

Minnow Catchment Action Plan



Completed by Peter Stronach with the support of the Mount Roland Rivercare Inc.

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Mapping attributes for this plan were true and accurate given the available resources at the time of completion and may change over time.

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Cover Image – *Eucalyptus regnans* in Minnow Catchment by Barbara Alsop

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Minnow Catchment Action Plan

Executive Summary

General

The Minnow Catchment Action Plan was developed in early June 2016, initiated by the Mount Roland Rivercare Catchment (MRCCI). During this time, many northern Tasmanian river systems (including the Minnow River) experienced record breaking flooding and associated flood damage. The floods broke an extended drought period, exacerbated by state-wide bushfires during summer 2016.

Historically, the Minnow Catchment has never been a static environment, impacted by many human and natural influences. Compounding these impacts is a predicted future of increasing stochastic events – in both scale and frequency. There is an opportunity today to protect and enhance the natural values of the Minnow that provide essential refuge for threatened and endangered species and vegetation communities as well as ensuring that the natural assets that humans rely upon are sustainably managed for our long-term future and survival.

In 2000, two Catchment Plans were produced to guide on-ground conservation actions of the greater Mersey catchment (Lampert, 2000; Attawater, 2000). The Minnow catchment was ranked highly in terms of condition and natural asset recoverability. Since that time, a number of successful on-ground MRCCI activities have contributed to the maintenance of the healthy trunk stream and some important tracts of the native vegetation has been retained. Conversely, land management practices have led to habitat loss/vegetation clearance causing the fragmentation of essential ecological links and compounded sedimentation rates and the spread of introduced weeds.

Building on these reports and the more comprehensive and catchment specific paper by Alsop (2015) and Alsop's subsequent monitoring data (2015-2016), a better understanding of the catchment's issues, values and recommendations has been consolidated in this Plan.

The Minnow Catchment Action Plan has also been guided by the MRCCI Group's Vision Statement 2016:

- To have in place a catchment management plan that prioritises the needs of biodiversity, and encourages agricultural production, forestry and other sustainable developments, and is endorsed by the local community, by land managers in the catchment, by Mt Roland Rivercare Catchment Inc, Kentish Council and relevant State and Federal Government Agencies (ie Department of Primary Industries, Parks, Water and Environment) .
- To implement the strategies and actions in the management plan in such a way as to ensure continuous improvement in ecological functions, riparian, aquatic, weed, soil, fauna and flora management.
- To create and foster a sustainable natural environment that offers aesthetic, economic and environmentally respectful recreational benefits to community members, land managers, tourists and tourism operators.

Aims and Methodology

The Minnow Catchment Action Plan is an overview of past and present conservation issues obtained through desktop analysis, a literature review, group input and collation of technical data. On-ground actions stemming from past Rivercare plans (Attawater 2000; Lampert, 2000) with actions focussed on the riparian zone, such as crack willow and other weed control and fencing large tracts of the middle catchment and adjoining remnant vegetation which have contributed to the positive restoration outcomes evident today.

The Minnow Catchment Action Plan 2016, expands the on-ground actions to reflect the broader catchment, not just the riparian zone: scoping the greater catchment influences and issues that include tributaries, surrounding forest and non-forest communities and matched with recommendations aimed at optimising long-term conservation and strategic outcomes that highlight its special and unique natural values.

In Section I, key recommendations of the strategic priorities have been identified for discussion and consideration. Section II provides detailed information regarding on-ground and planning management actions with reference to the mapped management reaches.

Summary of Key Recommendations

Key recommendations and management actions (drawn from Section I and Section II) are intended for the community, industry and relevant agencies as a guide towards a strategic and collaborative approach to on-ground actions for current and future projects and management plans. Key recommendations are outlined in the *Executive Summary of Key Recommendations and Strategic Priorities Table* below (page 3). More detail of coded reaches are outlined in corresponding tables: Section I is an overview, Section II provides details relating to each of the reaches.

The Key Strategic Priority Themes are:-

1. Retain High Conservation Value Forest
2. Rehabilitate and maintain Strategic Plantation Areas
3. Consolidate Conservation-related Data
4. Specific On- ground Activities
5. Priority Weed Management Plan
6. Other Conservation based Activities

Executive Summary of Key Recommendations and Strategic Priorities

(More detail of coded reaches are outlined in corresponding tables: Section I is an overview, Section II provides details relating to each of the reaches)

Strategic Priority	Priority Description	Overarching Needs:	Priority Reaches (See Map 1 for Reach Code)
1. Retain High Conservation Value Forest	There are a number of strategic, high conservation value forests in the catchment which need to be identified and protected (See Map 1 for intact native vegetation),	Identify High Conservation Value Forest in priority reaches and at a catchment-scale.	<ul style="list-style-type: none"> MR 2 and MH1, MC1 and MA1, MR3.2 & MU1, MR4, ME2 & ME8, MR7, MS1 & 2, MS3 & 4 & Dawkins Hill. (Other areas - All of catchment)
2. Rehabilitate and maintain Strategic Plantation Areas	Rehabilitation of a number of sections within harvesting areas are recommended to improve/maintain catchment health & connectivity. All forestry activities should be undertaken sensitively to minimise impacts that increase sedimentation from roading & logging, weed spread etc, particularly in upper catchment.	Develop a comprehensive plan for plantation restoration areas and minimisation forestry related impacts.	<ul style="list-style-type: none"> Specific reaches with forestry related recommendations -MR3.1, MA2 & MB1, MC4, MR3.2, MR4, MR6.2 All of catchment for forestry related impacts (see also Priority 5 – Weed Plan)
3. Consolidate Conservation -related Data	Increase and improve natural values data relating to this catchment. Current information is inconsistent and/or incomplete, including: <ul style="list-style-type: none"> Natural Values Atlas (NVA) - incomplete threatened species data (species such as <i>Engaeus granulatus</i> and <i>Prototroctes maraena</i> have been identified in adjoining catchments. Based on range boundaries these species may be or are likely to be present but this data has not yet been captured). TASVEG community identification errors or voids LIST metadata – e.g. reserve boundaries & definitions inaccurate. Build on existing data sets, ie fisheries, river health monitoring 	Collect essential natural values information for NVA. Collate existing data and correlate with areas of conservation value. Engage appropriate authorities and land managers to identify reserve management responsibilities.	<ul style="list-style-type: none"> MR2, MR3.2, ME2, MR7, MS1 & 2, MS3 & MR9 All of catchment
4. Specific On-ground Activities	A number of specific priority on-ground activities are required across the catchment	Develop on-ground works plan based on priority rankings described in Section II. Before proceeding with on-ground actions & rehabilitation activities conduct a feasibility /budget analysis with due consideration of MRRCI/land manager capacity & the long-term & on-going maintenance.	<ul style="list-style-type: none"> ME 2, ME5 and ME8 - riparian corridor MR5.1 - Restrict car access MND7: rehabilitation activities M11.2 & MK1 Remove stock from riparian zone <p>NB: List not limited to those reach priorities identified above – See Section II for all on-ground works recommendations.</p>
5. Priority Weed Management Plan	A number of priority weeds have been identified for the catchment including Spanish Heath, Elisha’s Tears, Blue Periwinkle and Montpellier Broom. These weeds are referred to in the Threats and Recommendations for each management reach in Section II.	Develop and implement a Catchment Weed Plan for the Minnow Catchment including a Hygiene Plan (for road and harvesting operations, and roadside weed control practices).	All of catchment
6. Other Conservation Based Activities	Promote conservation activities, cultural heritage and natural values. Promotion of threatened species regulations and restrictions e.g. The Giant Freshwater Lobster (<i>Astacopsis gouldi</i>) may be better protected if illegal fishing fines are more strongly publicised.	A feasibility study to highlight the catchment’s natural assets through promotion & interpretation opportunities including roadside signage.	All of catchment

Minnow Catchment Action Plan

VISION for the Minnow Catchment

(Mt Roland Rivercare Catchment Group Inc. 2016)

- To have in place a catchment management plan that prioritises the needs of biodiversity, and encourages agricultural production, forestry and other sustainable developments, and is endorsed by the local community, by land managers in the catchment, by Mt Roland Rivercare Catchment Inc, Kentish Council and relevant State and Federal Government Agencies (ie Department of Primary Industries, Parks, Water and Environment) .
- To implement the strategies and actions in the management plan in such a way as to ensure continuous improvement in riparian, aquatic, weed, soil, fauna and flora management.
- To create and foster a sustainable natural environment that offers aesthetic, economic and environmentally respectful recreational benefits to community members, land managers, tourists and tourism operators.


Introduction

The Minnow Catchment extends from the top of Mt Roland for approximately 30km before reaching the confluence with the Dasher River. The total catchment covers an area of 85km². The main forest types are wet and dry eucalypt communities with rainforest found in more elevated and protected valleys, including a number of threatened forest communities and threatened species (see Map 1). Native vegetation cover is at its best at the top of the catchment with links to the Mt Roland and Gog reserves and is variably influenced downstream by agriculture, forest production areas interspersed with a suite of various reserves. This history has combined to make the catchment what it is today. The MRRCI have been an active force in the area for over 15 years, driven by an aim to improve water quality and riparian health and strengthen the waterways against flood and weed impacts. More recently, the group has responded to predictions and real-life increases in frequency and veracity of stochastic events and the ramifications of not actively intervening.

The Minnow Catchment Action Plan therefore concentrates on protecting, enhancing and strengthening resilience: determining a way forward that is strategic and prioritised with a strong focus on a shared stewardship. The Plan is an overview of the conservation issues in the Minnow River Catchment, NW Tasmania, identifying key environmental management issues and outlining priority actions. It is intended as a guide, providing a framework to support the implementation of on-ground works in the catchment.

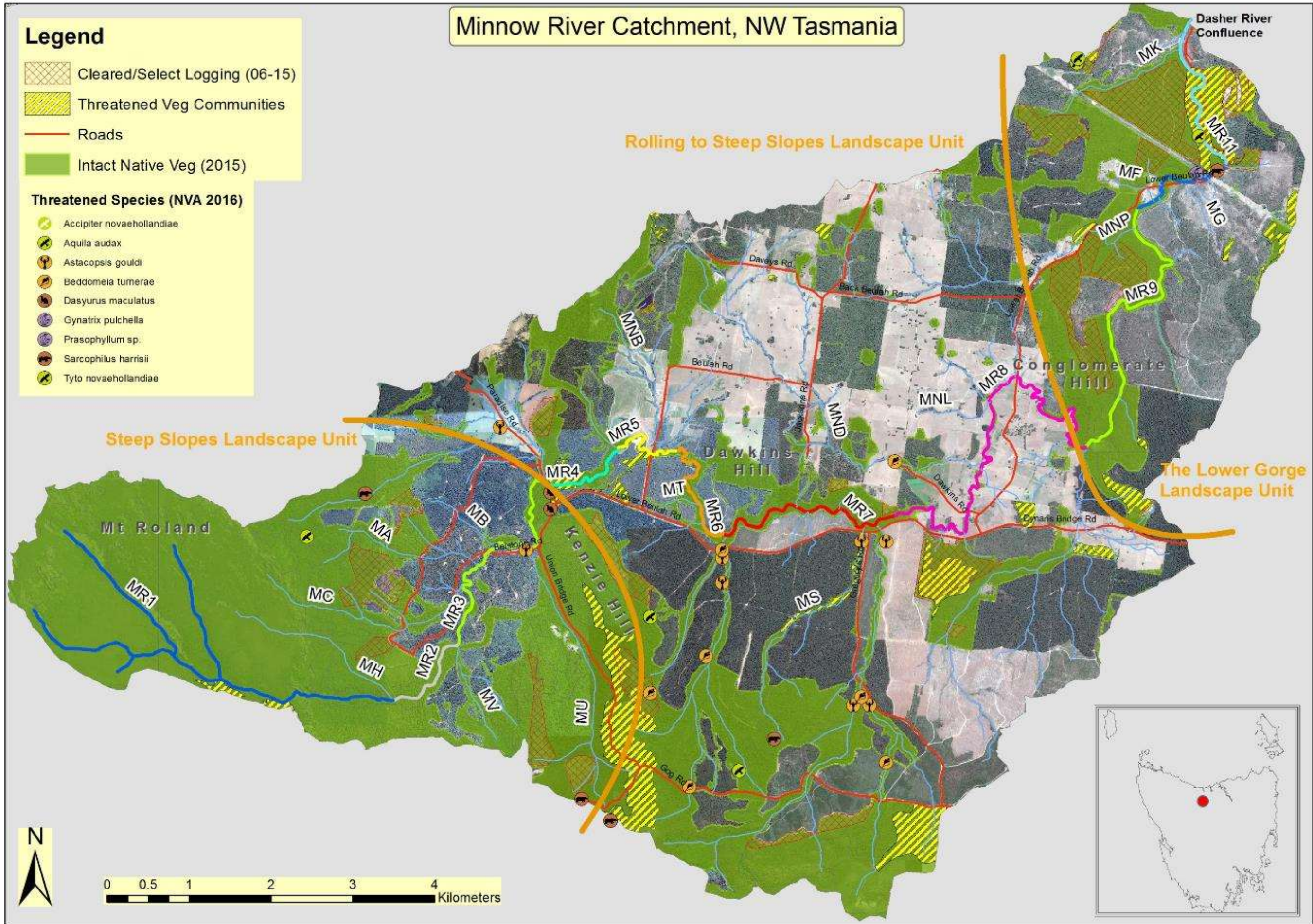
Minnow River Catchment, NW Tasmania

Legend

-  Cleared/Select Logging (06-15)
-  Threatened Veg Communities
-  Roads
-  Intact Native Veg (2015)

Threatened Species (NVA 2016)

-  *Accipiter novaehollandiae*
-  *Aquila audax*
-  *Astacopsis gouldi*
-  *Beddomeia tumerae*
-  *Dasyurus maculatus*
-  *Gynatrix pulchella*
-  *Prasophyllum* sp.
-  *Sarcophilus harrisii*
-  *Tyto novaehollandiae*



Map 1 Minnow River Catchment and tributaries and broad landscape units

Methodology

Past Reports and other desktop information

A briefing with Mount Roland River Catchment Incorporated (MRRCI) provided input from group members followed by a guided site visit to the key areas of interest to the MRRCI. Comprehensive desktop analysis, literature review and discussions with group members informed the catchment priorities for this report. Additional information was utilised from past reports (see below), NVA (Natural Values Atlas), the List (Land Information System Tasmania), Google Earth historical (2003-2007 through to 2015 & 2016 for whole of catchment) and historical ortho-rectified imagery from 1999 (MRRCI).

