Assessing the Feasibility of a National Road Classification

Report to ICSM on National Road Classification Developments

“Road classification is a means to an end, not an end in itself. Successfully allocating agreed labels to each element in the road system involves so much effort and controversy that it is pointless and best avoided unless the labels are going to have some application.”

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Executive Summary

The Intergovernmental Committee of Surveying & Mapping (ICSM) formed the Roads Working Group (RWG) arising from Resolution R05/05/01 in May 2005. The Working Group was established to promote and develop a nationally consistent approach to the classification of roads and associated infrastructure information. At this initial meeting the Terms of Reference were discussed, refined and finalised. A major objective was to:

*Develop and promote a nationally consistent classification and attribution scheme for the representation of roads and associated infrastructure.*

Irrespective of the type of road hierarchy being developed, it is important to emphasise that the process is not an exact or precise science. In principle, there is a diversity of ways of defining and classifying street and road types, and no single variable will ever be sufficient to completely describe a class of roads.

This paper represents the initial research phase towards a national road classification. Its purpose is to investigate the feasibility of developing a new nationally consistent road classification hierarchy; its objective is to provide recommendations to improve the existing national road classifications to better meet the requirements of expected future clients.

An investigation was undertaken into current road classification hierarchies applied by mapping and road traffic authorities, throughout Australia and internationally. Each of these classification hierarchies was reviewed to identify their positive and negative attributes, in an attempt to distil and qualify how best to develop an Australian national classification hierarchy.

The research, undertaken into classifications applied both nationally and internationally, highlighted that no single classification appears to be perfectly applicable. Rather, they all exhibit certain flaws and beneficial elements with respect to fundamental classification characteristics.

This research also indicated that the PSMA classification has, above all other existing Australian road classifications, the potential to be applied as the national model. However, the research did identify several considerations that could improve the PSMA model, that warrant further investigation. These led to the following recommendations:

It is also worth noting that this report represents the initial research phase towards a national road classification and investigates the feasibility of developing a new nationally consistent road classification hierarchy and process. Furthermore, none of the recommendations contained in this report advise for the ‘adoption’ of a particular approach at this stage. The recommendations are activities that could
potentially improve the utility and usefulness of the current PSMA classification for national applications, and therefore warrant further investigation.

The recommendations of this feasibility study, in no particular order, are:

**Recommendation 1:** To further investigate the utility and practicality of a rural/urban segregation of the PSMA road classification hierarchy, through discussion with relevant road transport & traffic authorities.

**Recommendation 2:** To refine the existing PSMA Road classification to enable better differentiation of local and State roads through liaison with relevant government representatives.

**Recommendation 3:** That additional variables of traffic volume, design speed, travel distance, route numbering, population measures and structural considerations, be investigated for possible inclusion as additional determinants of road classification type, either within the classification itself or in additional guidelines or decision trees.

**Recommendation 4:** To engage road traffic and transport authorities to investigate the feasibility of the periodic supply of coordinated higher order roads network classifications from road transport and traffic authorities.

**Recommendation 5:** To develop additional guidelines that contain decision-tree diagrams, supplementary instructions and examples that aid in the interpretation of road classification.

**Recommendation 6:** To consult with National Parks, State Forests and Indigenous Lands authorities to gauge their requirements for attribution of lower order roads for possible inclusion into a national classification, or in a separate attribute field in such a classification.

**Recommendation 7:** To adopt a cooperative approach between all levels of government (to agree) to implement a mutually acceptable national road classification system.
1. Introduction

Terms of Reference

1 The Intergovernmental Committee of Surveying & Mapping (ICSM) formed the Roads Working Group (RWG) arising from Resolution R05/05/01 in May 2005. The working group was established to promote and develop a nationally consistent approach to the classification of roads and associated infrastructure information.

2 At this initial meeting the Terms of Reference were discussed, refined and finalised. A major objective was to:

   Develop and promote a nationally consistent classification and attribution scheme for the representation of roads and associated infrastructure.

3 Attempts at a nationally consistent roads classification have been made numerous times over the past 30 years by the Australian road transport and traffic authorities. Unfortunately, these have been unsuccessful. RWG members have tried to obtain documentation on these failed attempts; however this has proved fruitless. This highlights the difficulty and complexity of the objective. Nevertheless, the RWG is confident that this is the first time such work on developing a national hierarchy has been carried out from a mapping perspective, and is optimistic that this fresh viewpoint could yield the desired outcome that eluded earlier attempts.

4 The RWG acknowledged the need for a national road classification, but was conscious that a slight variation of existing classification hierarchies may satisfy clients requirements, rather than designing an entirely ‘new’ classification hierarchy.

5 Therefore, the RWG proposed that the first phase of the project should be to undertake research into all existing road classification hierarchies in use within Australia, as well as some international examples. This would enable a complete assembly of ‘current thinking’ which is necessary to identify hierarchy variations and shortcomings. Also, this research should reveal whether such comparisons have already been successfully attempted elsewhere, avoiding the risk for potential duplication of effort, which is high given the vast number of stakeholders.

6 This paper represents the initial research phase towards a national road classification. The purpose being to investigate the feasibility of developing a new nationally consistent road classification hierarchy; its objective is to provide recommendations for improving the existing national road classifications to better meet the requirements of expected future clients.
2. Background

Australia’s Road Network

Australia has a network of around 800,000 km of public roads, making it one of the most extensive in the world. However, the number of people per kilometre of road is among the lowest in the developed world\(^3\). These roads serve a wide variety of users with diverse needs, primarily facilitating interaction of people and the exchange of goods and services. The roads that carry these movements vary considerably, and include modern freeways as well as vast kilometres of unsealed rural roads and vehicle tracks.

The Road Classification Hierarchy

The road hierarchy is system of network design and management which categorises different types of road in a framework and orders them in relation to each other, in terms of allowable connections between them in the network as illustrated in Figure 1.

![Road Classification Hierarchy Diagram](image)

Figure 1. The road classification hierarchy (adapted from\(^4\)).
Assessing the Feasibility of a National Road Classification

The Purpose of the Road Classification Hierarchy

Defining a road classification hierarchy can be undertaken for several purposes, many of which are interrelated and highlight the importance and complexity of defining the road classification appropriately. These purposes include:

Planning and Administration

The application of a road hierarchy provides a common base from which policy can be established. Moreover, it can be used as a tool to assist in determining the purposes of the various roads in the network. These different purposes will influence planning, in terms of an appropriate level of interaction between the roadway and land use, design standards, operational matters and funding considerations. The process of using a road hierarchy to assist in differentiating road types in order to allocate appropriate roads funding is a particularly contentious area. In practice, the higher levels of government provide limited funding support for roads in the lower classifications. Therefore, the persistence of ambiguous road hierarchies has the potential to enable jurisdictions to ‘double-dip’ for funding where there is dispute or uncertainty regarding the classification of particular road segments.

Conflict Avoidance - Reduce Overall Impact of Traffic

At a fundamental level a road classification hierarchy defines the network in such a way that it facilitates the safe and efficient movement of vehicles as well as other roads users, such as pedestrians and cyclists. In essence the hierarchy attempts to avoid conflict between the different roads users by guiding relationships between different types of route, considering both local and regional needs. In the absence of any ordered road classification framework one would expect a potentially volatile and chaotic scenario whereby roads could be used in ways that are incompatible with their intended use.

Improved Recognition of Road Types

Road users have expectations when using roads within the network, whereby they perceive roads exhibiting certain characteristics to deliver a particular travel expectation. Road user expectations have an important influence on user behaviour and performance in traffic. Therefore, having a well defined and consistent road classification hierarchy can reinforce road user expectations and improve the effectiveness with which the road network carries traffic. This logic applies across the gamut of road user experiences from daily routine journeys to and from work, to extended vacation trips to unfamiliar regions.
**Types of Road Hierarchies**

There are several types of road hierarchy that differ according to their intended purpose.

**Functional Road Hierarchy**

A functional hierarchy is the most common type which ranks roads according to how the roads are expected to function with respect to local through-traffic. In doing so, it recognises that the roads form part of an interconnected network and addresses the competing road uses of mobility and access. Fundamentally, streets and highways perform two types of service, either providing traffic mobility or land access (Figure 2). The proportion of service they provide will determine the rank each road is assigned in the hierarchy.

![Figure 2: Traffic function versus land function (adapted from)'](image)

Defining the hierarchy in this way describes how traffic should flow in a logical and efficient manner through the network, as well as how it should operate and be managed. There is a view, however, that a functional hierarchy should also be used:

“as a basis for allocating jurisdictional responsibility for roads”

However, others contend that administrative decision-making is better suited to administrative road hierarchies.

**Administrative Road Hierarchy**

An administrative hierarchy assigns an order to roads on the basis of who is responsible for managing a particular segment of road, whether it be Federal, State or local government. In broad terms, the Australian road system consists of National Highways, State Highways, State Roads, Main Roads and Local Roads. Mistakenly, in such hierarchies State Highways, State Roads and Main Roads are often categorised using functional terminology such as ‘Arterial’. This misuse of functional terminology in an administrative classification undoubtedly leads to confusion in differentiating these two types of road hierarchy.

**Matching Administrative and Functional Hierarchies**

It is important to note that these two road hierarchies should not be considered entirely separate. Increasingly, there is potential for the two hierarchies to match better; however, a complete match is unlikely to occur. Principally, this is because some local roads maintained and managed by local governments, will be required to perform a function greater than a traditional ‘local street’. Nevertheless, there are increasing examples both nationally and internationally where a mixture of administrative and functional characteristics have been used to define a road hierarchy. More will be discussed on this later.
Structural Road Hierarchy

Another, less common method of road hierarchy classification, is to rank roads according to the structural standards applied to a given segment of road. The structural determinants or geometric design that classify a particular road may vary, depending on the intended purpose of the classification, and can include individual variables or a combination. Variables that are often considered include road width, surface type, gradient, wet weather condition, load bearing and height restriction. Generally, a structural road hierarchy is most often applied in military situations and to a lesser extent, in State Forest and National Park management.

There is some conjecture as to whether structural considerations should influence certain functional classifications. By definition, the functional classification should be based purely on the location – although the structural characteristics may determine how many of a certain road type are needed to perform a particular function.

The Road Classification Challenge

Irrespective of the type of road hierarchy being developed, it is important to emphasise that the process is not an exact or precise science. In principle, there is a diversity of ways to define and classify street and road types, and no single variable will ever completely describe a class of roads. Because a road classification system is necessary to assist in policy and planning activities, amongst others, jurisdictions often produce their own road classification hierarchies. This accounts for the current situation, here and overseas, where numerous systems exist. Despite the different methodologies, however, there are some accepted fundamental classification criteria that should be addressed in all road classification hierarchies.

