounds and can contain:

- Masonry and other solid material waste – consists of building rubble, concrete, asphalt, bricks, timber, plastic, glass, metals, bitumen, trees, shredded tyres and e-waste (see Guidance sheet 7: Masonry and other solid material wastes)
- Hazardous wastes – consists of asbestos, polychlorinated biphenyls (PCBs), lead, and acid sulfate soils (ASS) and any other material waste that has a known risk to human health and the environment (see Guidance sheet 6: Hazardous waste)
- Putrescible wastes – those that can be decomposed by bacterial action. They usually consist of discarded food, domestic garbage, animal carcasses, grass and garden clippings and prunings.

The presence of historic buried waste may indicate existing land and groundwater contamination. See Chapter 6: Contaminated land and groundwater for guidance on managing contamination.

Step one: identify hazards

Presence of buried wastes.

Step two: assess risk

To help assess the risk associated with buried wastes, you can:

- Identify historic activities which may have involved the burying of waste on the site.
- Locate potential areas where waste may be buried.
- Identify the content of any identified historic buried waste sites.
- Understand how historic buried waste may have decomposed resulting in release of contaminants into the environment.
- Understand the pathways of pollution to the environment from buried waste, considering nearby neighbours, drains, conduits and local waterways.
- Define extent of the historic buried waste materials via methods including ground penetrating radar, test pitting and implementation of a comprehensive sampling program.
- Investigate if the cap over the historic buried waste is appropriate to protect current and future site users and to minimise impacts to the environment.

- Identify the nature of material, odour levels, presence of methane, groundwater quality, groundwater levels and leachate quality to determine the correct management method (see Chapter 6: Contaminated land and groundwater).
- Identify whether the historic buried waste and any associated impacted material is to remain onsite or if it is to be excavated and removed. Engage a suitably qualified person to manage the process (see Work with an environmental consultant, EPA website).
- If the waste is required to be removed from the site, it must be taken to a place that is lawfully able to receive it.
- Ensure the area does not pose an immediate threat e.g. strong odours, sharp objects, or drums of unknown chemicals. Where an immediate threat is encountered, access to the area should be restricted and the threat removed by a suitably qualified person.
- Develop and implement an ongoing management plan to maintain and manage the site to ensure that risks to site users and the environment are minimised into the future.

Buried wastes create a risk of harm to human health and the environment by causing pollution of air (gases), land, groundwater and surface waters, and present an explosion risk.

Contact EPA. If historic buried waste associated with a landfill is identified, contact EPA immediately – an in-depth assessment process may need to be followed.

Step three: implement controls

Implementing the following controls, in addition to those listed in Chapter 6: Contaminated land and groundwater, will assist you with managing buried waste discovered during your activities:

- Where historic buried waste has only been partly excavated, look to seal any uncovered waste - you may need approval from your local council to do this. Materials used to seal this waste may include geosynthetic liners and vegetative layers.
- If an existing cap over historic buried waste is found to be inadequate, undertake further capping works if the waste is to remain onsite.
- Control odours during excavation by minimising the working surface area and immediately covering with a clean fill (see Guidance sheet 5: Surplus excavated material). Use of a deodoriser may also be required to minimise emissions of malodorous gases to the atmosphere.
- Use sealed containers for the storage of small volumes of historic wastes and during transport to limit odour emissions.
- Limit leachate generation by minimising infiltration of ingress of water into the old landfill through installation of cut-off drains, banks or bunds around the excavation area.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of historic buried waste, this could include:

- monitoring upgradient and downgradient groundwater and surface water quality levels from any identified buried waste, including monitoring for leachate
- air quality monitoring for methane and sulphur gases of uncovered buried waste.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 10: Sewage

Sewage is a type of wastewater typically composed of excrement, detergents and toilet paper.

Improper management can lead to contamination of the surrounding environment, disease and illness, and odour issues.

Step one: identify hazards

Human exposure to sewage and its entry into the environment.

Step two: assess risk

Sewage can create nuisance odour and contamination of the surrounding environment. Due to its biological nature, it can cause viral, bacterial and parasitic diseases in humans and animals.

To help assess the risk of sewage entering the environment, you can:

- Identify the potential sources of sewage on your site, which includes identifying the location of underground sewage pipes.
- Understand the pathways for sewage flow from the site and into the environment.
- Consider nearby neighbours, drains, conduits and local waterways.

Step three: implement controls

Implementing the following controls may assist you with managing sewage discovered during your activities:

- Mark the location of underground sewage pipes onsite.
- Provide temporary toilets throughout the construction and demolition period, that are clearly signposted with appropriately sized waste and water tanks where there is no connection to sewer. Regularly service the facilities.
- Regularly inspect toilets and excavations for visual signs of sewage spills.
- Use an authorised contractor to collect the sewage waste.
- Where civil construction, building and demolition are expected to occur for a significant length of time, consider engaging an authorised contractor to connect the toilet facilities to the sewerage network.

- Assess the location of buried sewage pipes and mark out services on ground surface to prevent damaging them.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of sewage waste, this could include:

- monitoring upstream and downstream surface water and groundwater
- reviewing the sampling and analysis program and update depending on effectiveness.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness of controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance sheet 11: Wastewater

Wastewater is water that has been 'used', is contaminated (including contaminated stormwater), or is 'surplus' (i.e. unwanted or excessive), water resulting from dewatering activities.

Civil construction, building and demolition activities generating wastewater include:

- site dewatering
- vehicle and equipment washdown
- brick tile works
- concrete pour works
- painting and plastering
- air conditioner installations
- sewage generation (see Guidance sheet 10: Sewage).

Step one: identify hazards

Site dewatering

Dewatering is the permanent or temporary removal of ponded stormwater or infiltrated groundwater, usually for the purpose of excavation and construction activities.

Vehicle and equipment wash-down

Vehicles, machinery, tools and other equipment may require frequent or occasional washing on a construction site, with the washdown water potentially containing chemicals and / or sediments.

Other activities resulting in wastewater

Common construction and demolition activities with the potential to generate wastewater, include brick tile works, concrete pour works, painting and plastering, and air conditioner installations.

Step two: assess risk

To help assess the risk of wastewater entering the environment, you can:

- identify the potential sources of wastewater on your site
- understand how wastewater on your site can move offsite and into the environment
- consider nearby neighbours, drains and local waterways.

Site dewatering

Pumping out groundwater from an excavation or dewatering bore could cause groundwater drawdown, affecting nearby ecosystems, and draw contaminated water from other properties onto the site.

Discharge of potentially contaminated dewatering water to stormwater and reinjection into a groundwater aquifer could pollute surface water and groundwaters, posing a risk of harm to the environment and human health.

Vehicle and equipment wash-down

Washdown water can pollute waterways via the stormwater system if not managed appropriately.

Other activities resulting in wastewater

Wastewater from brick tile works, concrete pour works, painting and plastering, and air conditioner installations have the potential to enter the surrounding environment and pollute waterways.

Step three: implement controls

Site dewatering

The controls below may assist you to manage water resulting from dewatering activities to prevent potential adverse impacts to the environment. Consider engaging a suitably qualified person to manage this process (see Work with an environmental consultant, EPA website).

- Test the water resulting from dewatering activities for contaminants (see Chapter 6: Contaminated land and groundwater).
- Identify if the water can be reused onsite for activities such as dust suppression, vehicle and machinery wash down, earthworks compaction and revegetation.
- Treat contaminated water onsite where appropriate e.g. via flocculation or coagulation. Oils and grease may be removed from the surface of water by use of floating booms, pads and socks.
- Ensure any reuse of water does not cause ponding or run-off of water.
- For discharge to sewer, contact your local water authority to investigate whether the water meets the requirements for discharge to sewer by identifying the trade waste acceptance criteria and apply for a trade waste agreement.
- If discharge to a sewer is not viable and onsite treatment not appropriate, dispose of the water to a site that is lawfully able to receive it.
- Monitor upstream and downstream water quality during any discharge of treated water to a waterway (directly or via a stormwater drain) to check if discharge is affecting water quality of the waterway.

Cleaning of vehicle, equipment and roads

The controls below may assist you to manage your cleaning activities to prevent potential adverse impacts to the environment:

- Carry out washing of vehicles and equipment in a designated area, designed to allow collection of the washdown water.
- Cover the designated washdown area, where appropriate.
- Locate the washdown area away from drainage lines, stormwater inlets, waterways, areas of significant flora and fauna and other sensitive areas identified onsite.
- Contain wash out barrels in the designated washdown area for washing of tools and smaller equipment.
- Install sediment control structures e.g. fences or basins to collect sediments, downslope to prevent entry of sediment into drains and waterways (see Chapter 5: Erosion, sediment and dust).
- Appropriately bund the washdown area to contain all washdown water (see Chapter 7: Chemicals).
- Discharge the washdown water to the sewer with approval from the relevant water authority.
- Return concrete mixing and delivery trucks to the batching plant for washout, where possible. However, should this not be possible, designate an area onsite for washing out of concrete trucks, which:
  - is located near the site exit to encourage drivers to use it
  - signed for easy identification
  - is lined with an impervious liner (plastic or geotextile), allowing the water to evaporate, for concrete residue to then be disposed of as solid waste (in a skip bin or collected and transported to a site that is lawfully able to receive it) or used as a road base.
- Clean equipment off before washing to minimise use of water. Brush dirt and mud off equipment before you wash it.
- Avoid using solvents for cleaning vehicles and use phosphate-free soaps and biodegradable soaps.
- For tools used for water-based paints, use one container to wash the brush and another to rinse. The container used to wash the brush can be left to stand overnight to allow solids to settle – the contents can then be poured out and solids put in a bin.
- For tools used for oil-based paints, do not put on the ground and clean using a solvent bath. Contact a waste contractor to ensure it is taken to a lawful place.
- Where hazardous chemicals (see Chapter 7: Chemicals) are suspected to occur in the washdown water, ensure collection (e.g. via a sump with no outlet) and arrange for an authorised contractor to collect the washdown water and dispose of at a site that is lawfully able to receive it.
- For road cleaning:
  - Minimise use of roads by vehicles to reduce:
    - fuel and other chemical leaks from vehicles onsite
    - dust and sedimentation
    - frequency of vehicle washing.
  - Restrict access on and offsite during wet conditions.
  - Pave entry and exit roads with gravel and top dress these paths periodically.

- Sweep roads at least once a day.
- Install rumble grids (see Figure 2) and wheel washes at entry and exit points and remove sediment from the wheel wash as required. Consider placing rumble grids under water via excavation of a shallow pit, to facilitate removal of sediment.

Figure 2. Rumble grid.
(photo courtesy of McConnell Dowell)

- Designate a paved parking area.
- Where the site is not large enough to install rumble grids and wheel washes, sweep the road daily.
- Install road sediment controls such as litter traps lined with filter cloth in all side-entry pits.
- Cover all loads of waste, including soil, being taken offsite to a site lawfully able to accept that waste.

Other activities resulting in wastewater

- Brick tile works
  - Mix mortars in areas that will not drain into the stormwater system.
  - Prevent wastewater from brick-cutting activities from entering the stormwater system.
  - Recycle or discharge surplus wastewater from brick-cutting activities to a contained area for evaporation.
- Concrete pour works
  - Carry out concrete mixing in a contained area to prevent residues and wastes from entering the stormwater system.
  - Install temporary bunds down slope gutters where the use of concrete pumps from public roadways is required.
  - Seal concrete once cured to prevent run-off water from becoming alkaline.
  - See above under ‘Cleaning of vehicle, equipment and roads’ for washdown controls.
- Painting and plastering
  - Keep unused paint in a tin or other sealed container.
  - Dispose of unwanted paint to a site that is lawfully able to receive it.
  - See above under ‘Cleaning of vehicle, equipment and roads’ for cleaning controls to clean up painting equipment.

  - Filter solvent used to clean oil-based paints, for reuse, or have it taken to a site that is lawfully able to receive it.
  - Allow plastering residues to dry within a designated contained area on the site. Then put solid waste into a skip bin or dispose of at a site that is lawfully able to receive it.
  - Consider using solid plastering wastes such as calcium sulfate as a clay modifier for landscaping works.
- Air conditioner installations
  - Ensure that air conditioners are installed to manufacturers specifications.
  - Direct saline wastewater from the air conditioner dump valve systems and cooling towers to a sewer, rainwater tank (non-drinking), or garden.
  - Install cooling towers so that wastewater from the tower does not enter the stormwater system.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not. For the management of wastewater, this could include:

- monitoring upstream and downstream water quality, if discharging into waterways.
- inspecting bunds during daily site walks to ensure they are installed correctly.

Managing risk

For more information about managing risk, including monitoring and measuring the effectiveness controls, see Chapter 3: Managing your environmental risk and *Assessing and controlling risk: a guide for business* (EPA publication 1695).

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Glossary

Term	Definition
Contaminated land	Land and groundwater where waste or a chemical substance is present on or under the surface of the land at a concentration above safe levels that creates a risk of harm to human health or the environment.
Dewater	To drain, permanently or temporarily, groundwater or water flowing over land, for agriculture, construction or mining.
Dust suppressant	A chemical applied to disturbed soils to suppress dust.
Eutrophication	The excessive growth of aquatic plant species and algae which reduces the amount of oxygen that is dissolved in water negatively impacting other organisms (fish, birds, humans).
Flocculant	A substance which is added to promote the clumping and settling of suspended particles.
Floodplain	An area of land adjacent to a creek, river, estuary, lake, dam or artificial channel that is prone to flooding.
Habitable room	A room other than a kitchen, storage area, bathroom, laundry, toilet or pantry.
Land zoned for residential purposes	• residential zones in Victorian Planning Provisions (VPP) • another zone to facilitate development with residential component (e.g. a Comprehensive Development Zone for residential development) • land identified in local planning policy framework or incorporated document as for residential development
Lawful place	A lawful place is somewhere lawfully authorised to receive industrial waste. If you generate, transport or receive waste, you must make sure it ends up at a lawful place. See Understanding lawful place (EPA website)
Onsite	An area of land in which project activities occur, around which a complete boundary can occur i.e. continuity is not broken with presence of land controlled or managed by another person or for another purpose unrelated to the project.
Portable sedimentation tank	A prefabricated tank containing one or more compartments that is used to capture and retain sediment.
Primary containment	Infrastructure that is the primary container for the storage and use of a material.
Project site	Can include multiple geographic areas managed or controlled by a person for a specific project, which aren't necessarily joined at any one point (i.e. are separated by land being managed or controlled by someone else).
Receptor/receiver	These words have the same meaning and are used interchangeably throughout this guide. Receptors/receivers are something of value which can be harmed by hazards, including humans and the environment (e.g. animals, vegetation and waterways).
Regenerated noise	Noise heard within a building that is generated by vibration transmitted through the ground into the structure form construction works.
Riparian	Land that runs along rivers, creeks, estuaries, lakes and wetlands. Riparian land can vary in width from a narrow strip to a wide corridor.
Secondary containment	Infrastructure that can contain materials that have leaked or discharged, as a result of failure, from primary containment infrastructure (e.g. bunds).
Sedimentation	Deposits of sediment into low lying areas like natural waterways and artificial drainage systems, from wind and water erosion.