Several reports, management plans and maps have been drawn from including:

- Alsop 2015 - Unpublished Thesis 'Assessment of riparian buffer zone effectiveness for maintaining forest and river health'
- Alsop 2016 – unpublished technical data (reach specific) fauna and hydrological.
- Armstrong Agricultural Services Pty Ltd, Attawater, C. and Ecosynthesis 2000. Mersey Rivercare Plan. 2 – Dasher – Minnow.
- Lampert, G. 2000. Riverstyles™ Report - North West Tasmania. Mersey Catchment.

For the purposes of this Plan the catchment can be broadly defined into three main landscape units which encompass a number of reaches and tributaries (shown in Map 1).

- The Steep to very steep hills and mountains- the upper catchment (**MR1, MR2, MR3**, MA, MB, MC, MH, MU, ME)
- Rolling to steep Hills throughout the middle of the catchment including a number of the tributaries (**MR4, MR5, MR6, MR7, MR8**, ME, MS, MT, MNB, MND, MNL, MNP).
- The lower gorge- which continues to the confluence with the Dasher River. **MR9, MR10, MR11**, MF, MG, MK

The management sections in this Plan follow the reach based analysis of previous studies but also extend into the various tributaries and associated forest communities that form part of the catchment as a whole.

How to use the Action Plan

Section I - Summary and Explanation of Strategic Conservation Priorities for the Minnow Catchment (page 8) defines, justifies and draws out all the strategic priority recommendations relating to the actions: – Retaining High Conservation Value Forest; Rehabilitation of Strategic Plantation Areas; Conservation Related Data; Specific On-Ground Activities; Priority weed Plan; Other Conservation Based Activities.

In **Section II - Reach Specific Issues and Priorities** (page 12) include all priority levels (strategic, high, moderate and low – see definitions for these ratings on page 7). The Minnow Catchment River, creeks and tributaries have been divided into coded reaches; reaches are defined and mapped according to common management requirements. In **Reach Specific Priorities**, each Reach (or set of Reaches) is headed by *Description* and *Strategic Priorities for Reach* where the most important priority recommendations for the Reach are highlighted.

Reach Action Tables follow, with details of all the management prescriptions, described and prioritised under common attributes to guide the on-ground activities (Recommendations).

Explanation of Section II Table Attributes

Reach Code: – The Action plan has consolidated many of the Reach Codes (from previous studies) where stretches have a similar condition, recoverability and share common management and action prescriptions.

RiverStyle™: – Riverstyle refers to the classification system used to describe different geomorphological form and characteristics of a waterway, e.g. Headwaters, Confined Valley, Gravel Bed, Bolder Bed, Floodplain Pockets etc. These styles are taken from the Riverstyles™ Report (Lampert 2000). The Riverstyle descriptors are used as a uniform way of

nominating common waterway features. *Undefined tributaries* are river sections where a reach has not been classified.

Description: – Where the reach sits in relation to the total, and a brief outline of the vegetation or any other relevant descriptive features including condition assessment.

Conservation Value: – Described in terms of the general health of the vegetation based on whether it is intact or disturbed, high conservation value forest or degraded riparian vegetation condition, width from stream, ecological functionality and connectivity to healthy forest remnant/s, the presence of weeds, sedimentation impacts on instream habitat etc. Site visits to all areas was not possible – the condition information has been interpreted from Lampert (2000), Attawater (2000), detailed assessments in Alsop (2015) and field data Alsop (2016) and desktop analysis (including vegetation presence, communities, threatened species, historical change).

Issues/Threats: - e.g. proximity or limits to Reserve areas; prospect of logging occurring in adjoining coupes – current or future impacts; sedimentation, weeds; agricultural practices etc.

Recommendations: - e.g. actions to collect additional data on threatened species for inclusion in the NVA; fencing; weed control; etc.; plus some strategic project proposals which involve the rehabilitation of forestry harvest areas.

Tenure/Reserve Status: - Map Symbols and Acronym Definitions

- PFPZ – Permanent Timber Production Zone
- PR -Private Reserve (variable) – (red hatching)
- PUR - Public Reserves (includes Informal and Formal reserves)
 - Informal (Orange)
 - Formal (Green)
- Private – Private Freehold
- Threatened Forest Communities (yellow hatching)
- Threatened Species (Fauna/Flora Symbol) – also see Map Legend for species.

Priority Definitions

Priorities are rated: - Strategic, High, Moderate and Low and refer to the order of urgency for the actions to take place.

- Strategic: Actions defined as Strategic provide the highest environmental return in terms of the resource contribution and are to be adopted ahead of all other actions. Strategic actions need to occur as soon as possible to halt mounting threats within the catchment and enhance ecological function and connectivity. This may include further data collection or plan development outside the resource scope of this plan.
- High: Actions defined as High are to be undertaken following all Strategic actions. They are important in terms of contributing to the protection or enhancement of the natural values of the catchment.
- Moderate: Actions defined as Moderate are important, however less urgent because the values they are assigned to have lesser conservation value and/or require unequal resources compared to the overall gain and/or have complications attached.
- Low: Actions defined as Low have – a low return for high input and/or low conservation value, and/or low contribution to ecological functionality.

Section I: Summary and Explanation of Strategic Conservation Priorities for the Minnow Catchment

1.1 Retain High Conservation Value Forest

Some areas in the Minnow Catchment are supported by native forest remnants, encapsulating a healthy, diverse and unique assemblage of species and ecosystems. A number of these remnants are reserved or managed for their ecological significance, others are not reserved and in some cases completely unrecorded nor formally recognised and/or are under threat from degradation.

High conservation value forest is important for its greater functionality of ecosystem services and for the long-term ecological strength and resilience to environmental change. The ecological sustainability for the catchment as a whole is strategically and inseparably reliant on the spatial links between these remnants for species exchange and cyclic replenishment. High conservation value forest is defined below.

Specifically, high conservation value forests are those that possess one or more of the following attributes:

1. forest areas containing globally, regionally or nationally significant: concentrations of biodiversity values (e.g. endemism, endangered species, refugia); and/or large landscape-level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance
2. forest areas that are in or contain rare, threatened or endangered ecosystems
3. forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control)
4. forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health) and/or critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).

(source: Forest Stewardship Council's Principles and Criteria (FSC-STD-01-001 V5-0))

Overarching Needs

Identify High Conservation Value Forest in priority reaches.

Consider impacts from proposed harvesting areas that include high conservation forest.

Reach Priorities (see Section II for more reach specific details)

- MR 2 and MH1: Retain existing high conservation value forest in these reaches.
- MC1 and MA1: Retain existing high conservation value forest in these reaches.
- M3.2 and MU1: Retain existing high conservation value forest in these reaches.
- MR4, ME2 and ME8: Retain existing high conservation value forest in these reaches.
- MR7, MS1 & 2, MS3 & 4 and Dawkins Hill: Retain high conservation value vegetation.

NB: This does not exclude retaining high conservation value vegetation in other reaches.

1.2 Rehabilitate Strategic Plantation Areas

Rehabilitation of a number of sections within harvesting areas are recommended to improve/maintain catchment health and connectivity. These are either pre-Forest Practices Code harvest areas without riparian buffers or those areas identified as strategic for rehabilitation. Strategic areas have been selected for the feasibility of reconnection to adjoining high conservation value areas, where the forestry area has undergone one or few rotations and/or where the land may be out-of-production and has high or good recoverability potential. Regarding forestry areas generally,

the importance of minimising damaging activities such as roads, hygiene risks, increased sedimentation and degradation of adjoining vegetation has been highlighted.

Overarching Needs

Develop a comprehensive plan for plantation restoration areas and minimise forestry related impacts

Reach Priorities (see Section II for more details including reach based maps)

- All forestry activities should minimise impacts in sensitive areas such as increased sedimentation in steep slope areas, or areas that lack Forest Practices Code riparian buffers.
- MR3.1 Rehabilitate riparian buffer (A comprehensive restoration plan should be developed for this reach including MC4 on Minnow Creek, northern side of MR3.2, and the lower sections of MA2 & MB1)
- MR3.1 and MB1: Incorporate existing remnant vegetation into rehabilitation activities, including flood channels and wetlands.
- MC4 Reinstatement riparian buffer for Minnow Creek
- MR4 – Restore harvested plantation North of Lower Beulah Rd to native vegetation
- MR6.2 - After harvesting on north side, reinstate/restore appropriate riparian buffer (see map 7).

1.3 Consolidate Conservation-related Data

The NVA (Natural Values Atlas) is limited to the sightings and identification of threatened species officially recorded by authorised contributors (e.g. FPA trained staff, scientists, etc) – this means there are likely countless unrecognised/unrecorded plants and animals that have not been recorded for the NVA database. MRRCI can contribute by recording and uploading essential information about the catchment into the NVA to better inform future conservation management actions. Many formal forest management decisions are based on such records and so if a threatened species or important habitat has not been identified, there is less chance these factors will be taken into account regarding important forest retention or buffering allowances.

A number of threatened species (both flora and fauna) have been identified in surrounding adjoining catchments and are may be present in the Minnow based on Range Boundaries. The Central North burrowing crayfish (*Engaeus granulatus*), the Australian grayling (*Prototroctes maraena*) are potential species to be found in the Minnow.

The List (Land Information Systems Tasmania) metadata contains inaccuracies relating to reserve boundaries and values within the Minnow catchment. TASVEG too contains inconsistent spatial data for the area, consisting of vegetation community identification errors or voids. These databases are officially recognised data sources that must be updated and verified, especially where data is missing.

Data records with relation to the above databases cannot be entered directly by the MRRCI as entry is limited to the managers of these databases. The exception is the NVA, however the quality of the data must first be proven to be accurate. The collection, and importantly the methods of collection are therefore very important - so that they may be reported, recognised and ultimately included. For these reasons the development of a Procedures Manual for data capture is recommended.

Overarching Needs:

- Collate existing data and correlate with high conservation value forest (not excluding other areas of interest ie river health)
- Develop a procedures manual for data collection in priority areas.

Reach Priorities

- MR2 and all tribs & reaches. NVA - Collect data on threatened species for inclusion in the Natural Values Atlas (NVA) as a priority. There are no records of threatened species in the upper catchment of the Minnow but the presence of important species is certain to exist. Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating.
- M3.2 and all tribs & reaches.–NVA - Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating. Collect additional data on threatened species for inclusion in the NVA.
- ME2. NVA - Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating. Collect additional data on threatened species for inclusion in the NVA.
- MR7, MS1 & 2, MS3 & 4 NVA - Collect records using camera trapping and field observations (no only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating. Collect additional data on threatened species for inclusion in the NVA. Update past records.
- MR9: Identify vegetation community and formalise with TASVEG (State govt).

1.4 Specific Priority On- ground Activities

On-ground works were identified and initiated by the MRRCI after the two reports from 2000 (Lampert, 2000; Attawater, 2000). Effective fencing and willow control particularly in the reach MR 8 have greatly improved the condition of the trunk stream. Coupled with a relatively intact upstream riparian zone, reaches like this have been able to recover. A number of specific on-ground activities have been identified in this plan that will complement previous/existing works plus actions targeting additional localised impacts and threats. (A full reach by reach listing of all priority on-ground activities is given in Section II)

Overarching Needs:

Feasibility studies/budget analysis and landholder engagement should be considered for each recommendation.

Reach Priorities (See Section II for other reach specific on-ground activity recommendations)

- ME2, ME5 and ME8 - Establish riparian corridor but MUST include all activities relating to the rehabilitation of riparian corridor on plantation land, fencing on agricultural land and landholder commitment of follow up weed control.
- MR5.1 - Restrict car access using bollards/rocks at strategic access points including access through plantations
- MND7: Weed control and riparian restoration of reach.
- M11.2 and MK1 Remove stock from riparian zone

1.5 Priority Weed Management Plan

A number of environmental weeds have been identified as important for control in the catchment including Spanish heath (highest priority), willow, Montpellier broom, Elisha's tears, blue periwinkle and blackberry. These weeds are referred to in the Threats and Recommendations (Tables 1-11). Containment, eradication and best practice management (including long-term follow up) of these priority weeds is crucial in minimising spread and whole of catchment impacts.

Overarching Needs:

Develop and implement a Catchment Weed Management Plan for the Minnow Catchment including a Hygiene Plan for road and harvesting operations

Reach Priorities (See Section II for other reach specific on-ground activity recommendations)

- MR8 All reaches: General awareness raising targeting landholders regarding Spanish Heath
- MR10 All reaches: General awareness raising targeting landholders regarding Spanish Heath
- Weed species in other specific reaches are mentioned in Section II (a management plan and further data collection is required to better inform weed species distribution, density and resource availability and use)

1.6 Other Conservation based Activities

Overarching Needs:

A feasibility study to highlight promotional and interpretation sites in the catchment

Reach Priorities (some priorities are high and are shown in specific reach recommendations)

- MR2 MR3.1, MR3.2: Interpretative Value/high profile tourist routes – Minnow Falls and River and the falls track including bushwalker awareness and hygiene controls.
- General: Roadside signage showing conservation/restoration activities and values
- Consider cultural heritage values of the catchment
- Consider opportunities for sustainable recreation activities e.g. fisheries
- Promotion of threatened species regulations and restrictions e.g. The Giant Freshwater Lobster (*Astacopsis gouldii*) may be better protected if illegal fishing fines are more strongly publicised.

Section II Reach Specific Issues and Priorities

MR1 (Minnow River), MR2 (Minnow River) – MH1 (unnamed tributary) Headwaters

Site Description

The headwaters of the Minnow River begin near the highest point on the northwest of Mount Roland (1124 m above sea level), and flows diagonally across the mountain, down to southwest edge at Minnow Falls. The tall forest at the foot hills of Mt Roland are largely intact although the tributary MH1 and MR 1.2 lie outside any reserve (see Map 2). The reach extends from the base of the headwaters, to the edge of the Paradise plantation, and flows through a predominantly natural forested area with broad buffer zones.

