Access Management Framework for Oversize-Overmass (OSOM) vehicles in Tasmania

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Abstract

This paper outlines the development and implementation of a risk and evidence-based access management framework for Oversize-Overmass (OSOM) heavy vehicles (referred to as abnormal loads in Europe). The framework improves safety and productivity both through industry having increased levels of access certainty, efficiency, transparency and flexibility when planning their operations; and road managers having increased control and greater consistency over infrastructure management.

Australia commenced its new Heavy Vehicle National Law (HVNL) in February 2014 which provided, for the first time, clear legal accountabilities and responsibilities for all road managers, including local governments, to manage heavy vehicle access to their roads.

Tasmania has developed an extensive and sophisticated access management framework for OSOM vehicles (up to 103t GCM, 5.5m wide, 5.0m high and 30m long) including a vehicle classification framework, standardised and optimised structural assessments, and harmonised operating conditions.

Keywords: Heavy Vehicles, Oversize Overmass, OSOM, access management

1. Summary

Australia commenced the new Heavy Vehicle National Law (HVNL) in February 2014. For the first time, this provided clear legal accountabilities and responsibilities for all road managers, including local governments, to manage heavy vehicle access to their roads, thus providing for direct means of managing their assets in a safe, productive and sustainable fashion.

Tasmania[1] has developed an extensive and adaptive access management framework for OSOM vehicles (up to 103t GCM, 5.5m wide, 5.0m high and 30m long) including a classification framework, standardised and optimised structural assessments and harmonised operating conditions. Perhaps most importantly, a clear and collaborative engagement model was established between industry, road managers and the regulator to facilitate the successful development and implementation of the framework, which went live on 18 November 2015.

In developing the framework Tasmanian road managers now have a strong foundation for understanding road and bridge assets against OSOM vehicle operations. OSOM vehicle operations (upwards of 80%) are consented to under a gazette notice thereby alleviating the need for the permit application process and the framework's sophistication, flexibility and adaptability is promoting timely road manager responses, that enable OSOM operators to meet client demand, whilst responsibly managing the road transport asset for all customers.

2. Introduction and background

OSOM vehicles comprise only a small percentage of Australia's heavy vehicle fleet, however, they provide critical services in moving large indivisible items servicing the construction, agricultural, mining and other key industries. There are often significant knock-on effects should construction, harvesting or other critical equipment not arrive at the required location in a timely manner.

Australia has two basic legal mechanisms for granting access for these types of vehicles: a permit – designed for a single (or small group) of vehicles operating on specific routes; and a gazette notice – designed for categories of vehicles operating on defined networks. Traditionally OSOM vehicles have operated under permits, which under the previous legislation suffered from time delays, and lack of consent and visibility from road managers.

Under the Heavy Vehicle National Law (HVNL), the National Heavy Vehicle Regulator (NHVR) is the only entity with the authority to issue permits, and may only do so when consent from all relevant road managers has been provided. Whilst this has addressed issues around consent and visibility for all road managers, due to the access decision-making capacity and capability levels of road managers (which vary considerably around Australia), the lack of timely permits has been exacerbated and as such confidence in the system has degraded.

[1] Throughout this report 'Tasmania' should be read as the collaboration of the state road authority (Department of State Growth), local governments (including and led by the Local Government Association of Tasmania (LGAT)), key OSOM industry representatives and the National Heavy Vehicle Regulator (NHVR).

Furthermore, the road network consists of structural and geometrical challenges as roads and bridges (commonly many decades old) were not designed to accommodate these types of vehicles.

3. Current approaches

Prior to the establishment of the NHVR in 2014, each Australian jurisdiction approached OSOM movements in different ways. Most jurisdictions allowed ‘smaller’ OSOM vehicles up to 3.5m wide, 4.6m high and 25m long and 49.5t GCM to operate under gazette notice which were mostly modelled on the National Transport Commission’s (NTC) OSOM regulations (NTC, 2006), however some divergence occurred. The networks provided included either all roads (with a few exceptions), or on designated networks.

OSOM vehicles at masses and dimensions greater than those listed above need to obtain permits for access to the road network. Assessment approaches for these varies considerably around Australia.

The NHVR recorded 78,510 access permits issued in 2014-2015 (NHVR, 2015c) with the majority of these being for OSOM activities that could not access the road network under any existing gazette notice.

