



Review of the Council Rural Road Hierarchy

February 2016



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EXECUTIVE SUMMARY

The City of Ballarat has prepared this report to review the rural road hierarchy.

The review deals with a number of elements including, but not limited to, local access classifications, unsealed roads and strategic routes.

It specifically includes;

- A list of revised definitions for local Access Roads for rural categories.
- Recommended design standards including typical cross sections for the revised definitions suitable for incorporation in the Infrastructure Design Manual.
- Recommended service levels for rural unsealed roads (for each of the defined classifications) expressed in terms of surface material depth and intervention levels to sustain those levels of service.
- A costed routine and periodic maintenance schedule (based on reviewed classifications) for the rural unsealed road network.
- A review of evolutionary changes impacting on the network including functionality, land development, strategic planning and any anomalies or policy misalignment detected in the current Rural Road Hierarchy.
- Recommended variations to the Rural Road Hierarchy for Council consideration.
- Recommended a staged capital improvement program, including costings, for identified road classification upgrades.
- Incorporate proposed changes in an updated Rural Road Hierarchy document suitable for public exhibition and council endorsement.
- An updated policy on sealing of unsealed roads

The review takes into consideration the Road Management Act 2004 which came into operation on 1 July 2004. The Act was developed to provide a more efficient and safer Victorian road network.

The Act is based on the following key principles:

- Clear allocation of road asset ownership and management;
- Established processes and accountabilities for policy decisions and performance standards;
- Provision of operational powers to achieve targets and performance standards; and
- Clarification of civil liability laws for the management of roads.

Under the Act, Council is a Road Authority, and must

- Ensure that a safe and efficient network of roads is provided primarily for travel and transport and that road reserves are available for other appropriate uses.
- May determine the standard to which it will construct, inspect, maintain and repair roadways, pathways, road infrastructure and road related infrastructure.

The City of Ballarat is currently responsible for 356 km of unsealed roads of which 310 km are rural roads. A condition survey of pavement depth of 413 road segments totalling 302 km, shows 52 road segments totalling 19 km rated as 'Failed', and 189 road segments totalling 142 km are rated as 'Poor', all being Local Access Roads. This means that 51.9% of unsealed rural roads are in an unsatisfactory condition.

Feature Type	Total Length (km)	Asset Condition				
		Excellent	Good	Fair	Poor	Failed
RS-Unsealed	302 km	22 km (7%)	37 km (12%)	82 km (27%)	142 km (47%)	19 km (6%)
Total	302 km	22 km	37 km	82 km	142 km	19 km



Council currently provides a measurable Level of Service of its roads that is designed to meet community expectations within legislative requirements and available resources. The condition of unsealed roads needs to meet the Level of Service accepted by the community.

The Level of Service on a road within the network will depend on the function of that road. Roads that serve a transport and mobility function and carry high volumes of passenger and freight vehicles require a higher Level of Service than roads that provide a property access function only. The means of determining the Level of Service for each road is the Road Hierarchy which classifies each road dependent on its traffic and mobility function and its property access function. The road hierarchy was last updated in 2006, and this review recommends some changes to classifications and definitions. In addition, criteria to determine the classification of a road has been developed to make the process more objective. Out of the 310 km of unsealed rural roads, the review identified 70.5 km of roads that could be re-classified reflecting their current use in the hierarchy, leaving 239.5 km of roads classified as Primary Access (new classification) or higher classification.

Each classification within the road hierarchy will have its own design standard to enable the appropriate Level of Service to be delivered according to its function. The City of Ballarat is a member of the Infrastructure Design Manual (IDM) which provides design standards in the form of typical cross sections. In addition Council has some of its own typical cross sections. These design standards are applied to new developments and upgrades of existing roads. In line with the revised classifications and with reference to the IDM, typical cross sections have been developed.

Council's Road Management Plan sets intervention levels for maintenance activities. For unsealed road pavements, potholes, corrugations and loss of pavement material are responsible for the bulk of maintenance resources. Maintenance is carried out primarily on a reactive basis, that is, when intervention levels are met.

Council's current budget for capital maintenance (resheets) for the current financial is \$710,187. The current rate for resheeting is approximately \$33,600 per km, enabling approximately 21.1km of resheeting per annum. The 310 km of unsealed rural roads under the current road hierarchy could be resheeted on average every 14.7 years. The current hierarchy has been reviewed, and 70.5 km of unsealed rural roads have been identified which can be downgraded. At the current rate of resheeting 21.1 km per annum, the remaining 239.5 km could then be resheeted on

average every 11.3 years. The maintenance regime is recommended to be reactive to ensure higher order / higher use roads receive a requisite level of maintenance.

Under the existing hierarchy, 51.9%, or approximately 161 km, of unsealed rural roads have been assessed with a pavement depth condition of Poor or Failed. Under the proposed hierarchy changes recommended in this report, the percentage of Poor or Failed pavement depth condition remains almost unchanged at 51.8%, but the total length of road in this condition is reduced to approximately 124km. It is estimated that a capital injection of \$736,800 (indexed) per annum is required for the next seven years to restore the road network.

Council’s budget for recurrent maintenance of unsealed pavements for the current financial year is \$775,717. It is calculated that the reclassification of 70.5 km of unsealed roads under the proposed hierarchy, can lead to an estimated saving of approximately \$176,413 per annum. This saving should be offset against the additional capital expenditure leaving a net additional expenditure of \$560,387 per annum. As the additional capital expenditure takes effect, there should be a considerable saving in patching and pothole maintenance.

	RURAL (km)
DOWNGRADE	
Primary Access to Secondary	70.5
UPGRADE	
Local Access to Collector	23.5

1 INTRODUCTION

The review deals with a number of elements including, but not limited to, local access classifications, unsealed roads and strategic routes.

It specifically includes;

- A list of revised definitions for Local Access Roads for rural categories.
- Recommended design standards including type cross sections for the revised definitions suitable for incorporation in the Infrastructure Design Manual.
- Recommended service levels for rural unsealed roads (for each of the defined classifications) expressed in terms of surface material depth and intervention levels to sustain those levels of service.
- Reclassification of the rural unsealed road network.
- A review of evolutionary changes impacting on the network including functionality, land development, strategic planning and any anomalies or policy misalignment detected in the current Road Hierarchy.
- Recommend variations to the Road Hierarchy for Council consideration.
- Incorporate proposed changes in an updated Rural Road Hierarchy document suitable for public exhibition.

2 BACKGROUND

The City of Ballarat is located approximately 80 kms west north west of Melbourne and covers an area of 740 km². The urban boundary of the city covers approximately 90 sq km or approximately 12% of the municipality. Ballarat is Victoria's fourth largest city, and fastest growing regional city. The population recorded in the 2011 census was 95,007. The forecast population for 2031 is 128,333, an increase of 35%, or 33,326 from 2011.

The Ballarat West Employment Zone and Urban Growth Zone to the west and south-west of Ballarat will accommodate this growth, along with the designated site for the approved saleyards to the north west of the city.

Western Freeway and Midland Highway pass through the City whilst Sunraysia Highway and Glenelg Highway start within the municipality.

Ballarat is served by Victoria's broad gauge rail network with passenger services to Melbourne, Maryborough and Ararat, and freight services to those locations plus Geelong and Mildura.

Major industries are manufacturing, health, retail, education and construction, comprising approximately 60% of all employment. The agriculture, forestry and fishing sector comprises 10% of total employment, forecast to reduce to 1.5% by 2026.

2.1 THE ROAD NETWORK

2.1.1 General

A road network is a system of roads that connect places to other places within a defined area, i.e. national, state, municipal, regional, urban or rural.

The road network is the primary infrastructure for the movement of people and goods. Most people need to travel to get to work or to conduct business, to attend education or leisure activities. Movement of goods includes both large freight consignments and lighter distribution loads, and the efficiency of their movement affects the cost of goods.

According to Austroads, road transport accounted for 95% of the urban passenger transport task (measured in passenger-kilometres of travel) in Australia in 2003, 74% of the non-urban task and 37% of the domestic freight task (measured in tonne-kilometres (Austroads 2005).

2.1.2 Urban Networks

The following is an extract from Austroads Guide To Traffic Management Part 4: Network Management.

Urban road networks are characterised by significantly higher traffic volumes than rural networks. Analysis of 2003 data (Austroads 2005) shows an urban/rural ratio of around 13:1 averaged across Australia. Further, in urban areas arterial roads comprise 18% of the urban road networks (measured in lane-km of road), but carry almost 72% of the travel. It is not surprising then that the focus of mobility issues in traffic management, particularly congestion management, lies with arterial roads.