Strategic Priorities for Reach

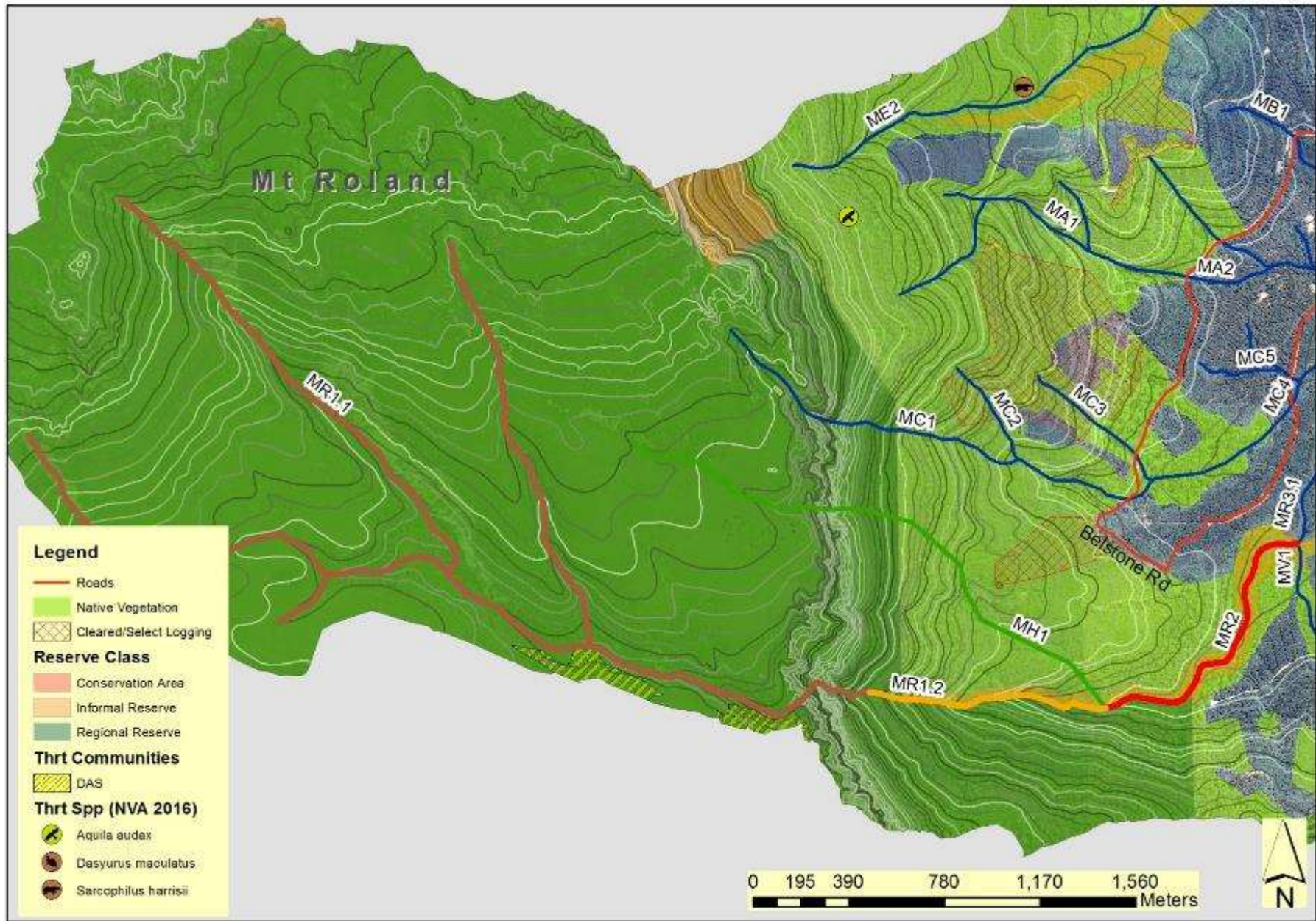
- MR2 and MH1: Retain existing high conservation value forest in these reaches.
- MR2 and all tribs & reaches. NVA - Collect data on threatened species for inclusion in the Natural Values Atlas (NVA) as a priority. There are no records of threatened species in the upper catchment of the Minnow but the presence of important species is certain. Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating
- MR2 MR3.1, MR3.2: Interpretative value/high profile tourist routes – Minnow Falls and River and the falls track including bushwalker awareness and hygiene controls.



Photo 1 The headwaters of the Minnow Catchment, Minnow Falls and Mount Roland (Barbara Alsop)

Table 1 MR1 (Minnow River) – MR2 (Minnow River) – MH1 (unnamed tributary) Headwaters -Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR1.1	Headwater	The headwaters of the trunk stream, this section includes the Mt Roland drainage area and the Minnow Falls.	High conservation value vegetation as part of (i.e. surrounded by) the greater Mt Rolland environment and intact, native vegetated stream.	Walking track, Phytophthora	Awareness raising directed at Bushwalkers regarding Phytophthora spread & hygiene	Strategic	PUR
					Interpretative signage/web based conservation value information	High	
MR1.2	Boulder Bed	Starting below Minnow Falls, this section of stream is dominated by a cascades and boulder bed stream. This reach has intact native riparian vegetation and is surrounded by native forest.	High conservation value vegetation as part of (i.e. surrounded by) the greater Mt Rolland environment and intact, native vegetated stream.	Potential logging of northern side of this reach (currently outside reserve boundary) will have a severe impact of sedimentation rates due to steepness of relief.	Protect existing vegetation outside current reserve boundary.	Strategic	PUR, PFPZ
					Protect all remnant vegetation.	Strategic	
					Collect additional data on threatened species for inclusion in the NVA.	Strategic	
MR2	Confined Valley, Occasional Floodplain	The trunk of this reach has intact native riparian vegetation and is surrounded by native forest. Downstream it meets the highly degraded MR3.1 Some surrounding areas are active native and plantation production.	High conservation value vegetation as part of (i.e. surrounded by) the greater Mt Rolland environment and intact, native vegetated stream.	Production forestry wildings and sediment increases from coupe harvesting, particularly in steep areas.	Wilding weed control	High	PUR, PFPZ
					Formalise Minnow Falls Interpretative walk	High	
					Protect all remnant vegetation	Strategic	
					Collect additional data on threatened species for inclusion in the NVA	High	
MH1	Confined Valley, Occasional Flood plain	Tributary flowing off Mt Roland has intact native riparian vegetation and is surrounded by native forest. Some surrounding areas are Forestry native and plantation production.	High conservation value vegetation as part of (i.e. surrounded by) the greater Mt Rolland environment and intact, native vegetated stream.	Future logging has the potential to cause major erosion impacts and sediment runoff , due to steepness and the underlying talus slope soil profile	Protect all remnant vegetation	Strategic	PFPZ, PUR
					Collect additional data on threatened species for inclusion in the NVA	High	



Map 2 MR1 (Minnow River) – MR2 (Minnow River) – MH1 (unnamed tributary) Headwaters -Reach Actions

MR3.1 (Minnow River), MC (Minnow Creek), MA, MB & MV (unnamed tributaries)

Site Description

Emerging from natural forest into Radiata pine plantations, this reach has a wide buffer zone - established since the last harvesting period (1997). Native vegetation regeneration has not occurred due to Radiata pine wildling incursions affecting forest structural integrity and ability of the riparian zone to recover. Minnow Creek is also included in this description along with three unnamed tributaries, MA, MB and MV. The site was cleared and harvested before the introduction of the Forest Practices Code and therefore has no native vegetation riparian buffer.

Strategic Priorities for Reach

- MC1 and MA1: Retain existing high conservation value forest in these reaches.
- MR3.1 Rehabilitate riparian buffer (A comprehensive restoration plan should be developed for this reach including M3.2, MC4 on Minnow Creek and lower MA2 & MB1.)
- MR3.1 and MB1: Incorporate existing remnant vegetation into rehabilitation activities, including flood channels and wetlands.
- MC4 Reinststate riparian buffer for Minnow Creek



Photo 2 MR3.1 Radiata Pine in Riparian Zone (Barbara Alsop)



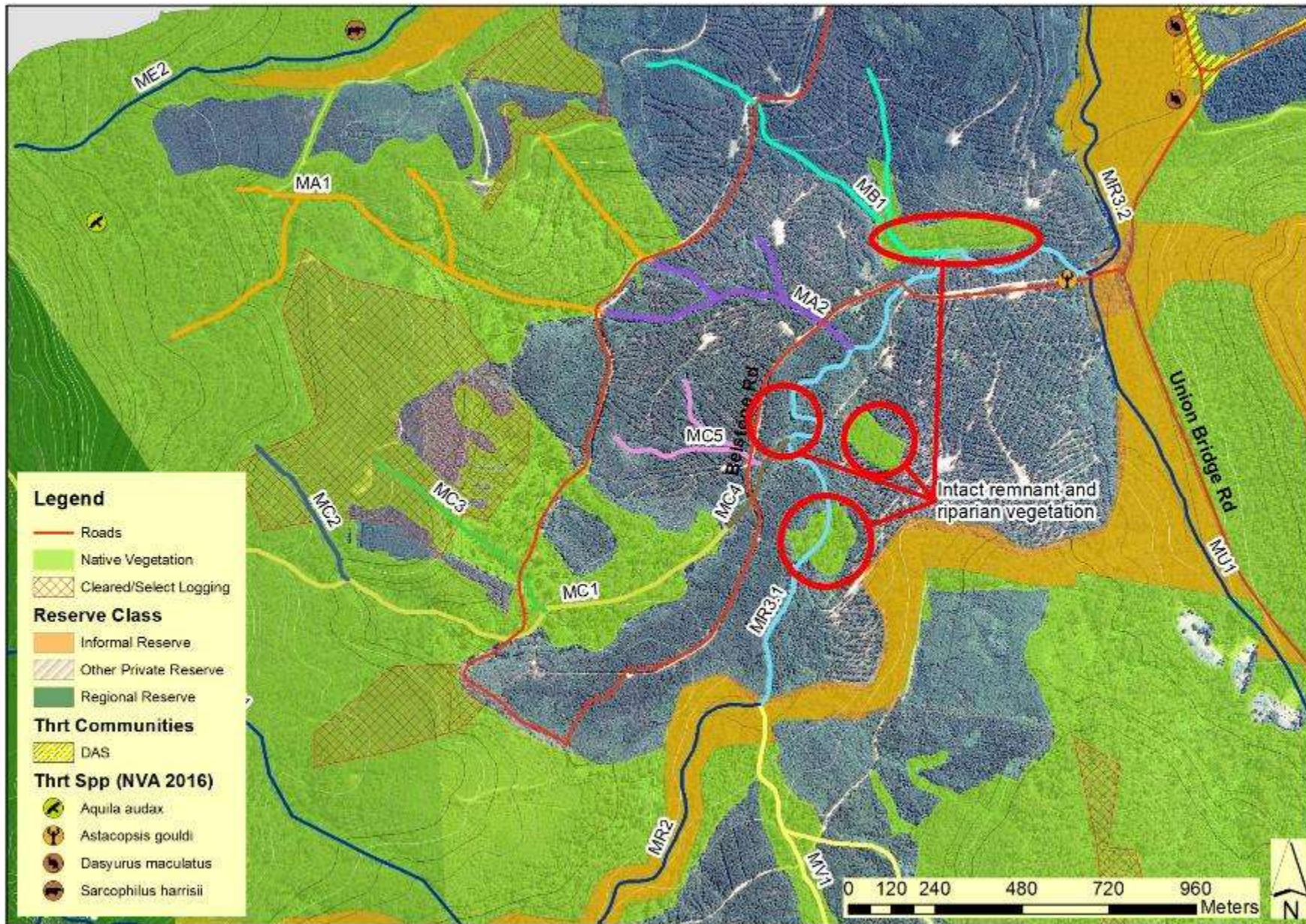
Photo 3 MC 4 Radiata Pine in Riparian Zone - Good native regeneration

Table 2 M3 1 (Minnow River), MC (Minnow Creek), MA, MB & MV (unnamed tributaries) Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR3.1	Meandering Gravel Bed, Partial Valley Confined	Highly degraded. This reach is dominated by the surrounding Radiata pine plantation. There are several patches of native vegetation remnants including forest and swamp areas along or near the main channel. (see Map 3 – red circles)	Conservation values are poor, but have the potential to greatly improve if reconnected to the greater Mt Rolland environment and existing native remnant riparian zones of MR 2 and MR 3.2	<ul style="list-style-type: none"> High levels of sedimentation caused by forest plantation harvesting & road infrastructure with little or no riparian protection – i.e. inadequate buffers. Weed spread e.g. wildings are infesting the riparian zone. 	Develop a comprehensive Restoration Plan (including MC4 on Minnow Creek), and all adjoining and/or nearby remnant native vegetation (e.g. the wetland and remnant to the north of Belstone Ford and the remnant forest upstream of the confluence with Minnow Creek) (see map). Natural regeneration is likely to occur if threats are removed (e.g. wildings controlled), however pine wilding control will be on-going and long-term.	Strategic	PTPZ
MV1	Confined Valley, Occasional Floodplain	Made up of two tributaries joining the Minnow River. At the start of M3.1 native vegetation is retained for 500 metres upstream. The rest of the reach is dominated by plantation without a riparian buffer. Natural regeneration is occurring.	Important connectivity location: Lower section is linked to some good native riparian vegetation adjoining the trunk stream at M2/M3.1 junction.	<ul style="list-style-type: none"> Pine plantation harvesting operations, wildings and increased sedimentation to the trunk stream. Future forestry harvesting 	Retain existing remnant vegetation in this reach.	Medium	PTPZ, PUR
MC1	Confined Valley, Occasional Floodplain	The upper Minnow Creek originates in the Mt Roland reserve. The riparian zone of the lower section of MC1 is bounded either side by extensive plantation.	High conservation value vegetation and intact stream. Wedge tailed eagle nest identified on NVA near MC1 (see Map).	Forest harvesting, road infrastructure causing sedimentation to the trunk stream. Wilding infestation	Protect native forest remnants in upper reach including buffers around MC2, and MC4.	Strategic	PTPZ, PUR
					Riparian flood channels need to be incorporated into Restoration Plan (see above M3.1).	Strategic	
					Collect data on threatened species for inclusion in the NVA	Strategic	