Fundamental Classification Criteria

Irrespective of the type of road hierarchy being developed and applied there are certain characteristics or criteria that are fundamental to all road classifications. It is important in reviewing the current status of road classifications that each be assessed on how well they satisfy these criteria.

Simple Number of Classes

When attempting to define categories to apply to a road hierarchy it is important to keep the categories to a relatively small manageable number. Careful consideration must be given to ensure a balance between adequately catering for the majority of class types (not simply all theoretically possible types) while not being too simplistic so as to exclude relevant classes.

Unambiguous – Descriptive Terminology of Classes

The definitions that comprise each category must be distinct, clear and concise. This is challenging given the often subjective nature of the task. Broad definitions that leave too much scope for interpretation must be avoided otherwise the desirable consistency in application is difficult to achieve.

Ubiquitous – Across Entire Network

To attain the greatest benefit from the development of a road hierarchy, it is important that the classification system contains variables that can be used systematically to distinguish roads across the whole spectrum. There is little benefit in attempting to derive a national classification system based on locally unique variables, irrespective of how quantifiable they may be.
Driver Perceptions – Using Common Language Terminology

24 Not all users of road hierarchies are experts in road classification terminology. Therefore, considerations must be given to use road definitions that are in line with road user expectations. For example, when road users encounter terminology such as ‘arterial road’ or ‘local road’, they will perceive the utility of these roads as different, which will influence their behaviour while on them. It is important that these perceptions of varying road types, which can differ across different States, be considered in the development of a road hierarchy.

Hierarchical Contiguity – Complete Coverage of Network

25 A core principle of any road hierarchy is maintaining the concept of hierarchical contiguity, whereby roads classified in the ‘highest’ category form a single contiguous network as do roads in ‘lower’ categories. Such considerations may seem obvious but they are important to stress to ensure they are satisfied during network design and classification.

Scaleless – Consistency Across Network

26 The development of a road hierarchy must be scaleless, such that the same classification system applies irrespective of the scale at which the classification is being interrogated. Too often road hierarchies are modified to include localised or regional significance which reduces the overall effectiveness of the hierarchy in a State-wide or national sense.
3. Road Classification Hierarchies in Australia & New Zealand

An investigation into current road classification hierarchies in use throughout Australia and NZ reveals that the majority are fundamentally functional classification systems. Those developed by mapping-related jurisdictions tend to be more closely aligned to a classic functional hierarchy, whereas those produced by traffic authorities tend to show some mix between a functional and administrative hierarchy.

In the following section, each of these classification hierarchies will be reviewed primarily against the fundamental classification criteria highlighted previously. This analysis will identify their benefits and shortcomings against the criteria, as well as in general, in an attempt to determine how best to develop a national road classification hierarchy, as well as whether any existing classification merits consideration for national application. Refer to Appendix A for comparison of the road classifications.

It is important to emphasise here that the assessment of existing road classifications relates to evaluating the perceived effectiveness of certain characteristics for use in a national classification system. Therefore, some identified shortcomings in existing classifications from a national perspective, may be locally beneficial. Furthermore, this analysis is not intended as a criticism of individual classifications, but in light of the RWG objective, it is important that constructive comments be tabled as a means of progressing discussion on a national road hierarchy.

**Mapping Jurisdictions Road Classifications in Australia**

Refer to Appendix A for a comparison of road classifications in Australia by mapping authorities.

**Australian Capital Territory**

The Roads ACT Department of Urban Services classifies the ACT road network in principle using the National Association of Australian State Road Authorities (NAASRA) (now Austroads) classification, which is based on road function and usage. However, ACT has further separated Urban Class 4 into an additional three categories of Urban residential 1, 2 and 3, resulting in a total of 12 types in all (Appendix A).

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
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<tbody>
<tr>
<td>- Distinction between urban and rural road regions.</td>
<td>- Lack of direction on how urban and rural divide is determined.</td>
</tr>
<tr>
<td>- Many other Australian road authorities have adopted the NAASRA classification, with minor variations, making for consistent representation.</td>
<td>- A Collective name not assigned to each class, such as ‘local road’ this complicates interpretation by users.</td>
</tr>
<tr>
<td>- Rural Class 5 road less ambiguity in definition, referring to ‘exclusively for one activity’.</td>
<td>- Uses subjective terminology, particularly for Class 2 &amp; 3 roads such as ‘key’ towns and ‘important’ centres (not quantifiable).</td>
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<td></td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
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<td></td>
<td>- Does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or Emergency Management (EM) purposes.</td>
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</table>
**Geoscience Australia**

31 The road classification hierarchy applied by Geoscience Australia (GA) to its national topographic map and data products is a five level hierarchy that exhibits both a mix of functional and structural characteristics (Appendix A).

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
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</table>
| - Simple number of classification types.  
- A limited number of classification levels makes it easier to amalgamate multiple different systems into it.  
- A Descriptive name is assigned to each class, such as ‘Secondary Road’ assisting interpretation by users. | - Greater distinction needed between designating State roads and local council roads.  
- Too few classification types make it difficult to combine with more complex classification types.  
- No distinction between urban and rural road regions.  
- Uses subjective terminology, such as ‘major through routes’ (not quantifiable).  
- Dual Carriageway (Class 1) and Vehicle Track (Class 5) introduce structural variables, whereas all other classifications have functional considerations.  
- Does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM. |

**New South Wales**

32 The NSW road classification hierarchy applied by the NSW Department of Lands (LPI) to its topographic map and data products is a nine level hierarchy. It is similar to the GA hierarchy, exhibits a mix of functional and structural characteristics for the lower order classifications of Local Road (Class 6) and Track Vehicular (Class 8) (Appendix A).

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
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</table>
| - Good differentiation of local road types.  
- A Descriptive name assigned to each class, such as ‘Distributor Road’, assisting interpretation by users.  
- Very descriptive definitions, particularly for contentious middle and lower order roads, reducing degree of subjectivity.  
- Introduces considerations of traffic speed to classify Motorways, to reduce ambiguity, however, fails to quantify.  
- Definitions reinforce linkages with ICSM standards. | - No distinction between urban and rural road regions.  
- Uses subjective terminology, such as ‘major traffic movements’, ‘high traffic volume’ (not quantifiable).  
- Local Road (Class 6) and Track Vehicular (Class 8) introduce structural variables whereas all other classifications have functional considerations.  
- Does not have an additional category of Vehicle Track to discern functions relevant for National Park, State Forest or EM, but can relate surface conditions of Four-Wheel Drive to aid in interpretation.  
- Includes Path category (not permitted to carry vehicular traffic) which may best be considered outside a road classification hierarchy. |
## Northern Territory

33 The Department of Planning and Infrastructure (DPI) classifies the NT road network principally with a NAASRA classification which is based on road function and usage; however, NT has further separated Pastoral into another distinct level of classification (Appendix A).19

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
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<tbody>
<tr>
<td>- Distinction between urban, rural and pastoral road regions.</td>
<td>- Lack of direction on how urban, rural and pastoral divide is determined.</td>
</tr>
<tr>
<td>- Many other Australian road authorities have adopted the NAASRA classification, or minor variations of, making for consistency in representation.</td>
<td>- Uses subjective terminology, such as ‘key towns’ and ‘important centres’ (not quantifiable).</td>
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<tr>
<td>- Descriptive definitions which have been enhanced from the standard NAASRA system with examples.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td>- Descriptive name assigned to each class, such as ‘Local Road’ assisting interpretation by users.</td>
<td>- Does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.</td>
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<td></td>
<td>- Includes category of road type not relevant to the Territory, i.e. State Highway.</td>
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## New Zealand

34 The NZ road classification hierarchy developed by Land Information Department New Zealand (LINZ) for its topographic map and data products is a four level hierarchy which is based on road function, but some categories do introduce structural characteristics (Appendix A).20 This classification is part of the ESA conceptual data model that is yet to be applied.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
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<tbody>
<tr>
<td>- Least number of classification types of all hierarchies.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
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<tr>
<td>- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.</td>
<td>- Too few classification types makes it difficult to combine with more complex classification types.</td>
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<tr>
<td>- Descriptive name assigned to each class, such as ‘Collector’ assisting interpretation by users.</td>
<td>- No distinction between urban and rural road regions.</td>
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<td>- Uses subjective terminology, such as ‘major’ settlements (not quantifiable).</td>
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<td>- All categories include the structural variable of lane counts in the definition, whereas the Local Road classification has only functional considerations.</td>
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<tr>
<td></td>
<td>- Does not have an additional category of vehicle track to discern different functions relevant for National Park, State forest or EM.</td>
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</table>
**PSMA Australia Limited**

35 The PSMA Australia Limited (formerly the Public Sector Mapping Agencies) road classification hierarchy as applied to their Road Transport layer has a nine level hierarchy, that exhibits a mix of functional and structural characteristics\(^2\), which is based on the Victorian classification system. Notably, this hierarchy is applied to all State, Territory and Commonwealth datasets, and depicts a nationally-applied road hierarchy, which represents the main objective of this RWG project. The method by which the road classification of each jurisdiction is translated into the PSMA classification is detailed in Appendix E. The RWG members believe that this particular hierarchy is approaching what is required and has the potential to become adopted as the nationally consistent road classification hierarchy (Appendix A).

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Good differentiation of local road types, although definitions could be more descriptive.</td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td>- Descriptive name assigned to each class, such as ‘Distributor Road’, assisting interpretation by users.</td>
<td>- Uses subjective terminology, such as ‘massive traffic movements’, ‘key towns’ (not quantifiable).</td>
</tr>
<tr>
<td>- Does have an additional category of Vehicle Track to discern functions relevant for National Park, State Forest or EM.</td>
<td>- Arterial Road (Class 2) and Track – 2 Wheel Drive (Class 6) and Track – 4 Wheel Drive (Class 7) introduces structural variables whereas all other classifications have functional considerations.</td>
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<td>- ‘Undetermined’ category potentially too broad and ambiguous, requires greater definition.</td>
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<td></td>
<td>- Some very descriptive definitions. However, should provide more detail for contentious middle order roads, reducing degree of subjectivity.</td>
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**Queensland**

36 The road classification hierarchy applied by the Queensland Department of Natural Resources and Water (DRW) to the Queensland Digital Road Network (DRN) is a nine level functional hierarchy (Appendix A)\(^2\).