2.1.3 Rural Networks

The following is an extract from Austroads Guide to Road Design Part 2

Rural road networks are characterised by lower traffic volumes than urban networks, higher operating speeds, longer average trip lengths, particularly on the arterial road component of the network, lower connectivity (the degree to which streets or areas are interconnected and easily accessible to one another) and lower abutting development density.

Analysis of 2003 data (Austroads 2005) shows that the proportions of travel occurring on rural arterial and rural local roads respectively are similar to those on urban roads, with rural arterials comprising around 16% of the road length but carrying 74% of the rural travel. The significant difference is that the rural traffic densities are, on average, only 8% of the urban densities.

2.1.4 Victoria

The road network in Victoria is comprised of the types of road set out in **Table 2.1.1**.

TABLE 2.1.1 VICTORIAN ROAD NETWORK

Type of Road	Responsible Authority / Organisation	Description
National highways	VicRoads.	The major road routes which connect the state capitals, and nominated major cities and jointly funded by the federal government and the respective state government.
Freeways and arterial roads	VicRoads	Provides a principal route for the movement of people and goods; between major regions, towns, major transport terminals and activity centres of the State, across or around cities; or Is a major route for public transport services; or Has State-wide economic or tourism significance or Provides necessary connections between arterial roads
Municipal roads	Council	Non-state roads that provide access from property to; the arterial network, towns and town centres, and other property connect towns to: other towns, and the arterial network
Non-arterial state roads	Government authorities such as DEPI	A state road that is not a freeway or arterial road.
Toll roads	Private operator	Freeways built and operated as public roads via specific legislation.

2.1.5 Ballarat

Ballarat has an extensive road network incorporating Council controlled / managed roads and major VicRoads managed highways.

Freeways and arterial roads managed by VicRoads within the City of Ballarat shown in **Table 2.1.1**.

TABLE 2.1.1 ARTERIAL ROADS WITHIN CITY OF BALLARAT

Freeways & Highways	Arterial Roads	
Western Fwy (M8)	Ballarat Maryborough Rd (C287)	Norman St (part)
Western Hwy (A8)	Delacombe Wendouree Rd (C307)	Barkly St (part)
Midland Hwy (A300)	Ballarat Burrumbeet Rd (C805)	Grant St
Sunraysia Hwy (B220)	Ballarat Carngham Rd (C296)	
Glenelg Hwy (B160)	Ballarat Daylesford Rd (C292)	
	Drummond St (C305)	
	Ballarat Buninyong Rd (C294)	
	Mt Clear Sebastopol Rd (C295)	

Note: Some arterial roads comprise a number of, and part of roads known by local road names. These are not identified here.

2.2 ROAD MANAGEMENT ACT 2004

2.2.1 The Act

The Road Management Act 2004 came into operation on 1 July 2004. The Act was developed to provide a more efficient and safer Victorian road network, and is the result of extensive stakeholder and community consultation.

The Act is based on the following key principles:

- clear allocation of road asset ownership and management;
- established processes and accountabilities for policy decisions and performance standards;
- provision of operational powers to achieve targets and performance standards; and
- clarification of civil liability laws for the management of roads.

2.2.2 Council is a Road Authority

Council, as a local government authority, is a Road Authority under the Act.

As a road authority, Council;

- Must ensure that a safe and efficient network of roads is provided primarily for travel and transport and that road reserves are available for other appropriate uses.
- May determine the standard to which it will construct, inspect, maintain and repair roadways, pathways, road infrastructure and road related infrastructure. The standard may be determined;
 - as a policy or policy decision, or
 - in a road management plan.

Council has a statutory duty to inspect, maintain and repair a public road for which it is the responsible authority, and must consider the following;

- the character of the road and the type of traffic that could reasonably be expected to use the road;
- the standard of maintenance and repair appropriate for a road of that character used by traffic of that type;
- the state of repair in which a reasonable person would have expected to find a road or infrastructure of that character.

2.3 OPERATION OF THE ROAD MANAGEMENT ACT

2.3.1 Road Management Plan

Council has determined that the standard to which it will construct, inspect, maintain and repair roadways, pathways, road infrastructure and road related infrastructure shall be in a road management plan. The current road management plan is Version 4, dated July 2013. To be reviewed in 2016.

The plan identifies a level of service that meets community expectations, and risk management based on requests, inspection, intervention levels and response.

2.3.2 Road Register

Under the Road Management Act, a road authority must keep a register of public roads specifying the roads in respect of which it is the coordinating road authority.

The register must contain a number of details including (but not limited to);

- the name of each public road or, if a road is unnamed, a description which enables the particular road to be easily identified;
- the classification, if any, of the public road;
- any ancillary areas.

It does not include roads that Council has made a decision that the road is no longer reasonably required for general public use.

Council's road register is a referenced document to the road management plan.

2.3.3 Road Hierarchy

A road network contains roads that provide differing functions, ranging from the primary connection between capital cities to unmade tracks, providing different combinations of mobility and access.

A road hierarchy is a classification system which identifies the function of each road. It provides a basis for establishing the policies which will guide the management of the road, by grouping roads together into categories according to their intended service or qualities. It allows a road authority to set standards, and allocate the resources to construct and maintain an efficient and safe road network.

Austrorads Guide to Traffic Management Part 1 states:

"The mixture of functions met by roads across a network is usually expressed as a functional hierarchy. The basis of a traffic management plan for a road network is the development of an agreed road hierarchy by means of which roads can be classified according to their existing, or their intended, function. Road management to pursue operational, safety or other (e.g. amenity) benefits – by design, traffic management, and/or other remedial action – must take account of the functional hierarchy of roads within the network.

The function of a road is reflected in traffic characteristics such as volume, speed, and mix of vehicular and non-motorised traffic. The function should also be reflected in the physical characteristics of the road, such as formation width, number and width of lanes, proximity and protection of potential hazards.

Roads, generally, are classified on the basis of how they currently operate, but consideration should also be given as to how they are expected or desired to function in the future, in terms of

the relative significance of the traffic function versus the land access function for a particular road, and its desirable operating speeds and traffic volumes.”

Roads provide other functions including for bicycle and pedestrian use.

Within local government authorities, nationally and on a state-wide basis, there is a large variation in road hierarchy classification. Terminology, criteria and levels of hierarchy vary greatly.

2.3.4 Road Segments

A road may vary in its classification as traffic increases or decreases over its length.

Changes in road function usually occur at an intersection as traffic enters or leaves one road, but may occur mid-block, at a major commercial traffic generator, or the last house along a road.

2.3.5 Level of Service

The Level of Service is the defined service quality for a particular activity, i.e. roads, footpaths etc., against which service performance may be measured. Roads of a higher classification will require a higher level of service which may be due to higher traffic volumes, higher vehicle speed, higher commercial traffic volume, or other factors, to reduce the risk to the road authority.

Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost (IPWEA, 2006).

Council has identified and developed its Levels of Service in its Road Management Plan from:

- Acquired knowledge of key infrastructure issues;
- Customer expectations;
- Council’s Policies, Goals and Strategies;
- Legislative requirements and standards; and
- Available resources (funding levels, staffing, asset capacity).

The process of identifying the appropriate Levels of Service has been documented in Council’s Asset Management Strategy.

2.3.6 Inspection and Intervention levels

Council has developed a system set out in the Road Management Plan for assessing risk through a three step process as follows;

1. Inspect the asset.
2. Identify what is outside Intervention Level.
3. Implement the appropriate action within the required response time.

Inspections are classified into three types;

- Reactive Inspections, where council is notified of an incident or event.
- Programmed Defect Inspection, programmed to identify any defects or hazards outside the approved tolerances.
- Programmed Condition Inspections, programmed to identify any deficiencies in the structural integrity of the assets, which if untreated are likely to negatively affect the asset values.

The intervention level is a predetermined value for a foreseeable defect. The response time is based on the hierarchy of the road

The required response time is the maximum time from the time the defect is recorded to the completion of routine maintenance. For some defect types, the response time can be extended by implementing appropriate warnings.

2.3.7 Design Standards

Using the road hierarchy, Council can set design standards that allow each classification of road to fulfil its role in the road network in a safe and efficient manner and, deliver best value to the community.

Council has adopted some typical cross sections which show lane, shoulder, kerb and channel, and footpath widths which provide the basis to design a road. Engineering principles are applied to other elements of a road such as structures, pavement strength, drainage, lighting, signage etc. where conditions may vary from site to site.

3 ROAD HIERARCHY

3.1 REVIEW

It is recommended that the rural road classifications be based on revised definitions and a set of criteria to determine the function of each road.