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MC2 and MC3	Confined Valley, Occasional Floodplain	Tributaries of MC1 with some existing remnant native vegetation, although plantation and native forest harvesting are in close proximity.	Some remnant vegetation that supports the main channel of MC1 in fair condition.	<ul style="list-style-type: none"> Plantation and native forest harvesting, road infrastructure causing increased sedimentation. Weed invasion. 	Retain remnant vegetation.	High	PTPZ
MC4	Confined Valley, Occasional Floodplain	Main channel completely surrounded by pine plantation. Flood channels (wetlands) in this reach have some intact native vegetation.	Important link between Minnow River and Minnow Creek	<ul style="list-style-type: none"> Plantation impacting on function and structure of native riparian vegetation in this reach. Road infrastructure causing extra sedimentation and contributing to fine bar formation. 	Restore native riparian zone to link MC1 with M3.1. Weed control of pine trees and wildlings. The presence of upstream native vegetation will provide a seed source and natural regeneration is expected, no revegetation planting required.	Strategic	PTPZ
MC5	Undefined tributary	Surrounded by plantation forest, including the riparian zone. This stream flows into Minnow Creek just ahead of the confluence with the trunk stream.	Highly degraded with very poor native regeneration occurring Pine plantation dominates this reach.	Impacted by harvesting activities and pine wildlings.	Not a high priority.	Low	PTPZ
MA1	Confined Valley, Occasional Floodplain	This reach is part of the Mt Roland drainage area and is connected to good native forest with intact native riparian vegetation.	Important connectivity location: The riparian zone is linked by approximately 50 hectares of remnant high conservation value vegetation to the greater Mt Rolland Reserve. A Wedge-tailed eagle nest is identified in this reach from NVA records along with Devils and Quolls. Links to ME3 and MC1	Native forest and plantation harvesting, sedimentation, loss of habitat and riparian zone degradation.	Retain remnant vegetation.	Strategic	PTPZ
					Collect data on threatened species for inclusion in the NVA	Strategic	

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MA2		Lower catchment all plantation to the water, with no riparian buffer. This reach adjoins the trunk stream at MR 3.1.	Link between upper tributary (MA1) and Minnow River	Wildings, road infrastructure and future harvesting.	Restore riparian buffer firstly through sensitive harvesting, followed by intensive wilding control. The high conservation value vegetation in the upper catchment (MA1) will provide an excellent seed source and natural regeneration potential for the rehabilitation of this reach. On-going, long term weed control will be necessary. (included in Priority 2 Section I)	Strategic	PTPZ
MB1	Undefined tributary	A small reach dominated by plantation and enters the trunk stream in reach MR3.1.	A small area of remnant native vegetation is located at the confluence with MR3.1 (see map).	Wildings, road infrastructure and future harvesting.	Retain remnant and associated floodplain vegetation and restore area adjoining trunk stream – this reach to be included in the Restoration Plan – (see MR3.1.& MC1 above) (see map). Sensitive harvesting in proposed restoration area.	Strategic	PTPZ



Map 3 MR3 1 (Minnow River), MC (Minnow Creek), MA, MB & MV (unnamed tributaries)

MR3.2 (Minnow River) - MU (unnamed tributary)

Site Description

This reach extends from Belstone Ford to the Paradise Rd Bridge. The trunk stream of M3.2 changes from the plantation dominated upstream reach of M3.1 to more substantial riparian vegetation and adjoining remnants. Connectivity and width increases and improves on the southern side but the riparian zone is patchy on the Paradise Plantation (North) side. This section also includes the unnamed tributary (MU) that runs parallel to Union Bridge Rd and the forested ridge of Kenzies Hill Reserve. The area to the east of MU is of high conservation value with numerous threatened species (identified in the Natural Values Atlas) in the vicinity and several stands of the threatened forest community *Eucalyptus amygdalina* forest and woodland on sandstone (DAS) (see map 4). The reach and ridge are part of an informal reserve that is also closely linked to the Gog Range Reserve to the south and several tributaries to the west which join the Minnow River in M7 (linked by MS1 & MS2).

Strategic Priorities for Reach

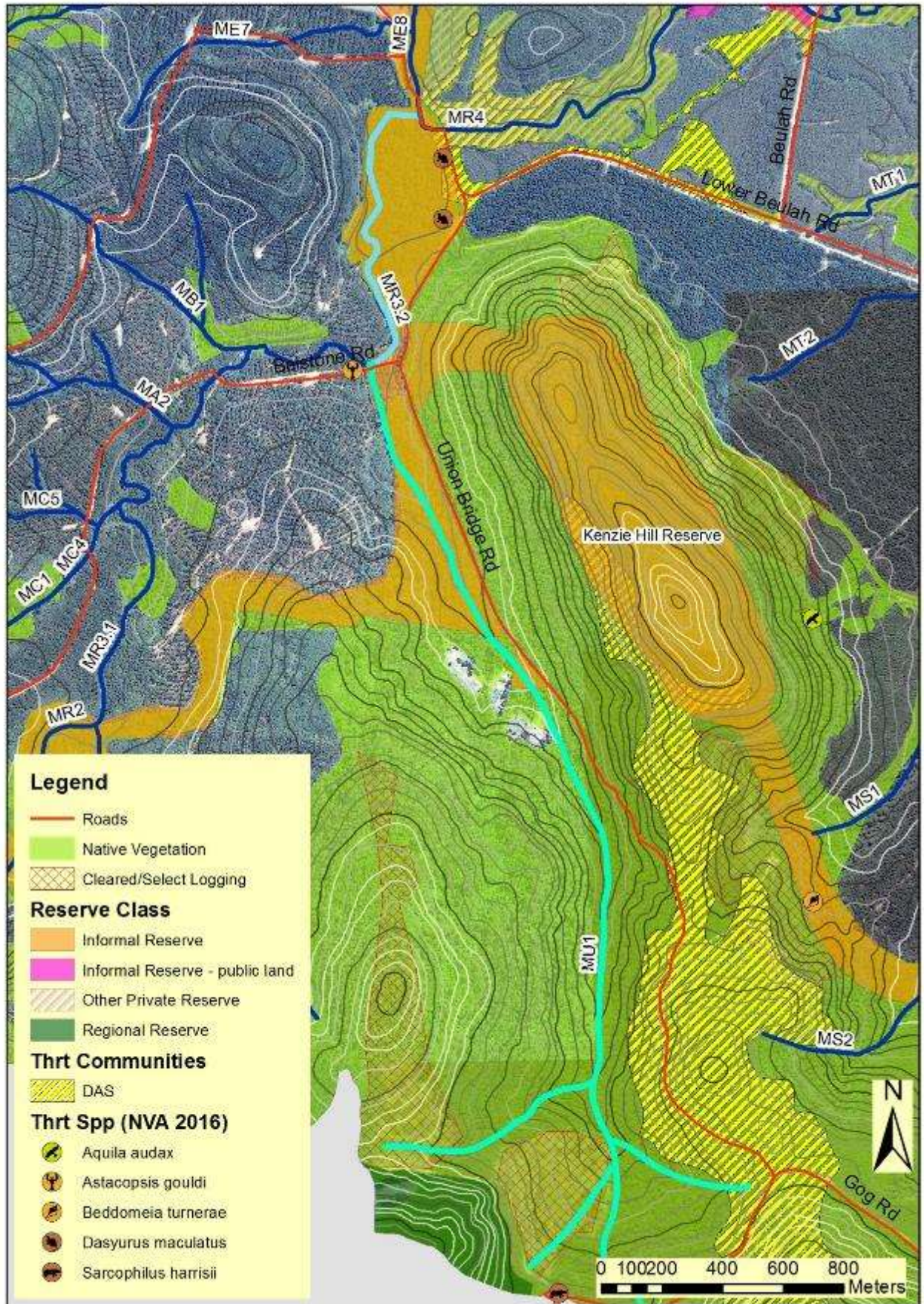
- M3.2 and MU1: Retain existing high conservation value forest in these reaches.
- MR3.2 - Include northern side of riparian zone in comprehensive restoration plan for MR3.1 (see MR3.1 recommendations and Table 2).
- MR3.2 and tribs All reaches.–NVA - Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating Collect additional data on threatened species for inclusion in the NVA.



Photo 4 MR3.2 (Minnow River) near Picnic Area

Table 3 M3.2 (Minnow River), MU (unnamed tributary) Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR3.2	Meandering Gravel Bed, Partial Valley Confined	Good native vegetation cover, surrounded by plantation. 400m of the northern bank is in pine plantation to the water (no buffer).	Riparian zone has native vegetation in fair/good condition. Linked to large area of high conservation value vegetation to the south (Kenzies Hill Reserve)	<ul style="list-style-type: none"> Impacted by harvesting activities and pine wildling invasion. Pine in riparian zone northern side of reach. 	Include northern side of riparian zone in comprehensive Restoration Plan for MR3.1 (see MR3.1 recommendations above). Ensure harvesting near riparian zone is done sensitively with restoration as the primary focus. Long-term follow up weed control will be required.	High	PTPZ
					Employ specialist - <i>Astacopsis gouldi</i> survey and collect data for inclusion in the NVA	Moderate	
MU1	Undefined Tributary	Union Creek is in good condition with good native vegetation cover. The remnant vegetation to west links to Kenzies Hill Reserve. The headwaters originate at the edge of the Mt Roland Reserve.	High conservation value vegetation. NVA records show the presence of devils & quolls	Impacts from native forest harvesting (including weeds)(logged in 2016).	Union Bridge Rd is a High-profile Tourist Route. Two nearby residential landowners could be approached and encouraged to champion this area.	High	PTPZ, Private, PUR
					Protect native vegetation and remove weeds,	Strategic	
					Collect data on threatened species for inclusion in the NVA.	High	
Kenzies Hill Reserve	Remnant Vegetation	This reserve forms a north/south ridge from the trunk stream to the Gog Reserve. It is a large tract of native forest with landuse ranging from production forestry, reserves and several small landholders. The union bridge road tourist route borders the reserve.	High conservation value vegetation with, links to the Gog and Mt Roland reserves plus tributaries MS1-4 and Minnow River. <i>Eucalyptus amygdalina</i> forest and woodland on sandstone (DAS). NVA records of WT Eagle nest, <i>Beddomeia turnerae</i> (hydrobiid snail – Minnow River) on adjoining tributary. NVA records show the presence of devils & quolls (see Map 4)	Logging of threatened community and know location of snail	Protect native vegetation	Strategic	PTPZ, PUR
					Collect data on threatened species for inclusion in the NVA.	High	
					Identify extent of DAS and whether logging has been undertaken in informal reserve (see map).	High	



Map 4 MR3.2 (Minnow River), MU (unnamed tributary)

MR4 (Minnow River), ME (unnamed tributary)

Site Description

100 metres upstream from Paradise Rd Bridge the unnamed tributary ME joins the Minnow River and the start of reach MR4, which flows downstream through a healthy riparian zone for approximately 1.2 km. The ME subcatchment has a number of smaller tributaries which are almost all exclusively in an agricultural setting with the exception of two large tributaries that originate in forest reserve or forest production zones.

Strategic Priorities for Reach

- MR4, ME2 and ME8: Retain existing high conservation value forest in these reaches.
- MR4 – Restore harvested plantation North of Beulah Rd to native vegetation Include northern side of riparian zone in comprehensive restoration plan for MR3.1) (See Map 5).
- ME2. NVA - Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating. Collect additional data on threatened species for inclusion in the NVA.
- ME 2, ME5 and ME8 - Establish riparian corridor but MUST include all activities relating to the rehabilitation of riparian corridor on plantation land, fencing on agricultural land and landholder commitment of follow up weed control.

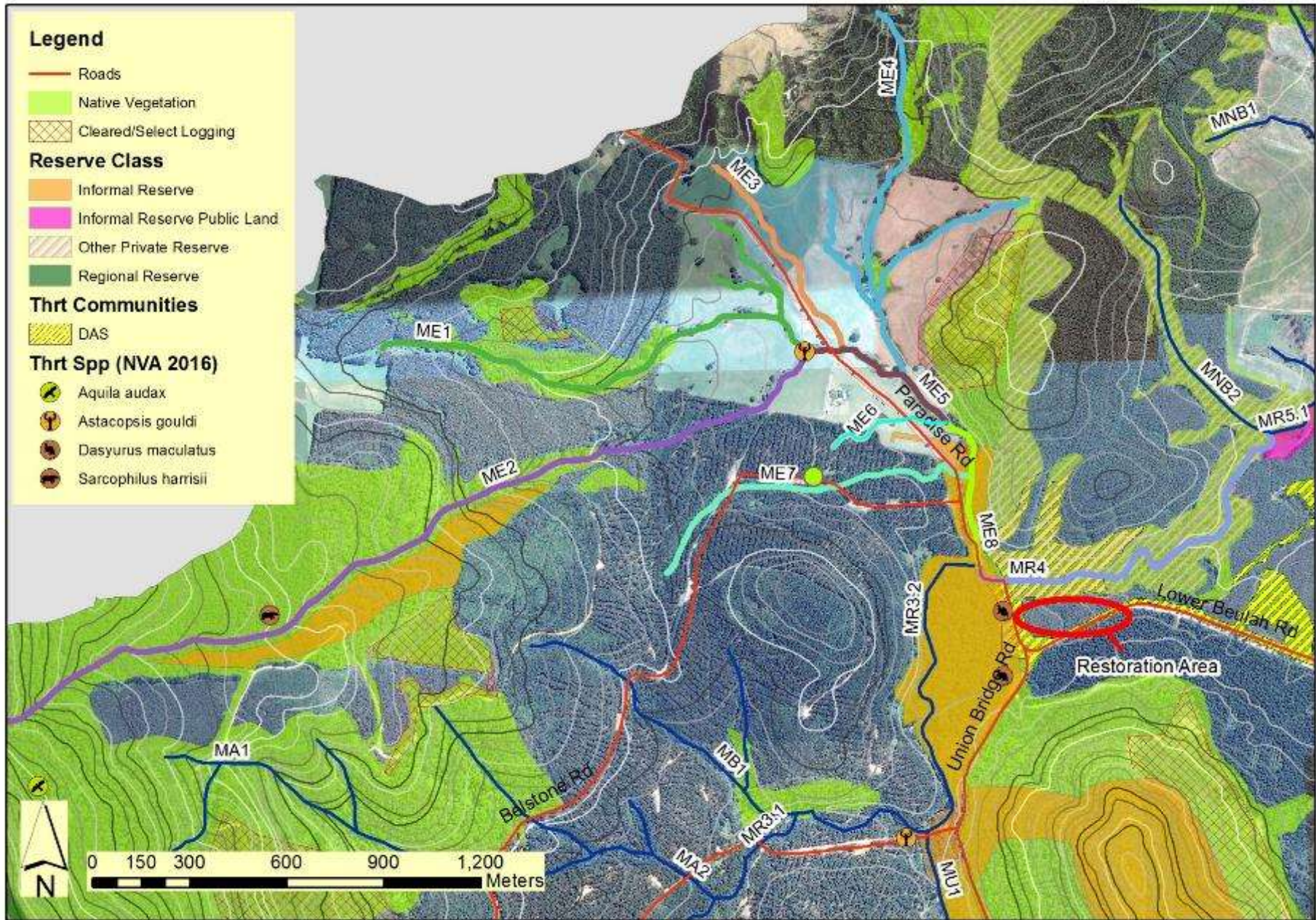


Photo 5 Proposed area for restoration of harvested *Euc. nitens* plantation north of Beulah road on MR 4. *Euc nitens* resprouting will need to be controlled. Native regeneration is exceptional at this site.