4. Heavy Vehicle Classification

Australia’s eight states and territories all have differing methods for describing heavy vehicles, and in some cases there are also regional differences. The NHVR undertook preliminary work on a national heavy vehicle classification framework for all heavy vehicles in 2013-14 as a foundational step towards national harmonisation, however further work is required.

The OSOM industry, due to the diverse nature of its clients’ needs, is diverse in itself and therefore there are numerous potential OSOM combinations and configurations. When this is considered in terms of the variability of the road network (e.g. alignment and cross section), and bridge structural capacity, it was established early on that, in order to maximise access under a gazette notice, a reasonably high degree of sophistication was required in describing the OSOM combinations.

Tasmania refined initial OSOM vehicle classification work undertaken by the NHVR with extensive consultation and input from the Tasmanian OSOM industry and established the *Tasmanian Class One Load Carrying Vehicle Guide* (the Guide) (NHVR, 2015b). The upper mass and dimension envelopes established in the Guide were 5.5m wide, 5.0m high, 30m long and up to 103t GCM.

These thresholds were settled upon as the appropriate balancing point between high and lower risk vehicles. That is, OSOM vehicles of greater mass and/or dimension are seen to have potential infrastructure impacts significant enough to warrant individual assessments by road managers, and are specialised enough to require industry and operators to adopt greater levels of management around these operations.

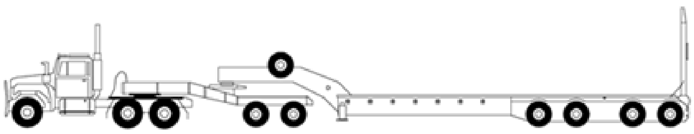
Seven high level Tasmanian Load Carrying (TLC) classifications, denoted TLC1 through to TLC7 were established, with TLC1 being an oversize only category (operating at regulatory masses). TLC2 through to TLC7 are over mass vehicles and are split depending on whether there is a dolly and whether the trailer and dolly have 4 or 8 tyres per axle. Categories are then split into subcategories depending on the number of axles in the trailer axle group. This results in 20 vehicle permutations (excluding mass schemes). Figure 1 illustrates an example of some combinations.

Tasmanian Load Carrying 4 (TLC4): Dolly (2 axles, 4 tyres/axle), Trailer (4 tyres/axle)

TLC4 Dimension Limits:

Width: Maximum 5.0m
Length: Maximum 30.0m
Height: Maximum 5.0m

Vehicle Designator	*TLC4-1*
Vehicle Description	A single steer, dual-drive tandem axle group prime mover towing a low loader dolly with a tandem axle group with 4 tyres per axle and a low loader with a spread quad-axle group with 4 tyres per axle.
Notes	• Minimum axle spacing between 1st and 2nd axle is 3.2m • Minimum axle spacing between 5th and 6th axle is 6.0m • Minimum axle spacing between 2nd and 5th axle is 5.0m • Minimum trailer axle spacing is 1.2m, 2.4m, 1.2m • Refer *Tasmania Class One Load Carrying Vehicles Mass and Dimension Exemption Notice 2016* for other requirements



Vehicle Designator	*TLC4-2*
Vehicle Description	A single steer, dual-drive tandem axle group prime mover towing a low loader dolly with a tandem axle group with 4 tyres per axle and a low loader with a closed quad - axle group with 4 tyres per axle.
Notes	• Minimum axle spacing between 1st and 2nd axle is 3.2m • Minimum axle spacing between 5th and 6th axle is 6.0m • Minimum axle spacing between 2nd and 5th axle is 5.0m • Minimum trailer axle spacing is 1.2m • Refer *Tasmania Class One Load Carrying Vehicles Mass and Dimension Exemption Notice 2016* for other requirements

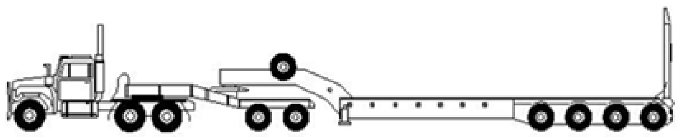


Figure 1 – Example combinations (TLC4-1 & TLC4-2, spread and closed quad axle low loader (4 tyres/axle) with tandem axle low loader dolly (4 tyres/axle))

Once the configuration has been selected, up to three mass schemes are available to the operator. Each successive mass scheme has lesser impacts on the infrastructure, and therefore greater network access is afforded. This flexibility recognises that a large amount of travel occurs at masses less than the maximum permissible.