The criteria to determine the classification of a road is based on:

- Definition of the function of the road
- Measured use - for example, road count and survey data;
- Strategic importance - for example, choosing a preferred route between roads that duplicate each other. In particular, the road categories reflect their usage by passenger vehicles, road freight transport and value in supporting towns, communities, tourism, and business.

The classifications and definitions for the rural road network are shown below in Table 3.1.1.

The criteria used to determine the function of a road are set out in Table 3.1.2.

The values or requirements of each criteria are set out in Table 3.1.3.

TABLE 3.1.1 DEFINITIONS TO BALLARAT RURAL ROAD HIERARCHY

Road Classification	Definition
RURAL	
Arterial Road	Not Applicable - These roads are the responsibility of other Road Authority and are not included in the hierarchy
Link Road	Roads other than arterial roads that link significant destinations ¹ and are designed for efficient movement of people and goods between and within regions. Also provide property access ² . Link Roads may consist of a number of roads which form a route.
Collector Road	Roads other than arterial or link roads that connect a substantial number of local roads and streets to higher order roads, or to significant destinations, and provide property access and movement of traffic within local areas.
Primary Access Road	Roads other than arterial, link or collector roads, that provide access to the street address of occupied properties ³ .
Secondary Access Rd	Roads other than arterial, link, collector or primary access roads that provide access to properties other than to the street address, or access to non-occupied abutting properties ⁴ .
Ancillary Area	An area of land owned or managed by the coordinating road authority to be maintained by a responsible road authority as ancillary to a public road; Includes shared pedestrian / vehicle access roads, car parks, rest areas, scenic lookouts and car parking areas, and indented bus stop on arterial road that are separated from the carriageway by a kerb.
Track (Unformed Road)	A road reserve that may have an unconstructed path created by occasional vehicles
Unused Road Reserve	Road reserve that is unmade and unused, but not declared.
Declared Unused	Road reserve that is declared unused. Responsibility reverts to DEPI (may be leased)

Notes:

1. Significant destinations include aerial roads, towns, major tourist attractions, and places of significance (usually significant traffic generators i.e. CBD's, universities, major hospitals).
2. Property means an area of land with its own title.
3. Occupied property means a property which is occupied for residential purposes or commercial purposes where workers attend for work on a number of days per week bases.
4. Non-occupied means a property which is not occupied for residential purposes or commercial purposes where workers attend for work on a number of days per week bases.

TABLE 3.1.2 ROAD HIERARCHY CRITERIA DEFINITIONS

Criteria	Definition
Primary Criteria: A road, or road section, must meet all of these criteria to qualify for the category.	
Degree of Connectivity	The strategic network importance of a road based on an assessment of the destination to destination capability of a road. Higher level destinations include high population centres (cities, large towns), CBD's, major facilities, and freeways and major arterial roads. Lower level destinations, include non-residential areas (farm paddocks, forest tracks, etc), no-through road residential streets etc.
Predominant Purpose	Whether the road serves a traffic movement or property access purpose. A road authority may determine that one of a group of similar roads serve a higher (or lower) traffic movement function and be funded accordingly.
Secondary Criteria Used as indicators of the likely characteristics of a road designated under a particular road type. Ideally, a road should have all of these characteristics, but it is recognised that is unlikely to occur in a number of instances, particularly for traffic volumes in rural areas.	
Traffic Volume	24 Hour traffic volume on a road
CVpd	Commercial traffic volume per day. Pavement design is based on "Equivalent Standard Axles" of 8.2 Tonne per axle.
Destination	Rural Destinations include towns with a minimum population of 200, major tourist attractions and places of significance.
All-weather surface	A sealed or unsealed granular pavement that is trafficable in all weather conditions
Bus Route	A road that is designated for use by public transport buses, including school buses
Intersecting Roads	The number of intersecting roads along a road or route, which indicates its ability to distribute traffic to other roads
Intersection Treatment	Generally sets out the priority of a road over another road of a different classification, and Statcon treatment (Stop/Give Way)
Higher Mass Limit or B-double route	A road that is a gazetted arterial and municipal roads suitable for Higher Mass Limits or, Class 2 B-Doubles and Class 3 B-Doubles operating under Victoria's Livestock Loading Scheme, as shown on maps available from VicRoads. Also includes local roads that Council may issue a permit for the use of such a vehicle.
Availability of alternative route	The availability of to access an equivalent road in the event of a temporary road closure
Impact to community if road temporarily closed	A broad description of the impact on the community in the event of a road closure

TABLE 3.1.3 ROAD HIERARCHY CRITERIA VALUES

Criteria		Link	Collector	Primary Access ³	Secondary Access	Track
Primary Criteria¹						
Degree of Connectivity		Roads linking significant destinations ⁴	Roads that connect local roads and streets to higher order roads.			
Predominant Purpose		Efficient movement of people and goods between and within regions.	Property access and movement of traffic within local areas.	Primary vehicle access to abutting occupied properties.	Access to abutting properties other than the primary access, or access to non-occupied abutting properties	Used by occasional vehicles.
Secondary Criteria²						
Traffic Volume ⁵	Rural	> 800	80 – 800 ⁶	5 - 80 ⁶	2 - 5	≤ 1
CVpd	Rural	> 80	20 - 80	< 20	NA	NA
Destination ⁴		To and From Significant Destination	To Significant Destination	Not Required	Not Required	Not Required
Through traffic		Always	Usually	Sometimes	Rarely	Never
All weather surface		Always	Always	Always	Sometimes	Never
Bus Route		Usually	Usually	Sometimes	Never	Never
Intersecting Roads		Many	Many	Some	Few	NA
Intersection Treatment		Controlled - priority route, allows commercial movements	Controlled - priority route	Controlled	Minor measures	Uncontrolled
Higher Mass Limit or B-double route		Yes, where current road conditions permit	Possible, Commercial source to nearest link or arterial	Exceptional circumstances	Never	NA
Availability of alternative route		Usually significant or complex detour.	Local detour usually available	Easy. If no through road, alternative access may not be available	Usually none	Not required
Impact to community if road temporarily closed		Major	Moderate	Minor	Insignificant	None

Notes to Table 3.1.3.

- The type designated to each road should represent the role that the road is intended to perform. It may not necessarily reflect the current conditions on the road.
 - 'Unused Road Reserve' and 'Declared Unused' are not included as there are no selection criteria other than meeting the definition.
1. Primary Criteria: A road, or road section, must meet all of these criteria to qualify for the category.
 2. Secondary Criteria: Criteria used as indicators of the likely characteristics of a road designated under a particular road type. Ideally, a road should have all of these characteristics, but it is recognised that is unlikely to occur in a number of instances, particularly for traffic volumes in rural areas.
 3. A route of minimum Primary Access standard must be provided to all occupied residential and commercial premises that operate normal working hours, from a higher order road.
 4. Destinations are significant destinations;
 - Rural Destinations include towns with a minimum population of 200, major tourist attractions and places of significance.
 5. Traffic volumes are based on City of Ballarat traffic volumes and patterns. Note that the volumes differ to IDM classification volumes in part due to IDM applying to a design network with little or no consideration to a long established network.
 6. Note Council's application of the adopted policy in respect to sealing gravel roads is not reliant on a collector road meeting maximum traffic volumes (i.e. 800 vehicles per day). Sealing of gravel roads will be determined based on specifics of the adopted policy.

3.2 ‘TRACKS’

3.2.1 General

Under the Local Government Act, Councils have the care and management of—

- all public highways vested in the Council,
- all roads subject of a Council declaration that the roads are reasonably required for public use to be open to public traffic.,
- all public highways on Crown land and roads vested in a Minister (other than freeways and arterial roads and public highways and roads vested in a public authority),
- all roads that the Council has agreed to have the care and management of.

Under the Road Management Act, a road authority must keep a register of public roads specifying the roads in respect of which it is the coordinating road authority.

In addition, under the Act, a road authority must remove a road from its register of public roads if the road authority has made a decision that the road is no longer reasonably required for general public use.

3.2.1.1 Public Road

A Public Road is a road which the road authority has made a decision that the road is reasonably required for general public use.

3.2.1.2 Public Highway

A Public Highway is any area of land that is a highway for the purposes of the common law. At common law, it is a way over which all members of the public have a right to pass and re-pass and therefore includes a footpath over which the public right of passage is on foot.

3.2.2 Fire Access Tracks

The road hierarchy classification ‘Track’ should not be confused with the use of the classification of ‘Fire Access Track’ by other road authorities. Council has no legal obligation to provide and maintain fire access tracks.