Term	Definition
Sensitive receivers	Sensitive areas or species from a human or environmental context which include, but are not limited to, the following: • social surroundings (houses, hospitals, schools, playgrounds, public amenities) • waterways, streams, source of drinking water for people or livestock • parks and recreational areas • area of public interest and cultural significance • land or water with identified flora, fauna, vegetation, ecosystem or environmental value.
Stormwater	Surface run-off from rain and storm events.
Subsoil	The layer of earth or soil immediately under the surface soil.
Suitably qualified person	Identifying and understanding hazards and appropriate controls to eliminate or reduce risk can be complex. You will need to determine who is most suitably qualified to do this. EPA does not endorse any individuals, businesses, certifications, accreditation schemes or professional associations. See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.
Topsoil	The surface or top layer of the soil.
Treatment train	A sequence of treatment controls designed to manage potential impacts to the environment.
Turbid water	Water with suspended particles, making it opaque or muddy.
Waterway	A river, creek, lake, canal, stormwater drain or other body of water.

Further reading and references

This list of references includes many of the sources EPA drew from to develop this guide.

Erosion, sediment and dust

International Erosion Control Association Australasia, 2014. *Builders pocket guide – practical advice on managing worksites and the environment*, v.3. Access online: https://www.austieca.com.au/publications/builders-pocket-guide

International Erosion Control Association Australasia, 2008. *Best practice erosion & sediment control.* Access online: https://www.austieca.com.au/publications/books-1-3

Department of Environment and Conservation 2011, *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*. WA Department of Environment and Conservation

Environment Protection Authority 2005, *Reducing stormwater pollution: A guide for home maintenance teams and tradespeople*. Access online: https://www.epa.vic.gov.au/about-epa/publications/984

Environment Protection Authority 2007, *Protocol for Environment Management. State of Environment Protection Policy (Air Quality Management) Mining and extractive industries*. Access online*:* https://www.epa.vic.gov.au/about-epa/publications/1191

Melbourne Water, '*Principles of erosion management*'. Access online: https://www.melbournewater.com.au/planning-and-building/developer-guides-and-resources/standards-and-specifications/stormwater-0

Melbourne Water, 'Sediment management measures'. Access online: https://www.melbournewater.com.au/planning-and-building/developer-guides-and-resources/standards-and-specifications/stormwater-1

NSW Government Department of Primary Industries, *Soil erosion solutions, Fact Sheet 1: Types of erosion*. Access online: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0003/255153/fact-sheet-1-types-of-erosion.pdf

NSW Government Transport, Roads and Maritime Services 2015, *Guideline for Batter Surface Stabilisation using vegetation*. Access online: https://www.rms.nsw.gov.au/documents/about/environment/guideline-for-batter-surface-stabilisation-using-vegetation.pdf

NSW Government 2004, *Managing Urban Stormwater: Soils and construction*, vols.1 and 2A. Access online: https://www.environment.nsw.gov.au/research-and-publications/publications-search/managing-urban-stormwater-soils-and-construction-volume-1-4th-editon

Witheridge 2012, *Principles of construction site erosion and sediment control – A training tool for the construction industry, v.1.* Access online: https://www.austieca.com.au/documents/item/430**.**

Witheridge 2012, *Erosion and sediment control field guide for builders, v.2.* Catchments & Creeks Pty Ltd., Access online: https://www.austieca.com.au/documents/item/355**.**

Contaminated land and groundwater

Parliament of Victoria 2001, *Ministerial Direction No. 1 – Potentially Contaminated Land*. Access online: https://www.planning.vic.gov.au/__data/assets/pdf_file/0019/27121/Ministerial-Direction-Section-12-No.1-Potentially-contaminated-land.pdf

State Government of Victoria Department of Environment, Land Water and Planning, *Environmental Protection Amendment Act 2018 – Factsheet.* Access online: https://www.environment.vic.gov.au/__data/assets/pdf_file/0019/334450/Factsheet-Environment-Protection-Amendment-Act-2018.pdf

State Government of Victoria Department of Sustainability and Environment 2005, *Potentially Contaminated Land*. Access online: https://www.planning.vic.gov.au/__data/assets/pdf_file/0020/12764/PPN30-Potentially-Contaminated-Land.pdf

WorkSafe Victoria 2017, *Contaminated construction sites*. Access online: https://content.api.worksafe.vic.gov.au/sites/default/files/2018-06/ISBN-Contaminated-construction-sites-industry-standard-2017-06.pdf

Chemicals

EPA Victoria 2018, *Liquid storage and handling guidelines* (publication 1698). Access online: https://www.epa.vic.gov.au/about-epa/publications/1698

EPA Victoria 2019*, Solid storage and handling guidelines* (publication 1730). Access online: https://www.epa.vic.gov.au/about-epa/publications/1730

Waste

Australian Government Department of Health 2018, *Expert Health Panel for PFAS: Summary*. Access online: https://www1.health.gov.au/internet/main/publishing.nsf/Content/ohp-pfas-expert-panel.htm

State Government of Victoria Department of Sustainability and Environment 2010, *Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soils*. Access online: www.marineandcoasts.vic.gov.au/coastal-management/information-for-coastal-managers.

Appendix 1 Risk register – completed example

The colours in this register example correspond with the four steps of the risk management process covered in Chapter 3: Managing your environmental risk. You should identify and add further controls if you need to address remaining or 'residual' risk.

Revision: **Date:** **Attendees:** **Signed:**

Hazard	Potential causes	Initial risk: Consequence	Initial risk: Likelihood	Controls implemented	Residual risk: Consequence	Residual risk: Likelihood	How controls will be checked	Any further controls/actions required	Actions: Due date	Actions: Date completed
Litter	Bins overflowing Bins with no lids Site staff disposing of general rubbish directly onto ground.	Litter entering nearby waterways, polluting the water, and causing harm to human health (from the decline in water quality and spread of disease) and wildlife (incl. causing choking).	Litter is easily dispersed to waterways via wind and rain, due to its generally light nature.	• Arranging collection of litter bins in a timely matter to prevent overflow. • Ensure all litter bins have lids which are closed at all times. • Education of staff regarding the importance of correctly disposing general waste.	Less contamination of waterways as a result of litter entry, and less harm to human health and wildlife.	Dispersal of litter into the environment is significantly reduced.	Site inspection to identify: • no overflowing general waste bins • emptying of general waste bins at schedule dates. • Presence of any litter on site	Litter still being observed on site even though bins not overflowing: Remind site staff during toolbox meetings to close lids on bins after use.	dd/mm/yy	dd/mm/yy

Appendix 2 Environmental management plan – structure outline

Project name:

Project address:

In this Appendix we outline some elements you can consider including in your own environmental management plan (EMP).

Depending on the type of works and the conditions of your site, you may need to adjust these or include additional information in your EMP to help you manage your risks.

Note: Victorian councils and other regulatory bodies may have specific requirements regarding the content of your EMP. This is an *outline only* and is not intended to indicate the content and level of detail that may be required in your own EMP.

The paperclip indicates where it may be useful to attach additional information at the end of your EMP.

The *italicised content* helps explain the various elements of an EMP.

Prepared by:

Company name:

Company address:

See AS/NZS ISO 14001:2016 Environmental management systems – Requirements with guidance for use (Australian Standards)

Declaration of accuracy

Some regulatory authorities may require the submission of an EMP prior to project approval or commencement of works. A declaration of accuracy indicating the submitted information is not false or misleading may be required.

You can insert the relevant declaration of accuracy here – see relevant regulatory authority for wording to be used.

Signed:

Full name:

Organisation:

Date:

Document control

Providing a record of version of your EMP can help ensure staff are referring to the most recent version.

Version	Date	Description	Authorised by
V1	18 September 2019	Draft for comment	Project manager
V2	25 October 2019	Updated the review period	Project director
V3			

Location of document

Keeping a copy of your EMP onsite in an easily accessible location can encourage site staff to refer to it when required. Depending on the size of the project, you may want to consider keeping copies at various location(s).

You can list the site locations of the document here.

Contents

Key contacts

Providing the key contacts and responsibilities at the beginning of the EMP can be a quick way to direct readers to the appropriate person.

Key contacts		
Company		
Company responsible for implementing the EMP	*Company name* *Business address* *Contact number*	
Person responsible for implementing and updating the EMP	*Name* *Email* *Contact number* *After-hours contact number*	
Project Manager	*Name* *Email* *Contact number* *After-hours contact number*	
Scope of works		
	Describe method and equipment used	*Company responsible*
Demolition		
Excavation		
Construction		
EMP updates	*Review date:*	*Reason:*

Permits or approvals required

Additional approvals may be required prior to works commencing. You should make the appropriate enquiries to ensure all approvals and permits are obtained prior to commencing site works. In some instances, your local council may identify these authorities for you. The approval and permit applications can be attached to your EMP and provided to the relevant authority.

Including a table such as the example provided below may assist you with identifying whether you need to apply for a particular permit or approval.

Will the project:	**No**	**Yes**
Be within a conservation area identified in the 'Biodiversity Conservation Strategy for Melbourne's Growth Corridors'?	☐	☐ *You can attach the DELWP approval for projects on land within a conservation area*
Require removal of native vegetation?	☐	☐ *You can attach the application and permit to remove native vegetation*
Change a place or object on the Victorian Heritage Register?	☐	☐ *You can attach the Heritage Victoria Application and Permit*
	☐	☐

Conditions of approval

Depending on the regulatory authority, you may be required to address conditions for approval of your project. You may want to include a table which lists approval conditions and the relevant sections of the EMP in which they are addressed.

Item	Condition reference	Condition requirement	Relevant section in EMP	Description of how addressed
1	*14(d)*	*The EMP must address disposal of contaminated soil from X location*	*3.2 Management measures*	*Provides information on how contaminated soil will be sampled, collected, transported and disposed of.*
2				
3				

Legislative requirements

In absence of conditions of approval, you can list any environmental legislation relevant to your project, including any specific legislative requirements, to assist with preparation of relevant environmental management measures and ensure you are compliant with the law.

Name of legislation	Regulatory authority	Requirement	Where addressed in this EMP
Environment Protection Amendment Act 2018	*Environment Protection Authority*	*Duty to manage contamination*	*Section XX*
Environment Protection and Biodiversity Conservation Act 1999	*Department of Environment, Land, Water and Planning*	*Protection of Growling Grass Frog (Litoria raniformis) habitat*	*Section XX*

Key reference documents

Preparing EMPs in accordance with the following can ensure consistency and with company practices and ensure obligations are met:

- *Company policies and / or environmental management systems to ensure consistency in company practices*
- ***Current legislation** to ensure legislative obligations are met.*
- ***Up-to-date guidance** that outlines good environmental practice and control measures.*

You can attach copies of the business EMS or environmental policies to your EMP.

Project overview

Providing a brief description of the project will provide further context.

Environmental setting

A description of the surrounding environment, including the condition and any features of significance (for example threatened species, environmentally sensitive areas, and areas of historic significance). To assist you identify sensitivities, provide local and regional context.

Site location

Describe the location of the site, including the address, and insert a map showing the local and regional area, with any sensitive receptors (e.g. schools, residential buildings, and boundary of the site) indicated.

Site description

A description of the site, including historical land use, geological features, hydrology, and surrounding land uses, can assist with identifying sensitive receptors and designing the appropriate controls to manage your environmental risks.

Description of activities

A description of activities to be undertaken as part of your civil construction, building or demolition activities, can assist with identifying the environmental risks of the projects, and implementing the required controls. You can also include the hours of works here.

Phase of works	Method	Company responsible	Expected commencement/ completion dates
Demolish site structures	*You can describe how works will be undertaken, including what plant and equipment will be used.*		

Impact footprint

A description of the area that will be directly impacted by the works, and adjacent areas, will assist with planning for minimisation of risks.

Site plan

The site plan would show the extent of the works, either as a map or photograph, showing the boundary of the site, location of infrastructure, and other relevant features. Multiple site plans may be required depending on the extent of the works.

Timing

Providing a project timeline, showing the total duration of works and time of year they will occur, may assist you with keeping on track to complete works as scheduled.

Summary of site information

You can provide a summary of the site information based on the information collated in the previous section.

Site address	*Address*
Site location	*(e.g. 250 kilometres (km) northwest of nearest capital city).* *The site location is shown on Figure X.*
Local government authority	*Name of LGA.*
Surrounding land uses and sensitive receptors	*Describe land uses and potential receptors, (e.g. residential properties, schools, hospitals, parks, conservation areas, rivers, lakes).* *North: (describe land uses and receptors).* *South: (describe land uses and receptors).* *East: (describe land uses and receptors).* *West: (describe land uses and receptors).* *Surrounding land uses and potential receptors are shown on Figure X.*
Site area (ha)	*Area in square metres (m^2) or hectares (Ha).* *The site layout during works is included as Figure XX.*
Historical land uses on site	*Describe historical land uses on site, if known, starting from most recent.*
Site geology	*Describe geology, e.g. the presence of fill, acid sulfate soils or potential acid sulfate soils, underlying natural soil, rock type/s).*
Site hydrology and surface water features	*Describe hydrology, if known.* *Describe surface water features present on site or adjacent to site, including stormwater drains).* *Site surface water features are shown on Figure XX.*
Hours of works	*(e.g. 7 am to 6 pm, Monday to Friday).* *7 am to 1 pm, Saturday.*
Expected project commencement and completion dates	*Commencement date:* *Completion date:*

Objectives of this EMP

Listing the objectives of your EMP can assist you with identifying what content you require in your EMP to appropriately manage your environmental risks.