Whilst this may appear initially complicated, a meaningful vehicle coding system is used (which has been picked up as common terminology and language), and once the system is used a few times becomes intuitive. Appendix 1 outlines the flowchart for determining vehicle category.

5. Network assessment

Following the classification of the range of OSOM vehicle combinations, network assessments were undertaken. There were two key elements here: geometric and structural capacity.

5.1. Geometric assessments

Geometric considerations were mainly centred on the available width of the carriageway and the vehicle's relation to it. Half metre increments were used to identify width restrictions in the networks ranging from 2.5m wide (maximum regulatory width) to 5.5m wide. Similarly, overall OSOM vehicle lengths of 21m, 23m, 26m and 30m were used to identify length restrictions (related to both common combination lengths, and the topography of Tasmania).

Due to the 'inherited' nature and incrementally constructed road alignments and cross sections that make up a network at any given time, determining the appropriateness of a particular combination envelope, to operate safely when travelling, and determining any appropriate mitigations, tends to be an 'art' rather than a 'science'. Factors considered by an experienced practitioner, often working with input from an OSOM operator, include: the transitory interaction between OSOM activity and opposing traffic; trafficable road widths, including consistency of cross-section, curve widening and 'storage' to allow passing potential; longitudinal alignments including consistency, degree of navigable difficulty and sight distance; localised impediments (e.g. narrow bridge barrier railings not consistent with the balance of the overall corridor); traffic volume including make-up; and adjacent land use including level of side friction.

To facilitate broad acceptance and ease of use for industry and road managers, the networks have been clearly displayed on interactive online maps that prompt the user to select the width and length of the vehicle (including load), along with its classification before displaying the matching network map.

This approach aims to provide network access based upon safety risks and the infrastructure 'impact' of a combination. Striking a balance between overly complicated and numerous networks versus unlocking latent network capacity (and associated productivity benefits of allowing more vehicles to safely utilise it) was a key consideration, and this is undergoing ongoing review. Figure 2 illustrates the vehicle selector and Figure 3 is a snapshot of the associated network. The example is for a TLC2-4 (tri-axle low loader, no dolly) at 3.5m wide 26m long at 'C' masses which allow 45.5t GCM.