Table 4 MR 4 (Minnow River)- ME (unnamed tributary) –Reach Actions

Reach Code	River style	Site Description and Condition	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR4	Partially Valley confined Occasional Floodplain	Forest area starts near Paradise Rd Bridge & picnic area (see MR3.2 and Kenzie Hill Reserve), continues for 1.2 kms with a continuous riparian zone with a minimum of 30 metre buffer. Plantation on the south of the river to Lower Beulah Rd (see Map 5). The plantation zone has a high recovery potential	High conservation value vegetation with a relatively intact (re plantation to the south), riparian zone, adjoining natural areas. Remnant corridors are on both sides of the river.	<ul style="list-style-type: none"> Blackberry from ME reaches and Euc nitens from adjoining coupe. Harvesting has noticeably affected on the condition of riparian zone through exposure and edge effect. 	Restore harvested Euc. nitens plantation zone north of Beulah road (see map). This will require a Recovery Plan and ongoing weed control (mainly Euc nitens regrowth from old stumps) (See Map 5).	Strategic	PR,PTP Z, PUR,
					Blackberry control including confluence with ME tributary at ME8	High	
					Interpretation walk and signage for Minnow Catchment conservation values at Picnic area.	Moderate	
ME1-	undefined tributary	This reach is largely surrounded by plantation and agricultural land although some native riparian vegetation occurs in the upper reaches and is in fair condition.	Native vegetation in upper reaches.	<ul style="list-style-type: none"> Blackberry evident. Future harvesting impacts. 	Could be fenced but would require long term follow up of blackberry.	Low	Private
ME2	undefined tributary	This reach originates at the foothills of Mt Roland and is connected to good native forest with intact native riparian vegetation. It is still part of a large tract of high conservation value vegetation which links to MA1, MC1 and the Dasher Catchment. An informal reserve follows the tributary until reaching a plantation in the lower reaches. These lower sections are in poor condition, flowing through agricultural land before joining ME6.	High conservation value vegetation with a relatively intact riparian zone in upper section. NVA records of Wedge-tailed eagle nest, Devil and Quoll identified in upper reaches and <i>Astacopsis gouldi</i> identified in lower reach (older record).	<ul style="list-style-type: none"> Wildings, blackberry. Future harvesting impacts 	Retain native vegetation	Strategic	Private, PFPZ, PUR
					Rehabilitate riparian buffer in plantation coupe in lower reach and fence and revegetate lower section on agricultural land. Ongoing blackberry control and landholder commitment will be required.	High	
					Plantation of the lower riparian zone should be restored following the next harvest (see map).	High	
					Collect data on threatened species for inclusion in the NVA.	High	
					Astacopsis survey for whole of tributary	Moderate	
ME3,4, 6, 7	undefined	These reaches are highly disturbed - largely surrounded by plantation and	Native vegetation is outcompeted by	<ul style="list-style-type: none"> Blackberry. Unrestricted stock 	ME 7 Isolated willow to be controlled (see map –green dot)	High	Private

Reach Code	River style	Site Description and Condition	Conservation Values	Issues/Threats	Recommendations	Priority	Status
	<i>tributary</i>	agricultural land. The riparian zone is impounded, weedy with no native vegetation value.	plantation, pasture grass or other weeds (such as blackberry)	<ul style="list-style-type: none"> access into the stream Spanish Heath identified on Paradise Rd in Dasher catchment 	Fencing and revegetation with long-term follow up commitment for weed control Monitor for Spanish Heath entering catchment from roadside incursions	Low High	
ME5	<i>undefined tributary</i>	This short reach (500 metres) is highly degraded within an agricultural zone. Cleared to the waterway.	Although highly disturbed, this reach is importantly located in terms of its relationship to the less impacted reaches of ME1, 2, 3 and 8.	<ul style="list-style-type: none"> Blackberry Continued impacts from upstream reaches Unrestricted stock access to stream. 	Fencing and revegetation with long-term follow up commitment for weed control.	Moderate	Private
ME8	<i>undefined tributary</i>	Remnant and riparian zone in moderate condition. Connectivity to MR4 and also linked to a good remnant corridor along ridge line to the east joining to MNB2.	Important corridor which is protected by an informal reserve. Adjoining remnant provides resilience and links to MR4 with MNB2	<ul style="list-style-type: none"> Blackberry Unrestricted stock access to stream 	Blackberry control is important for protection of MR4 Clarify the informal reserve boundaries. Appears to be pasture in the reserve(see map in orange) Clarification of stock access from ME5.	Moderate Moderate Moderate	PR, PUR



Map 5 MR 4 (Minnow River), ME (unnamed tributary)

MR5 (Minnow River) and MNB1 (unnamed tributary)

Site Description

Leaving the healthy riparian zone of MR4, the trunk stream reaches the Public Reserve near Beulah Rd. Several tributaries MNB1 and MNB2 also enter the trunk stream in this reach. The Public Reserve section (MR 5.1) is identified as “the worst of the reaches” in the Dasher-Minnow Mersey Rivercare Plan (Attawater, 2000). The main cause of its degraded condition is unrestricted vehicle access and unauthorised firewood removal. The adjoining plantation has been harvested, clearing most native vegetation on the southern side of river. The opposite bank is also largely impacted by vehicular access and poor riparian vegetation cover. Downstream in MR5.2, vegetation cover improves, however Radiata pine and other weed species have invaded the reach. MNB1 retains a good riparian zone with some intact remnant vegetation. Except for several isolated remnants in its headwaters, MNB1 is largely devoid of cover throughout the riparian zone.

Strategic Priorities for Reach

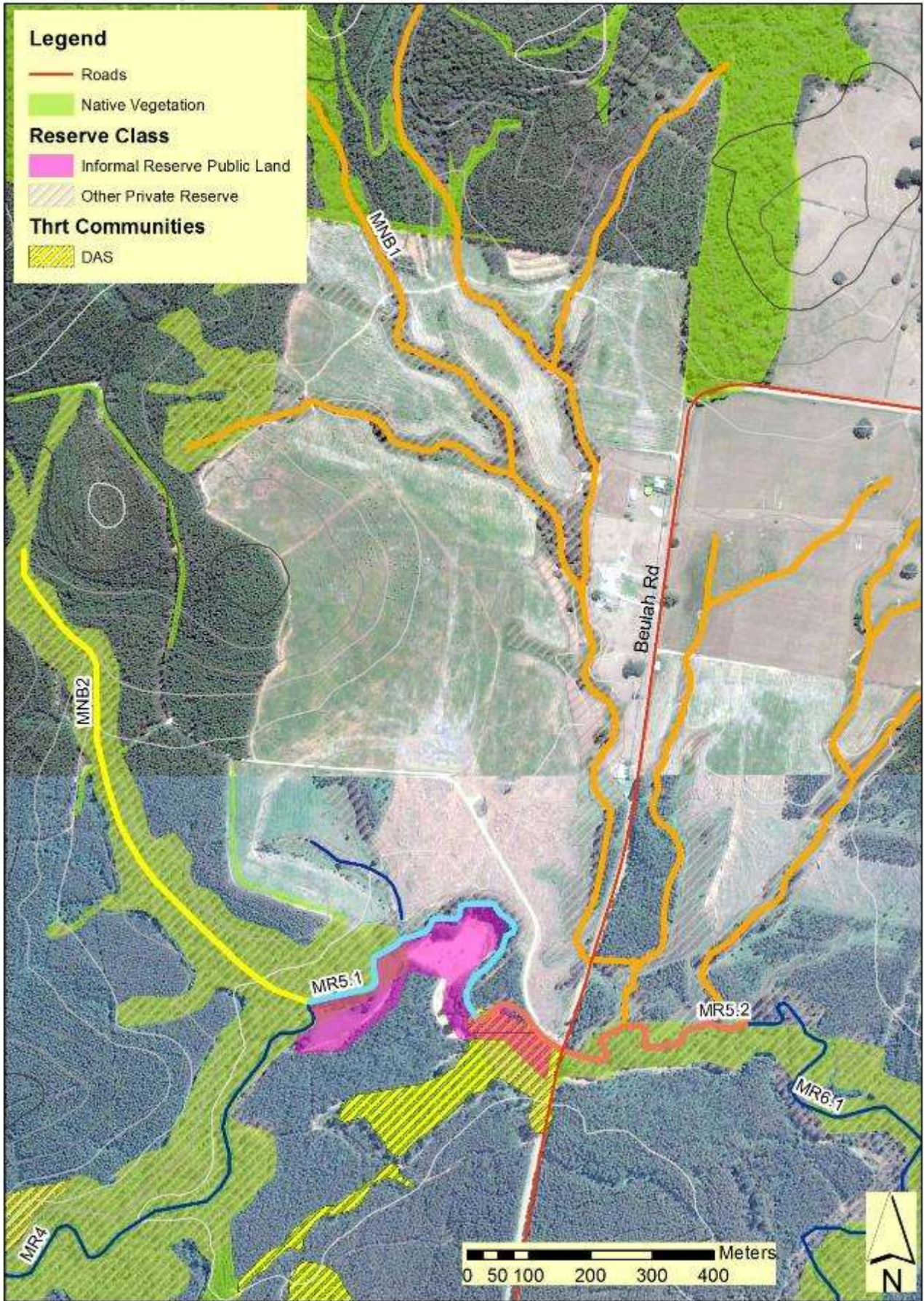
- MR5.1 - Restrict car access using bollards/rocks at strategic access points including access through plantations



Photo 6 Example of vandalism and weeds while still retaining mature trees in MR5.1 riparian zone

Table 5 MR5 (Minnow River) and MNB1 (unnamed tributary) – Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Actions	Priority	Status
MR5.1	Meandering Gravel Bed	This reach is highly degraded. Starting at the confluence with MNB2, it is distinguished by a large meander bend. The floodplain is highly disturbed by off-road vehicular traffic/vandalism. Vehicles are accessing via a number of openings through the riparian vegetation and/or across the river. Bank and floodplain erosion is evident.	<ul style="list-style-type: none"> Although degraded, there are some important mature trees Adjoins MNB2 and the upstream reach MR4 – which are both in good condition. 	<ul style="list-style-type: none"> High level of disturbance. Bank and floodplain erosion. Abandoned vehicles, vehicular damage and waste. Extensive blackberry present. Montpellier broom present 	Restrict car access using bollards/rocks at strategic access points including access through plantations	Strategic	PUB, Private, PR
					Allow for natural regeneration - close proximity of good native seed source	High	
					Blackberry containment and Montpellier broom control essential	High	
					Monitor weed incursion which may accelerate as threats are reduced	High	
MR5.2	Meandering Gravel Bed	Downstream from MR5.1 this reach retains some riparian vegetation in fair condition although the understorey is largely impacted by weeds (mainly Blackberry). There is a small native remnant attached to this area.	Canopy structure present within the riparian zone (surrounded by extensively cleared land). Some value in the understorey in some areas. The small remnant is a threatened community : Eucalyptus amygdalina forest and woodland on sandstone (DAS) (See Map 6)	<ul style="list-style-type: none"> Blackberry and Montpellier broom Mature pines and wildlings. Agricultural weeds invading via MNB1 	East of bridge selective control of mature pine required (below Beulah Rd bridge)	Low	PUB, Private, PR
MNB1	Undefined Tributary	Plantation. Highly degraded, cleared to the water, no native riparian vegetation. Agricultural land converted to plantation which has been clear-felled	Private Reserves are in place on a number of these tributaries despite there being minimal conservation value present.	Stock access. No riparian vegetation. Weeds – e.g. blackberry	Identify the Private Reserve values – Reserve allocations may be better used in high conservation value zones (See Map 6 for location)	Moderate	PR, Private
MNB2	Undefined Tributary	Native vegetation corridor, bounded by plantation on both sides.	Important natural corridor to ME subcatchment and Dasher	Nitens/plantation on both sides	Retain native vegetation	Medium	PR, Private



(Minnow River) and MNB1 (unnamed tributary)

MR6 (Minnow River) and MT1-2 (unnamed tributary)

Site Description

Surrounded by plantation MR6 is a section of river with a moderately healthy riparian zone and some linkages to small remnants and Dawkins Hill which are largely in Private Reserves. Two unnamed tributaries enter MR6, MT1 and MT2 includes intact remnant vegetation.

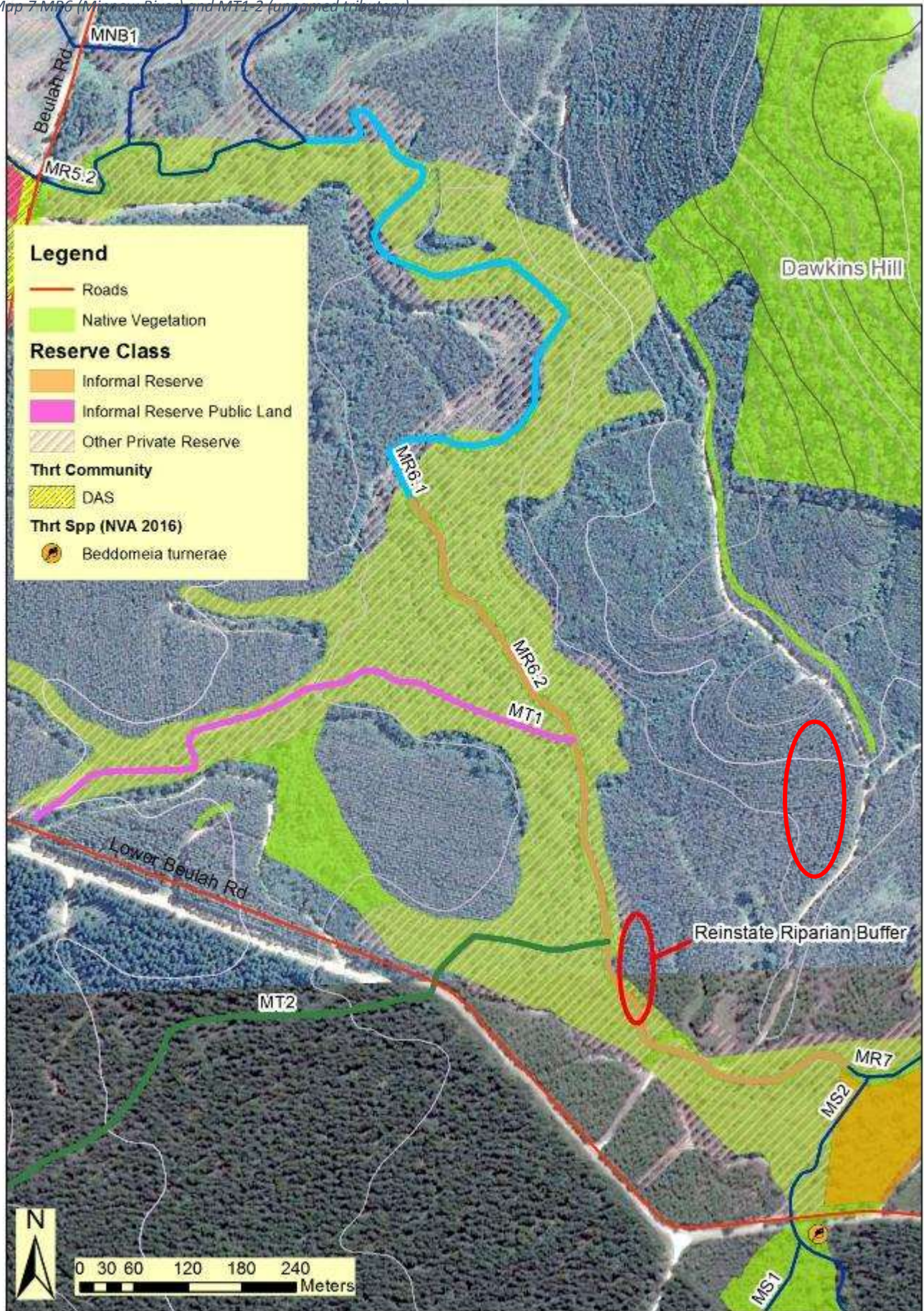
Strategic Priorities for Reach

- MR6.2 - After harvesting on north side, reinstate/restore appropriate riparian buffer (See Map 7) and to be included in restoration plan (see Priority 2 Section I).