Roles and responsibilities

Defining the roles and responsibilities of staff (including contractors and subcontractors) involved in environmental management of the project, can help to ensure environmental management is being undertaken by the most appropriate person. Any changes to roles and responsibilities would also be documented.

New environment protection laws mean that anyone engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must eliminate or reduce that risk as far as reasonably practicable.

The **general environmental duty** (ss.25–27) applies to all Victorians.

Position	Name	Environmental responsibilities	Person reporting to	Contact details
Principal contractor (company name)				
Project manager				*Email address* *Landline* *Mobile*
Person responsible for implementing EMP				
Project health, safety and environment officer				
Stakeholder liaison officer				
Subcontractor 1 (company name)				
Project manager				
Team member 1				
Subcontractor 2 (company name)				
Project manager				
Team member 1				

Reporting

You may be required to report implementation of this EMP to external parties, which include providing environmental management records to the regulator. You can describe reporting requirements in this section.

Staff training

Appropriate staff training will ensure that roles and responsibilities, procedures and processes are clear to all site personnel, including contractors, subcontractors and visitors.

In this section, you can describe the modes of training you will be implementing to ensure the relevant aspects of the EMP are communicated to all relevant staff, and list the key points of environmental value you would like to communicate during training e.g. natural values of particular significance, and the role of the EMP.

Modes of training may include:

- *site induction*
- *tool-box meetings each day, prior to commencement of works*
- *induction meetings with sub-contractors.*

Maintaining a record of a training register or record of attendance can be useful in ensuring all staff are provided the necessary training to manage the risks of their activities.

Name of person	Business	Date of training	Name of trainer	Description of training content

You can attach training and induction registers to your EMP.

Emergency contacts and procedures

Listing key emergency contacts and emergency response procedures associated with the project's environmental risks can help to ensure that emergencies are managed appropriately to prevent and mitigate pollution events.

Emergency contacts

Organisation / person	Contact no	Alternative contact no.
Company responsible for implementing your EMP		
Person responsible for implementing and updating your EMP		
Project manager		
Site 24-hour emergency contact person (1)		
Site 24-hour emergency contact person (2)		
First aid officer		
Project HSE officer		
Person responsible for implementing EMP		
Fire brigade/Police/ Ambulance)		
EPA Victoria		
Wildlife rescue		

Emergency response procedures

Item	Description
How to notify of an emergency	*Describe procedure.*
Emergency alarm sound	*Describe sound.*
What to do if the emergency alarm is activated	*Briefly describe what site workers should do if the emergency alarm is activated (e.g. stop work, walk to emergency muster point).*
Emergency muster point	*Describe location of emergency muster point.*
Frequency of drills	*State the frequency of emergency drills.*
CB radio channel	*List the relevant radio channel.*
Hazardous materials	*List names, quantities and locations of hazardous materials.*

Item	Description
Locations of mitigating controls	• *EMP document* • *locations of Safety Data Sheets* • *locations of spill kits* • *locations of fire extinguishers* • *locations of first aid kits*
Responding to a chemical spill	*Refer to the spill response procedure, stating its location onsite.*
Insert additional rows as relevant	

You can attach any relevant emergency response procedures to your EMP.

Identifying risks

Identifying the environmental risks of your activities can assist with identifying appropriate controls for inclusion in the EMP. See Chapter 3: Managing your environmental risk *and* Assessing and controlling risk: a guide from business (EPA publication 1695)*, for further information on how this can be undertaken.*

Environmental management measures / controls

Describing the environmental measures / controls you will implement to manage the risks of your activities, with timelines, controls and performance targets can assist you with implementing the appropriate controls, once you have identified your risks. You may also want to include maps and diagrams to assist you with implementation of controls.

Management measures also include corrective actions and non-compliance reporting.

You can also present each environmental aspect / impact relevant to your project e.g. dust, noise, sediment and erosion control, waste, as a separate table to list your environmental controls and measures.

Noise			
Objective	*Minimise noise impacts on nearest sensitive receivers* *Undertake works in accordance with the relevant legislation*		
		Responsibility	***Timing***
Control(s)	• *Turn off vehicles and machinery when not in use* • *Use silencers on vehicles, where possible* • *Do not schedule noisy works during the early morning and in the evenings*	*Site Environment Manager*	*Ongoing*
Performance indicator(s)	*No complaints received from nearest sensitive receivers.*		
Monitoring	*Daily site inspections.*		
Reporting	*Incidents are to be reported immediately to XXX*		
Corrective action(s)	*Located noisy activities behind noise barriers.*		

Environmental monitoring checklist - noise					
Daily	*Weekly*		*Monthly*		*Other*
Checklist completed by:	*Signed:*		*Date:*		
Environmental control / issue	*Type of monitoring (e.g. site inspection)*	*Observations*	*Action required (and by when)*	*Person responsible*	*Date actioned*

Incident reports

You may want to include a register of any incidents occurring on site, which can assist you with review and update of the EMP (see next section) to ensure that risks are being controlled as appropriate.

Date and time	Description of incident	Action required	Person responsible for actioning	Action by	Date actioned

Audit and review

The following will help ensure the controls you implement are appropriate to eliminate or reduce the risks of your project:

- *including a schedule and triggers for auditing and reviewing the implementation and effectiveness of your EMP (set this against your objectives and any regulatory conditions)*
- *having a procedure for evaluating and updating your EMP.*

Events that may trigger a review and update include:

- *completion of one phase of works*
- *change to scope of works*
- *occurrence of an environmental incident or near miss occurs, prompting a review of the controls*
- *monitoring results indicate a control is inadequate*
- *an improvement to the controls is identified through onsite experience, a change in industry best-practice or legislation*
- *there is a change of subcontractors or key personnel.*

Complaints procedure

Recording complaints made from stakeholders, including members of the community, within a register can assist with managing them appropriately. You may also wish to prepare a complaints procedure for the reporting of complaints and responding to complaints.

Date	Name	Contact details	Comment or complaint	Action taken	Date action

You can attach a copy of the complaints register to your EMP.

Resubmitting revised EMPs

Depending on the regulatory authority, you may need to resubmit any revised EMPs for approval, specifying what changes were made.

ETHOSNRM

Habitat Hectares Assessment and Offset Requirement for proposed subdivision

10 Marlo Road, Marlo

Final v2

Prepared For: Mr & Ms Grech

September 2015

ETHOS NRM Pty Ltd

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TABLES

FIGURES

Cover Photo: 10 Marlo Rd, Marlo

Ethos NRM Pty Ltd				
Document Control				
Client	Michael and Katherine Grech			
Title	Habitat Hectares Assessment and Offset Requirement for proposed subdivision– 10 Marlo Rd, Marlo			
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	Richard Hoxley (Crowther and Sadler)	Final v2	PDF	9/9/15
	Michael Grech	Final v2	PDF	9/9/15

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 4 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.

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.

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number:7 of 70

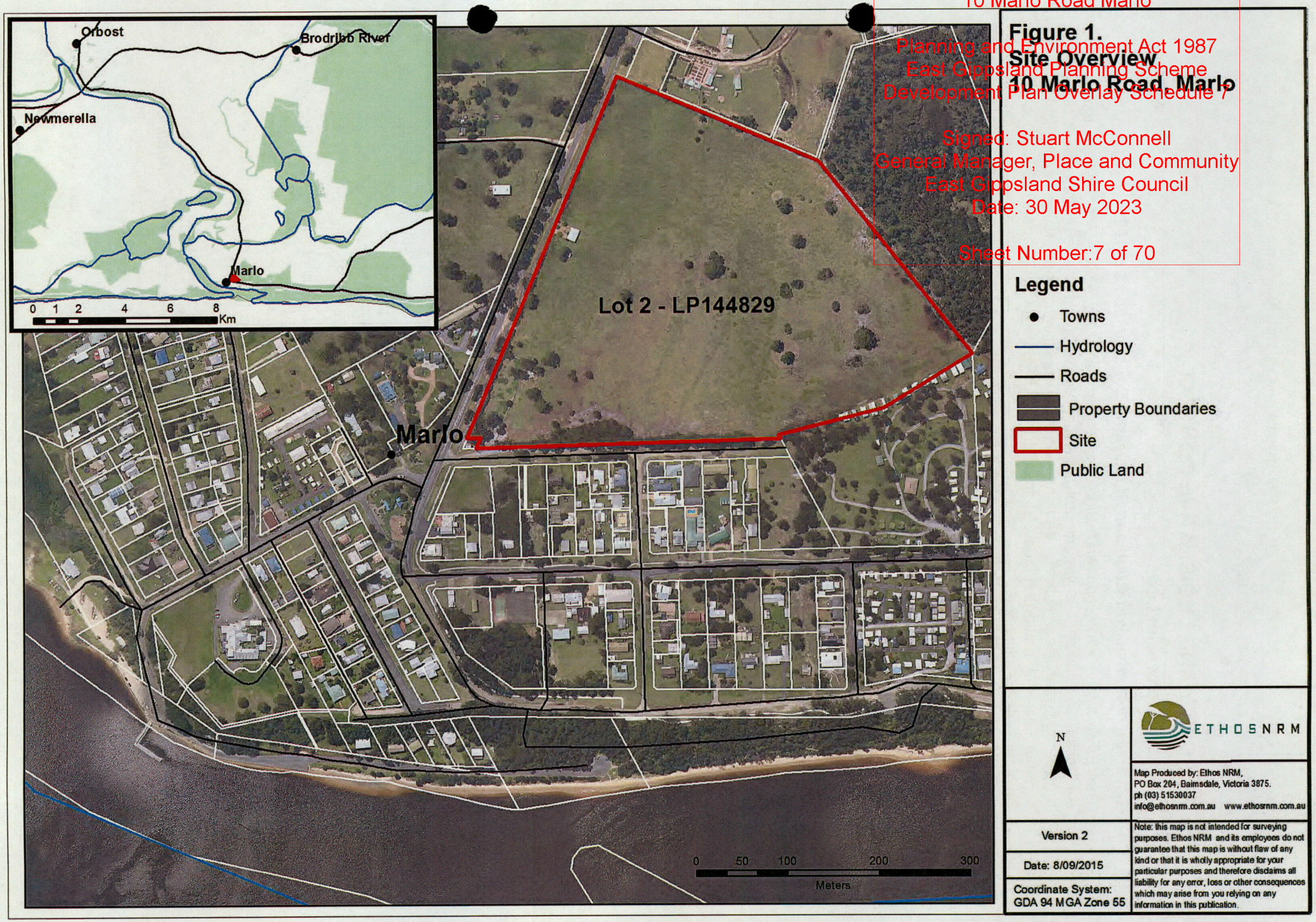

Figure 1.
Site Overview
10 Marlo Road, Marlo

Legend

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

N

ETHOSNRM

Map Produced by: Ethos NRM,
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Version 2

Date: 8/09/2015

Coordinate System:
GDA 94 MGA Zone 55

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 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 *(Leptospermum continentale).* Several large old senescing Saw Banksias *(Banksia serrata)*

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 Mahogony *(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.

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number: 14 of 70

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

Fencline 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)

N

0 10 20 40 60
Meters

1:3,000

Version 2

Date: 8/09/2015

Coordinate System:
GDA 94 MGA Zone 55

ETHOSNRM

Map Produced by: Ethos NRM,
PO Box 204, Bairnsdale, Victoria 3875.
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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
Ripogonum album	White Supplejack	r		
Libertia paniculata	Branching Grass-flag	r		
Eupomatia laurina	Bolwarra	r		
Dichondra sp. 1	Silky Kidney-weed	r		
Rubus X novus	Hybrid Bramble	r		
Hybanthus vernonii subsp. vernonii	Erect Violet	r		
Cladium procerum	Leafy Twig-sedge	r		
Corybas fimbriatus	Fringed Helmet-orchid	r		
Juncus revolutus	Creeping Rush	r		

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

Table 3. DELWP Threatened Fauna records (VBA database)

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

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number:23 of 70

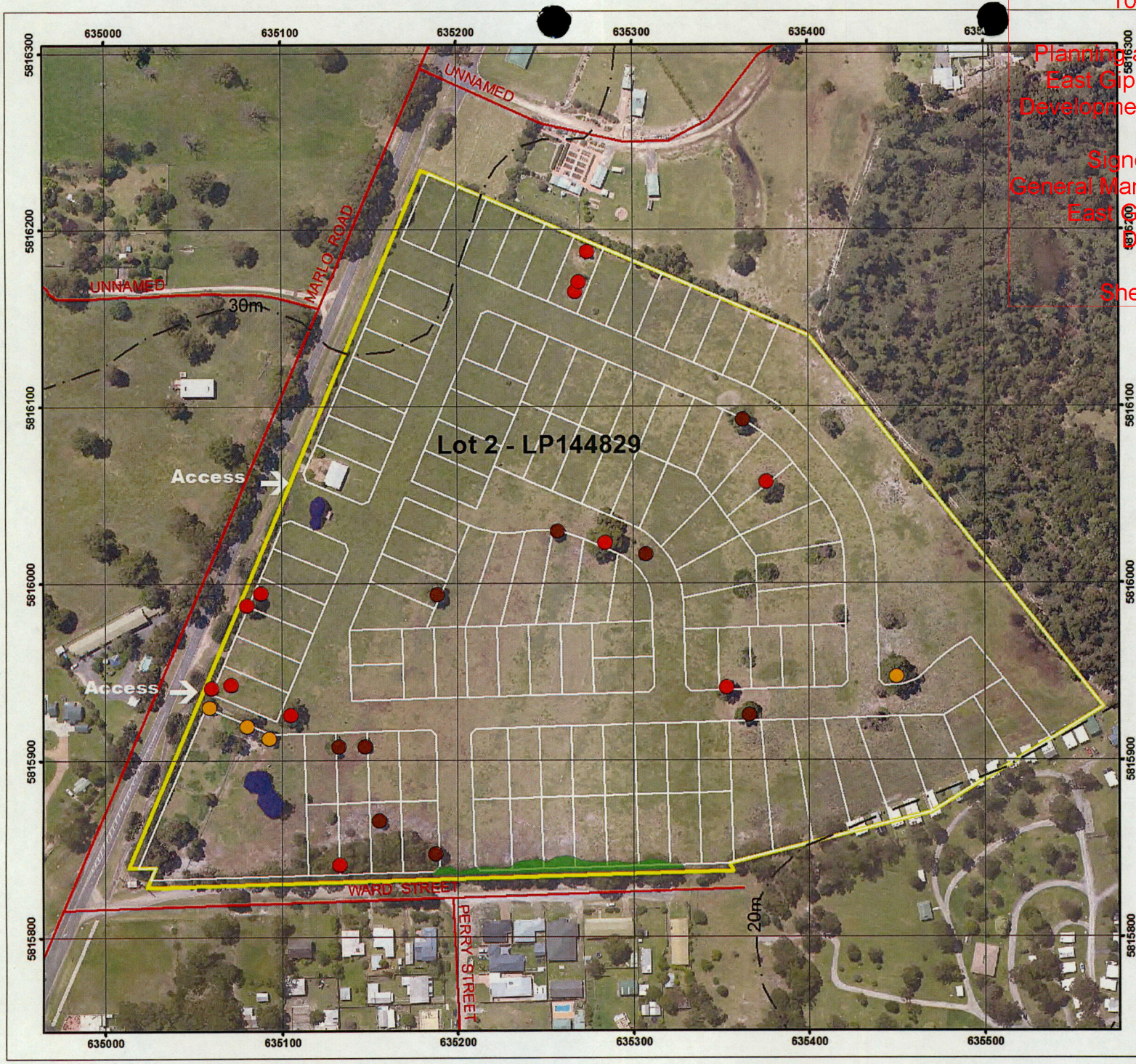


Figure 3.
Vegetation Removal Site Plan
10 Marlo Road, Marlo

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

1:3,000

Version 2

Date: 8/09/2015

Coordinate System:
GDA 94 MGA Zone 55

ETHOSNRM

Map Produced by: Ethos NRM,
PO Box 204, Bairnsdale, Victoria 3875.
ph (03) 51530037
info@ethosnrm.com.au www.ethosnrm.com.au

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.