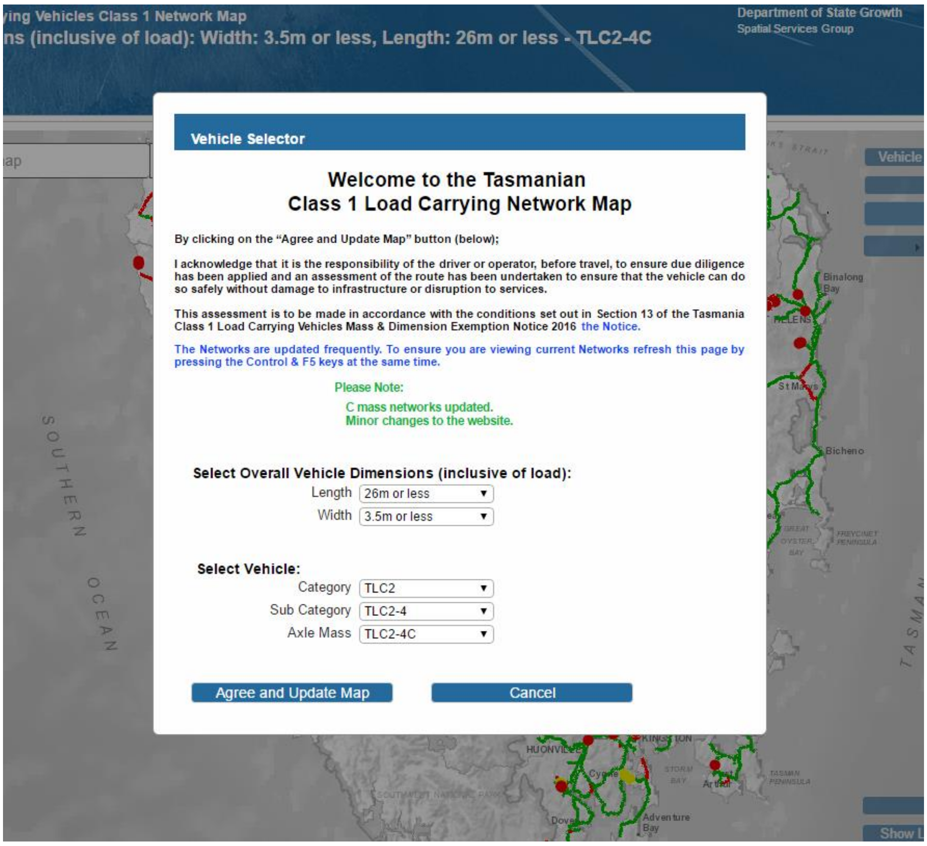


Figure 2 – OSOM vehicle selector

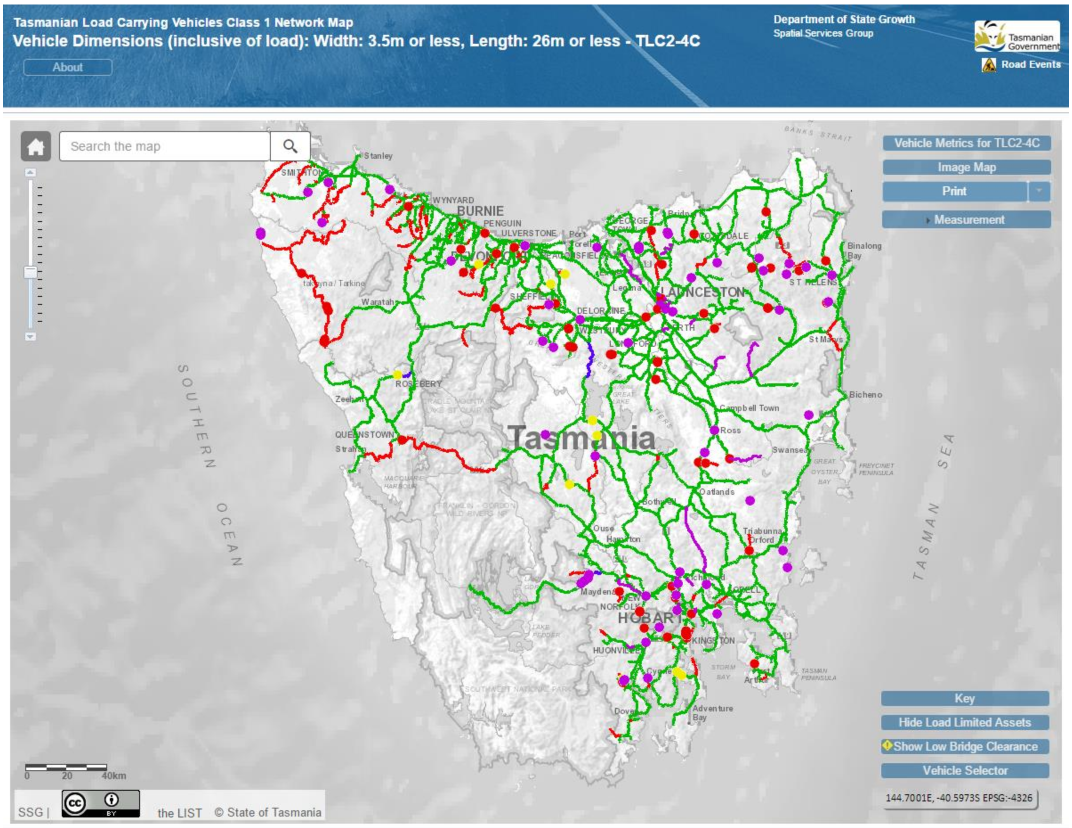


Figure 3 – Snapshot of TLC2-4C network

Networks also include route and area-specific conditions that mitigate safety, infrastructure and amenity-related risks. For instance, curfew conditions have been imposed during peak-hour travel to ensure congestion impacts are managed.

5.2. Structural assessments

Tasmania developed a methodology that was used by state and all local road managers to provide a consistent and timely assessment of structural capacity. This consisted of several stages.