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
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</thead>
<tbody>
<tr>
<td>- Good differentiation of local road types.</td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td>- Descriptive name assigned to each class, such as ‘Local Connector Road’, assisting interpretation by users.</td>
<td>- Does not appear to have documented definitions to describe each classification in detail, making assessment difficult.</td>
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<tr>
<td></td>
<td>- Does not have an additional category of Vehicle Track to discern functions relevant for National Park, State Forest or EM.</td>
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<tr>
<td></td>
<td>- Includes Bikeway/Walkway//Passenger Ferry and Construction Line category (used for connection through roundabouts) which may best be considered outside a road classification hierarchy.</td>
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</tbody>
</table>
South Australia
37 The SA Department of Environment & Heritage (DEH) has adopted the same road classification hierarchy as PSMA (Appendix A). For the relative benefits and shortcomings of this classification system refer to the PSMA table.

Tasmania
38 The Department of Infrastructure, Energy and Resources (DIER) has adopted for Tasmania a condensed version of the PSMA road classification hierarchy (Appendix A)\(^2\), having only five categories compared to nine.

**Benefits**
- Good differentiation of local road types, although definitions could be more descriptive.
- Simple number of classification types.
- Descriptive name assigned to each class, such as ‘Collector Road’, assisting interpretation by users.
- Class 5 – ‘Local Road’ introduces road ownership considerations, however, none of the other classes do.

**Shortcomings**
- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘key towns’ (not quantifiable).
- Does not have an additional category of vehicle track to discern different functions relevant for National Park, State forest or EM.
- Too few classification types makes it difficult to combine with more complex classification types.
- Some very descriptive definitions. However, should provide more detail for contentious middle order roads, reducing degree of subjectivity.

Victoria
39 The Department of Sustainability and Environment (DSE) for Victoria developed the original classification on which the PSMA classification is based. However, unlike PSMA, has added two additional hierarchy levels (Walking Track & Bicycle Track) and have also added supplementary content to each of the additional classes\(^2\) (Appendix A).

**Benefits**
- Good differentiation of local road types, although definitions could be more descriptive.
- Identifiable name assigned to each class, such as ‘Collector’, assisting interpretation by users.
- Does have additional category of Vehicle Track to discern functions relevant for National Park, State forest or EM.
- Includes proposed road as a discrete category type with adequate definition.

**Shortcomings**
- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘key towns’ and ‘massive traffic movements’ (not quantifiable).
- Arterial Road (Class 2) and Track – 2 Wheel Drive (Class 6) and Track – 4 Wheel Drive (Class 7) introduces structural variables, whereas all other classifications have functional considerations.
- Some very descriptive definitions. However, should provide more detail for contentious middle order roads, reducing degree of subjectivity.
- Includes Walking and Bicycle tracks which may best considered outside a road classification hierarchy.
**Western Australia**

The WA road classification hierarchy applied by the Department of Land Information (DLI) to their Road Centreline Network is a ten level hierarchy which is based on road function, but some categories do introduce structural characteristics (Appendix A).

### Benefits

- Good differentiation of local road types, although definitions could be more descriptive.
- Does have additional categories of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.
- Descriptive name assigned to each class, such as ‘Minor Road’, assisting interpretation by users.
- Has accompanying business rules that include further definition examples and diagrams to aid in interpretation and assignment of particular roads.

### Shortcomings

- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘mass traffic movement’ (not quantifiable).
- Includes Connectors, Roundabouts & Malls which may best considered outside a road classification hierarchy - but at least they are considered together in one category.
- Some very descriptive definitions, however, should provide more detail for contentious middle order roads, reducing degree of subjectivity.
Assessing the Feasibility of a National Road Classification

Road Transport and Traffic Authority Road Classifications in Australia

**NAASRA**

All States and Territory road transport and traffic authorities, except for NSW, VIC and QLD, have adopted some variation of the NAASRA classification for road management (Appendix B). The current NAASRA classification separates road by function, which replaced the State classifications based on legislated definitions. Interestingly, this classification system is used by road management authorities to aid in defining road types eligible for Commonwealth Grants Commission (CGC) funding, despite an administrative classification being more applicable. The variability and inconsistency of results received by the CGC has prompted much debate and discussion over the shortcomings of the NAASRA hierarchy as an adequate classification system.

**Benefits**
- Distinction between urban and rural road regions.
- Many other road authorities have adopted the NAASRA classification, or minor variations of, making for some consistency in representation.
- Rural Class 5 roads less ambiguity in definition, refers to ‘exclusively for one activity’.

**Shortcomings**
- Lack of direction on how urban and rural divide is determined.
- Collective name not assigned to each class, such as ‘local road,’ complicating interpretation by users.
- Uses subjective terminology, particularly Class 2 & 3 roads such as ‘key’ towns and ‘important’ centres (not quantifiable).
- Greater distinction needed between designating State roads and local council roads.
- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.

**Victoria**

VicRoads has adopted several road classification systems to manage the road network that have been more recently refined under the Road Management Act 2004 (RMA). The most commonly applied of these systems is the Declared Roads classification which is a functional based hierarchy used for road management and funding purposes. The Declared Road classification has two categories, freeways and arterial roads with the roads that fall outside these classifications being predominantly the responsibility of local councils.

**Benefits**
- Simple number of classification types.
- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.
- Descriptive name assigned to each class, such as ‘Freeway’, assisting interpretation by users.
- Good distinction between designating State roads and local council roads.

**Shortcomings**
- Too few classification types make it difficult to combine with more complex classification types.
- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘major regions’ (not quantifiable).
- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.
New South Wales

The NSW Roads and Traffic Authority (RTA) has two concurrent road classifications, the first being the State’s Roads Act 1993 legislation and the second being the Three Level Administrative Classification. In practice, however, the latter classification is applied for road management and funding activities. Roads under this administrative classification are classified according to function, being either State Road, Regional Road, or Local Road (Appendix B).

**Benefits**
- Simple number of classification types.
- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.
- Descriptive name assigned to each class, such as ‘Secondary Road’, assisting interpretation by users.
- Succinct definitions link to additional criteria and tests as well as specific guideline examples to aid interpretation consistency and reduce ambiguity, such as considerations of traffic volume.

**Shortcomings**
- Greater distinction needed between designating State roads and local council roads.
- Too few classification types make it difficult to combine with more complex classification types.
- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘major’ through routes (not quantifiable).
- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.

New Zealand

Transit New Zealand (TNZ) has developed a Geometric Design Guide for NZ roads which contains a road classification based on road function. The hierarchy comprises five categories. Unlike other classification systems based on geometric designs (as in Canada: discussed later), which have a tendency to be very rigid, this system introduces considerations of traffic volume, but in a less prescriptive sense.

**Benefits**
- Simple number of classification types.
- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.
- Descriptive name assigned to each class, such as ‘Collector Routes’ improving interpretation by users.
- Introduces considerations of traffic flow to classify between lower order road types, which reduces ambiguity.
- Some very descriptive definitions, however, should provide more detail for contentious middle order roads, reducing degree of subjectivity.

**Shortcomings**
- Greater distinction needed between designating State roads and local council roads.
- Too few classification types make it difficult to combine with more complex classification types.
- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘significant’ and ‘nationally important’ (not quantifiable).
- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.
Queensland

The QLD Department of Main Roads (DMR) also has several road classifications, the first based on the State Legal Class legislation and the second being the ‘Current Road Classification System’ applied for road management and operations activities. The latter is a four level hierarchy defined in Appendix B. Currently the QLD Road Alliance initiative is reviewing the lower-order State-controlled roads under this classification system.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Simple number of classification types.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td>- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.</td>
<td>- Too few classification types make it difficult to combine with more complex classification types.</td>
</tr>
<tr>
<td>- Descriptive name assigned to each class, such as ‘Regional Road’, assisting interpretation by users.</td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td></td>
<td>- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State forest or EM.</td>
</tr>
</tbody>
</table>
4. International Road Classification Hierarchies

Research was undertaken to review other international road classification hierarchies. The RWG identified that assessment of the US, Canada, EU and Japan, would be most beneficial in assisting Australia’s road classification review. Unfortunately, none of the countries investigated had successfully implemented a true, nationally adopted and consistent road classification hierarchy. Interestingly, the majority of these countries mimicked Australia in the sense that most had developed concurrent road classifications, one applied by the national mapping authority and another by the relevant road transport and traffic authority. However, the degree to which there was commonality between the two varied. Each of these classification hierarchies will be reviewed, as was done for the Australian classifications, to identify their positive and negative attributes, again in an attempt to distil and discern how best to develop a national classification hierarchy. However, the different road classification of each country will be assessed together (Appendix C which compares the international road classifications). When considering international classifications it is also important to recognise that some more complex classification may require extra resource allocation to be effectively maintained; many jurisdictions in Australia may suffer from significant resource restrictions that may limit their capacity to maintain more complex classifications.

United States

US Mapping Authority Road Classification

The United States Geological Survey (USGS) is responsible for topographic mapping throughout the country at various scales, their flagship product being the National Map which has complete coverage at 1:24,000 scale. The road classification hierarchy used comprises five categories. The USGS classification is functional in nature, and aligns quite closely with the US Federal Highway Administration Department (FHWA) (Appendix C).

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Simple number of classification types.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td>- Introduces route number variable to assist in interpretation of highest order road.</td>
<td>- Too few classification types make it difficult to combine with more complex classification types.</td>
</tr>
<tr>
<td>- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.</td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td>- Includes structural considerations throughout all categories to aid interpretation. ‘Passability’ considerations included for lower order roads.</td>
<td>- Uses subjective terminology, such as ‘important private road’ (not quantifiable) in defining Class 3.</td>
</tr>
<tr>
<td>- Uses terminology consistent with Federal Highway Administration to allow comparison and consistency in application.</td>
<td>- Collective name not assigned to each class, such as ‘local road,’ complicating interpretation by users.</td>
</tr>
<tr>
<td></td>
<td>- Does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.</td>
</tr>
<tr>
<td></td>
<td>- Class 3 has a very descriptive definition. However, there should be more detail for Class 4 to reduce degree of subjectivity for these contentious middle order roads.</td>
</tr>
</tbody>
</table>
Assessing the Feasibility of a National Road Classification

US Road Transport and Traffic Authority Road Classifications
48 The FHWA is a major agency of the U.S. Department of Transportation (DOT) that has developed a nationwide urban and rural classification based on road function. The rural hierarchy comprises five categories, and the urban has four (Appendix C). Design standards, such as lane and shoulder width, shoulder radii, are then attributed to each function class. The designation of classification is reviewed at least every decennial census or when stipulated by federal regulation.