DELWP, 2015c. ***Native Vegetation Information Management online tool***. www.depi.vic.gov.au Victorian Government Department of Environment, Land, Water and Planning.

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 21/7/22

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

9.2 Appendix 2: EVC Map (DELWP)

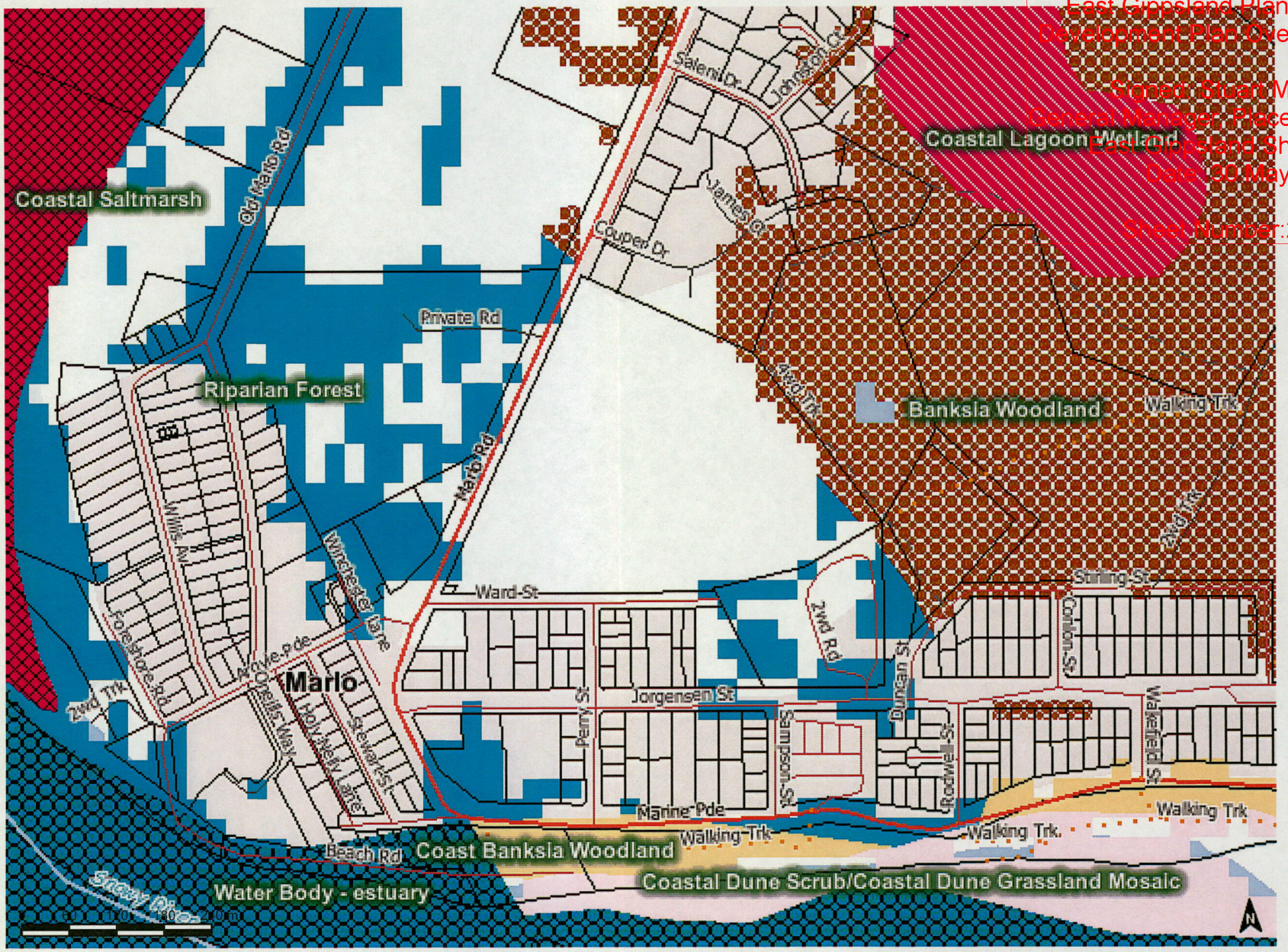
Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number:29 of 70

Map created Fri Jul 17 16:07:24 EST 2015



ROADS
- Freeway
- Highway
- Main Road
- Secondary Road
- Local Road
- 2WD (Unsealed)
- 4WD Only
- Walking or Cycle Track

WATERCOURSES
UNNAMED DRAINAGE LINES
APPROVED PARCELS
ECOLOGICAL VEGETATION CLASSES
- 18 Riparian Forest
- 1107 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

Map Scale 1:7,034

Biodiversity Interactive Map A4 Landscape

Produced on Fri Jul 17 16:07:28 EST 2015

GDA

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 marlo rd marlo Date 24/1/05

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 (✓)
LT	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	—
LTG	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	✓	✓
	/	/		
	/	/	5 / 14	5 / 5

Present

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.

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 the benchmark species diversity; or
- no reproductively-mature specimens are observed.

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

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Vegetation Quality Field Assessment Sheet

Version 1.3 October 2004

Recruitment — Score: 3

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.

Species Recruitment

Woody species recorded in habitat zone	Adequate Recruitment (✓)
Eucalypt canopy (combined species)	×
Prickly Broom Heath	✓
Pittosporum	✓
Burgan	✓
Coast Tea-tree	×
	3/5
number of woody spp. in EVC benchmark (SS 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.

Organic Litter — Score: 0

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

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

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 2/7/14

Assessor(s) K.Spencer Map Name/No. AMG

Tenure Private EVC Lowland Forest Bioregion 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).

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 Life forms

LF Code from EVC benchmark	# spp observed / Benchmark spp.	% cover observed / Benchmark % cover	Present (✓)	Modified (✓)
LT	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	✗	–
	/	/		
	/	/	7 / 14	2 / 7

Present

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.

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 the benchmark species diversity; or
- no reproductively-mature specimens are observed.

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: 15

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

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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.

Species Recruitment

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

5/12

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.

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

'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

Component	'Site Condition Score'							'Landscape Context Score'			Total
	Large Trees	Tree Canopy Cover	Lack of Weeds	Understorey	Recruitment	Organic Litter	Logs	Patch Size	Neighbourhood	Distance to Core Area	100
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** **DELWP ref: ETH_0038**
Time of issue: **12:35 pm**

Project ID	GRE_MAR_V2

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

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.

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

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

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]

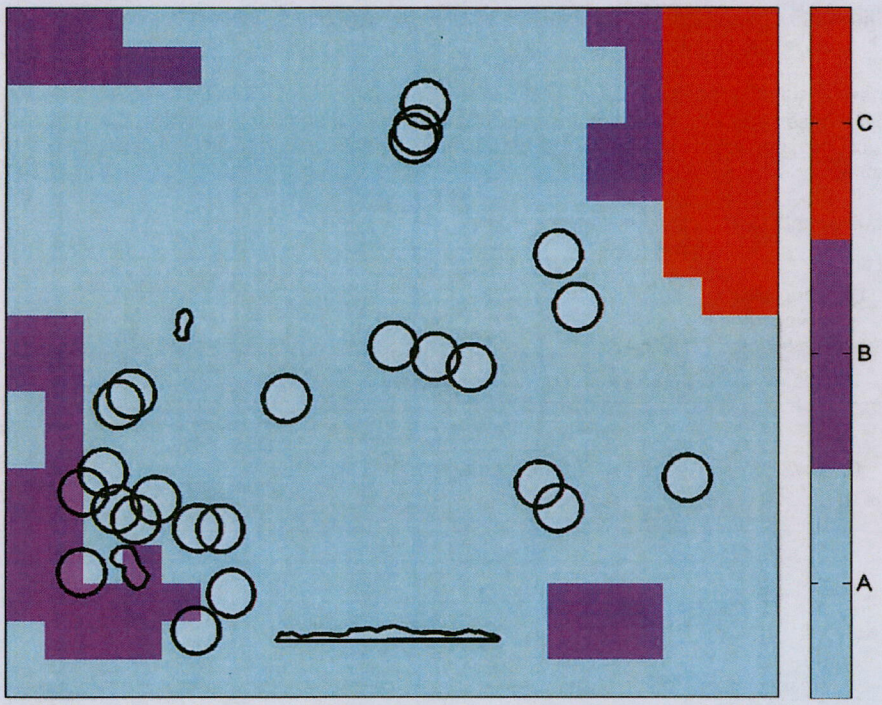
The offset requirements for your proposal are as follows:

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

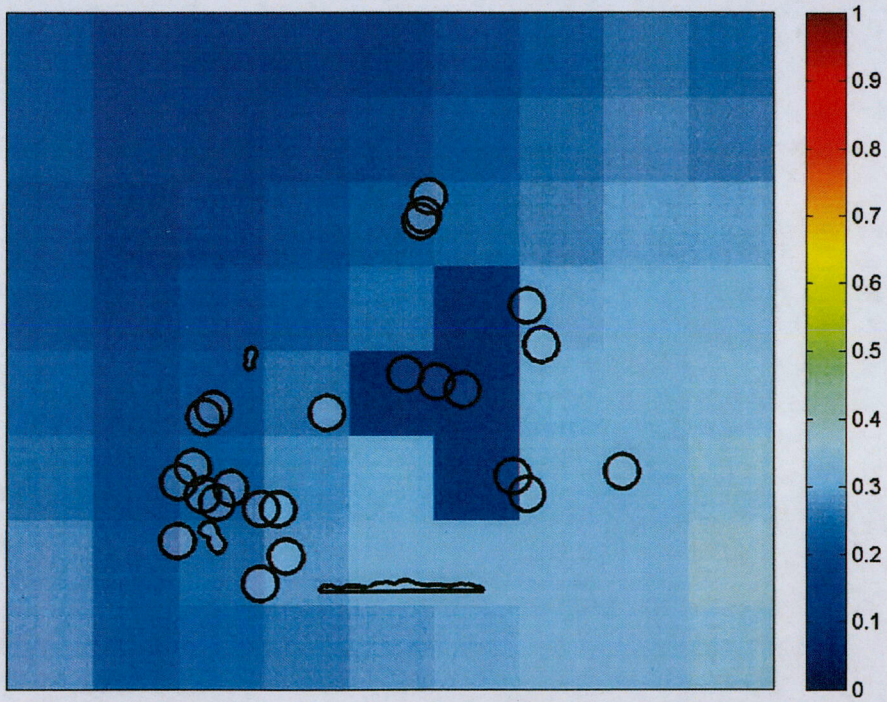
[2] Strategic biodiversity score is a weighted average across habitat zones where a general offset is required

Appendix 3 – Images of marked native vegetation

1. Native vegetation location risk map



2. Strategic biodiversity score map



3. Aerial photograph showing marked native vegetation

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:

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

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.

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

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:

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

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 importace 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.

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.

$$\textit{Risk factor for general offsets} = 1.5$$

$$\textit{Risk factor for specific offset} = 2$$

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.

$$\textit{Risk adjusted specific biodiversity equivalence score} = \textit{specific biodiversity equivalence score clearing} \times 2$$

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:

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

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.