The Country Fire Authority website states;

“Fire access roads should be planned to overcome deficiencies in the permanent road network. They should facilitate a rapid and concentrated response to areas where the application of these two principles will be critical to early containment of an outbreak of fire, and where road access is limited and off road operation of two wheel drive firefighting vehicles would be difficult.”

If Council elects to maintain roads for the purpose of fire fighting vehicle access as a community service, that particular function should be attached to that road in the road register, and not as a separate hierarchal class.

A definition for Fire Access Track should be included in Council’s Road Management Plan. It should be noted that;

- all constructed roads should provide fire access, but some narrow Local Access Roads may not allow large vehicles past parked cars for example..
- DEPI is the responsible authority for providing fire-fighting access to Crown land.

Funding is available to municipalities under the Fire Access Road Subsidy Scheme Subsidies for the construction and maintenance of fire access roads or construction of static water supplies. The

scheme is a State Government funded subsidy scheme administered by CFA, and funding is provided annually.

3.3 PROPERTY DEVELOPMENT

Where a residence or commercial development is proposed resulting in the re-classification of a road, the developer should meet the cost of upgrading that road, if required, to a higher design standard.

In rural areas, it is common for a house located at the intersection of two roads to have the vehicle entrance from the side road. For existing properties, the status quo should remain, whilst for new developments, the developer should meet the cost of upgrading the road to Primary Access where required.

3.4 CHANGING THE CLASSIFICATION OF A ROAD

The classification of roads should be reviewed as circumstances changes and different criteria are met. This step should be applied equally to upgrading the status of a road, as well as downgrading. Review of road classifications will be undertaken on a 2 yearly basis.

A further review of rural roads may be required to upgrade / downgrade roads to provide a structured network, as opposed to 'shortest route' to provide the most cost effective, but service based, network.

It is important that road segments reflect the function of a road, and if necessary, a road segment may end mid-block.

Recommendations:

- i. Road hierarchy classifications be amended to Link, Collector, Primary Access, Secondary Access, Ancillary Area and Track.
- ii. The definitions for road hierarchy classifications shown in Tables 3.1.1 and 3.1.2 be adopted
- iii. 'Track' be included in Council's road hierarchy as a classification. Tracks are not recorded in the Road Register.
- iv. The selection criteria to determine a road's classification, shown in Table 3.1.3 be adopted.

4 DESIGN STANDARDS INCLUDING TYPE CROSS SECTIONS

4.1 DESIGN CONSIDERATIONS

Design standards provide the minimum criteria that allow a safe and efficient road network to be developed. Funding for road construction and maintenance is limited and it is imperative that the constructed form of the road reflects its classification under the road hierarchy. Therefore, the design of a road must address its function in regards to the traffic movement / mobility function and the access function.

Typical cross sections show lane, shoulder, kerb and channel, and footpath widths which provide the basis on which to design a road. Engineering principles, provided in a range of technical journals and texts, are applied to other elements of a road such as structures, pavement strength, drainage, lighting, signage etc. where conditions may vary from site to site.

TABLE 4.1.1 PROPOSED BCC CLASSIFICATIONS AND EQUIVALENT IDM CLASSIFICATIONS

	Proposed Ballarat Classification	IDM Classification
	Link Road	Rural Living Collector Road <i>(only if connecting significant destinations)</i>
RURAL ROADS	Collector Road	Rural Living Collector Road Low Density Residential Collector Road
	Primary Access Road	Rural Living Access Road Rural Living or Low Density Residential Low Density Residential Access Road Court Bowls Rural Access
	Secondary Access Road	<i>No classification</i>
	Ancillary Area	<i>No classification</i>
	Path	<i>No classification</i>
	Track	<i>No classification</i>

4.2 BUS ROUTES

In addition to IDM and BCC typical cross sections, the Department of Transport (DOT) publication “Public Transport: Guidelines for Land Use and Development” specifies lane widths for roads carrying buses as part of the public transport network.

Bus routes are independent of the local road network hierarchy. For example, the Ballarat bus network currently operates on Arterial, Link, Collector and Local Access Roads.

Where buses run on local roads, the DOT cross section should be adopted where practicable.

TABLE 4.3.2 PROPOSED TYPICAL CROSS SECTIONS - RURAL

Proposed Classification	Ballarat	IDM Classification	Sealed Width (m) ¹	Shoulder (no. x width) (m) ¹	Total Pavement Width (m) ¹	Reserve Width (m) ¹	Recommended IDM Typical Cross Section Dwg	Comments
Link Road		Rural Living Collector Road <i>(only if connecting significant destinations)</i>	2 x TL (3.5) ²	2 x 1.5	10.0	20.0	None	Develop new drawing
Collector Road		Rural Living Collector Road Low Density Residential Collector Road	2 x TL (3.1)	2 x 1.5	9.2	20.0	SD 620 Rural Living Collector	
Primary Access Road		Rural Living Access Road Rural Living or Low Density Residential Low Density Residential Access Road Court Bowls Rural Access	0-50 vpd 4.0m gravel 51-150 vpd 4.0m seal 151vpd + 6.2m seal	2 x 1.5 2 x 1.5 2 x 1.5	7.0 7.0 9.2	20.0	SD 615 Rural Access – Group A Councils	
Secondary Access Road		<i>No classification</i>	NA	No new development	No new development			
Ancillary Area		<i>No classification</i>	To suit function of area					
Path		<i>No classification</i>						
Track		<i>No classification</i>	NA	No new development				

1 Road design widths proposed are minimum widths.

2 3.5 m traffic lanes as Link Roads are freight routes

4.3 RECOMMENDATIONS

- i. Council continue to use the IDM with the following amendments.
 - For Rural Link Road, adopt proposed cross section as per drawing 'Rural Link Rd' in Appendix A

4.4 GENERAL

The level of service that Council provides to the community must address community expectations including quality, reliability, safety, responsiveness, quantity, accessibility and cost.

The Australian Road Research Board (ARRB) Unsealed Roads Manual: Guidelines to Good Practice is an excellent publication that provides a good technical basis for the design and maintenance of unsealed roads. The following extract explains in simple terms, the need for gravel roads.

*"In using the Manual, it is **essential** that the reader bear in mind that unsealed roads are, by definition, a compromise between resources, needs and quality. In a country as large and sparsely populated as Australia, and similarly in New Zealand, it is impossible to construct sealed roads wherever people wish to drive. Where the economic choice is between unsealed roads and nothing, the former is clearly preferable."*

Unsealed roads are subject to much greater wear and tear, and degradation than sealed roads. They are cheaper to construct and maintain for low traffic volumes than sealed roads however, maintenance costs increase as traffic volumes increase. Council's Unsealed Roads Policy sets out a procedure to rank the priority for sealing unsealed roads.

A number of factors will affect the performance of an unsealed road, including;

- Depth of material
- Type of material
- Soil type
- Drainage
- Traffic volume
- Type of traffic
- Vehicle speed
- Vertical alignment
- Horizontal alignment
- Level of maintenance
- Climatic conditions
- Bridges and bridge approaches

Council has adopted Sealing of Unsealed Roads Policy, to assist in determining if a road warrants sealing. Under the policy, a review will be carried out every 2 years. The current policy was last updated in August 2005.

This policy has been reviewed and is attached as Appendix B to this document. This policy recommends a revision of the traffic volumes for the consideration of sealing an unsealed road from 500 vehicles per day to 250 vehicles per day.

4.5 PAVEMENT

4.5.1 General

A variety of materials are used for gravel road construction within the municipality, including local gravels, granitic sands and crushed rock.

The level of service of an unsealed road is affected by a number of factors including rough and uneven surfaces such as corrugations and potholes, skid resistance, crossfall and dust creation etc.. Roads constructed of poor materials may be more prone to loss of shape, corrugations, rutting, or becoming slippery when wet. Dirt roads are typically suitable as dry weather roads only.

Four factors have the greatest effect on the performance of an unsealed road; traffic volume, vehicle speed, and number of commercial vehicles, and topography.

Unsealed rural roads with the same traffic volume as unsealed urban roads deteriorate faster due to higher vehicle speeds. As a consequence, maintenance of rural roads is more intensive than urban roads.

Link, Collector and Primary Access Roads must provide all weather access to property as described in **Table 3.1.3**. Rural Secondary Access Roads are typically farm access only, and can be dry weather roads only. This will vary depending on land use and climatic conditions.

Council is currently resheeting with a blend of locally available granitic sand and crushed rock which provides a hard wearing gravel surface, with a PI (plasticity index) that minimises dust generation. Crushed rock is expensive but it is considered the blend provides a good surface for unsealed roads.