Benefits
- Distinction between urban and rural road regions with Census block minimum population density figures used to aid in urban and rural determination.
- Many other US departments have adopted the classification, or minor variations of, making for some consistency in representation.
- Includes considerations of population sizes for the highest order urban classification to aid in interpretation and reduce ambiguity.
- Includes considerations of trip lengths between rural collectors and rural minor arterials to aid in interpretation and reduce ambiguity.
- Descriptive name assigned to each class, such as ‘Urban Collectors’, assisting interpretation by users.

Shortcomings
- Uses subjective terminology such as ‘larger towns’ and ‘most important’ centres (not quantifiable).
- Greater distinction needed between designating State roads and local council roads.
- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.

Canada

Canadian Mapping Authority Road Classification
49 The Centre for Topographic Information, Division of the Department of Natural Resources Canada (DNRC) is responsible for topographic mapping throughout the country at various scales, their flagship product being their 1:50,000 polychrome map series. The road classification hierarchy used comprises 10 categories. This classification is primarily structural in nature, separating roads into different classes based on surface type, seasonal ‘passibility’, lane count and width (Appendix C). This was the only structural classification system, with extensive application, that was identified during all the national and international research. It is likely that a structural system was favoured over a functional one, because of the extreme environmental/weather conditions that prevail throughout Canada as well as the remoteness of the landscape. Furthermore, users of the topographic product in such extreme conditions may be more concerned with structural characteristics for planning and safety reasons (Appendix C).
### Assessing the Feasibility of a National Road Classification

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Introduces considerations of road design (including maintenance 'hard surface', seasonal 'passability' and road width design) to classify between all road types, which reduces ambiguity.</td>
<td>- Structural classification not easily comparable with TAC functional classification.</td>
</tr>
<tr>
<td>- Does have additional category of Vehicle Track to discern functions relevant for National Park, State forest or EM.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td></td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td></td>
<td>- Descriptive name not assigned to each class, such as ‘Urban Collectors’ to assist interpretation by users.</td>
</tr>
</tbody>
</table>

### Canadian Road Transport & Traffic Authority Road Classifications

The Transportation Association of Canada (TAC) has developed a Geometric Design Guide for Canadian roads which contains a rural and urban classification based on road function. This classification system is very rigid in its definitions and classification categories and is based on more discrete measures rather than subjective terminology. The rural hierarchy comprises four categories, and the urban has six (Appendix C)\(^{31}\). Design standards, such as traffic volume, design speed and flow characteristics are also characteristics considered in classifying rural and urban roads.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Distinction between urban and rural road regions</td>
<td>- Lack of direction on how urban, rural and pastoral divide is determined.</td>
</tr>
<tr>
<td>- Includes considerations of flow characteristics and land service to aid in interpretation and reduce ambiguity.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td>- Descriptive name assigned to each class, such as ‘Rural Collectors’ assisting interpretation by users.</td>
<td>- Because used primarily for funding allocation, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.</td>
</tr>
<tr>
<td>- Uses less ambiguous terminology in favour of more quantifiable measures, such as traffic volume and design speed.</td>
<td>- Some contend quantifiable measures are too inflexible and detailed to be applied by all local jurisdictions.</td>
</tr>
</tbody>
</table>
Japan

**Japanese Mapping Authority Road Classification**

51 The Geological Survey Institute (GSI) is responsible for topographic mapping throughout the country at various scales, their flagship product being the 1:25,000 scale topographic national base map. The road classification hierarchy is structural and comprises six categories, based on road width (Appendix C)\(^32\). National Highways and Toll Roads, however, are classified separately, not based on road width characteristics.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Is based on considerations of road design (road width) to classify all road types, except National Highways &amp; Toll Roads.</td>
<td>- Structural classification not easily comparable with the Road Bureau functional classification.</td>
</tr>
<tr>
<td>- Does have additional category of Vehicle Track to discern functions relevant for National Park, State forest or EM.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td></td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td></td>
<td>- Descriptive name not assigned to each class, such as ‘Urban Collectors’ to assist interpretation by users.</td>
</tr>
</tbody>
</table>

**Japanese Road Transport & Traffic Authority Road Classifications**

52 The Road Bureau within the Ministry of Land, Infrastructure and Transport (MLIT) is the designated body responsible for the administration of roads throughout Japan. Roads are classified for administrative and management purposes according to their function. There are five categories of road type, which are defined in accordance to Japanese Road Law (Appendix C)\(^33\). An additional fifth category of ‘other road’ is also applied in the real world; however, this classification falls outside the scope of the Road Law. Interestingly 84% of roads in Japan are classified as municipal. It is therefore surprising that this category is not broken down into further classifications, particularly considering that the road network of Japan is four times the density of the United States.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Shortcomings</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Simple number of classification types.</td>
<td>- Greater distinction needed between designating State roads and local council roads.</td>
</tr>
<tr>
<td>- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.</td>
<td>- No distinction between urban and rural road regions.</td>
</tr>
<tr>
<td>- Descriptive name assigned to each class, such as ‘Municipal Road’ assisting interpretation by users.</td>
<td>- Too few classification types make it difficult to combine with more complex classification types.</td>
</tr>
<tr>
<td>- Definitions assigned to roads classification linked to Japanese Road Law, becoming a legal requirement.</td>
<td>- Because used primarily for administration, it does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.</td>
</tr>
</tbody>
</table>
Great Britain

Great Britain Mapping Jurisdiction Road Classification

53 The Ordnance Survey (OS) is responsible for topographic mapping throughout Great Britain at various scales. Their flagship map product is the Explorer Map series which has complete coverage at 1:25,000 scale. The road classification hierarchy used comprises nine categories (Appendix C)\(^3\). The OS receives information about the classification of all Motorways and A and B roads from the Highway Agency (HA) and Department for Transport (DfT). Therefore, the definitions for the higher order roads are less descriptive, because the OS are not part of the decision-making process for these roads.

Benefits
- Descriptive name assigned to each class, such as ‘Local Road’, assisting interpretation by users.
- Good differentiation of local road types; introduces considerations of alternative access to land or houses.
- Succinct definitions with specific examples to aid interpretation consistency and reduce ambiguity, particularly for lower order roads.
- Introduces considerations of maintenance and access restrictions for private roads.
- Introduces considerations of ‘pedestrianised’ street being shared zones between pedestrians and vehicles.

Shortcomings
- No distinction between urban and rural road regions.
- Uses subjective terminology, such as ‘regional importance’ (not quantifiable).
- Does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.

Great Britain Road Transport &Traffic Authority Road Classifications

54 The DfT and HA are responsible for the administration of Trunk Roads and Highways in Great Britain. They have developed a highway system of classification that is based on functional characteristics, with no reference to structural or traffic volume considerations. The highway system divides roads into urban and rural categories, allowing for a total of 12 different road classes (Appendix C)\(^3\).

Benefits
- Distinction between urban and rural road regions.
- Descriptive name assigned to each class, such as ‘Principal Route’, assisting interpretation by users.
- Many other departments, such as OS, have adopted the classification making for consistency in representation.

Shortcomings
- Lack of direction on how urban, rural and pastoral divide is determined.
- Greater distinction needed for designating of lower order roads.
- Does not have an additional category of Vehicle Track to discern different functions relevant for National Park, State Forest or EM.
- Uses subjective terminology, such as ‘the most important roads’ (not quantifiable).
**EuroRoadS**

The EuroRoadS initiative commenced in early 2004, with a major objective being to develop a pan-European road capture and classification methodology model to be used throughout the EU. However, this will not result in a pan-European dataset. Fundamentally, the standardised classification objective of EuroRoadS appears to be closely aligned with the objectives of the RWG. Given these similarities, Julie Goodgame, a RWG member, attended the closing workshop in Brussels in June as an opportunity to liaise with EuroRoadS participants to gain insight into issues that could assist the RWG in their endeavour. The EuroRoadS specifications provide a good example of core feature attribution, as well as processes for dealing with roundabouts and problematic complex intersections\(^{15,38}\). While these issues are not directly related to this RWG objective of national classification, this work will undoubtedly help the RWG in other areas. Unfortunately, the road classification template applied under the EuroRoadS model is very generic and simply allows each of the member countries to directly map their existing classification straight to the model\(^{37}\) (For more information on the EuroRoadS initiative refer to the EuroRoadS report compiled for ICSM).
5. Considerations Towards the Development of a National Road Classification System

Appendix D summarises the comparative analysis of the road classification systems applied nationally and overseas by mapping and road authorities. The summary highlights the fact that no single classification appears to be perfectly applicable; rather, they all exhibit certain shortcomings and benefits in fundamental classification characteristics. Nevertheless, the assessment did reveal certain characteristics that warrant further discussion for potential inclusion into a nationally consistent road classification.

Will the PSMA Road Classification Suffice?

It was the considered opinion of the RWG that the PSMA system, which represented a nationally-applied road classification system, could potentially be adequate as a nationally applied hierarchy. It was the belief of the RWG, however, that the PSMA classification would require a degree of modification to make it more suited as a national model. The research undertaken into classifications applied both here and overseas has indicated that the PSMA classification has, above other existing Australian road classifications, the potential to be applied as the national model. However, the research did identify several considerations that could improve the PSMA model, and warrant further investigation. These are discussed here:

Rural/Urban Dichotomy

A potential improvement to the PSMA classification could be to further segregate roads according to whether they are rural or urban. This distinction is currently present in the NAASRA classification system which is applied by the majority of road transport and traffic authorities as discussed previously. Interestingly, there were only a few mapping agencies where the rural/urban dichotomy had been applied. Many more road traffic authorities, however, both nationally and internationally, have developed a road classification system that differentiates between urban and rural roads.

There is some debate whether any distinction is necessary. Urbanised areas are concentrations of populations, more intense land use, and higher traffic volumes compared to rural areas. One criticism, however, of this dichotomy, particularly in Australia, has been the lack of direction on how the urban/rural divide is determined in a consistent manner. A potential solution could be to use Census block minimum population density figures, as is the case in the US. Certainly, the NSW RTA classification guidelines include a reference to defining urban areas in accordance with the Australian Bureau of Statistics (ABS).

One benefit of differentiation could be the availability of additional road use and design statistics data in urban areas. The availability of this information could allow for further segregation of road types based on these statistics. In the absence of any distinctions this additional information could not be utilised to further differentiate roads within a hierarchy, because such measures could not be applied in a ubiquitous manner across the national network. Indeed, there is still the potential risk for individual road authorities to collect vastly different local traffic information at the urban level, and that little commonality and amalgamation would be possible to enable any nationally consistent further differentiation of roads at the urban level. Nevertheless, the RWG feels this warrants further investigation through discussion with each of the road transport and traffic authorities.
authorities, in order to determine a baseline of consistency in road attribute capture at the urban level that could be used to further differentiate roads.