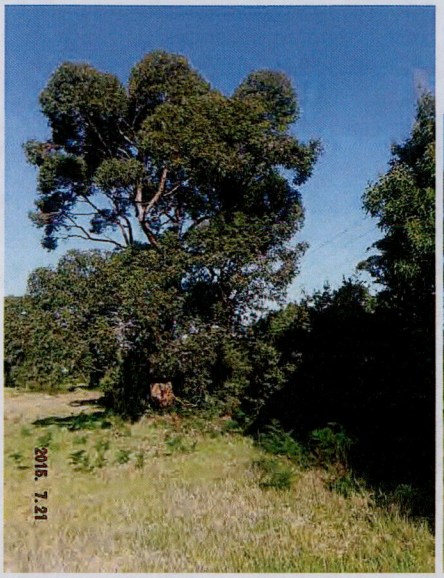
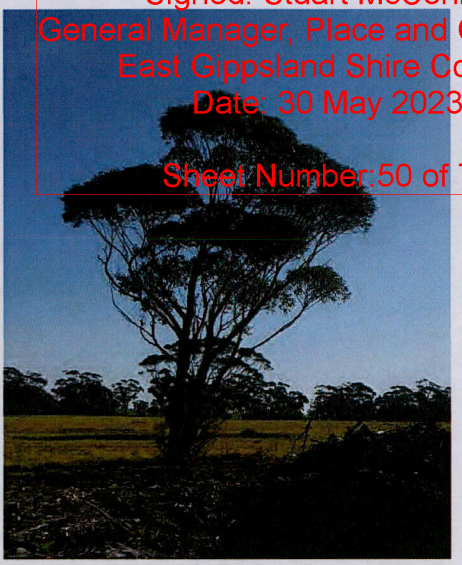
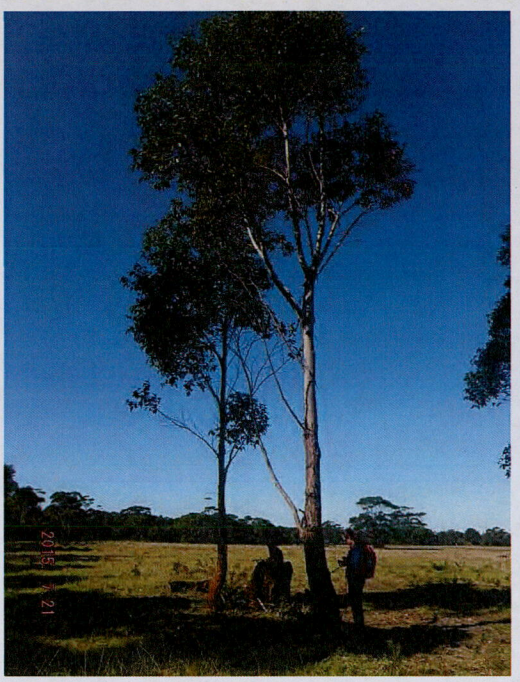
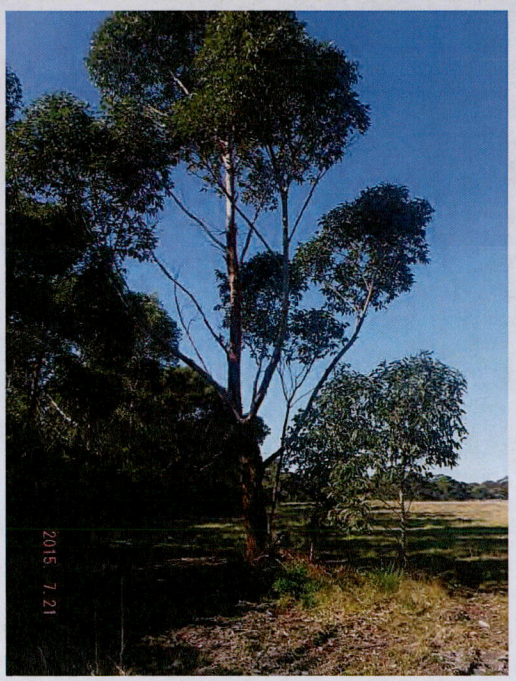


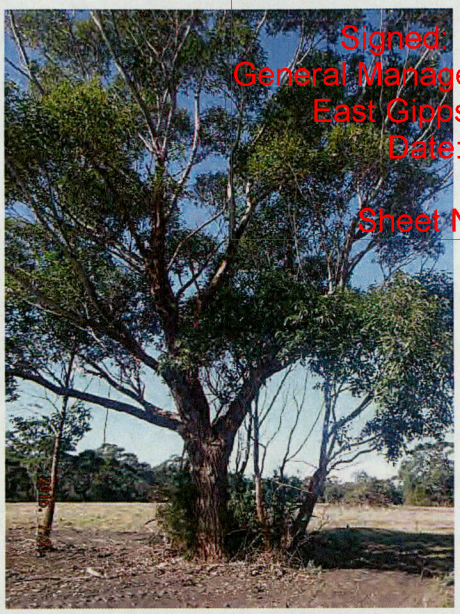
Plate 4. Canopy Tree assumed loss due to encroachment in TRZ

Plate 5. Scattered Trees within paddock to be removed









9.6 Appendix 6: EPBC Protected Matters Search

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire Council
Date: 30 May 2023

Sheet Number:53 of 70

Australian Government
Department of the Environment

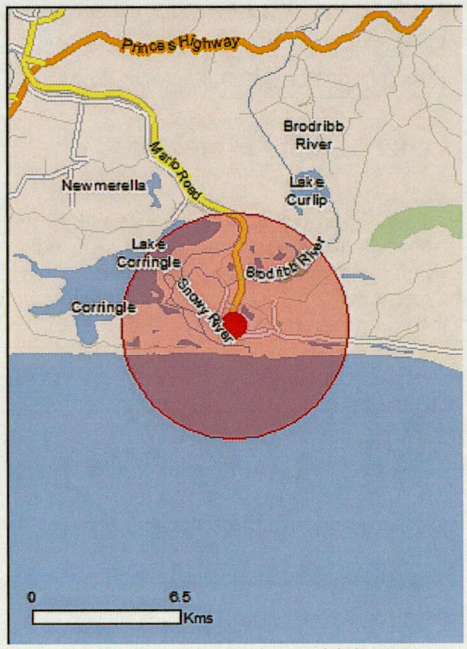
EPBC Act Protected Matters Report

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.

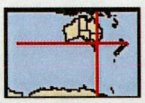
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

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
Phoebetria 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
Phoebetria 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
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
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to 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
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pandion cristatus Eastern Osprey [82411]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

[Resource Information]

Listed Marine Species

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may 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
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur

Name	Threatened	Type of Presence 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
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
Phoebetria 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
Hypselognathus 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 Dophin, 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 Corringle 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 Resouces 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]		habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		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.

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 1 of 26

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

R:/1918
Revision F, 26/03/2022

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
Rev F	26/03/2022	M Supplitt	Distribution: C&S (incorporate Council resolution of 07/12/2021 including amended subdivisional layout)

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.***

Table of Contents

Figures

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

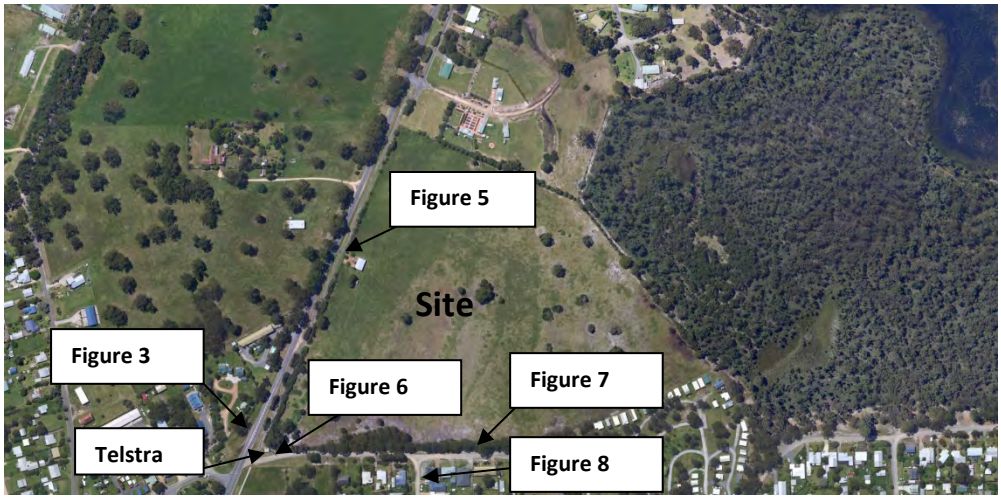


Figure 2: Site Aerial

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

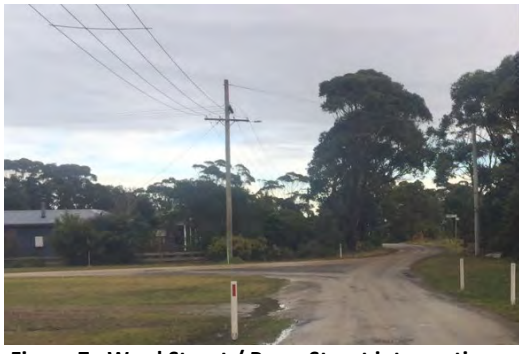


Figure 7: Ward Street / Perry Street intersection

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	DoT 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 87 residential allotments in 5 stages (there is an existing dwelling on one proposed allotment), a 5,272m^2 future development site (Lot A), and a number of Reserve areas as shown on Crowther and Sadler "Proposed Subdivision" Drawing 16273, Version 15 dated 10/11/2021.

5 Access / Egress

The "Road Infrastructure Layout Plan" (Crossco Drawing 1918/004-H) at Appendix 1 shows the proposed road layout, location of footpaths and road alignment within existing and proposed road reserves.

5.1 Vehicles

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), and
- construct 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 DoT and this Traffic Management Plan is premised on the outcomes of the discussion but subject to DoT confirmation and final approval.

Marlo Road is a declared public road administered by DoT. 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 3[1] 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 DoT requirements and it is anticipated consistent with DoT practice, that this would be included as a condition of any

[1] Refer to Crowther & Sadler Drawing 16273, Version 9 drawn 21/12/2021

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 to DoT requirements at the time formal approval of the intersection is sought from DoT.

5.1.2 Ward Street

Proposed Stage 1[1] requires the:

- construction of upgrade of Ward Street, and
- construction of a new intersection to access 10 Marlo Road, and
- and upgrade of the existing Marlo Road intersection.

Ward Street is an existing public road managed 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.

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 2, Stage 5, Lot A (50)

Assuming 10 vehicle movements per day ((14+50) x 10) a total of 550 vmpd could be anticipated in Ward Street.

Based on the estimated vmpd Ward Street could be conservatively classified an "Access Street – Level 1[2] (traffic volume 1000 vpd to 2000 vpd).

If all proposed allotments accessed this intersection the vpd calculation would be ((14+88)x10) providing a total vpd of 1,020 vpd, so still well within the vpd for an "Access Street-Level 1" categorisation.

Construction of Ward Street is proposed to be undertaken including:

- kerb and channel (SM2-M profile) to north and south side
- all-weather seal
- drainage (refer to Stormwater Management Plan)
- footpath to north side at 10 Marlo Road frontage
- Ward Street is proposed to terminate at the east end in a T-head allowing for garbage truck manoeuvring.

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.

A typical section through Ward Street is included at Appendix 1 (Crossco Drawing 1918/004-H), Section C. This typical section shows:

- Seal width
- Trafficable width
- Nature strip width

[2] East Gippsland Planning Scheme Clause 56.06

- Footpath location
- Kerb profile (SM2-M)
- Property lines
- Pavement construction

Legal Agreement

We are advised that the existing S173 Legal Agreement (AJ8197393) which in part prescribes upgrade requirements and cost for Ward Street is to be removed from the property. We have therefore disregarded the provisions of the agreement in addressing the traffic engineering issues for Ward Street.

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 movements 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 DoT managed road, the intersection design will require DoT approval and is proposed to constructed to DoT 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

A concept layout illustrating the proposed intersection upgrade is included at Appendix 3, Crossco Drawing No 1918/014-C.

5.2 Pedestrians & Shared paths

Pedestrian links and shared pathways are proposed as shown on Crossco Drawing 1918/004-H included at Appendix 1.

The shared pathways are proposed to be 2.5m wide.

All internal road reserves are proposed to include a 1.5m wide concrete footpath.

The location of proposed paths is as follows:

- a footpath is proposed on the north side of Ward Street as part of the construction of this street.
- a footpath linking at five (5) locations along the west boundary to Marlo Road and the existing Marlo Road shared trail.
- a shared path through a proposed Reserve between Lot 1 and Lot A, linking to the existing Marlo Road shared trail.
- a shared path linking to the north, to existing track and proposed future subdivision. This shared path terminates at the head of the two proposed cul-de-sac road reserves.
- a shared path through the south-east reserve linking the to the “existing track” at the adjacent to the east boundary.

These proposed pathways provide linkages to existing paths / tracks and connectivity within and through the proposed development for pedestrians and bicycles.

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 has not supported the development of a shared path between Orbost and Marlo (*Snowy River Shared Path)*[3], but at the time of updating this report to Rev F Council's position is unclear. The Marlo to Conran bicycle path project is being pursued by Others.

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 5.30, released 24 March 2020[4].

The proposed general arrangement, traffic control measures and geometry of internal roads is illustrated on Crossco Drawing 1918/004-H at Appendix 1. Two typical sections of the internal roads are included at the top of the drawing (Section A and Section B).

6.2 West Entry Road (new Marlo Road intersection)

A 22m 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.

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-H illustrates typical 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, or alternative wearing course acceptable to Council.

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.

[3] EGSC Council Meeting Minutes 7 April 2015.
[4] Earlier report revisions IDM Version 4.3, September 2014

Table 1: Internal road compliance summary

	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 880 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 minimum	Varies: 20m (Ward Street entry) 22m (balance)	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 at some locations.	Yes(1)
Cycle path provision	Carriage way designed as a shared zone and appropriately signed	No separate cycle provision	No separate cycle provision Shared paths through Reserves	Yes

(1) Council approved variation providing connectivity through 10 Marlo Road from developments to the north (by Others), to existing tracks / shared paths.

6.3.2 Internal Road Termination

The layout of the subdivision has been designed such that there is two roads that terminate 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 12 and 13 at the north-west of the proposed subdivision, and

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 12 and 13 which will be required to leave bins adjacent to proposed Lot 11 or 14 for collection.

6.5 Hierarchy

Indicative traffic control measures and road hierarchy are shown on Crossco Drawing 1918/004-H. Within the site the internal "loop" road has been designed to retain right-of-way.

6.5.1 Entry Road from Marlo Road:

- GIVEWAY or STOP and pavement marking at exit on to Marlo Road subject to DoT requirements for intersection.
- 4-way roundabout at intersection with internal "loop" road which will function as a standard roundabout with vehicles in the roundabout having right-of-way.

6.5.2 Internal "loop" Road:

- has right-of-way at all intersections with the exception of the single roundabout.

6.5.3 Cul-de-sacs (2 of):

- west cul-de-sac – 4-way roundabout at intersection with internal "loop" road which will function as a standard roundabout with vehicles in the roundabout having right-of-way.
- east cul-de-sac - GIVE WAY and pavement marking at intersection with internal "loop" road. Internal loop road has right-of-way.