4.5.2 Pavement Depth

The specified depth of pavement will vary depending on the function of the road, and the conditions, and the performance of different pavement materials will vary depending on factors identified in Section 5.1. Roads carrying a high volume of commercial or heavy traffic, typically Link and Collector Roads, require greater depth of pavement to provide the necessary strength. Those roads are also subject to faster degradation through the formation of corrugations and potholes.

Figure 3.2 (copied below) of the ARRB Unsealed Roads Manual provides a table that shows recommended pavement depths based on traffic volumes and CBR.

➔ Industrial Standard – Depth of payment to meet use characteristics

4.6 RECOMMENDATIONS

- i. Adopt new standard.
- ii. The maximum and minimum pavement depths, and pavement condition criteria set industry best practice.
- iii.

TABLE 5.2.1 RECOMMENDED UNSEALED ROAD PAVEMENT DEPTHS

Road Hierarchy Classification	Maximum Pavement Depth ¹ (mm)	Minimum Pavement Depth ² (mm)	Excellent (mm)	Good (mm)	Fair (mm)	Poor (mm)	Failed (mm)	
RURAL ROADS	Link Road ³	225	100	200+	150 - 200	100 - 150	50 - 100	<50
	Collector Road	175	75	150+	125 - 150	75 - 125	50 - 75	<50
	Primary Access Road	150	75	125+	100 - 125	75 - 100	50 - 75	<50
	Secondary Access Road ⁴	0	0	50+	0 - 50	NA	NA	NA
	Ancillary Area	Varies according to function						
	Track	0	0	NA				

1. Determined from ARRB Unsealed Roads Manual Figure 3.2
2. Minimum depth where damage to subgrade will be minimal if intervention level is reached.
3. Rural Link Roads are subject to high speed, heavy traffic. Corners and steep gradients can be subject to severe corrugations.
4. The minimum standard for Rural Secondary Access Roads should be a formed, dry weather road only, providing farm access. These roads are still subject to maintenance by Council. Landowners requiring all weather Rural Secondary Access Roads should pay for construction (if not currently constructed) and maintenance, and resheeting.

5 RECLASSIFICATION OF THE UNSEALED ROAD NETWORK

A desktop review of the unsealed roads within the city was carried out and a comparison made between the existing hierarchy and proposed hierarchy, with reference to the selection criteria in Table 3.6.1.

For the purposes of the review, the roads with the current classifications have been assessed with the equivalent classification under the revised hierarchy as shown in **Table 6.1**

TABLE 6.1 EQUIVALENT CLASSIFICATION FOR PROPOSED HIERARCHY

Current Classification	Proposed Equivalent Classification
Arterial Road	Arterial Road
Link Road	Link Road
Collector Road	Collector Road
Access Road	Primary Access
Laneways	Secondary Access
Off Street Parking	Ancillary Area
Unmade Natural Surface	Track

The review reclassifies 188 road segments, with approximately 86 km of unsealed road currently classified as Local Access Road downgraded to the new classification of Secondary Access Road or Track.

The outcome for Council is to reduce costs by

- reducing the amount of maintenance grading required,
- extending the response time once intervention level is reached,
- reducing the need for resheets.

If the proposed hierarchy is adopted, the resultant cost savings can then be better directed to maintain and improve a smaller number of roads.

Due to the condition of, and the cost to restore the unsealed rural road network, it is extremely important that Council provide the most cost effective network possible. The re-classification of roads contributes significantly in achieving this aim.

5.1 RECOMMENDATIONS

That the proposed reclassification of approximately 86 km of unsealed road currently classified as Local Access Road to the new classification of Secondary Access Road or Track will be adopted.

5.2 CONDITION SURVEY

Council has carried out a condition survey of the unsealed rural road network. The survey has investigated the depth of pavement material and assessed each road segment as Excellent, Good, Fair, Poor or Failed. The results of the survey on rural unsealed roads are shown in **Table 7.6.1**, and **Figure 7.6.1**.

TABLE 7.6.1 PAVEMENT DEPTH CONDITION OF RURAL UNSEALED ROADS UNDER EXISTING ROAD HIERARCHY

Feature Type	Total Length (km)	Asset Condition				
		Excellent	Good	Fair	Poor	Failed
RS-Unsealed	302 km	22 km (7%)	37 km (12%)	82 km (27%)	142 km (47%)	19 km (6%)
Total	302 km	22 km	37 km	82 km	142 km	19 km

FIGURE 7.6.1 PAVEMENT DEPTH CONDITION OF RURAL UNSEALED ROADS UNDER EXISTING ROAD HIERARCHY



Note: The Pavement Depth condition is a measure of pavement depth only, and does not indicate the Level of Service provided. Level of Service is generally measured by ride quality. A road with Poor pavement depth can provide the required Level of Service, but it will require higher maintenance

Under the existing hierarchy, 51.9%, or approximately 161 km, of assessed unsealed rural roads have a pavement depth condition of Poor or Failed as shown in Table 7.6.1 and Figure 7.6.1.

Table 7.6.2 and Figure 7.6.2 show the condition rating under the proposed hierarchy changes recommended in this report, where the percentage of Poor or Failed pavement depth condition remains almost unchanged at 51.8%, but the total length of road in this condition is reduced to approximately 124km.

TABLE 7.6.2 PAVEMENT DEPTH CONDITION OF RURAL UNSEALED ROADS AFTER HIERARCHY REVIEW

Feature Type	Total Length (km)	Asset Condition				
		Excellent	Good	Fair	Poor	Failed
RS-Unsealed	232 km	22 km (9%)	29 km (12%)	59 km (25%)	109 km (47%)	15 km (6%)
Total	232 km	22 km	29 km	59 km	109 km	15 km

FIGURE 7.6.2 PAVEMENT DEPTH CONDITION OF RURAL UNSEALED ROADS AFTER HIERARCHY REVIEW



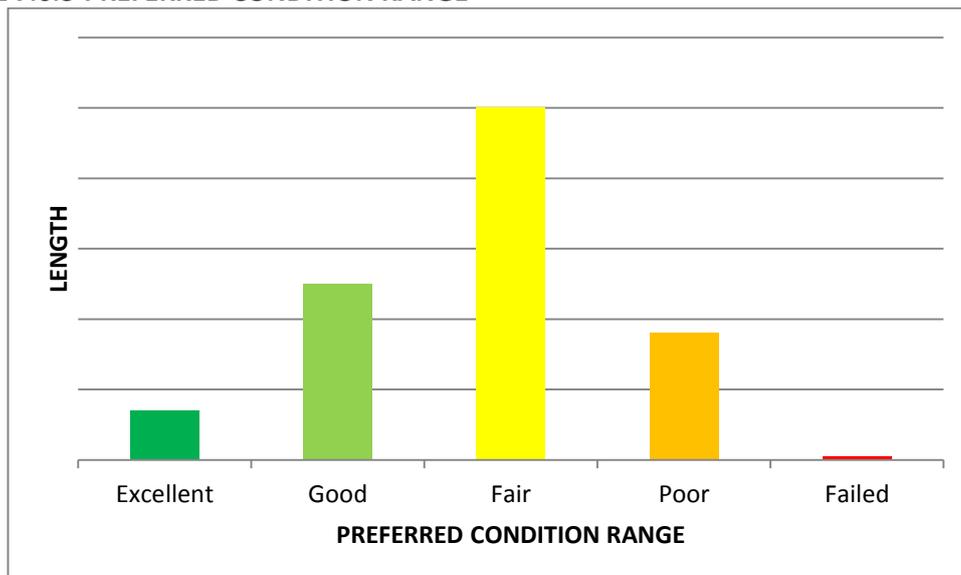
The amount of roads in Poor and Failed condition should not exceed the total length that can be resheeted or effectively maintained within, the following three years, otherwise subgrade damage can occur when the pavement reaches Failed condition greatly increasing costs. Figures 7.6.1 and 7.6.2 indicate a substantial problem with the pavement depth condition within the municipality.

Assuming pavement material loss is linear versus time, and the resheet cycle is 15 years, then a road will move into the next lowest rating on average every three years. Based on the proposed hierarchy, that means within three years, it can be expected that up to 54.5 km of road (half of 109 km) in 'Poor' condition will reach a 'Failed' condition, in addition to the 15 km already in 'Failed' condition. In seven years, it can be assumed that nearly all of the roads currently in Poor and Failed condition, plus half of the roads in 'Fair' condition, totalling 153.5 km, will have, or be reaching, a 'Failed' condition. This assumption excludes patching and potholing maintenance, but under current practices, patching and potholing costs will only escalate in an attempt to prevent the aforementioned roads reaching a 'Failed' condition.