Table 6 MR6 (Minnow River) and MT1-2 (unnamed tributary) – Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR6.1	Meandering Gravel Bed	Fair condition. Reduced riparian width in some sections. Upstream degradation.	Riparian vegetation largely intact Private Reserves are in place on some sections of this reach despite there being minimal conservation value present.	<ul style="list-style-type: none"> • Pine wildlings • Road is too close to riparian zone/-logging edge effects. • Future harvesting activities. 	Identify the Private Reserve boundaries, assess condition. Some sections are in need of rehabilitation. Shift the Forestry road out of the riparian zone.	High	Private, PR
MR6.2	Partially Valley Confined Occasional Flood plain	This reach has a wide riparian buffer zone offering reasonable protection from plantations which are extensive here. Downstream the north bank is plantation to the water (no buffer). This reach links with MT1 and 2. The lowest eastern section is bound by plantation.	Known <i>Astacopsis gouldi</i> habitat. Part of continuous riparian zone up and downstream.	<ul style="list-style-type: none"> • Narrow Riparian zone on north side of the downstream end – inadequate buffer provided. • Future harvesting activities. 	After harvesting on north side, reinstate/restore appropriate riparian buffer (See Map 7).	Strategic	PF
MT1-2	Undefined Tributary	Small tributaries entering from plantation on the southern side of the trunk stream MR6.2. MT2. Condition variable – MT1 in good condition with a riparian buffer. MT2 without buffer.	Supporting the natural values of MR6.2 by providing upstream native vegetation protection but limited value on its own.	<ul style="list-style-type: none"> • Fragmentation caused by logging and roads. • Future harvesting activities. 	Retain native vegetation including remnant link between two tributaries (see map)	Moderate	PF, PFPZ

Map 7 MR6 (Migaw River) and MT1-2 (unnamed tributary)



MR7 (Minnow River) - MS1-4 (unnamed tributaries)

Site Description

MR7 has several tributaries entering it from the south (MS1-4). These have moderate riparian buffers (>30 metres wide) and contribute to the conservation values of the trunk stream. MR7 has a healthy riparian zone and is supported by remnant vegetation around Dawkins Hill to the north. Plantations dominate the other areas.

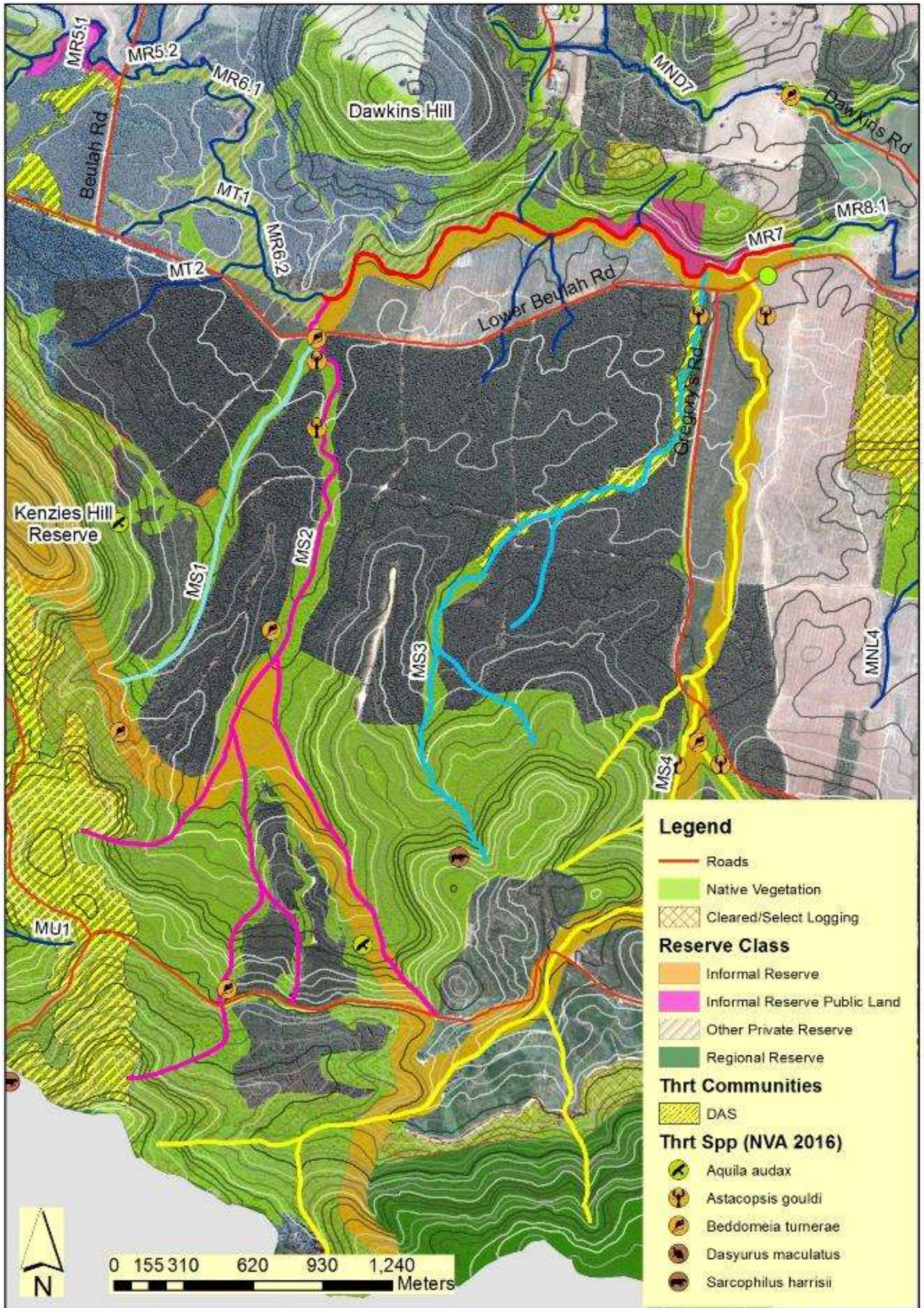
Strategic Priorities for Reach

- MR7, MS1 & 2, MS3 & 4 and Dawkins Hill: Retain high conservation value vegetation
- MR7, MS1 & 2, MS3 & 4 NVA - Collect records using camera trapping and field observations (not only *threatened* species). Identify and collate TASVEG communities, boundary and reserve information etc. for future updating. Collect additional data on threatened species for inclusion in the NVA. Update past records.

Table 7 MR7 (Minnow River) - MS1-4 (unnamed tributaries) - Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR7	Partially Valley confined Occasional Floodplain	The main channel has continuous native riparian, although riparian quality and width is affected in several locations by plantations (and harvesting effects) on both sides. This zone remains linked to remnants and intact tributaries and is in good condition.	High conservation value vegetation. Most of the riparian zone is protected in a reserve. Continuous, intact riparian zone in good condition with linkages to both sides of the valley. Threatened species have been identified in adjoining tributaries near the trunk stream including <i>Astacopsis gouldi</i> , and <i>Beddomeia turnerae</i> (hydrobiid snail – Minnow River).	<ul style="list-style-type: none"> • Blue Periwinkle (<i>Vinca major</i>) identified in lower reach on Lower Beulah Rd (see map – green dot). Montpellier broom also present. • Edge effects from harvested plantation and future harvesting activities. 	Control Blue Periwinkle	High	PFPZ, PR, PUR
					Collect data on threatened species for inclusion in the NVA, particularly within adjoining remnant on Dawkins Hill (see map).	High	
MS1-2	Undefined tributary	Good riparian width, high value tributaries feeding the trunk stream. Linked to Kenzies Hill Reserve and several intact tributaries (MS3).	High conservation value vegetation. Important riparian corridors linkages – e.g. to Kenzies Hill. Significant north-south corridor with NVA records for Wedge-tailed eagle nest,	<ul style="list-style-type: none"> • Native forest logging, road infrastructure and associated increased sedimentation and edge effect. 	Retain remnant vegetation.	High	PFPZ, PUR
					Collect data on threatened species for inclusion in the NVA including updating past records.	High	

			<i>Beddomeia turnerae</i> (hydrobiid snail – Minnow River), <i>Astacopsis gouldi</i> (see MR3.1). Eucalyptus amygdalina forest and woodland on sandstone (DAS) found in headwaters (see Map 8)	<ul style="list-style-type: none"> • Weed spread from MR7 	Employ specialist - <i>Astacopsis gouldi</i> survey and collect data for inclusion in the NVA. Assess likely impacts ie illegal fishing habitat degradation.	Moderate	
MS3, MS4	Undefined Tributary	Gregorys Rd follows these two tributaries into the headwaters reaches. The upper catchment still contains excellent stands of native vegetation. Both reaches contain threatened vegetation and fauna species and have wide riparian buffers before reaching the intact trunk stream at MR7.	High conservation value vegetation. Excellent connectivity to upper headwaters including MS2. Vegetation also links to southern reserve including Kenzies Hill Reserve and Gog Reserve. NVA id - <i>Astacopsis gouldi</i> , <i>Beddomeia turnerae</i> (hydrobiid snail – Minnow River) and Devils. MS3 is unprotected but contains significant Eucalyptus amygdalina forest and woodland community on sandstone (DAS) (threatened) identified on NVA.	<ul style="list-style-type: none"> • Native forest logging, road infrastructure, associated increased sedimentation and edge effect. 	Collect data on threatened species for inclusion in the NVA including updating past records.	High	PFPZ, PUR
					Retain upper catchment and riparian vegetation. Protect <i>E amygdalina</i> community	Strategic	
					Employ specialist - <i>Astacopsis gouldi</i> survey and collect data for inclusion in the NVA. Assess likely impacts ie illegal fishing habitat degradation.	Moderate	
Dawkins Hill	Remnant Vegetation	Northern area of Dawkins Hill has an intact remnant that is in moderate/good condition and links across MR6.2 to MR 7.2 (see map)	High conservation value vegetation. Linkage to the intact trunk stream and the headwaters of MND7. Conservation values unknown	<ul style="list-style-type: none"> • Edge effect from adjoining harvesting operations. • Future harvesting activities. 	Retain remnant vegetation including linkage to MR7, MND7 and MR6.1	Strategic	PFPZ, PF
					Collect data on threatened species for inclusion in the NVA including updating past records and determine conservation status	High	



MR8 (Minnow River) - MND (Dawkins Rd) – MNL (unnamed tributaries)

Site Description

MR8 encompasses several large tributaries (MND and MNL) and a section of the trunk stream that primarily meanders its way through agricultural land. Condition varies between tributaries, however the trunk stream (MR8) is in fair to good condition due to a continuous riparian vegetation coverage and good upstream seed source of native riparian vegetation. Willow removal in the 2000's and subsequent fencing for riparian stock exclusion has greatly improved river quality is also significant in linking adjoining upstream and downstream reaches.

MND originates in the Lizard Hill Forest Reserve. It is largely impounded and additionally impacted by agricultural practices. MNL is identified as a series of small tributaries feeding MR8 and are part of the agricultural setting of Lower Beulah. The larger tributary, MNL4 is the exception, with the headwaters within a mix of plantation and native vegetation, which meets the Minnow River at the start of the gorge and MR9.

Strategic Priorities for Reach

- MR8 All reaches: General awareness raising targeting landholders regarding Spanish Heath
- MND7: Weed control and riparian restoration of reach.

NB: Before proceeding with on-ground actions & rehabilitation activities conduct a feasibility /budget analysis with due consideration of MRRCI/land manager capacity and the long-term and on-going maintenance requirements.