6.5.4 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

6.5.5 Ward Street / Marlo Road intersection:

- GIVE WAY or STOP (subject to DoT requirements) and pavement marking at intersection with Marlo Road

This indicative hierarchy and associated control measures are subject to final design requirements of DoT and Council and may therefore vary. A signage and pavement marking drawing will form part of the detailed design for approval by DoT and/or Council respectively.

7 Conclusion

- Stage 1 requires the construction of Ward Street and the Ward Street / Marlo Road intersection in accordance with DoT requirements.
- Stage 3 of the development requires the construction of a new intersection with Marlo Road in accordance with DoT 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 12 and 13.
- Footpaths are proposed on all internal roads, and shared paths through Reserves linking to the existing shared path along Marlo Road and the existing track adjacent to the east boundary.
- Two internal streets terminate at a cul-de-sac with a radius of 10m.

M Supplitt
26/03/2022

Appendix

Appendix 1 – Drawings

Site Topography – Drawing 1918/001-E

Existing Traffic Infrastructure – 1918/002-E & 1918/003-E

Road Infrastructure Layout Plan – 1918/004-H

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 16 of 26

FOR DISCUSSION PURPOSE ONLY

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

N

ROAD
MARLO ROAD
RESERVE
LOT A
WARD STREET
PERRY STREET
EXISTING TRACK

LEGEND:

- EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- EXISTING WATERMAIN
- EXISTING OVERHEAD ELECTRICITY

NOTE:

1. AERIAL INDICATIVE LOCATION ONLY

CROSSCO ENGINEERING & ENVIRONMENTAL CONSULTANTS

Crossco Consulting Pty Ltd
ABN: 88 135 548 110

154 Macleod St
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Bairnsdale Vic 3875

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Email: consult@crossco.com.au

M & K GRECH

10 MARLO ROAD, MARLO.

SITE TOPOGRAPHY PLAN

DRAWING No.

1918/001-E

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-001.dwg

DATE: 16 MARCH 2022

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 17 of 26

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N

EXISTING SEALED WALKING TRACK

2.0m WALKINGTRACK

3.2m/3.1m TRAFFIC LANES

MARLO ROAD

2.0m WALKINGTRACK

3.2m/2.9m TRAFFIC LANES

EXISTING SEALED WALKING TRACK

EXISTING GRAVEL INTERSECTION WARD STREET/ MARLO ROAD

EXISTING GRAVEL INTERSECTION WARD STREET/ PERRY STREET

EXISTING SEALED INTERSECTION ARGYLE PARADE/ MARLO ROAD

CARPARKING CAFE AND SHOPS

EXISTING TRACK

ROAD

WARD STREET

PERRY STREET

4.8m

4.4m

4.8m

28 27 26 25 24 23 22

LEGEND:

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

NOTE:

1. AERIAL INDICATIVE LOCATION ONLY

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M & K GRECH

10 MARLO ROAD, MARLO.

EXISTING TRAFFIC INFRASTRUCTURE
SHEET 1 OF 2

DRAWING No.

1918/002-E

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-002.dwg

DATE: 16 MARCH 2022

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 18 of 26

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N

2.0m WALKINGTRACK
3.2m/3.1m TAFFIC LANES
2.0m WALKINGTRACK
3.2m/2.9m TRAFFIC LANES
EXISTING SEALED WALKING TRACK
EXISTING GRAVEL INTERSECTION WARD STREET/ MARLO ROAD
EXISTING GRAVEL INTERSECTION WARD STREET/ PERRY STREET
CARPARKING CAFE AND SHOPS
OLD MARLO ROAD
WINCHESTER LANE
WILLIS AVENUE
ARGYLE PARADE
STEWART STREET
JORGENSEN STREET
WARD STREET
PERRY STREET
4.8m
4.4m

LEGEND:
- EXISTING CONTOURS (1m INTERVAL)
- EXISTING EDGE OF SEAL
- EXISTING WATERMAIN
- EXISTING OVERHEAD ELECTRICITY

LEGEND:
- EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- EXISTING WATERMAIN
- EXISTING OVERHEAD ELECTRICITY

NOTE:
1. AERIAL INDICATIVE LOCATION ONLY

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M & K GRECH
10 MARLO ROAD, MARLO.

EXISTING TRAFFIC INFRASTRUCTURE
SHEET 2 OF 2

DRAWING No.
1918/003-E

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1 : 2000 AT A3

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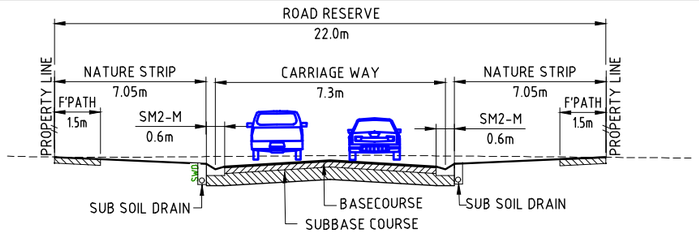
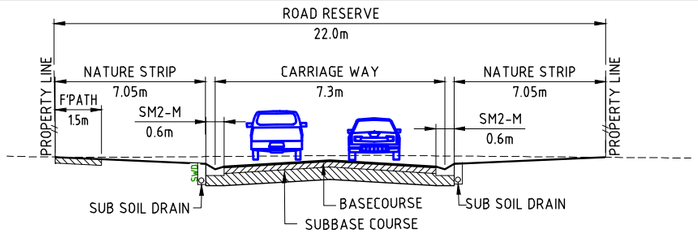


SECTION A
NOT TO SCALE



SECTION B
NOT TO SCALE

SECTION C
NOT TO SCALE

Development Plan
10 Marlo Road Marlo
Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7
Signed: Stuart McConnell
General Manager Place and Community
East Gippsland Shire
Date: 30 May 2023
Sheet Number: 19 of 26

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LEGEND:

- INDICATIVE ROAD ALIGNMENT
- INDICATIVE FOOTPATH
- INDICATIVE DRIVEWAYS
- TRAFFIC DIRECTION
- 10 EXISTING CONTOURS (0.2m INTERVAL)
- EXISTING EDGE OF SEAL

20 10 0 20 40 60 80
1 : 1000 AT A1
1 : 2000 AT A3

CROSSCO ENGINEERING & ENVIRONMENTAL CONSULTANTS

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M & K GRECH

10 MARLO ROAD, MARLO

ROAD INFRASTRUCTURE LAYOUT PLAN

DRAWING No.

1918/004-H

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-004.dwg

DATE: 16 MARCH 2022

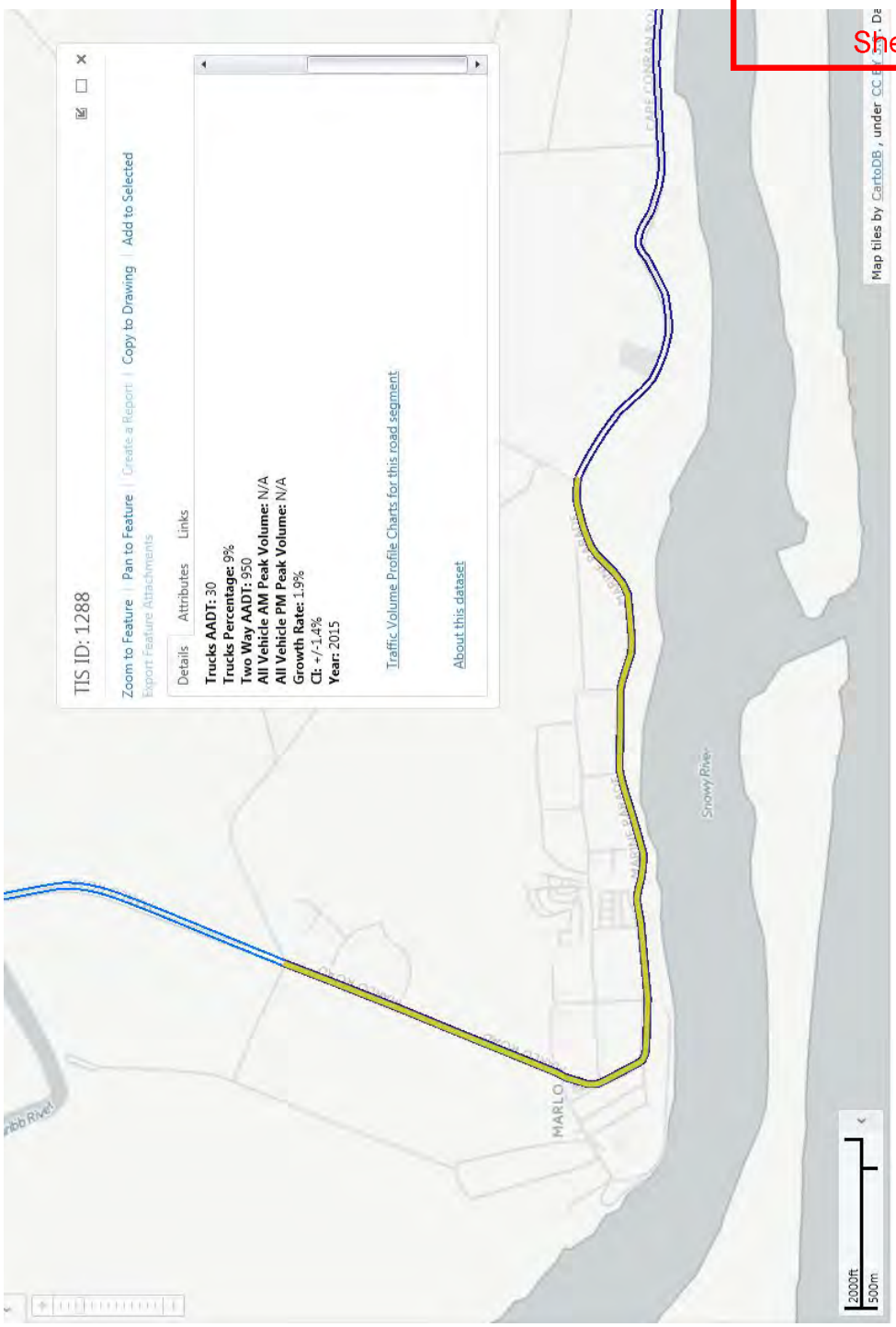
Appendix 2 – VicRoads Traffic Data

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 21 of 26



Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 22 of 26

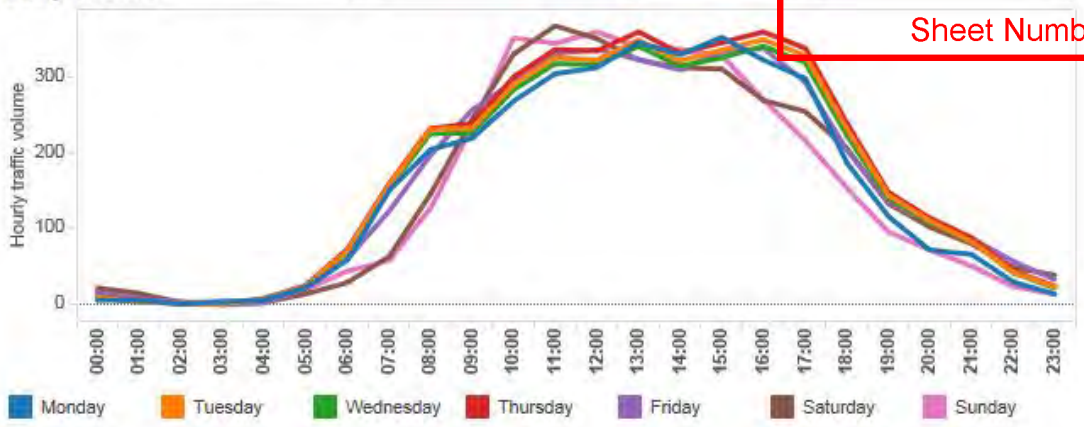
vicroads **Traffic Profiles**

MARLO ROAD btwn HEALEYS ROAD & UNNAMED

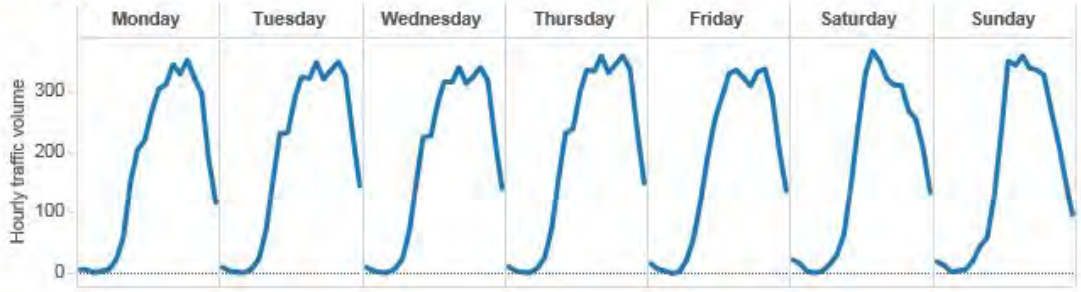
Daily Profile

Direction: (All)

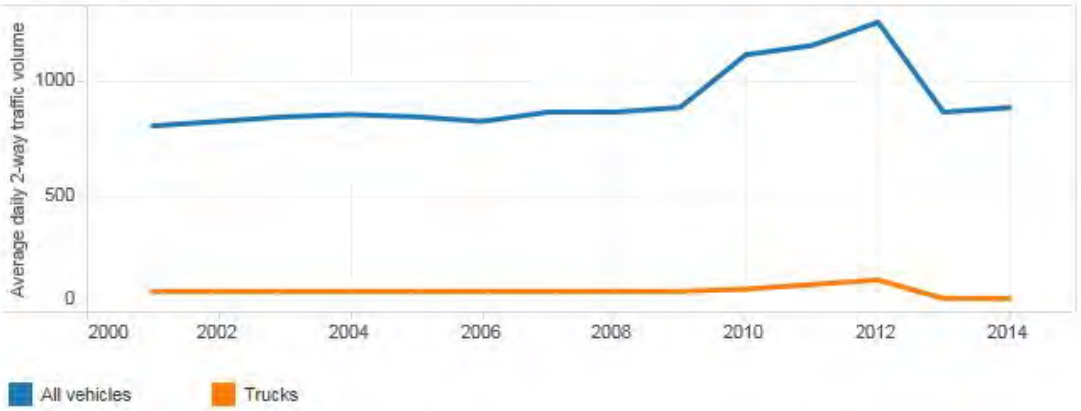
Period Type: (All)