These assumptions also exclude roads that have not been assessed. The inclusion of those roads will worsen the outcomes of these assumptions.

The preferred shape of a graph showing pavement depth condition is shown in **Table 7.6.3**

TABLE 7.6.3 PREFERRED CONDITION RANGE



The graph is based on;

- a small percentage having Excellent pavement depth, being roads that have been resheeted in say, the previous two years;

- a larger percentage having Good pavement depth, those roads being resheeted from in the previous two to six years;
- the biggest percentage having Fair pavement depth, those roads having been resheeted in the previous six to fourteen years, and well maintained;
- a small percentage having Poor pavement depth, those roads coming to the end of a resheet life, and where there is insufficient material to effectively maintain the road
- No roads with a Failed condition

To address the Poor and Failed condition roads under the revised hierarchy;

- 69.5 km of roads should be resheeted within the next three years, and
- 153.5 km of roads should be resheeted within the next seven years.

This means that 21.9 km of road should be resheeted per annum for the next seven years.

Whilst this addresses the Poor and Failed roads, it is important that Council maintain the remainder of the network to ensure that those roads do not become Poor or Failed.

It is recommended that the existing capital budget be retained to continue resheeting high traffic volume roads that are in Fair condition, and a program implemented to inject additional monies spent restoring roads that are in Poor or Failed condition. The additional monies required each year is 21.9 km x \$33,600 per km = \$735,800. It is also recommended that the additional monies be allocated for three years with the option to extend to seven years. A pavement depth condition survey should be carried out to evaluate the program after the initial three years.

5.3 COSTS

Over the last 3 years Council has increased its annual rural gravel road renewal (resheet) to \$710,000 from a low base of \$240,000 in 2012. With the proposed downgrades of road to secondary access Council will be able to meet its desired renewal schedule of each road every 10 years. Maintenance savings from these downgrades will enable a holistic maintenance program that will maintain the desired service level.

Annual condition inspections to analysis the effect of the hierarchy changes and assist with the prioritisation of the renewal program should be funded.

5.4 RECOMMENDATIONS

- I. Review the performance of pavement materials to determine best value to Council and the community.
- II. Formalise the recording of maintenance activities and costs incurred by Council's operations staff.
- III. Adopt the 2016 policy on sealing of gravel roads (Refer Appendix A) to inform all future decisions in respect to sealing gravel roads.
- IV. Review the program after three years.
- V. Allocate funding for unsealed road condition inspections. Inspections to include:
 - Materials of construction.
 - Condition of pavement, shoulders, ancillary drainage.
 - Topography.
 - Vehicles per day.
 - Road classification.
 - Complaints received from the public.
 - Number of properties served, connectivity.
 - Dust.

GLOSSARY

ADT	Average Daily Traffic volume
ARRB	Australian Road Research Board
AUSTROADS	An organisation representing the six state and two territory road transport and traffic authorities, the Commonwealth Department of Infrastructure, Transport, Regional Development and Local Government, the Australian Local Government Association, and New Zealand Transport Agency.
CBR	California Bearing Ratio. A test that measures the stiffness of a soil
CFA	Country fire Authority
CV	Commercial Vehicle
DEPI	Department of Environment and Primary Industries
ESA	Equivalent Standard Axle defined as a Dual Tyred Single Axle transmitting a load of 80kN (or 8.2 tonne) to the pavement.
LGA	Local Government Authority
NAASRA	National Association of Australian State Road Authorities
vpd	Vehicles per day

REFERENCES

Road Management Act 2004

Code of Practice for Road Management Plans

VicRoads Fact Sheet: The Road Management Act - at a glance for Local Government Authorities

Ballarat City Council

Infrastructure Design Manual

Department of Planning and Community Development – website

IPWEA

Austrroads

- Guide to Traffic Management Parts 1 & 4
- Guide to Road Design Part 2

Australian Road Research Board (ARRB) Unsealed Roads Manual: Guidelines to Good Practice

Ballarat Economic Strategy 2010 - 2014 (SGS Economics and Planning 2010)

Ballarat West Local Structure Plan – Transport Infrastructure Planning Strategy (Grogan and Richards 2007)

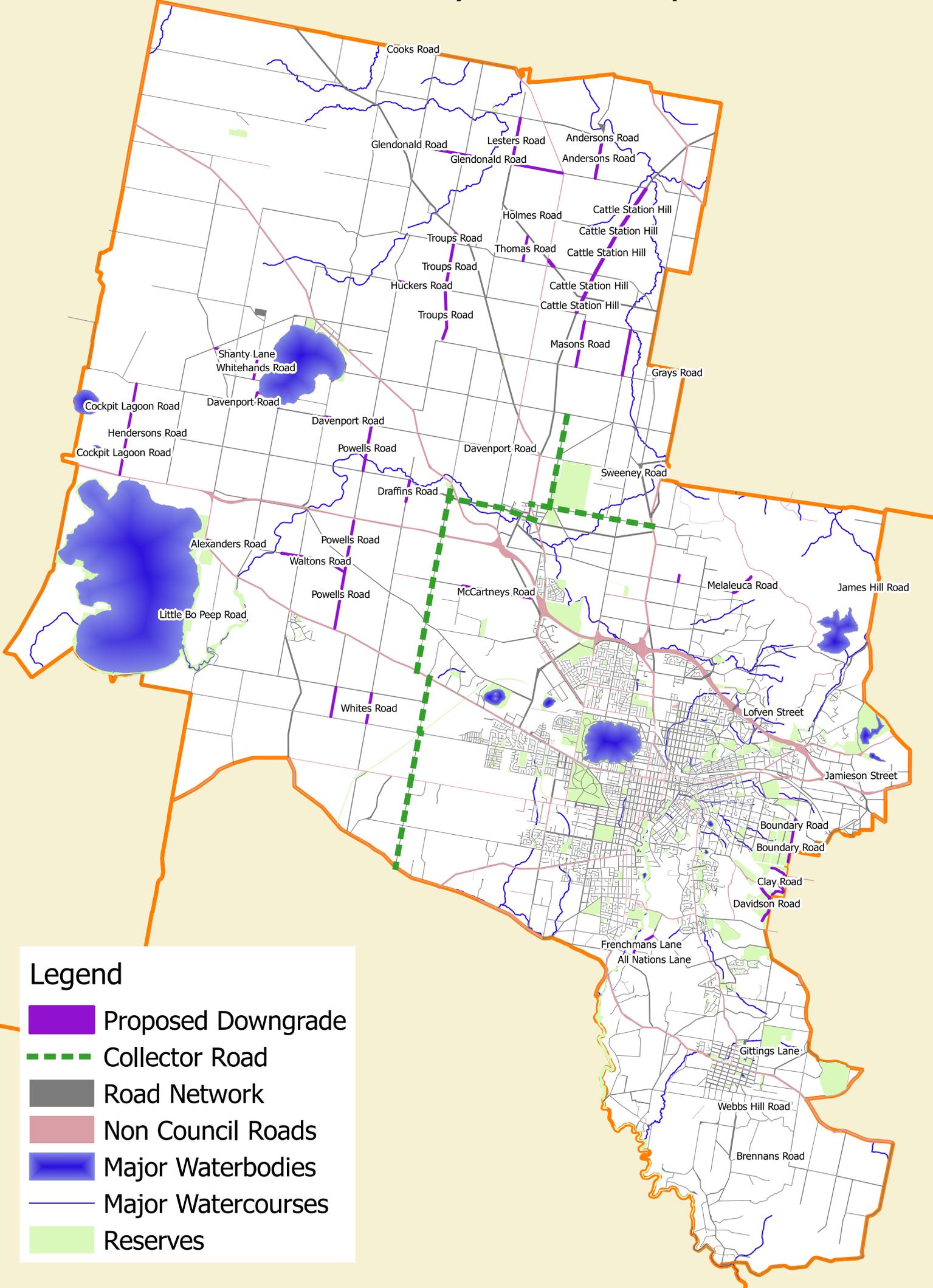
Alfredton West Precinct Structure Plan (Integra 2011)

Ballarat Road Transport Strategy (Ratio Consultants 2007)