61 Another consideration is the classification of roads within National Park, State Forests and Indigenous Lands. Typically, these areas are found predominantly in areas outside urban boundaries, therefore, there is potential for complex road issues, such as ‘passability’ and 4WD access, to be included in rural areas but excluded from urban classifications, because fundamentally they do not apply. Having a rural/urban classification, therefore, has the potential to reduce the complexity of the classification hierarchy by excluding certain considerations that are not relevant in particular areas.

**Recommendation 1**: To further investigate the utility and practicality of a rural/urban segregation of the PSMA road classification hierarchy, through discussion with relevant road transport & traffic authorities.

**Differentiate Local Roads from State-controlled roads**

62 A major criticism of many road classification hierarchies, both nationally and internationally, is their inability to adequately differentiate between local roads (those maintained by local governments) and State-controlled roads. Currently, ambiguous definitions enable subjective interpretation with inconsistent application as a result. In Australia, this inconsistency has significant implications.

63 One major area affected by such inconsistencies is the allocation of roads funding through the Commonwealth Grants Commission (CGC) and under Auslink initiatives. Needless-to-say, there are numerous recent reports produced by the CGC in relation to this issue. Notably, some CGC research has identified the inadequacy of the current NAASRA-based classification as a funding allocation tool, and have initially suggested that elements of the PSMA classification would be a more pragmatic alternative. However, the CGC identified that the application of the PSMA classification was compromised because it did not fully consider road condition and usage elements. This CGC finding lends further support to the RWG notion that the PSMA classification has merit as a national system but can be improved.

64 More detailed discussions of the complex issue of roads funding allocation and how it relates to road classification is beyond the scope of this paper. There is no doubt that funding considerations complicate the scope of deriving a nationally consistent road hierarchy, and may on the surface appear to relate little to ICSM activities. However, the reality is that funding considerations play a pivotal role in road issues and that a comprehensive assessment of road classification could not be conducted without considering the influence that funding issues have over the application of a road hierarchy. They influence all roads types, from vehicle tracks that receive infrequent minor repairs, to state-of-the-art major arterial roads.

65 It is the opinion of the RWG that addressing this short-coming of current road classification hierarchies should be a major objective when defining a nationally consistent road classification. Were any future national road classification to prove incapable of improving the consistent differentiation of local and State roads, then it would be clearly inadequate, failing a significant proportion of potential users. However, others propose that a complete distinction between State and local roads will never be achieved, stating:
There is no absolutely rigorous method for classifying roads at the interface between classes”  

The RWG agrees that while a ‘perfect’ classification system may not be possible, improvements can still be made and recommends they liaise between State and local government road authorities in a attempt to agree upon more stringent definitions of local and State roads, incorporating diagrams, examples and decision trees to aid in interpretation. This is further discussed later.

**Recommendation 2:** *Refine the existing PSMA Road classification to enable better differentiation of local and State roads through liaison with relevant government representatives.*

**Use of Additional Variables**

The comparative analysis of road classifications revealed several variables that could be considered as having the potential to improve the existing PSMA classification by reducing the degree of subjectivity involved in classification. It is important to emphasise that these variables would be considered as additional measures, not as replacements to existing classification definitions. Furthermore, these variables could be incorporated into the classification definition or used in additional interpretation aids, such as guidelines or decision trees (which will be discussed later). It is not the intention of this report to recommend that mapping jurisdictions will need to assume responsibility for maintaining these variables, but only use them for the purpose of aiding road classification.

**Traffic Volume**

Nearly all classifications refer to traffic volume as a method to discern between some levels within the hierarchy. In the majority of cases, however, traffic volumes are considered only broadly and do not equate to quantifiable volume measures such as Average Annual Daily Traffic (AADT). Typically, traffic volume considerations are expressed in ambiguous terms such as ‘massive traffic movements’, which have a tendency to be applied inconsistently depending on the extent and scale at which the assessment is taking place. For example, a shire council may consider a regional road to carry massive traffic movements from their local perspective (relative to other roads within the shire which may only carry very limited localised traffic). However, from a State or national perspective, this volume of traffic would not be considered ‘massive’. This subjective interpretation of ambiguous terminology leads to inconsistency in road classification.

There are, however, examples where AADT traffic volume figures have been used to aid in classification. The most notable Australian example is the NSW RTA Road Classification Guidelines10,39. This guideline identifies specific traffic volume figures, as well as other criteria, to provide assistance in differentiating road classification types, particularly State-controlled and regional roads. It is important to emphasise that these guidelines are an additional reference aid, not contained within the RTA road classification itself. Another example is applied by the Canadian TAC31. However, unlike in NSW, traffic volume ranges form part of the classification characteristics. Also, these AADT ranges are applied across all road classification levels, from local roads through to freeways.

In Australia, a criticism of AADT traffic volume figures as a determinant of road classification has been that the majority of local roads do not have individual traffic counts, unless there have been specific complaints
Assessing the Feasibility of a National Road Classification

regarding traffic volumes or speed. Therefore, the argument has been that the lack of complete coverage of such figures means they should not be used\textsuperscript{41,44}. However, in both examples highlighted previously, where traffic volume has been used, it has only been as an additional measure, never referenced as a sole determinant for a particular road classification level. This degree of reliance would never be feasible given the sporadic coverage of available data on traffic volume. Nevertheless, the RWG recommends that specific traffic volume ranges, where available, be used as an additional variable because their discrete nature allows less subjective determination. Whether the inclusion of traffic volume be applied to the classification characteristics (i.e. TAC example) or as an additional guideline aid (i.e. NSW RTA example) warrants further investigation through consultation with relevant stakeholders.

Traffic Design Speed

71 In principle, the inclusion of speed considerations to a functional road classification appears logical. Road users have a certain expectation when travelling on local roads; there tends to be an acceptance that they are choosing a different trip and travel experience with respect to time, traffic volume and speed\textsuperscript{2}.

72 The issue of traffic speed, however, is not as straightforward as one might expect. It is important to recognise the difference between design speed and posted (or operating) speed. Design speed is used as a basic parameter in determining the geometric standards for a road. The posted speed limit or operational speed is the speed limit which is set at the 85th percentile speed, that is, the speed below which 85 percent of motorists travel\textsuperscript{45}.

73 Discussion at RWG meetings in relation to including posted speed limit information has identified that there were reservations regarding the ability of obtaining reliable information on speed limits. In many cases, examples were highlighted where councils had been approached to provide mapping jurisdictions with speed limit information for segments of road. In many cases, however, the council had refused to provide this information because of fear of litigation in the event of an accident where the posted speed exceeded the design speed.

74 However, there may be potential for design speed, rather than posted speed limit information to be included as an additional variable to assist in the determination of a road type. Typically, the design speed is expressed in terms of a range (e.g. 80-130km/h) and is static compared to the posted limit because it is a geometric standards parameter, thus reducing litigation concerns. Furthermore, the consideration of design speed may be of more use within urban regions where, in general, differences in speed do segregate roads in accordance with their functional classification, such as local streets being low speed environments and roads of higher classification, with their emphasis on long distance travel, tend to be higher speed environments\textsuperscript{11}. It highlights the case for having a classification which divides roads by rural or urban regions, as was discussed earlier. There is some contention, however, that road users may not necessarily relate one message (speed limit) to also convey another message (function of road). Suggestions have been made that further study needs to be undertaken to confirm the effectiveness of these multiple messages\textsuperscript{12}.

75 In the US and Canada, both authorities responsible for highway management (the FHWA and TAC respectively) include a range of posted speeds as additional indicators of road type within the classification system\textsuperscript{29,31}. Furthermore, posted speed considerations are applied to all road types, from motorways to local roads. In Australia, the VIC and QLD mapping classification references speed broadly, but only for higher order roads\textsuperscript{22,24}. Austroads uses travel speed as an indicator to further categorise the road network\textsuperscript{3}. Whether ‘travel speed’
relates to the sign-posted speed limit or design speed needs to be clarified. Nevertheless there appears to be scope to include some speed component into road classification, at least with respect to higher order roads under the jurisdiction of Austroads members. Further investigation is required to assess the feasibility of speed considerations at the local level.

Travel Distance

76 The inclusion of travel distance as a variable to assist in the differentiation of road classification was not found to be very prevalent. It is based on the assumption that roads of higher classification cater for Statewide and regional traffic movements over relatively long distances, while lower order classifications cater for local traffic movements over shorter distances. One might expect smaller, highly populated countries, like Japan and Great Britain, that have a greater density of road network, to potentially correlate travel distance with functional classification. However, this was not found to be the case.

77 Surprisingly, the US FHWA was the only authority that referenced travel distance or trip length as a determinant. Considering the same application of travel distance to Australia, it is apparent that in Australia there is greater variation in road network density and consequently the same correlation does not apply. Moreover, in Australia, many lengthy journeys in remote areas are on lower order roads. However, this correlation is likely to apply in urban regions in Australia and should be considered as an additional determinant, if the classification system adopted differentiates between rural and urban roads, as discussed earlier.

78 The RWG recommends, however, that considerations of travel distance must, if possible, relate to discrete ranges of journey distances. Or, at least, it should make the distinction, as is the case in the US example, where trip length must be indicative of ‘substantial Statewide or interstate travel’. This is necessary to avoid the undesirable alternative where subjective terminology such as ‘long distance’ is used, with inconsistent application a result.

Route Numbering

79 Road route numbers are assigned to segments of road generally relative to road type, to enable differentiation. Therefore, in essence route numbers alone define a road classification hierarchy based on function. Their limitation, however, is that they are typically only applied to higher order roads within the network. Nevertheless, there is potential for route numbers to have application within functional road classification hierarchies.

The best example of a route numbering system complementing a road classification hierarchy is in Great Britain, where they are classified as shown in Table 1.

<table>
<thead>
<tr>
<th>TABLE 1- Great Britain Road Route Numbering System</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Road</td>
</tr>
<tr>
<td>A Road</td>
</tr>
<tr>
<td>B Road</td>
</tr>
<tr>
<td>C Road</td>
</tr>
</tbody>
</table>
All M, A and B roads are classified by the relevant road transport and traffic authorities, the HA and DfT. The benefit of this system, from a road classification perspective, is that it allows different jurisdictions to consistently classify higher order roads. For example, the Great Britain mapping authority the Ordnance Survey, simply applies the M, A and B classifications to their higher order roads depiction and is not involved in the decision making process\textsuperscript{34}. The result is a uniformity in classification of these roads across different disciplines, such as mapping and road administration, which is facilitated by having a definitive source.