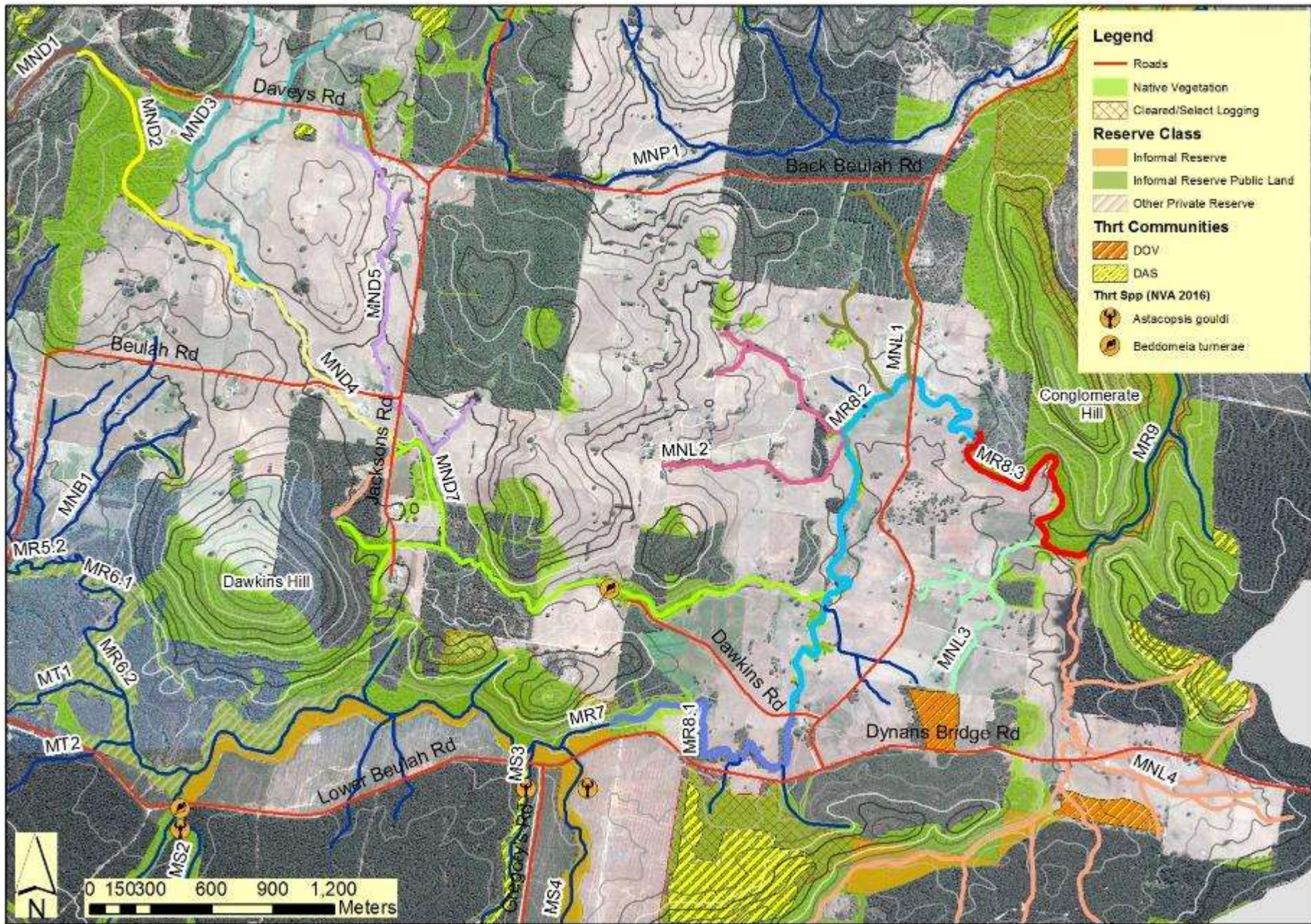
Photo 7 Upstream from Dawkins Road Bridge MR8.1 (Minnow River)

Table 8 MR8 (Minnow River) - MND (Dawkins Rd) - MNL (unnamed tributaries) - Reach Actions

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR8.1	Meandering Gravel Bed	Patchy native riparian vegetation cover in an agricultural zone. Native riparian vegetation present in variable condition along this reach. The upper most section has been significantly cleared in the last 10 years.	Linked to high conservation vegetation upstream. Continuous riparian vegetation, width and condition varies but in good quantities considering the close and harsh clearing. Willows removed and the channel is in a stable state.	<ul style="list-style-type: none"> Unrestricted stock access Sections of narrow riparian zone. Weed incursion – Blackberry, Montpellier Broom. 	Widen riparian restoration areas. Record existing fence lines and nominate areas for extended fencing (esp. to widen). Allow for natural regeneration (good potential).	Moderate	Private
					Monitor for willow.	High	
MR8.2	Meandering Gravel Bed	Patchy native riparian vegetation cover in an agricultural zone. . This reach starts at Dawkins Rd Bridge and ends 100m downstream of the Lower Beulah Road Bridge. The majority of the reach is fenced and willow has been removed, but in some sections the fence line is too close to the water, leaving a narrow ineffective riparian buffer. MND and MNL feed into trunk stream in this reach.	Mature trees and healthy riparian vegetation through the reach although too narrow to function adequately as a healthy riparian zone. Due to past restoration activities this reach is recovering already. Willows removed and the channel is in a stable state.	<ul style="list-style-type: none"> Unrestricted stock access Sections of narrow riparian zone. Blackberry Weed and sediment impacts coming from MND tributary 	Widen riparian restoration areas. Record existing fence lines and nominate areas for extended fencing (esp. to widen),	Moderate	Private
					Monitor for willow from MND.	High	
					Revegetate gaps to widen the native riparian buffer.	Moderate	
MND1-2	undefined tributary	Good condition and strategic. Several large forest remnants are present in the upper headwaters of these reaches – e.g. MNB1 and Lizard Hill Reserve	Important connectivity location: High conservation value vegetation remnants upstream– large and connected. However downstream connectivity is low.	<ul style="list-style-type: none"> Blackberry and other weeds. Native forest logging 	Ensure remnants are fenced and protected. Check for weeds.	High	Private, PUR
MND3, 4, 5, 6	undefined tributary	Highly degraded and altered conditions in agricultural and forestry areas. These reaches are heavily impounded with little riparian vegetation cover.	Low conservation values with low recoverability	<ul style="list-style-type: none"> Unrestricted stock access Willows and other weeds Erosion and sedimentation Spanish Heath entering from 	Do not attempt rehabilitation activities unless a feasibility study has been completed.	Low	Private
					Spanish Heath community awareness and monitoring. Develop and implement a weed	Strategic	

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
				north on Beulah road.	management plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP (Back Beulah Rd)).		
MND7	undefined tributary	Agricultural land. The section of stream contains the better condition native riparian vegetation in the MND reaches. Sections of good native riparian vegetation have various impacting influences. This reach links to adjoining forest remnants i.e. Dawkins Hill and MR7.2	Important connectivity location: links to Dawkins Hill and MR7.2 high conservation vegetation areas. A number of threatened fauna species have been recorded on the NVA in MND7 including <i>Astacopsis gouldi</i> and <i>Beddomeia turnerae</i> (hydrobiid snail – Minnow River) (see Map 9)	<ul style="list-style-type: none"> Willows, blackberry and other weeds (Montpellier broom and Elisha’s tears) Narrow riparian zone Unrestricted stock access Impoundment (instream dams) Plantation harvesting operations Future harvesting activities 	Fencing, rehabilitation and weed control.	Moderate	Private
					Develop an on-ground works plan based on priority rankings described in Section II. Before proceeding with on-ground actions & rehabilitation activities conduct a feasibility /budget analysis with due consideration of MRRCI/land manager capacity and the long-term and on-going maintenance requirements.	Strategic	
					Develop and implement a weed management plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP (Back Beulah Rd)).	Strategic	
MNL1 & 2	undefined tributary	Agricultural land. Riparian zone in a highly degraded condition with low recoverability. These reaches are heavily impounded with instream dams with little riparian vegetation cover.	Low conservation values. A few small remnants of native vegetation occur near the trunk of the stream confluence.	<ul style="list-style-type: none"> Spanish Heath entering north from Lower Beulah road, Montpellier broom present. 	MNL3 – benefits may be gained from fencing off patches of native remnant vegetation and excluding stock.	Low	Private
					Spanish Heath community awareness and monitoring Develop and implement a weed management plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP (Back Beulah Rd)).	Strategic	

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
					Do not attempt rehabilitation activities unless landholder interest and commitment.	Low	
MR 8.3	Meandering Gravel Bed	Agricultural land, cleared to the south. Areas of vegetation in good condition on north side connected to Conglomerate Hill. The upper section of this reach is naturally regenerating after past logging practices.	Important connectivity location: High conservation vegetation Linkage to Conglomerate Hill and intact gorge reach downstream (MR9)	<ul style="list-style-type: none"> Willows coming from upstream reaches. Unrestricted stock access. 	Install fencing to exclude stock (may require flood prone fencing in floodplains) Allow natural regeneration to occur, monitor for weed competition. Monitor for willows.	High	Private, PTPZ, PUR
MNL3-4	undefined tributary	MNL3 contains a few good native remnants at the top of the reach (next to Dynans Bridge Road) the rest is mostly cleared agricultural zone. MNL4 is a group of tributaries in variable condition with native vegetation at the headwaters, running through agricultural and forestry productions areas. The riparian zone is patchy. There are a number of impoundments.	High conservation value vegetation remnant - Eucalyptus ovata forest and woodland (DOV) on MNL3 and MNL4 (near to Dynans Bridge Road) (See Map 9)	<ul style="list-style-type: none"> Unrestricted stock access Plantation impacts e.g. sedimentation Limited riparian buffer allowances 	Ensure fencing of high conservation (MNL 3) and remnant vegetation (MNL4 upstream) to exclude stock access. Protect high conservation value vegetation.	Moderate	Private, PFPZ



Map 9 MR8 (Minnow River) - MND (Dawkins Rd) - MNL (unnamed tributaries)

MR9 (Minnow River) and MNP (Back Beulah Rd)(unnamed tributaries)

Site Description

MR9 is defined by the gorge setting. It flows alongside Conglomerate Hill. To the east, plantation forestry is the dominant landuse and to the west Conglomerate Hill is a Production Forest Zone with an informal reserve bounding the trunk stream. There are several small unnamed tributaries that flow into the gorge from the plantations which retain a native riparian buffer. In the lower section of this reach the tributary MNP enters, its upper catchment is dominated by agricultural and smallholder properties.

Strategic Priorities for Reach

Whole of Catchment: Develop and implement a Catchment Weed Plan for the Minnow Catchment including a Hygiene Plan

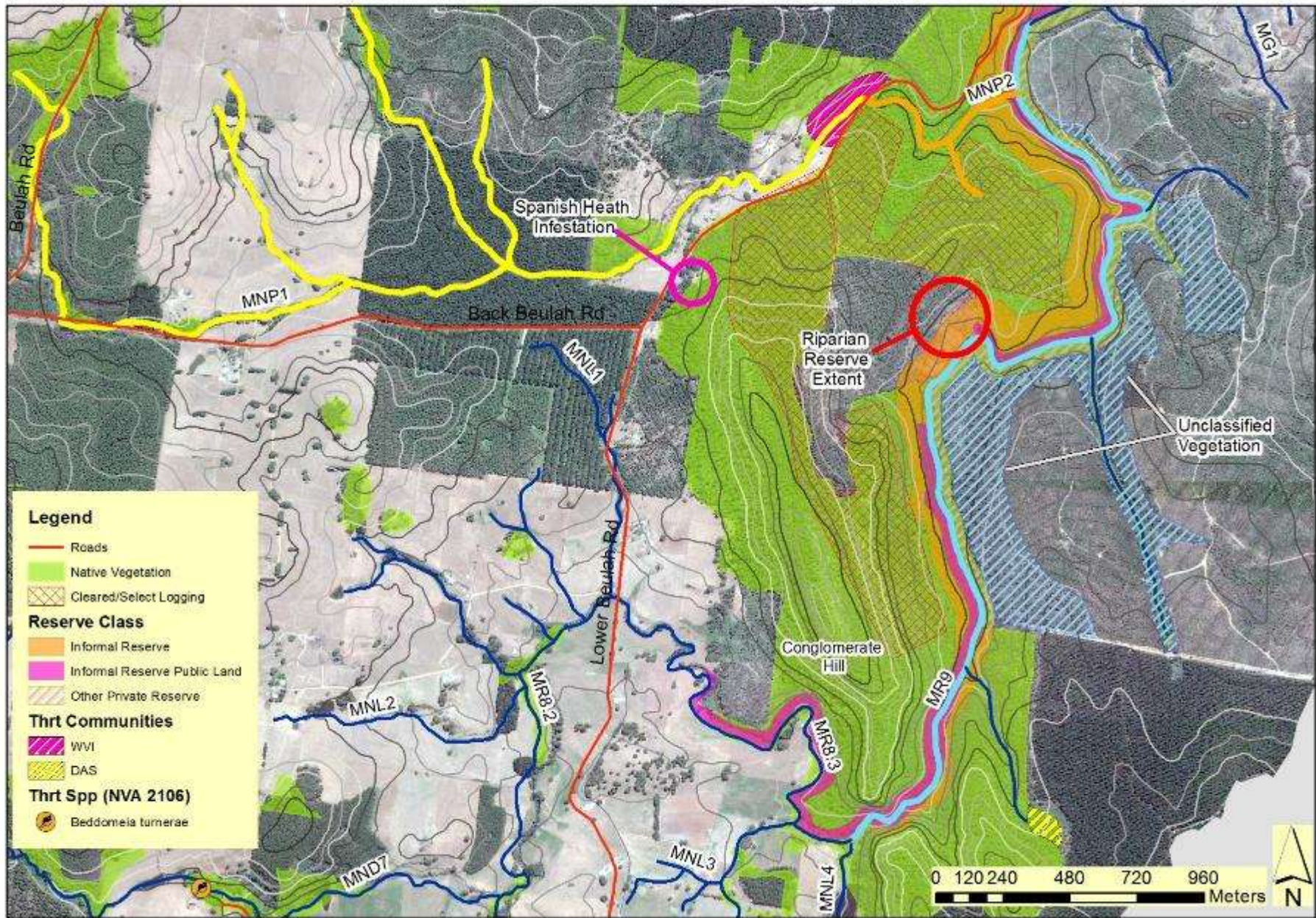
- MR9: Identify vegetation community and formalise with TASVEG (State govt) (see Map 10)



Photo 8 From Back Beulah Rd looking downstream to MNP2 NB: poor water quality from upstream impacts in MNP1

Table 9 MR9 (Minnow River) and MNP (Back Beulah Rd)(unnamed tributaries) – Reach Actions