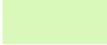
Ballarat Bicycle Strategy

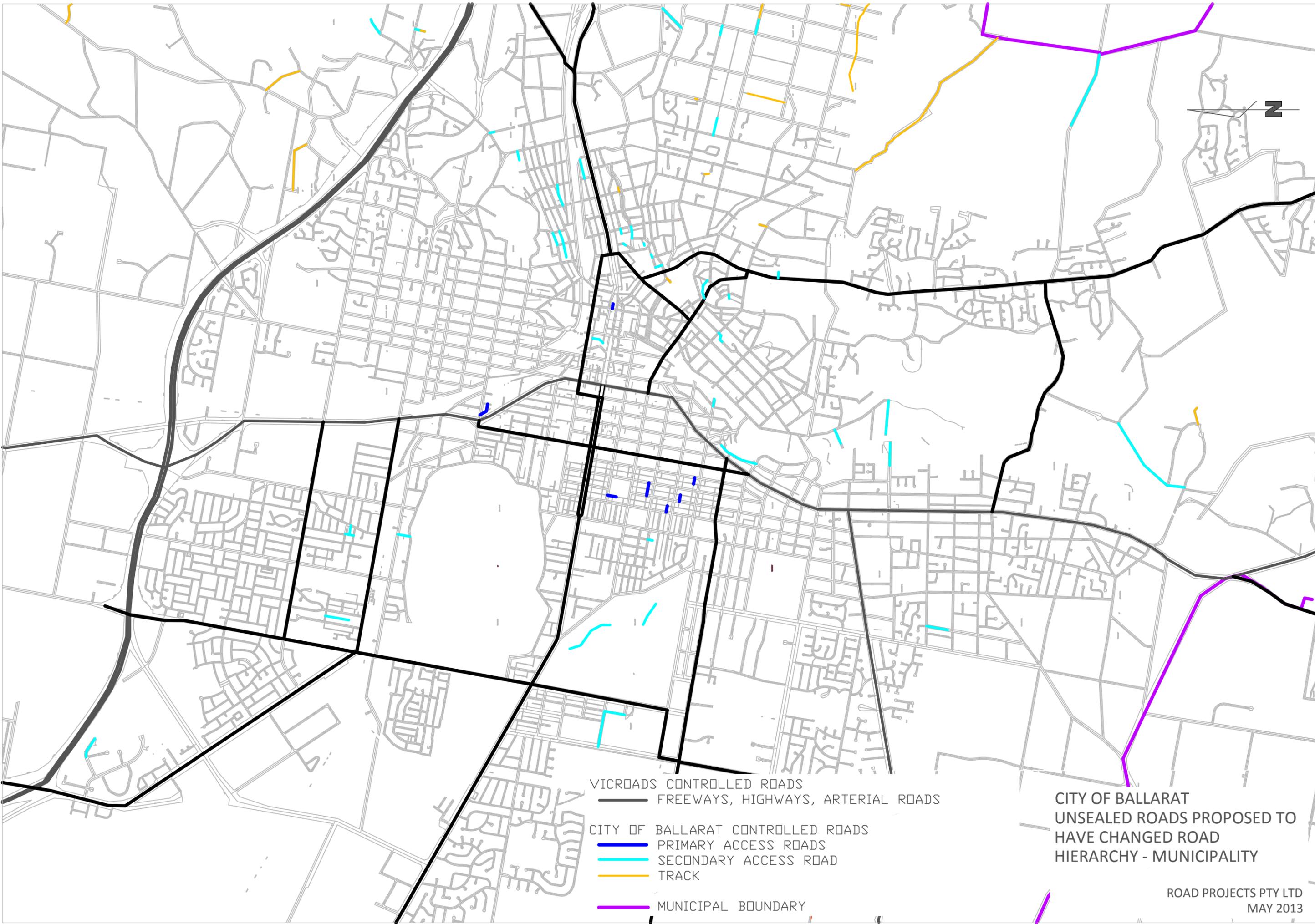
APPENDICES

Road Hierarchy Review Map



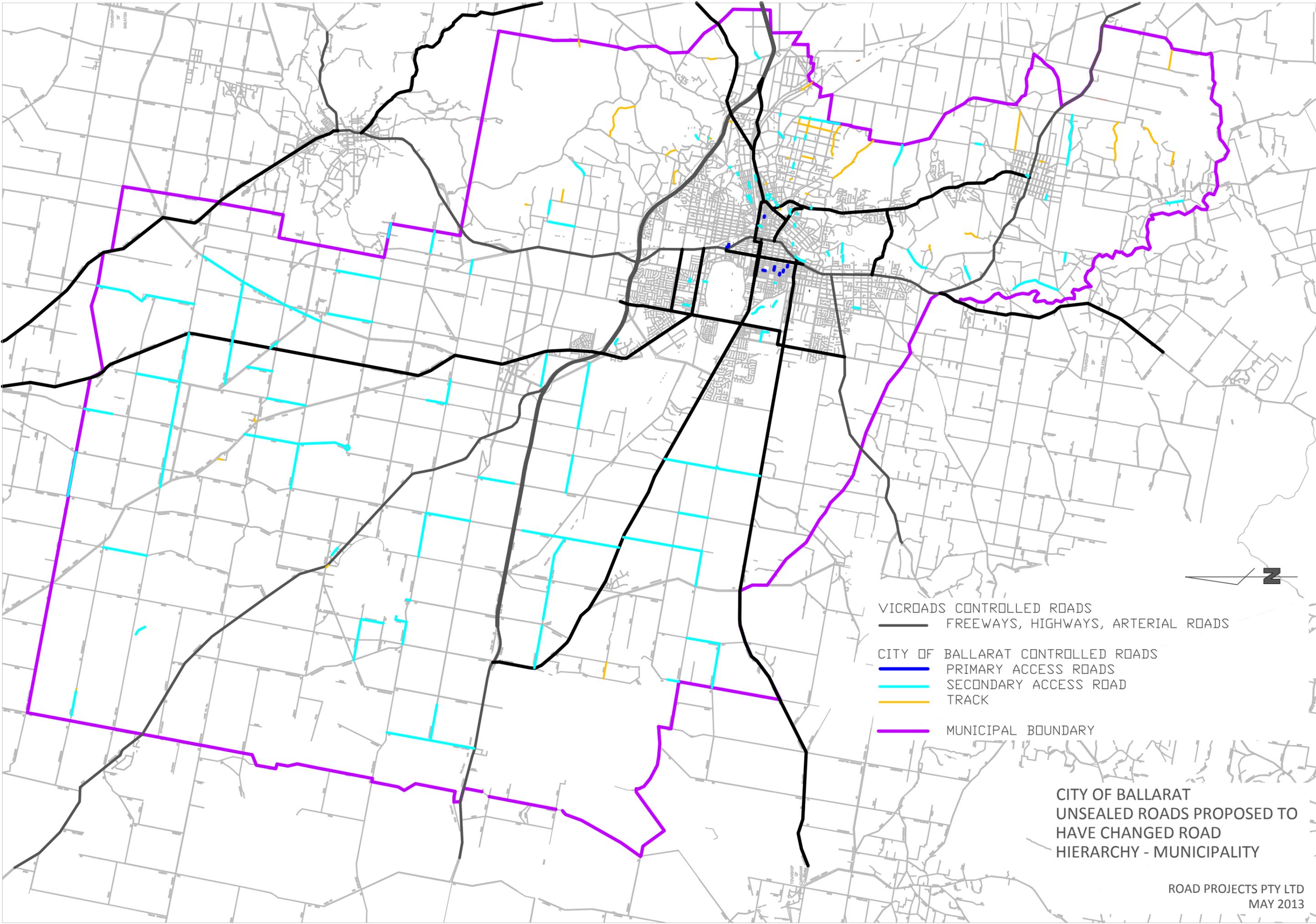
Legend

-  Proposed Downgrade
-  Collector Road
-  Road Network
-  Non Council Roads
-  Major Waterbodies
-  Major Watercourses
-  Reserves