There is potential for such a relationship to be fostered in Australia. In May 1997, Australian transport ministers agreed to principles for a national approach to a rural road route numbering system which was expected to take some ten years to be implemented across the country\textsuperscript{46,47}. Approaching this ten year mark, it is apparent that considerable work still needs to be done to have a truly national route numbering system in place. The alphanumeric numbering has been completed in Tasmania, South Australia and Victoria\textsuperscript{46,47}. The remaining states and territories are still in the process of converting to the system. This system is based closely on the British model, where the letter prefix relates to the functional importance and standard of the route. The number is purely for navigation purposes.

Table 2 - Australian Road Route Numbering System\textsuperscript{47}

<table>
<thead>
<tr>
<th>Route</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M Routes</td>
<td>These are divided carriageway roads, generally forming part of the main links between capital cities, or from a capital city to a key regional centre. All Freeways and Motorways should be designated as M Roads.</td>
</tr>
<tr>
<td>A Routes</td>
<td>These would be expected to form the principal routes within regions that are not of M Road standard. They would be expected to form links between capital cities or provide the connections between key regional centres or between key centres and capital cities.</td>
</tr>
<tr>
<td>B Routes</td>
<td>These would be expected to form the primary connections between major regions not served by A Routes.</td>
</tr>
<tr>
<td>C Routes</td>
<td>These are the other routes in the arterial network.</td>
</tr>
</tbody>
</table>

At present the limitation is that while there has been an in-principle agreement between the States that they will endeavour to update their network in accordance with the agreed standards, funding restrictions and conflicting priorities have meant that achieving a nation-wide system is still a way off. Speculating on a potential completion date is difficult because Austroads do not have the authority to enforce this agreement.

Nevertheless, there is potential for the route numbering system to aid a national road classification hierarchy, even though many route numbers are still to be posted. The RWG contends that if a definitive publication of nationally ‘planned’ and completed route numbers was released by an authoritative source, logically Austroads, could be adopted by all mapping jurisdictions and be applied to higher order roads within a national road classification, as is the case in Great Britain. Having one definitive source would enable a consistency in application which, over time, could be replicated on the ground as sign posts were gradually upgraded as resources allowed.
Population Measures

A major criticism of virtually all existing road classification hierarchies both nationally and internationally, is the proliferation of subjective terminology when relating a certain road type to a particular locality or population centre. Broad terms such as ‘key towns’, ‘major centres’, or ‘significant geographic areas’ dominate guidelines to aid interpretation of classification levels. In practice though, such terms are often too vague and subjective and lead to inconsistent interpretation, particularly when applied locally. This was highlighted earlier with traffic volume interpretation, where councils perceive certain features to be ‘key’ or ‘major’ within their shire, that would not necessarily be considered so from a State or national perspective. The RWG suggests a possible remedy could be to attribute discrete, or a range of, population figures from ABS to define terms like ‘key towns’. That way, terminology like ‘key’ could still be retained, however, it would be attributed against additional guidelines which relate it to more specific population sizes. A similar methodology to this is used in the NSW RTA Road Classification Guidelines, although population measures only feature to differentiate between small coastal holiday town numbers that fluctuate seasonally. The RWG recognises that while including some element of population measure does appear logical and straightforward, in practice the exercise is likely to be considerably more complicated.

Structural

Structural elements such as road width/lane count and surface type (sealed/unsealed) relate to the condition of the road. The Canadian mapping agencies’ (CTI) road classification is primarily structural in nature, classifying roads into classes based on surface type, seasonal ‘passibility’, lane count and width. It is likely that a structural system was favoured over a functional one because of the extreme environmental conditions that prevail throughout Canada as well as the remoteness of the landscape.

This was not the only structural classification system that was identified. The Australian Defence Mapping Specification depicts roads according to a structural classification; the classification is based on a combination of factors, namely, surface type (hard paved/loose), width and weather type (all weather, fair/dry weather/ winter only). Structural considerations are paramount in determining military vehicle accessibility under varying conditions. Attempts were made to compare international military mapping specifications to Australia’s. However, requests for this information were denied, which is likely because of current global sensitivity regarding border protection issues.

Nevertheless, the question of whether a national structural road classification could be superior to a functional hierarchy warrants discussion. The benefit of structural elements in a classification is that they represent quantifiable measures that can be applied consistently, with the possible exception of ‘weather type’ which is somewhat subjective. The problem with applying such a classification system to Australia is that there are numerous roads in remote areas that are structurally poor in parts: being unsealed, single lane and dry weather only. Even so, they are regionally significant from a functional perspective, an example being the Kennedy Development Road in Queensland.

An alternative is to incorporate structural characteristics into a functional classification hierarchy to aid in the interpretation of roads. Purists of road classification hierarchies would argue that incorporating structural elements into a functional classification ignores the fundamental differences between the two classification types and is best avoided. There are, however, several examples of structural characteristics being included in a functional hierarchy, notably the PSMA and Canadian TAC classifications. Interestingly, these structural...
variables tend to be used to further differentiate the lower order roads, specifically vehicle tracks where issues of weather type, road width and surface tend to vary considerably. However, vehicle tracks, due to their typical remoteness and infrequent use, are one of the most difficult road types for which reliable information is available. Therefore, attempting to obtain additional structural variables on these roads may prove exceedingly difficult. The inclusion of structural considerations, particularly for lower order roads in remote areas, again highlights the potential benefit in a rural/urban dichotomous classification. This could confine structural considerations to lower order roads in rural and remote areas where the importance of such would be greater.

**Recommendation 3:** That additional variables of traffic volume, design speed, travel distance, route numbering, population measures and structural considerations, be investigated for possible inclusion as additional determinants of road classification type, either within the classification itself or in additional guidelines or decision trees.
Additional Considerations

Clear Division of Responsibility for Higher Order Roads

A potential classification model that could be applied in Australia is one where all higher order roads (those above the local street level) could only be classified by the relevant authority, similar to the route numbering approach described previously which has proved successful in Great Britain. In the majority of cases this responsibility would fall on each State and Territory road transport and traffic authority. Whether Austroads could coordinate the application of this classification and supply incremental updates of higher order road classification, on a periodic basis, warrants consideration. Under this model, individual mapping authorities are not part of the decision-making process of classifying higher order roads. Instead, they simply adopt the classification as it is defined by the relevant road transport and traffic authority. The RWG acknowledges that some mapping authorities have more recently engaged in a similar relationship with their respective road transport and traffic authority, NSW LPI, and WA DLI being notable examples. The RWG believes this approach could be extended to become a national methodology which, would lead to a more consistent classification of these roads.

Recommendation 4: To engage road traffic and transport authorities to investigate the feasibility of the periodic supply of coordinated higher order roads network classifications from road transport and traffic authorities.

Classification Interpretation Aids

Many of the recommendations proposed above, that relate to the inclusion of additional variables, could be applied in various ways to improve the road classification decision process. Understandably, it is not practical to include too much information within the over-arching definitions within a classification hierarchy. There is scope, however, for supplementary documentation, in the form of guidelines and decision trees, to contain more specific instructions and examples, to reduce ambiguity and subjectivity.

Guidelines

The best example of additional guidelines being used effectively in road classification is the NSW RTA Road Classification Guidelines. These guidelines identify specific traffic volume figures, as well as other criteria, to assist in differentiating road classification types, particularly State-controlled and regional roads. These guidelines are also useful because they provide very descriptive and specific examples on how to classify problematic roads, as well as additional tests that either exclude from or include a road in a particular category. The RWG recommends that similar guidelines be developed for any future road classification hierarchy. Also, any adopted guidelines could be further enhanced by including diagrams to explain in more detail particular road functions, connections and associations.

Decision Trees

One criticism of additional guidelines, however, is that their detailed nature can sometimes overwhelm effective interpretation. There is potential that some guideline content, described previously, could best be communicated to users through decision tree diagrams. An example of this is illustrated in Figure 3. A major benefit of using decision trees is that they can further reduce ambiguity and subjectivity. The difficulty with them is achieving an
Assessing the Feasibility of a National Road Classification

Effective balance between complexity and effectiveness. The RWG recommends that decision tree diagrams be developed to aid interpretation of any future road classification hierarchy.

**Recommendation 5:** Additional guidelines be developed that contain decision-tree diagrams, supplementary instructions and examples that aid in the interpretation of road classification.

![Figure 3 - Example of a decision tree defining road topology types (adapted from)](image)

**Classification Complexity**

Unfortunately, none of the classifications reviewed represented a true, nationally adopted and consistent road classification hierarchy. Interestingly, the majority of countries, like Australia, had developed concurrent road classifications, one applied by the mapping authority and another by the relevant road transport and traffic authority. However, the degree to which there was commonality between the two varied. It is uncertain whether these concurrent classifications exist because amalgamation into one definitive classification was found to be too difficult or possibly that it has never been considered. In practice, the research indicates, and others support the contention, that it is not possible for one definitive road classification hierarchy to be 'all things to all people'. Inherently there will always be a degree of trade-off with respect to the objectives that the classification system is attempting to best satisfy.

The review of road hierarchies has also emphasised that they vary in complexity. A glance at the comparative Appendices A-C reveals the varying degree of classification complexity and detail in definitions. Some systems have as many as ten different categories, whereas others are more simplified, with all local roads bundled into one classification. Often, the more simplified classifications also have a ‘Local Road’ category, where the remaining unspecified lower order roads are grouped together. There are obvious benefits to having a simplified national classification system. This would make it easy for all other jurisdictions to adapt their local classification system to this kind of system, to depict roads in a nationally consistent manner.

The difficulty, however, is getting the balance right. Too simplistic a classification has little application. Too complex a classification becomes too prescriptive and rigid, making it unmanageable. Indeed, it appears that the PSMA classification may have the right balance. Although some contend that greater differentiation is
needed to distinguish between local and State-controlled roads so that these roads can be classified with greater precision and certainty\textsuperscript{42}, however, others argue that: “\textit{There is no absolutely rigorous method for classifying roads at the interface between classes}”\textsuperscript{10,39}.

96 Another identified risk of an overly simplistic classification is that while it may satisfy the objective, the resulting classification hierarchy could have very limited application other than for very broad, large scale use. This is primarily because the majority of roads in Australia, particularly in relation to geographic area covered, fall into the lower categories of local roads and vehicle tracks\textsuperscript{3}; therefore, further differentiation between these roads is desirable to provide enhanced specific depiction. The PSMA classification is not too simplistic in this respective, in that it makes allowances for differentiation between lower order roads. For example, the PSMA classification has two ‘local road’ categories and two ‘vehicle track’ categories. The question is, however, whether further differentiation of these categories is necessary?