Reach Code	River styles	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR9	Gorge	The reach as a whole is in good condition, with an intact riparian zone and well forested on either side. Selective logging has occurred west, at Conglomerate Hill. There is a 100 metre wide informal reserve bordering the river on the west side. Plantation occupies land to the east with a native vegetation buffer against the main channel. The tributary MNP enters the trunk stream in this reach but is largely degraded above Lower Beulah Road.	Continuous, high conservation vegetation throughout main channel and adjoining forested, high conservation vegetation of Conglomerate Hill.	<ul style="list-style-type: none"> Weeds – Willow, blackberry and Spanish heath (large patch see-Map 10) Partial clearing of the riparian reserve (see Map 10) Unrestricted recreational vehicles accessing and degrading the reserve area(associated with the cleared area – above) Vegetation on east side not listed on TASVEG as a forest community. 	Investigate the extent riparian reserve, the condition including weed spread and mitigation measures relating to impacts (See Map 10)	Strategic	PUR, PTPZ,
					Restrict vehicle access to the riparian zone (access via Lower Beulah Rd).	High	
					Identify unclassified vegetation community and formalise with TASVEG (State govt) (see Map 10).	Strategic	
					Protect native vegetation.	High	
					Monitor and control willow and Spanish Heath. Develop and implement a weed management plan for the Minnow Catchment (see Priority recommendations for MR8 and MND (Includes Back Beulah R/See Map 10)).	High	
MNP1	Undefined tributary	Agricultural and plantation land. This tributary is highly degraded with little native vegetation present until reaching the Lower Beulah Rd Bridge (MNP2).	Low conservation value.	<ul style="list-style-type: none"> Spanish heath Unrestricted stock access Willows Poor riparian zone 	Develop and implement a weed plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP (Including Back Beulah Rd).	Strategic	Private, PUB, PTPZ
					Restrict stock access in lower MNP1.	Low	
MNP2	Undefined tributary	This reach begins at the Lower Beulah Bridge Rd entering a stretch of mature native vegetation. A confined channel continues into the lower section of MR9.	Nearly intact native riparian vegetation. Adjoining remnant vegetation is in good condition although impacted by selective native forest logging on Conglomerate Hill	<ul style="list-style-type: none"> Upstream weed spread 	Monitor and control willows, Spanish heath and Elisha’s tears. Retain native vegetation and allow for natural regeneration.	Moderate	Private, PUB, PTPZ



Map 10 MR9 (Minnow River) and MNP (Back Beulah Rd)(unnamed tributaries)

MR10 (Minnow River)

Site Description

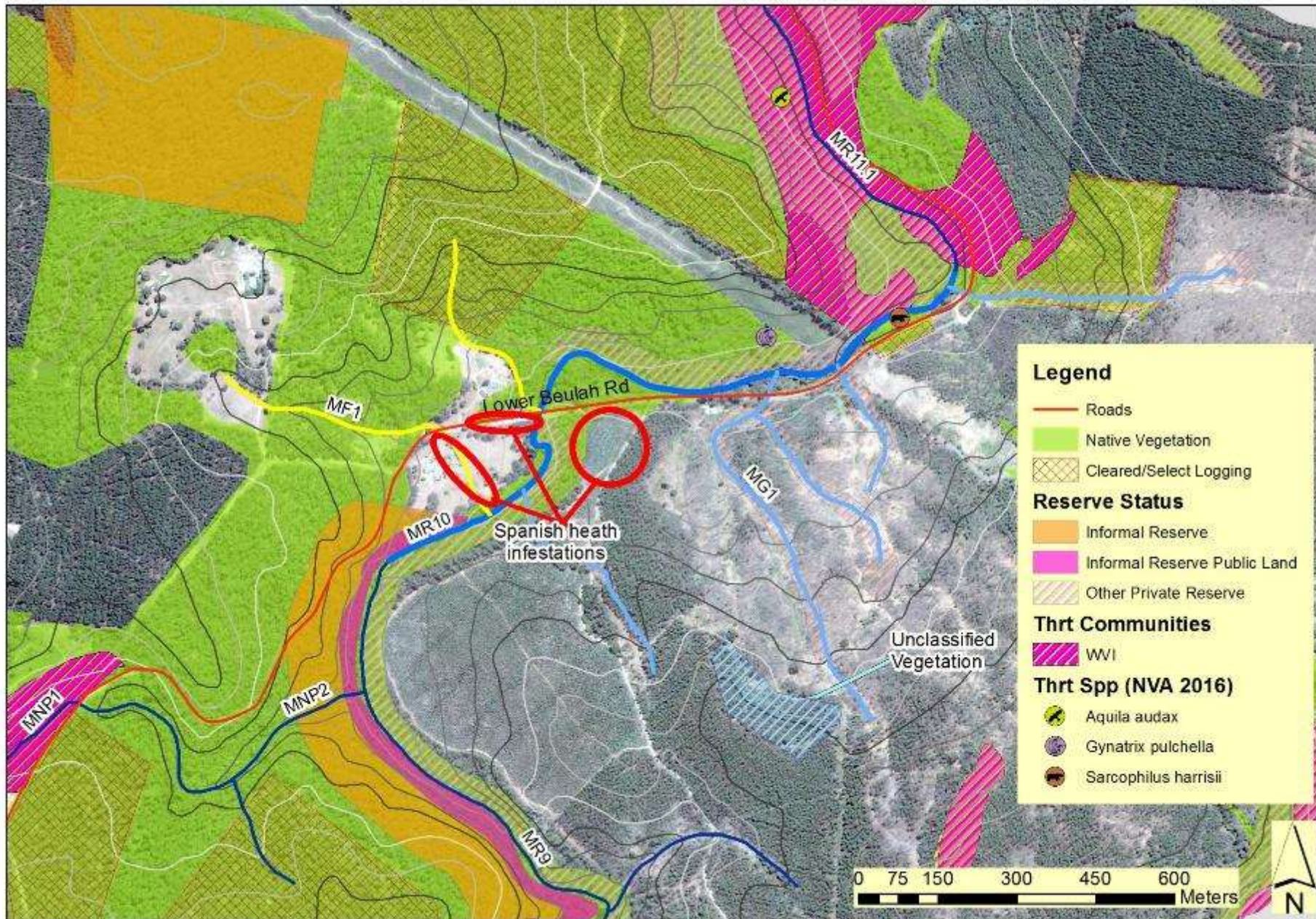
As MR10 leaves the gorge of MR9, several small floodplain pockets occur with smallholder properties on the west and plantation converted agricultural to the east. Lower Beulah Rd Bridge crosses the river. This road runs alongside the river edge in very close proximity for the majority of the reach. The main powerline easement also crosses the river in this reach.

Strategic Priorities for Reach

- Whole of Catchment: Develop and implement a Catchment Weed Plan for the Minnow Catchment including a Hygiene Plan MR10 All reaches: General awareness raising targeting landholders regarding Spanish Heath

Table 10 M10 (Minnow River) – Reach Actions

Reach Code	River styles	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR10	Valley Confin ed Occasi onal Floodp lain	The lower Beulah Rd runs close to river for the majority of its length and riparian vegetation is bounded by agricultural land consisting of cleared paddocks and extensive plantation converted agricultural land. Smaller tributaries on the east are largely devoid of native vegetation.	Native vegetation values are compromised by the narrowness of riparian zone & weed incursions however, the native riparian vegetation is continuous. Adjoining remnants have some conservation value – e.g. <i>Gynathrix pulchella</i> (rare flora) & <i>Wet Eucalyptus viminalis</i> (WVI) community identified on NVA (see map 11).	<ul style="list-style-type: none"> • Roadside Spanish heath, Plantation east of Lower Beulah Rd bridge has large patch of Spanish heath (see Map 11). • Blackberry infesting bushland. • Willows upstream • Narrow riparian zone • Unrestricted stock access 	Develop and implement a weed plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP (Back Beulah Rd). Roadside Spanish heath a priority (see Map 11).	High	Private , PR, PUB, PTPZ
					Blackberry control a priority (but high resources with moderate returns)	Moderate	
					Monitor and control willow	High	
					Fencing of smallholder paddocks if running stock.	High	
MG1	undefi ned tributa ry	Plantation area. Largely degraded and devoid of native vegetation.	Private Reserves are in place in reach despite there being minimal conservation value present and vegetation not classified (See Map 11).	Spanish heath, main patches near bridge (see Map 11)	Develop and implement a weed plan for the Minnow Catchment	Strate gic	Private , PR, PUB, PTPZ
					Identify the Private Reserve values – Reserve allocations may be better used in high conservation value zones	High	
MF1	undefi ned tributa ry	Small tributaries on the west of the trunk stream. Good native vegetation cover fragmented among several small holdings.	Excellent remnants (including the informal reserve adjacent to the powerlines)	Spanish heath - on roadside and at “Minnow Cabins” (see map)	Develop and implement a weed plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP (Back Beulah Rd).	Strate gic	Private , PR, PUB, PTPZ



Map 11 M10 (Minnow River) Spanish heath in red

MR11 Minnow River – MK (Unnamed Tributary)

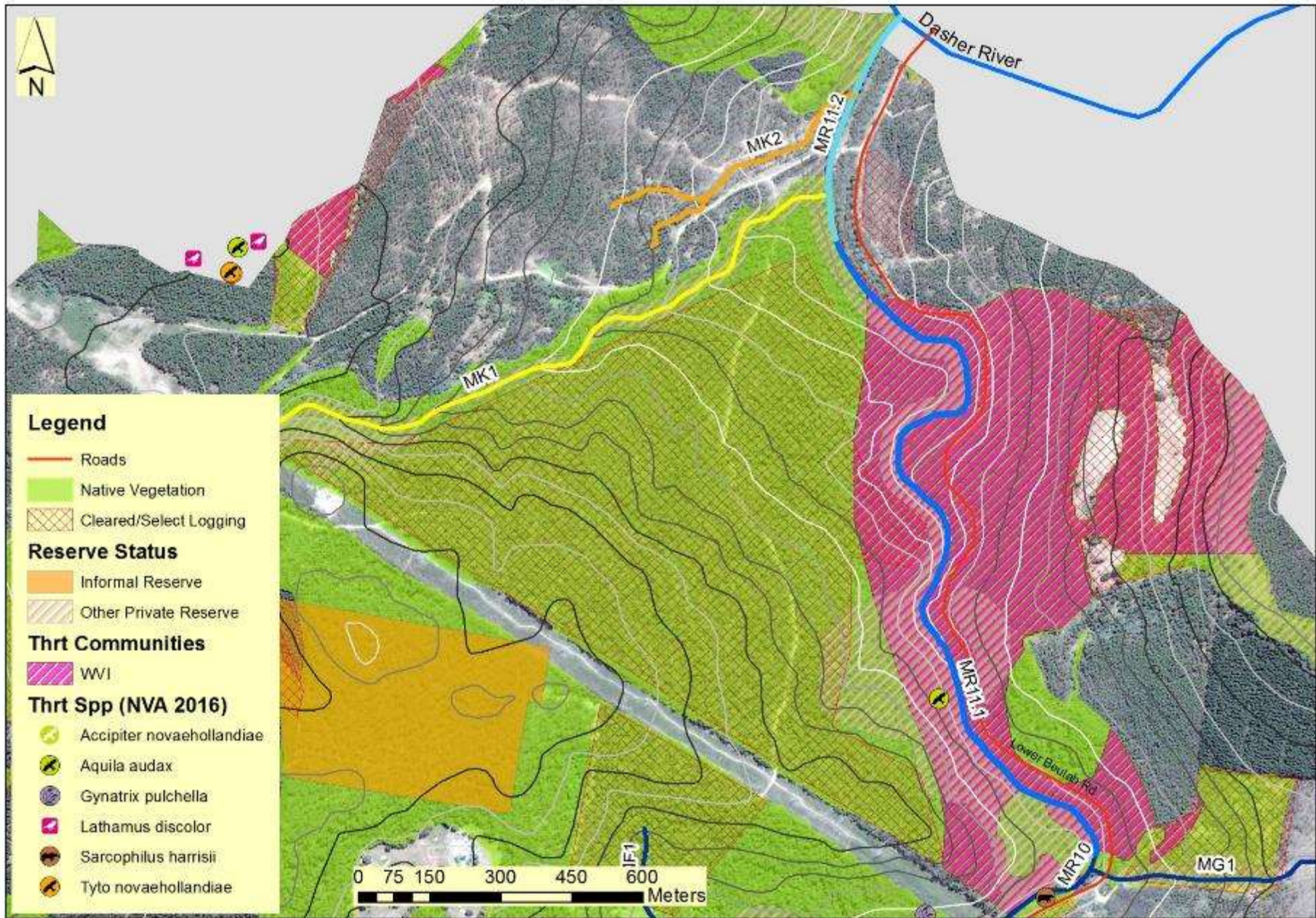
Site Description

The lowest reach in the catchment is divided into two sections. The upper most MR11.1 is confined by a well forested gorge while MR11.2 opens up slightly as a floodplain pocket dominated by plantation *Euc nitens* on both sides of the channel. It then returns to native riparian vegetation where it reaches the confluence with the Dasher River.

Strategic Priorities for Reach

- M11.2 and MK1 - Remove stock from riparian zone.
- Whole of Catchment: Develop and implement a Catchment Weed Plan for the Minnow Catchment including a Hygiene Plan

Reach Code	River style	Site Description	Conservation Values	Issues/Threats	Recommendations	Priority	Status
MR11.1	Gorge	This confined section of river is in good condition with minimal degradation.	High conservation forest. The threatened forest community, Wet <i>Eucalyptus viminalis</i> (WVI) and Wedge-tailed eagle nest are listed on NVA (see Map 12).	<ul style="list-style-type: none"> • Roadside weeds: Blackberry and Spanish Heath 	Roadside Spanish heath control priority. Develop and implement a weed plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP).	Strategic	Private, PR
					Protect high conservation vegetation	High	
MR11.2	Partially Valley Confined Occasional Floodplain	The river emerges from the gorge onto a Floodplain Pocket which is dominated by plantation converted agricultural land. The riparian vegetation condition deteriorates in the agricultural and plantation areas.	Important connectivity location: Linkage between gorge and the confluence with the Dasher River. Potentially highly recoverable.	<ul style="list-style-type: none"> • Unrestricted stock access • Plantation in riparian zone inhibiting native vegetation restoration and limited buffers. • Bank erosion. 	Remove stock from M11.2	Strategic	Private, PR
					Actively revegetation of plantation back to native vegetation on east side (see map). Following next harvest – reinstate a 40 metre buffer on west side.	High	
					Develop and implement a weed plan for the Minnow Catchment (see Priority recommendations for MR9 and MNP)	Strategic	
					Interpretation Signage	Moderate	
MK1-2	undefined tributary	These two small tributaries of M11.2 vary in condition. MK1 has retained its native vegetation cover. MK2 is dominated by plantation – no buffer.	Important connectivity location: MK1 provides an important tributary connection to the lower trunk stream and adjoining remnant vegetation.	<ul style="list-style-type: none"> • Unrestricted stock access 	Remove stock from MK1 riparian zone.	Strategic	Private, PR
					Powerline management should be part of Catchment Weed Management Plan (see Priority recommendations for MR9 and MNP).	Strategic	



Map 12 MR11 (Minnow River) - MK (Unnamed Tributary)