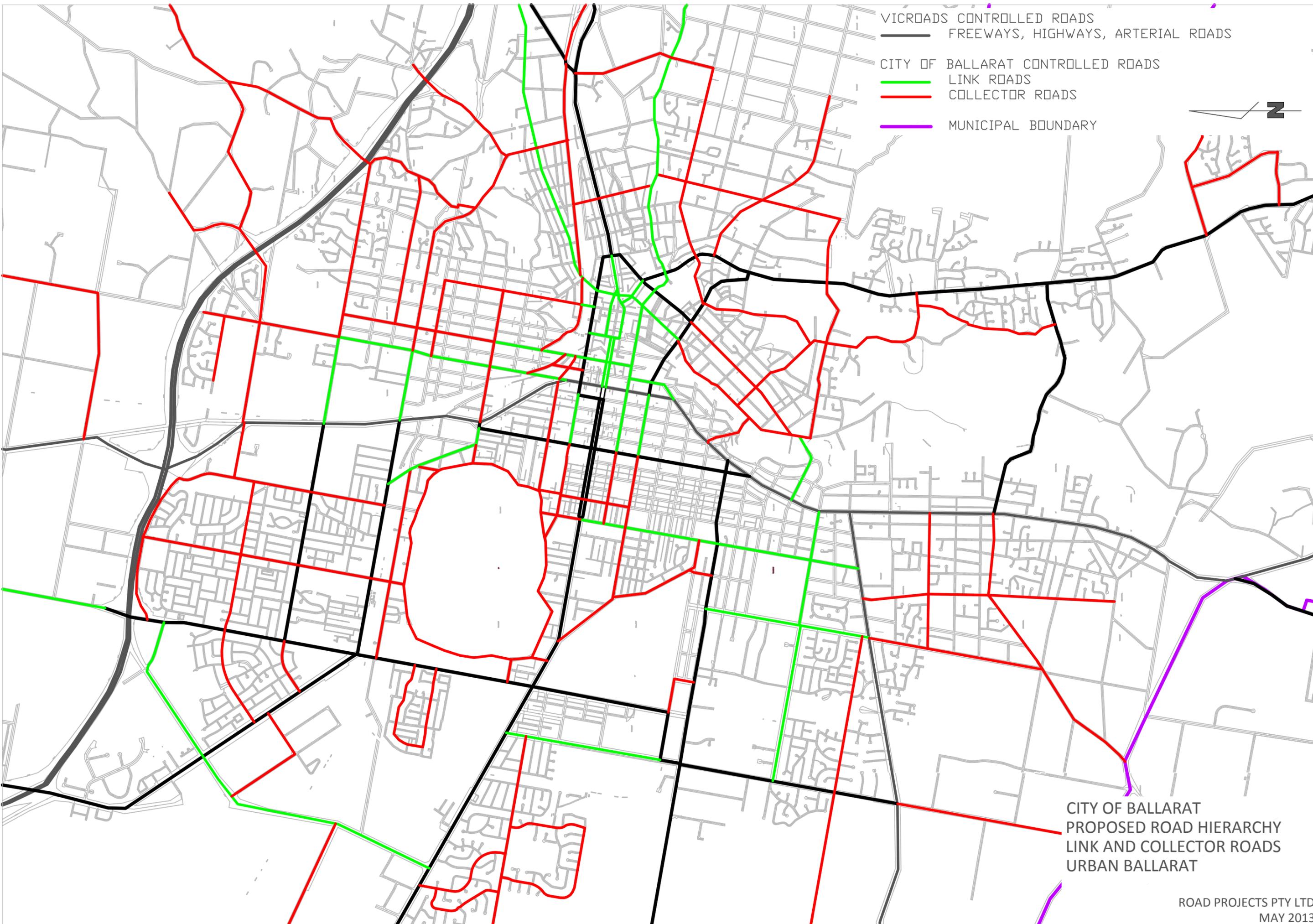
- VICROADS CONTROLLED ROADS
- FREEWAYS, HIGHWAYS, ARTERIAL ROADS
- CITY OF BALLARAT CONTROLLED ROADS
- PRIMARY ACCESS ROADS
- SECONDARY ACCESS ROAD
- TRACK
- MUNICIPAL BOUNDARY

CITY OF BALLARAT
 UNSEALED ROADS PROPOSED TO
 HAVE CHANGED ROAD
 HIERARCHY - MUNICIPALITY



- VICROADS CONTROLLED ROADS
— FREEWAYS, HIGHWAYS, ARTERIAL ROADS
- CITY OF BALLARAT CONTROLLED ROADS
— PRIMARY ACCESS ROADS
— SECONDARY ACCESS ROAD
— TRACK
- MUNICIPAL BOUNDARY

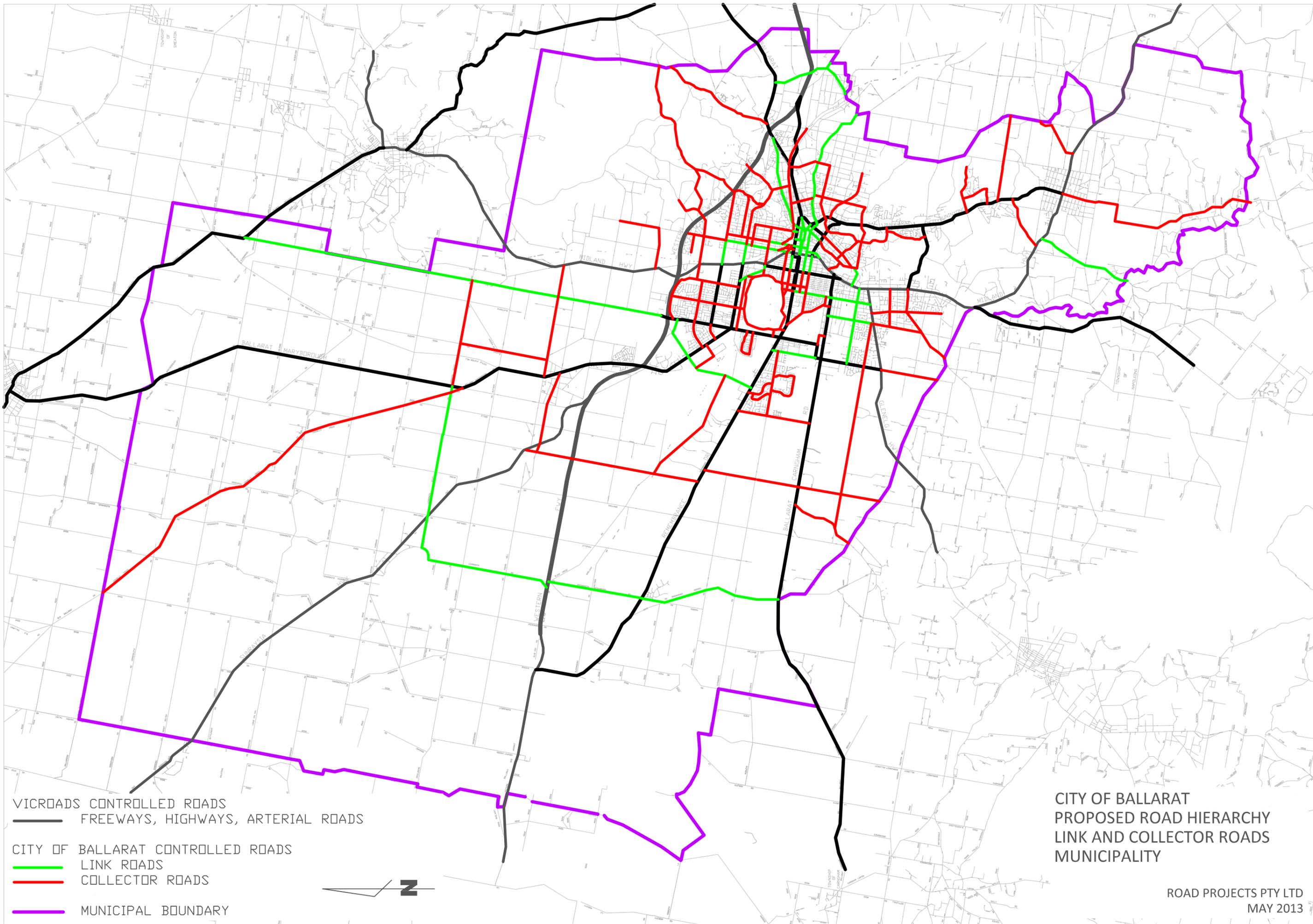
CITY OF BALLARAT
UNSEALED ROADS PROPOSED TO
HAVE CHANGED ROAD
HIERARCHY - MUNICIPALITY



- VICROADS CONTROLLED ROADS
- FREEWAYS, HIGHWAYS, ARTERIAL ROADS
- CITY OF BALLARAT CONTROLLED ROADS
- LINK ROADS
- COLLECTOR ROADS
- MUNICIPAL BOUNDARY



CITY OF BALLARAT
PROPOSED ROAD HIERARCHY
LINK AND COLLECTOR ROADS
URBAN BALLARAT



- VICROADS CONTROLLED ROADS
- FREEWAYS, HIGHWAYS, ARTERIAL ROADS
- CITY OF BALLARAT CONTROLLED ROADS
- LINK ROADS
- COLLECTOR ROADS
- MUNICIPAL BOUNDARY

CITY OF BALLARAT
PROPOSED ROAD HIERARCHY
LINK AND COLLECTOR ROADS
MUNICIPALITY