97 A significant proportion of ‘public’ roads reside in National Parks, State Forests and Indigenous Lands. Increasingly, information on these roads is being recorded with a greater degree of attribution by jurisdictions, to further differentiate roads into sub-categories to aid interpretation. A cursory comparison of some of these additional classifications reveals that while there is some commonality between jurisdictions and across States and Territories, there is by no means a standardised approach\textsuperscript{51,52,53,54}. It would be better if a standardised approach could be reached between jurisdictions, which could then be included into a national classification. Then there are roads which do not fall under any jurisdiction, such as roads in unincorporated areas and private vehicle tracks. Many of these roads have restricted access, permanently or periodically. Nevertheless these roads may still need to be considered under a national classifications system, particularly where they may be utilised for EM. In some cases, EM authorities have begun recording additional information relating to the condition of lower order roads in a separate attribute field, to simplify the road classification hierarchy\textsuperscript{53}.

98 Again, the issue of complexity needs to be considered and the core user-base determined, which then sets the priorities for defining the road classification hierarchy. Therefore, the RWG recommends that further liaison with the aforementioned bodies be undertaken to more accurately gauge their requirements with respect to the inclusion of more detailed, lower order road classification.

\textbf{Recommendation 6: To consult with National Parks, State Forests and Indigenous Lands authorities to gauge their requirements for attribution of lower order roads for possible inclusion into a national classification, or in a separate attribute field in such a classification.}
6. How best to implement a National Road Classification

“Road classification is a means to an end, not an end in itself. Successfully allocating agreed labels to each element in the road system involves so much effort and controversy that it is pointless and best avoided unless the labels are going to have some application.”

This quote highlights the opinion that irrespective of whatever eventual national road classification is agreed upon, the greatest challenge will undoubtedly be applying the classification system universally at a national level. Evidence of previous failed attempts at this is testimony to its difficulty. So too is the existence of so many concurrent road classifications, despite consensus on the benefits of a unified system. Unfortunately, the Australian government framework does not allow for the application of such a system to be legislated at the Commonwealth level, which is not the case in Japan. The logical path toward universal adoption in Australia, therefore, is through cooperative agreements between all States and Territories. This was the approach taken when developing the national route numbering system, which has had slow uptake as discussed earlier.

Another approach suggested is one where the RWG, through the ICSM, develops a model that primarily meets the needs of its mapping constituents. The hope would be that this system becomes universally adopted in mapping and, over time, its use then gradually extends to disciplines beyond which it was originally intended, much in the same way that the old NAASRA classification, which was initially used exclusively by road authorities, has since been applied more broadly by other disciplines. This technique of implementation, however, is somewhat slow and outdated. Previously, States, Territories and Commonwealth bodies rarely collaborated when it came to standardisation issues. Today, the emphasis has shifted towards greater national communication, information sharing and collaboration to achieve mutually beneficial outcomes.

Therefore, the RWG supports the cooperative agreement approach, and believes that over time a nationally consistent road classification hierarchy could become ubiquitous, particularly if the recommendations contained in this report are actioned. Furthermore, this research has identified that extensive collaboration is critical to engender the needed support for the process. The ICSM, through the RWG, has a significant role to play here, in engaging all interested parties The RWG acknowledges that initially it had sought to target only a core group of key stakeholders, so as not to involve too many parties which could significantly impede progress. The RWG now hopes that with extended participation, progress can still be made towards this goal. Austroad, have the potential to be key participants, given their national role is to promote “harmonisation, consistency and uniformity in road and related operations”.

**Recommendation 7:** To adopt a cooperative approach between all levels of government (to agree) to implement a mutually acceptable national road classification system.
National Highway -

National Highway 1 and National Route 94.

- Hard surface roads which are of avenue for high volume traffic. Classification derives from Main Roads Road Number field with Prefix H.

Highways connect major centres and/or key towns or have Freeway - speed roads declared as 'Freeway'; comprising dual carriageway roads that are major connectors National State Highway or AUSLINK Network form part of Highway and are named as such the Arterial -

Having multi-lanes, capable of supporting major intrastate through route, and/or are principal connector roads between Capitals and/or major regions and/or key towns. As well as those roads defined in the Highways and Jetties Act.

1- Pastoral National Highway -

Those roads, not being of importance in a national sense, and/or are a major purpose of collecting and distributing traffic from local areas to the wider road network, including access to abutting properties.

2- Rural National Highway –

Those roads not being Class 6, whose main function is to perform as the principal arteries for through traffic and freight movements across urban areas, provide access to major freight terminals and/or which are extensions into urban areas of Class 2 or Class 3 roads.

3- Rural State Highway:

Those roads not being Class 1 or 2, whose main function is to form an important avenue for metropolitan transport movements.

4- Rural Arterial Road

Those roads which are a road which acts as a connector between highways and/or arterial roads, or an alternate route for class 302 roads, or a principal avenue for massive traffic movements.

5- Rural Collector

Those roads which form the principal artery of communication for movements: Between important centres and the Class 1 and Class 2 roads and/or key towns; or communication for movements: Between important centres; or Of an arterial nature within a town in a rural area.

6- Rural Arterial Road

Those roads which provide almost exclusively for one activity (i.e. recreational, mining or forestry roads).

7- Rural Local/Minor

Those roads which cannot be assigned to Classes 1, 2, 3, or 4 (e.g. access to national parks, dam access, mining, and forestry roads).

8- Unimproved -

A road which is not capable of and/or not maintained.

9- Proposed -

A track which is not capable of and/or not maintained.

10- Surveyed Unconstructed -

Public or private road construction connecting other roads or leading to a property access.

11- Unsurveyed Unconstructed -

An unimproved vehicular road of minimal or no construction which are not necessarily maintained.

12- Proposed Unsurveyed -

A track which is not capable of and/or not maintained.

13- Walking Track

A pathway designed for traffic on foot and which is open to and not restricted to the public.

14- Parking Area

An area identified as being located adjacent to a road and extending into the available side of the road for public use.

15- Bike Path

A path which is not a road and which is designed for use by cyclists, pedestrians, or horse riders. Qualification: This is theoretically a replication of RoadSegment class subtype Pathway.

16- Private or Restricted Roads

A road which acts as a connector within a property or a road or path which is not open to the public.

17- Bikeway/Walkway/Mall

A path which is not a road and which is designed for use by cyclists, pedestrians, or horse riders. Qualification: This is theoretically a replication of RoadSegment class subtype Pathway.

18- Unconstructed Track

A track which is not capable of and/or not maintained.

19- Track -

A pathway designed for traffic on foot and which is open to and not restricted to the public.

20- Proposed -

A track which is not capable of and/or not maintained.

21- Surveyed Unconstructed -

Public or private road construction connecting other roads or leading to a property access.

22- Unsurveyed Unconstructed -

An unimproved vehicular road of minimal or no construction which are not necessarily maintained.

23- Proposed Unsurveyed -

A track which is not capable of and/or not maintained.

24- Walking Track

A pathway designed for traffic on foot and which is open to and not restricted to the public.

25- Parking Area

An area identified as being located adjacent to a road and extending into the available side of the road for public use.

26- Bike Path

A path which is not a road and which is designed for use by cyclists, pedestrians, or horse riders. Qualification: This is theoretically a replication of RoadSegment class subtype Pathway.

27- Private or Restricted Roads

A road which acts as a connector within a property or a road or path which is not open to the public.

28- Bikeway/Walkway/Mall

A path which is not a road and which is designed for use by cyclists, pedestrians, or horse riders. Qualification: This is theoretically a replication of RoadSegment class subtype Pathway.

29- Unconstructed Track

A track which is not capable of and/or not maintained.

30- Track -

A pathway designed for traffic on foot and which is open to and not restricted to the public.

31- Proposed -

A track which is not capable of and/or not maintained.

32- Surveyed Unconstructed -

Public or private road construction connecting other roads or leading to a property access.

33- Unsurveyed Unconstructed -

An unimproved vehicular road of minimal or no construction which are not necessarily maintained.

34- Proposed Unsurveyed -

A track which is not capable of and/or not maintained.

35- Walking Track

A pathway designed for traffic on foot and which is open to and not restricted to the public.

36- Parking Area

An area identified as being located adjacent to a road and extending into the available side of the road for public use.

37- Bike Path

A path which is not a road and which is designed for use by cyclists, pedestrians, or horse riders. Qualification: This is theoretically a replication of RoadSegment class subtype Pathway.

38- Private or Restricted Roads

A road which acts as a connector within a property or a road or path which is not open to the public.

39- Bikeway/Walkway/Mall

A path which is not a road and which is designed for use by cyclists, pedestrians, or horse riders. Qualification: This is theoretically a replication of RoadSegment class subtype Pathway.

40- Unconstructed Track

A track which is not capable of and/or not maintained.
### APPENDIX B – Australian & New Zealand Road Transport and Traffic Authority Road Classification Comparison

<table>
<thead>
<tr>
<th>NAASRA*</th>
<th>NSW</th>
<th>NZ</th>
<th>QLD</th>
<th>VIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural</strong></td>
<td>Urban</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 1</td>
<td>- Those roads which form the principal avenue for communications between major regions of Australia, including direct connections between capital cities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 2</td>
<td>- Those roads, not being Class 1, whose main function is to form the principal avenue of communication for movements: Between capital city and adjoining States and their capital cities; or Between a capital city and key towns; or Between key towns.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 3</td>
<td>- Those roads, not being Class 1 or 2, whose main function is to form an avenue of communication for movements: Between important centres and the Class 1 and Class 2 roads and/or key towns; or communication for movements: Between important centres and the Class 1 and Class 2 roads and/or key towns; or Between important centres; or of an arterial nature within a town in a rural area.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 4</td>
<td>- Those roads, not being of Class 1, 2 or 3, whose main function is to provide access to abutting property (including property within a town in a rural area).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class 5</td>
<td>- Those roads which provide almost exclusively for one activity or function which cannot be assigned to Classes 1, 2, 3 or 4.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Notes:

- *The NAASRA Classification is applied in ACT, NT, SA, TAS & WA.*
- The NAASRA* Classification is applied in ACT, NT, SA, TAS & WA.
- Class 6 - Those roads whose main function is to perform the principal avenue of communication for massive traffic movements.
- State Roads (Freeways and Primary Arterials) - The State Road network (including the National Highways) is formed by the primary network of principal traffic carrying and linking routes for the movement of people and goods within the urban centres of Sydney, Newcastle, Wollongong and Central Coast, and throughout the State.
- National Routes - Motorways, expressways and major two-lane roads which: Form a nationally important strategic road network; Are significant elements in the national economy; Have the highest degree of access standard and control, and provide a high level of user service at all times.
- National Highways - The Queensland National Highway network comprises the State’s major corridors linking the State’s provincial cities and interstate capitals to Brisbane. It is the primary road set within the State’s road network. National Highways are owned by the State but funded by the Commonwealth as they have national as well as State significance.
- Freeways - provides a principal route for the movement of people and goods: between major regions of the State; or between major centres of population or between major metropolitan activity centres; or to major transport terminals; or 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.
- Motorways - provides a principal route for the movement of people and goods: between major regions of the State; or between major centres of population or between major metropolitan activity centres; or to major transport terminals; or 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.
- Primary (Regional) Arterials - Major roads which: Form strategic links between regions, or within regions and between districts; Are significant elements in the regional economy, and have some access controls and standards for permitted activities, which are determined mainly on the basis of strategic function and traffic volume.
- State Strategic Roads - The Strategic Road network complements the National Highways in the primary movement of people and goods throughout the State. It comprises State declared highways and development roads linking major regions within the State, and interstate regions with regions in Queensland.
- Arterial Road - Freeways - provides a principal route for the movement of people and goods: between major regions of the State; or between major centres of population or between major metropolitan activity centres; or to major transport terminals; or 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.
- Regional Roads - The Regional Road network, together with the National Highway and State Strategic road networks, caters for movements linking areas of economic importance within the region to one another and to economic areas in adjacent regions. This network promotes future industry establishment and development in the region and provides a corridor for trade movements external to the region.
- Collector Routes - Locally preferred routes between, or within, areas of population or commercial activity which: Complement district arterials but have property access as a higher priority, and have standards suitable for the safe operational requirements of the traffic volume on each section.
- District Roads - Are less significant for State and national movements and serve a more localised function. District Roads generally provide links within a local government area, and perform the important functions of feeding the national state and regional system, and distributing traffic from that system to the local road network. The Department of Main Roads has management and funding responsibility for some 14 000 kilometres of District Roads that would generally be the responsibility of councils in other jurisdictions.
- Local Roads - All other roads. The standards for these roads are those considered appropriate by the road controlling authority for local traffic operation and land access requirements.
- Local Government Roads - Comprise all roads controlled by local governments or Aboriginal and Torres Strait Islander community councils.
### Table: International Road Classifications of Mapping and Road Transport & Traffic Authorities

<table>
<thead>
<tr>
<th>SIGA</th>
<th>JG TWIN</th>
<th>Canada CTC</th>
<th>Canada TAC</th>
<th>JICA</th>
<th>JAPAN MLIT</th>
<th>Great Britain Ordnance Survey</th>
<th>Great Britain - DfT, HA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
<td>Rural</td>
<td>Urban</td>
<td>Urban</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>1</td>
<td>9</td>
<td>C</td>
<td>Class 1</td>
<td>A1 - Rural Principal Arterial</td>
<td>A3 - Secondary and Connecting Road</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>2</td>
<td>8</td>
<td>C</td>
<td>Class 2</td>
<td>A2 - Minor Principal Arterial</td>
<td>A4 - Local, Neighborhood, and Rural Road</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>3</td>
<td>7</td>
<td>C</td>
<td>Class 3</td>
<td>A3 - Major Arterial</td>
<td>A5 - Unpaved Small Rural Road</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>4</td>
<td>6</td>
<td>C</td>
<td>Class 4</td>
<td>A4 - Local, Neighborhood, and Rural Road</td>
<td>A6 - Unimproved Roads</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>5</td>
<td>5</td>
<td>C</td>
<td>Class 5</td>
<td>A5 - Unpaved Small Rural Road</td>
<td>A7 - Road as Other Thoroughfare</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>6</td>
<td>4</td>
<td>C</td>
<td>Class 6</td>
<td>A6 - Unimproved Roads</td>
<td>A8 - Road as Other Thoroughfare</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>7</td>
<td>3</td>
<td>C</td>
<td>Class 7</td>
<td>A7 - Road as Other Thoroughfare</td>
<td>A9 - Road as Other Thoroughfare</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>8</td>
<td>2</td>
<td>C</td>
<td>Class 8</td>
<td>A8 - Unimproved Roads</td>
<td>A10 - Road as Other Thoroughfare</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>9</td>
<td>1</td>
<td>C</td>
<td>Class 9</td>
<td>A9 - Unimproved Roads</td>
<td>A11 - Road as Other Thoroughfare</td>
</tr>
</tbody>
</table>

### Notes:
- **Urban** refers to urban transport networks.
- **Rural** refers to rural transport networks.
- **Class 1** - Rural Principal Arterial: A road in this category is usable only by limited-access vehicles.
- **Class 2** - Minor Principal Arterial: A road in this category is usable only by limited-access vehicles.
- **Class 3** - Major Arterial: A road in this category is usable only by limited-access vehicles.
- **Class 4** - Local, Neighborhood, and Rural Road: A road in this category is usable only by limited-access vehicles.
- **Class 5** - Unpaved Small Rural Road: A road in this category is usable only by limited-access vehicles.
- **Class 6** - Unimproved Roads: A road in this category is usable only by limited-access vehicles.
- **Class 7** - Road as Other Thoroughfare: A road in this category is usable only by limited-access vehicles.
- **Class 8** - Unimproved Roads: A road in this category is usable only by limited-access vehicles.
- **Class 9** - Unimproved Roads: A road in this category is usable only by limited-access vehicles.
- **Class 10** - Road as Other Thoroughfare: A road in this category is usable only by limited-access vehicles.
## 10. Appendix D - Comparative Benefits/Shortcomings of the Road Classification Hierarchies

### Mapping Authorities

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### Benefits

- Distinction between urban and rural road regions.
- Simple number of classification types.
- Many other road authorities have adopted the classification, making for consistency in representation.
- Descriptive name assigned to each class, such as ‘Secondary Road’ assisting interpretation by users.
- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.
- Good differentiation of local road types.
- Very descriptive definitions, particularly for contentious middle and lower order roads, reducing degree of subjectivity.
- Introduces considerations of traffic speed to classify Motorways, to reduce ambiguity.
- Definitions reinforce linkages with ICSM standards.
- Includes Proposed Road as a discrete category type with adequate definition.
- Includes considerations of population sizes for the highest order urban class to aid interpretation and reduce ambiguity.
- Includes considerations of trip lengths between rural collectors and minor arterials to aid interpretation.
- Includes considerations of traffic volume and flow characteristics to aid in interpretation and reduce ambiguity.
- Uses less ambiguous terminology in favour of more quantifiable measures, such as traffic volume and design speed.
- Is based on considerations of road width to classify between all road types.
- Definitions assigned to roads classification linked to Nation wise Road Law.
- Introduces considerations of shared zones between pedestrians and vehicles.

### Shortcomings

- Lack of direction on how urban and rural divide is determined.
- No distinction between urban and rural road regions.
- Uses subjective terminology, ‘major centre’, ‘high traffic volume’ (not quantifiable).
- Greater distinction needed between designating State roads and local council roads.
- No additional category of Vehicle Track to discern different functions relevant for National Park, State forest or EM.
- Too few classification types makes it difficult to combine with more complex classification types.
- Collective name not assigned to each class, such as ‘local road’, complicating interpretation by users.
- Introduces structural variables, but not across all classification types.
- Includes categories that may be considered beyond basic trafficable road definition, such as Path, Undetermined etc.
- Some contend quantifiable measures are too inflexible and detailed to be applied by all local jurisdictions.

### Traffic Authorities

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<thead>
<tr>
<th>Australian &amp; NZ</th>
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### Comparisons

- Distinction between urban and rural road regions.
- Simple number of classification types.
- Many other road authorities have adopted the classification, making for consistency in representation.
- Descriptive name assigned to each class, such as ‘Secondary Road’ assisting interpretation by users.
- Limited number of classification levels makes it easier to amalgamate multiple different systems into it.
- Good differentiation of local road types.
- Very descriptive definitions, particularly for contentious middle and lower order roads, reducing degree of subjectivity.
- Introduces considerations of traffic speed to classify Motorways, to reduce ambiguity.
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- Includes Proposed Road as a discrete category type with adequate definition.
- Includes considerations of population sizes for the highest order urban class to aid interpretation and reduce ambiguity.
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- Includes considerations of traffic volume and flow characteristics to aid in interpretation and reduce ambiguity.
- Uses less ambiguous terminology in favour of more quantifiable measures, such as traffic volume and design speed.
### 11. Appendix E – PSMA Hierarchy Conversion Summary Table

#### New South Wales

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#### Queensland

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12. Acknowledgments

The ICSM acknowledges the assistance provided by officers of the following agencies:

MAPPING AUTHORITIES
- ACT Planning and Land Authority (ACTPLA)
- Department of Defence (DoD)
- Geoscience Australia (GA)
- Land Information New Zealand (LINZ)
- NSW Land Property & Information (LPI)
- NT Department of Planning & Infrastructure (DPI)
- PSMA Australia Limited
- QLD Department of Natural Resources & Water (NRW)
- SA Department of Environment & Heritage (DEH)
- Tasmanian Department of Primary Industries, Water and Environment (DPIWE)
- Vic Department of Sustainability and Environment (DSE)
- WA Department of Land Information (DLI)

INTERNATIONAL MAPPING AUTHORITIES
- Division of Natural Resources Canada (DNRC)
- Geological Survey Institute (GSI) of Japan
- Ordnance Survey (OS) of Great Britain
- United States Geological Survey (USGS)

OTHER NATIONAL AUTHORITIES/CORPORATIONS
- Austroads
- Australian Bureau of Statistic (ABS)
- Australian Local Government Associations (ALGA)
- Department of Transport & Regional Services (DOTARS)
- Land Transport NZ
- Main Roads Western Australia
- NSW Roads and Traffic Authority (RTA)
- QLD Main Roads (QMR)
- Roads ACT
- Tasmanian Department of Infrastructure, Energy & Resources (DIER)
- Transport Agency Surveying And Mapping (TASAM)
- Transport SA
- VicRoads

OTHER INTERNATIONAL AUTHORITIES/CORPORATIONS
- Department for Transport (DfT) Great Britain
- Highway Agency (HA) of Great Britain
- Ministry of Land, Infrastructure and Transport (MLIT) of Japan
- Transportation Association of Canada (TAC)
- US Federal Highway Administration Department (FHWA)
13. End Notes


14. LGAQ, 2006, Submission to CGC Review of Interstate Distribution of Local Road Grants January. Local Government Association Queensland (LGAQ)


25. DLI, 2005, ‘Road Centreline Capture Rules’, Road Centreline Quality Improvement Team (internal Draft), Department Land Information (DLI) WA.