Weekly Profile



Last 10 Years



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Appendix 3 – Conceptual Intersection Layout

Marlo Road – Crossco Drawing 1918/015-B

Marlo Road / Ward Street – Crossco Drawing 1918/014-C

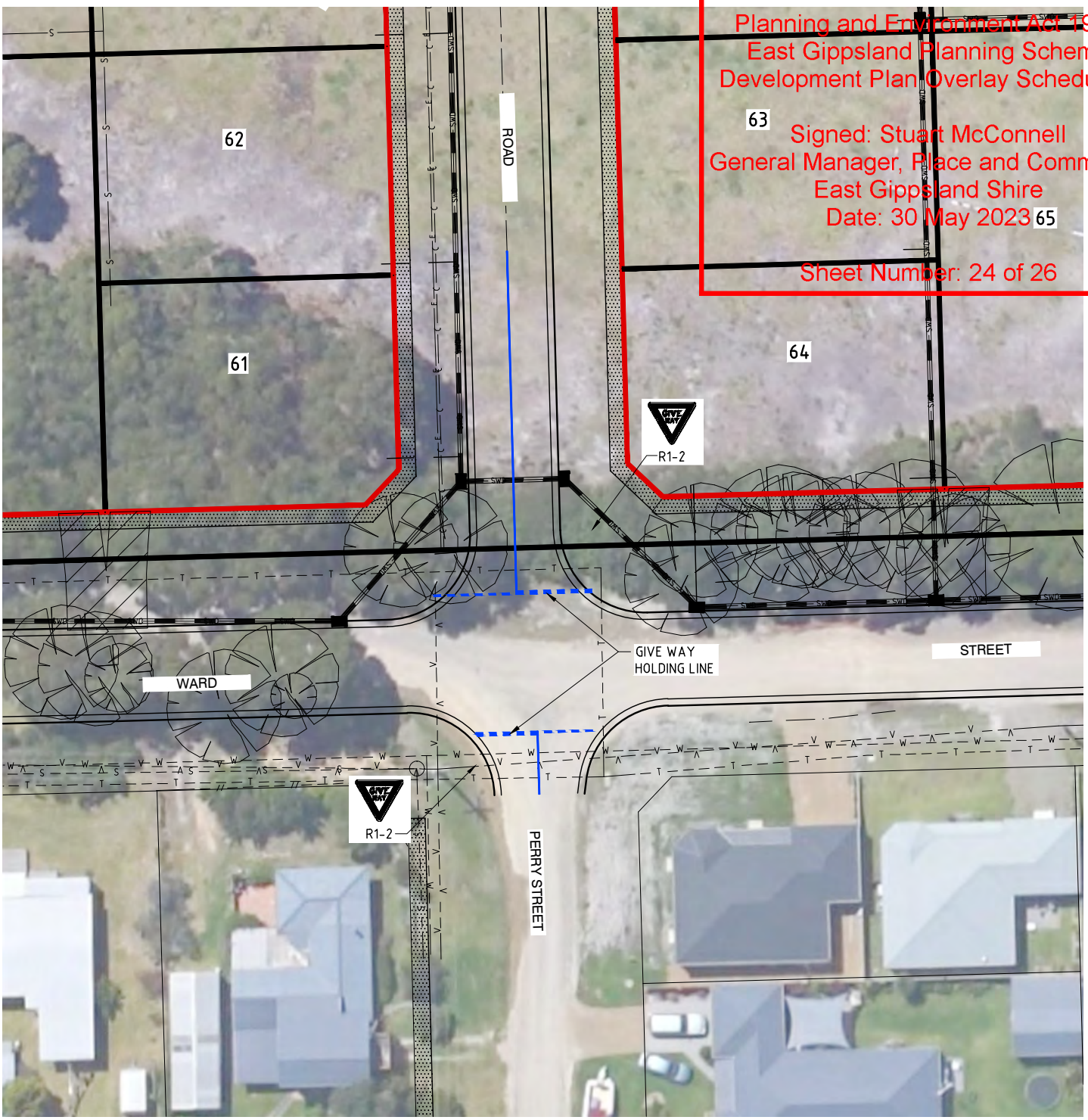
Ward Street – Crossco Drawing 1918/013-C

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 24 of 26



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M & K GRECH

10 MARLO ROAD, MARLO

CONCEPTUAL WARD ST & PERRY ST
INTERSECTION LAYOUT

DRAWING No.

1918/013-C

NOTE:

1. INDICATIVE ONLY, SUBJECT TO ROAD MANAGERS APPROVAL AND DETAILED DESIGN.

10 5 0 10 20

1 : 500

A4 SCALE

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-013.dwg

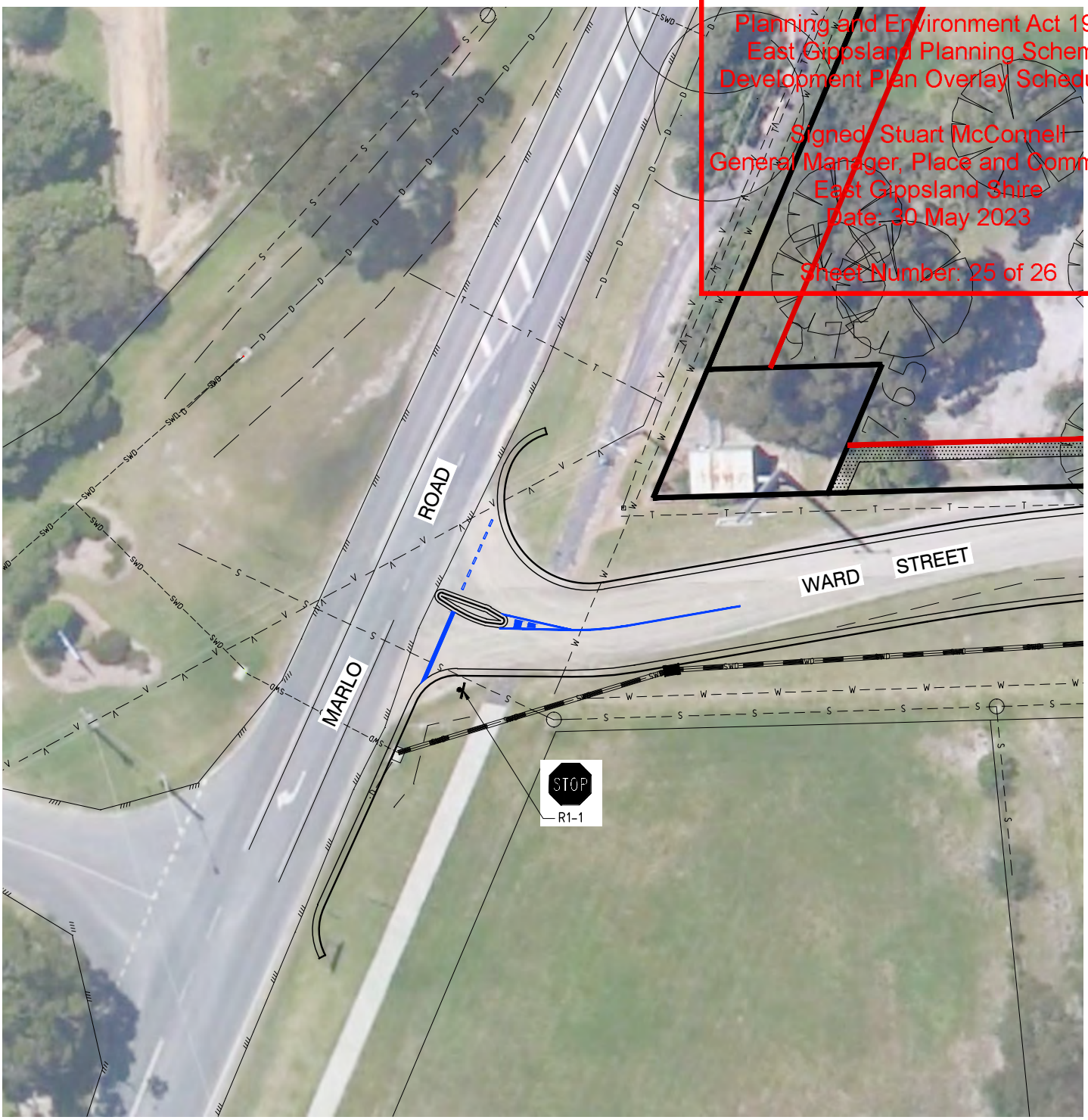
DATE: 16 MARCH 2022

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 25 of 26



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M & K GRECH

10 MARLO ROAD, MARLO

CONCEPTUAL WARD ST & MARLO RD
INTERSECTION LAYOUT

DRAWING No.

1918/014-C

NOTE:

1. INDICATIVE ONLY, SUBJECT TO ROAD MANAGERS APPROVAL AND DETAILED DESIGN.

10 5 0 10 20

1 : 500

A4 SCALE

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-014.dwg

DATE: 16 MARCH 2022

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 26 of 26

NOTE:

1. INDICATIVE ONLY, SUBJECT TO ROAD MANAGERS APPROVAL AND DETAILED DESIGN.

10 5 0 10 20

1 : 500

A3 SCALE

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M & K GRECH

10 MARLO ROAD, MARLO

CONCEPTUAL MARLO ROAD INTERSECTION LAYOUT

DRAWING No.

1918/015-B

DATE: 16 MARCH 2022

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-015.dwg

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 1 of 17

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
Rev D	25/03/2022	M Supplitt	Distribution: C&S (incorporate Council resolution of 07/12/2021 including amended subdivisional layout)

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 (of Development Plan) 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.***

Table of Contents

Appendix .....

Figures

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

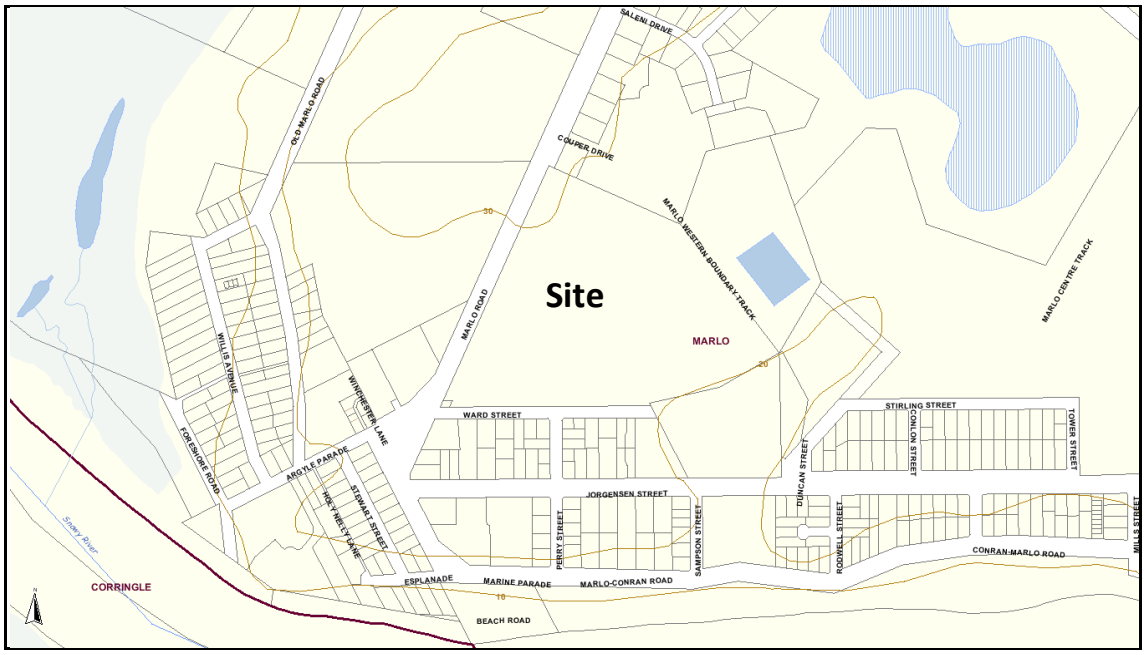

Figure 3: Marlo Topography[1]

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 are 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-H at Appendix 1 shows the location of existing municipal stormwater drainage infrastructure in the vicinity of the site.

3.2 Site Inspection

The site was inspected with Council on 15 July 2015. A number of subsequent informal inspections have been undertaken in the ensuing years.

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

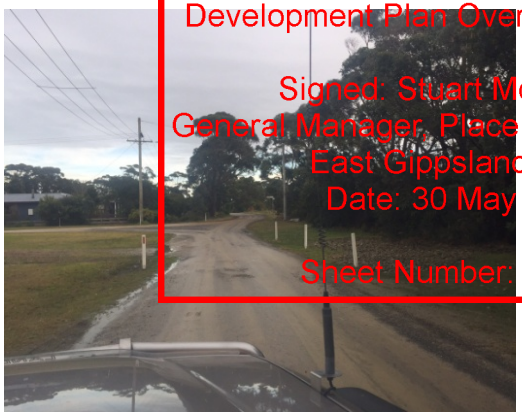

Figure 7: Ward Street

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 87 residential allotments in 5 stages (there is an existing dwelling on one proposed allotment), a 5,272m^2 future development site (Lot A), and a number of reserve areas as shown on Crowther and Sadler "Proposed Subdivision" Drawing 16273, Version 15 dated 10/11/2021.

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. Compliance with EPA Publication 1834 during all phases of construction is strongly recommended.

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 Drainage

Minor drainage system:

Stormwater is proposed to be collected and transported via a traditional pit/pipe system with capacity consistent with the requirements of the Council adopted IDM for "Urban Residential Developments" (20% AEP).

Major drainage system:

Drainage of rainfall events exceeding 20% AEP is provided for in the road network with the overland flow path consistent with the pipe network within the road reserves.

The proposed pit/pipe network is shown on Crossco Drawings at Appendix 1. The red lines show the indicative location of stormwater conveyance infrastructure (pipes or swales) with direction of flow indicated by arrow heads.
Surface flow (direction of slope) of each allotment is indicated by arrows at each allotment along with the indicative location of outfall to the drainage system (legal point of discharge / LOP) for each allotment.

6.3 Proposed Drainage Outfall

Stormwater generated at the site is proposed to be collected in the two catchments identified on Crossco Drawing No 1918/006-H 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-H:

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. East sub-catchment: via detention tank in proposed reserve to the east of proposed Lot 87, and outfall to Municipal drainage system located in Caravan Park to the south.
3. South sub-catchment: via potential detention tank in road reserve (under road) at the access road / Ward Street intersection.

6.4 Site Detention and Treatment

Stormwater discharging from the development site is proposed to be retarded to ensure flows do not exceed pre-development flow rates in accordance with Council requirements. Pre and Post development flows for a 20% AEP event are included on Drawing No. 1918/012-E at Appendix 1.
The total volume of stormwater storage for retarding of flows (detention) is 750 m3.

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 confirmed 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-H and 1918/012-E which illustrates the proposed developed stormwater management system:

- West sub-catchment (outfalls to Marlo Road / Ward Street intersection):
  - Treatment:
    - a swale is proposed to be constructed and incorporated into landscaping to the west of proposed allotments 58 and 71.
    - a rain garden (approx. 50 m3 capacity) is proposed in the Reserve to the north of allotment 38.

- Detention:
  - the final strategy for provision of detention will be confirmed during detailed design and is subject to Council's appetite / preference for sub-surface tanks (such as concrete or plastic modular systems at Figure 14) or constructed dry detention basins[2].
  - a buried (subsurface) "detention tank" is proposed to be constructed in the road reserve to the north of allotment 71.
  - a buried (subsurface) "detention tank" is proposed to be constructed in the reserve to the north of allotment 38.
  - this is in addition to the tanks on each allotment providing detention as stated above.

- East sub-catchment (outfalls to south-east corner)
  - Treatment:
    - a raingarden at south-east corner of the east Reserve.
  - Detention:
    - a buried (subsurface) "detention tank" is proposed to be constructed upstream of the south-east rain garden.
- South sub-catchment (outfalls to access / Ward Street / Perry Street intersection)
  - Detention:
    - a buried (subsurface) "detention tank" is proposed to be constructed under the road pavement at the Ward Street intersection, or alternatively additional detention may be provided in the pipe network such as the typical arrangement illustrated at Figure 13. This is subject to detailed design.

[2] A "dry" detention basin is designed to retard / detain stormwater entering the basin, but there is no permanent water in the basin between rainfall events. The "dry" detention basin may be incorporated into a swale or other surface drainage structure.

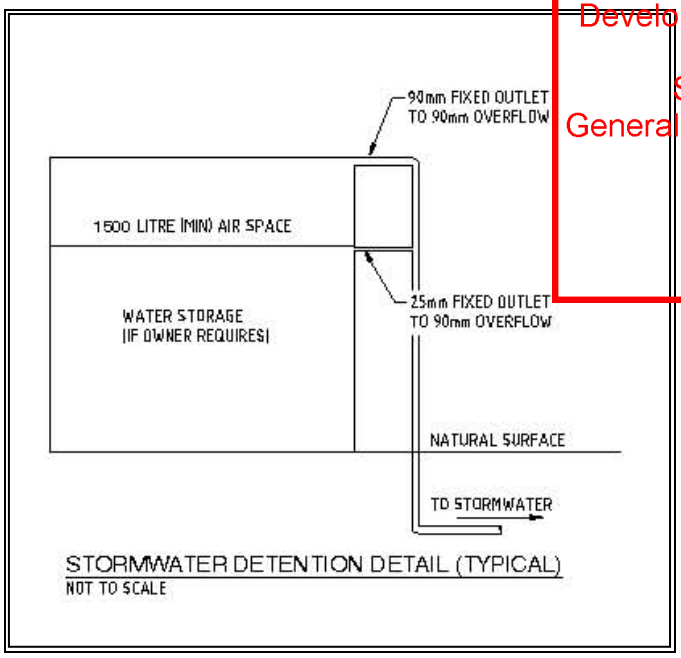

Figure 12: House Tank Example with Detention

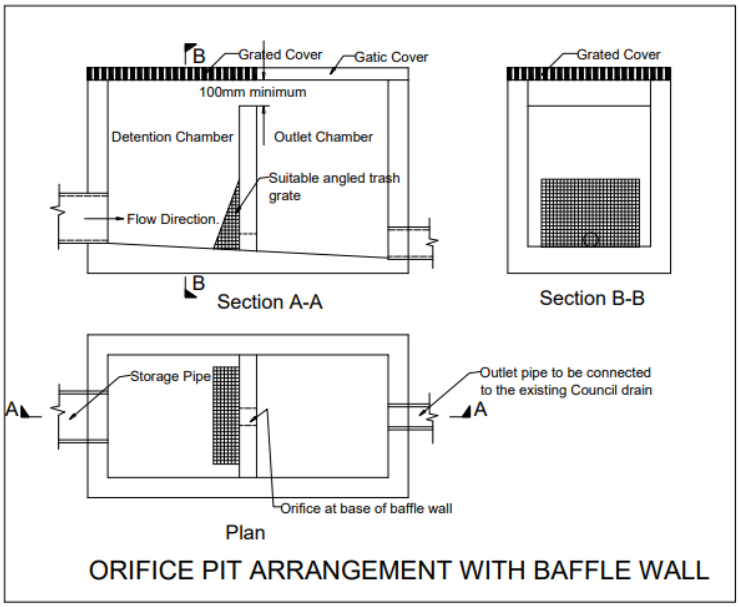

Figure 13: Typical Pipe Storage Arrangement[3]

[3] Source: Melton Shire "Guidelines for on-site stormwater detention", May 2009

Figure 14: Subsurface Detention Tank examples (under construction)[4]

➔ Drawing 1918/012-E includes both detention and treatment calculation outputs, demonstrating that post-construction that a stormwater management system can be constructed that meets Council requirements

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 two sub-catchments, draining / out-falling to the 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 previously indicated a preference for rainwater tanks on allotments with detention capacity and this has been considered in the drainage solution. Storage tanks (underground / buried) proposed could be replaced with alternative storage (such as basins) subject to Council's preference.
- As with the stormwater network proposed in V1 of this report, the proposed drainage network provides an opportunity to improve stormwater management in the precinct.

M Supplitt
25/03/2022

[4] Source: Ausdrain Stormwater Solutions and OSD tanks

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 14 of 17

Appendix

Site Topography – Drawing 1901/001-E

Drainage Strategy Plan – Drawing 1901/006-H

Stormwater Management Plan – Drawing 1918-012-E

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 15 of 17

FOR DISCUSSION PURPOSE ONLY

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

N

MARLO ROAD
ROAD
RESERVE
LOT A
WARD STREET
PERRY STREET
EXISTING TRACK

LEGEND:

- EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- EXISTING WATERMAIN
- EXISTING OVERHEAD ELECTRICITY

NOTE:

1. AERIAL INDICATIVE LOCATION ONLY

CROSSCO ENGINEERING & ENVIRONMENTAL CONSULTANTS

Crossco Consulting Pty Ltd
ABN: 88 135 548 110

154 Macleod St
P.O. Box 858
Bairnsdale Vic 3875

Tel:(03) 51526298
Fax (03) 51527222
Email: consult@crossco.com.au

M & K GRECH

10 MARLO ROAD, MARLO.

SITE TOPOGRAPHY PLAN

DRAWING No.

1918/001-E

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-001.dwg

DATE: 16 MARCH 2022

Development Plan
10 Marlo Road Marlo

FOR DISCUSSION PURPOSE ONLY

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Planning and Environment Act 1987
East Gippsland Planning Scheme
Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 16 of 17

N

MARLO ROAD

STAGE 1

STAGE 2

STAGE 3

STAGE 4

STAGE 5

ROAD

RESERVE

LOT A

EXISTING TRACK

WARD STREET

PERRY STREET

JORGENSEN STREET

DETENTION TANK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

DETENTION TANK 69m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

RAIN GARDEN 50m² APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DETENTION TANK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

RAIN GARDEN. (SIZE AND LOCATION DETERMINED IN DETAIL DESIGN)

DRAINAGE OUTFALL INTO EXISTING DRAINAGE NETWORK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

DETENTION TANK. (SIZE, LOCATION AND CONSTRUCTION DETERMINED IN DETAIL DESIGN)

LEGEND:

- INDICATIVE STORMWATER & FLOW DIRECTION
- INDICATIVE STORMWATER PIT
- INDICATIVE TANK DETENTION (UNDERGROUND)
- INDICATIVE RAIN GARDEN
- INDICATIVE DETENTION TANK (3.0KL MINIMUM DETENTION)
- HD — INDICATIVE HOUSE DRAIN
- INDICATIVE PROPERTY FLOW DIRECTION
- 10 — EXISTING CONTOURS (1.0m INTERVAL)
- EXISTING EDGE OF SEAL
- SWD — EXISTING STORMWATER
- D — D — EXISTING SWALES

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10 MARLO ROAD, MARLO.

DRAINAGE STRATEGY PLAN

DRAWING No.

1918/006-H

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

DATE: 16 MARCH 2022

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-006.dwg

Stormwater Detention

Pre development

20% AEP Pre Development Flow:

A	Tc	I	C	Q
(ha)	(min)	(mm/hr)		(m³/s)
10.760	30.000	43.400	0.350	0.454

Post development

20% AEP Post Development Flow and Storage:

Time	I	C	A	Sum CA	Ip	V	Qp	1-Qp/Ip	Smax
(min)	(mm/hr)		(ha)	(ha)	(m³/s)	(m³)	(m³/s)		(m³)
5	105.000	0.65	10.760	6.994	2.040	611.975	0.454	0.777	475.771
10	80.300	0.65	10.760	6.994	1.560	936.030	0.454	0.709	663.623
15	65.300	0.65	10.760	6.994	1.269	1141.771	0.454	0.642	733.160
17	60.900	0.65	10.760	6.994	1.183	1206.815	0.454	0.616	743.722
18	59.000	0.65	10.760	6.994	1.146	1237.938	0.454	0.604	747.605
19	57.200	0.65	10.760	6.994	1.111	1266.847	0.454	0.591	**749.273**
20	55.500	0.65	10.760	6.994	1.078	1293.890	0.454	0.579	749.075
21	53.900	0.65	10.760	6.994	1.047	1319.418	0.454	0.566	747.363
25	48.600	0.65	10.760	6.994	0.944	1416.285	0.454	0.519	735.267
30	38.200	0.65	10.760	6.994	0.742	1335.854	0.454	0.388	518.632
45	33.600	0.65	10.760	6.994	0.653	1762.488	0.454	0.304	536.655
60	28.000	0.65	10.760	6.994	0.544	1958.320	0.454	0.165	323.876

DETENTION TANK 155m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DETENTION TANK 69m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

RAIN GARDEN 50m² APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DETENTION TANK 103m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

RAIN GARDEN 100m² APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

DETENTION TANK 38m³ APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

RAIN GARDEN 200m² APPROX. (LOCATION TO BE DETERMINED IN DETAIL DESIGN)

375 DIA OUTFALL PIPE (TBC IN DETAIL DESIGN)

375 DIA OUTFALL PIPE (TBC IN DETAIL DESIGN)

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

EXISTING DRAINAGE PIPE IL 20.90

EXISTING DRAINAGE PIPE IL 17.70

MARLO ROAD

ROAD

RESERVE

LOT A

STREET

PERRY STREET

JORGENSEN STREET

STORMWATER DETENTION - SUMMARY

REQUIRED SITE DETENTION = 750m³

NOTES:

1. FOR LEGEND AND NOTES REFER TO DRAWING No. 1918-006.
2. INDICATIVE LOCATIONS HAVE BEEN SHOWN FOR UNDERGROUND STORAGE TANKS AND RAINGARDENS. THIS MAY VARY UPON DETAILED DESIGN AND APPROVAL FROM EAST GIPPSLAND SHIRE COUNCIL.
3. PROPOSED METHOD OF DETENTION WILL INCLUDE A COMBINATION OF TANKS ON LOTS AND IN RAINGARDENS UNDERGROUND STORAGE TANKS IN RESERVES.
4. 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 REQUIRED DETENTION FOR THE SITE.

Required Detention =	**750**	**m³**
Rainwater Tanks - 88 @ 3.0	264	m³
Underground Storage Tanks	365	m³
Raingarden	123	m³

	Sources	Residual Load	% Reduction	% Best Practice
Flow (ML/yr)	46.2	41	11.2	
Total Suspended Solids (kg/yr)	5.33E+03	1.07E+03	80	≥80
Total Phosphorus (kg/yr)	13.4	6.37	52.5	≥45
Total Nitrogen (kg/yr)	117	53.1	54.8	≥45
Gross Pollutants (kg/yr)	1.44E+03	3.31E+01	97.7	≥70

20 10 0 20 40 60 80

1 : 1000 AT A1
1 : 2000 AT A3

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10 MARLO ROAD, MARLO.

STORMWATER MANAGEMENT PLAN

DRAWING No.

1918/012-E

DATE: 16 MARCH 2022

CAD FILE NAME: R:\1918 Grech\ACAD\Prelim\1918-012.dwg

Development Plan
10 Marlo Road Marlo

Planning and Environment Act 1987
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Development Plan Overlay Schedule 7

Signed: Stuart McConnell
General Manager, Place and Community
East Gippsland Shire
Date: 30 May 2023

Sheet Number: 1 of 1

MGA94 ZONE 55

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

Legend of Features

- Electricity Pit
- Stop Valve
- Telecom Pit
- Electricity Pole
- Light Pole
- Sewerage Manhole
- Water Meter
- Fire Plug
- Tap
- Sign
- Grated Pit

PLAN OF RE-ESTABLISHMENT & FEATURES

PARISH OF ORBOST EAST
SECTION C
CROWN ALLOTMENT 9^{S} (PART)

C\T VOL 9546 FOL 023

MICHAEL GRECH
10 MARLO ROAD, MARLO

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

Crowther & Sadler Pty. Ltd.
LICENSED SURVEYORS & TOWN PLANNERS
152 MACLEOD STREET, BAIRNSDALE, VIC., 3875
TELEPHONE (03) 5152 5011

SURVEYORS REF.	SCALE @ A1
16664	1 : 1000

CAD FILENAME: N:\Jobs\16000-16999\16600-16699\16664 Grech\16664 Feat v1.pro