Firstly a high level desktop assessment (screening) was undertaken whereby the capacity available for live load of each bridge was assumed to be:

$$\text{Capacity} = 2 \times \text{Load Effect of Design Vehicle} \times (1 + \text{DLA of Design Vehicle}) \qquad (1)$$

This required the following data to be available for each bridge:

- design vehicle (or assumed design vehicle based on the year of construction)
- span arrangement
- support type (i.e. simply supported or continuous)

Then the load effect of each proposed OSOM combination (with a DLA of 0.4) was determined to be:

$$\text{Load effect} = \text{Load Effect of proposed OSOM Vehicle} \times (1 + 0.4) \qquad (2)$$

The live load factor for the proposed OSOM vehicle was calculated by dividing (1) by (2). The vehicle was determined to pass the screening if a live load factor of greater than or equal to 1.6 was achieved.

The load effects considered in this screening were peak shear force and peak bending moment. Bending moment and shear force results were generated for all design vehicles and OSOM vehicles for 0 to 100m simply supported span lengths in 0.1m increments. This data was provided to all road managers which ensured a consistent and timely screening was undertaken.

The OSOM load effects for some vehicles included an envelope of potential combinations (i.e. the mass distributed between the prime mover drive and low loader dolly axles includes some flexibility and can increase when the distance between axle groups increases).

An assumption was made in the screening whereby the 2.4m wide ground contact width version of a vehicle combination represents all other ground contact widths with increasing mass. Road Managers were advised to be aware of this assumption as it may be incorrect for some structure types.

Support reactions for multispan structures and all load effects for continuous structures were determined by a more detailed assessment. In addition, timber structures were not included in the screening and required a site inspection to determine their capacities.

For structures whereby one or more vehicles did not pass the screening, detailed assessments were undertaken whereby capacities were calculated and distribution factors determined using a grillage model.

This methodology also allows road managers to consider different levels of risk by reviewing the live load factors for each vehicle on a given bridge. Coupled with an understanding of the OSOM task and key routes, road managers have been able to consider accepting lower live load factors (1.5 or less) on some structures or alternatively restrict access along some routes to signal to industry which routes are preferred.

Furthermore, this consistent approach has provided industry with confidence and understanding on where deficient and critical pinch points are situated, and the ability to lodge jointly-supported funding submissions to improve productivity and safety.

6. Standardised operational conditions

Ensuring that the OSOM industry enjoys an across-the-board harmonised system of access and that it is not unnecessarily burdened with red tape are primary considerations in any access management framework in Australia.

Historically, road managers, whether across state or local boundaries, have applied access conditions, with a similar intent but in different and inconsistent ways, to the operation of OSOM vehicles. This could be as simple as a curfew (or time restriction) that starts and ends at different times. Even a half hour difference across borders can mean significant safety and logistical issues. It is clearly impractical to assume that any vehicle can stop mid-road at a border of a jurisdiction for a few minutes, let alone 30 or more minutes.

However, there may be legitimate local considerations that are at the crux of these differences. Managing a holistic approach to the operational conditions of access is critical in realising productivity and safety benefits. The Tasmanian approach was to include all local road managers and industry representatives in the consultation and decision-making process (indeed, there was a legal requirement under the HVNL).

A holistic approach allowed operational conditions, for example, travel times between depots and jobs, to be considered in the process for making informed decisions. This translates directly into across-the-board understanding and greater acceptance of conditions being applied.

Another key example is the imposition of pilot and escort conditions. In the Tasmanian model, a base level was set and where roads of increased risk were identified (mainly due to geometric and/or sight distance issues being identified), additional pilot/escort conditions were set. After further analysis, a third tier was identified whereby more stringent pilot/escort conditions were applied.

7. Conclusions

The Tasmanian experience has been an invaluable testbed for potentially establishing a similar harmonised framework throughout Australia. It appears to have successfully transformed a previously opaque environment, into one whereby both industry and road managers have significantly increased understanding of the capability of the network and the freight task that it needs to support. This has translated into greater levels of trust, and reduced red tape and regulation under the HVNL. Further it has unlocked latent network capacity and identified critical infrastructure bottlenecks which have since been the subject of funding submissions which will provide for a better managed and sustainable network.

The framework is highly adaptable and flexible. New and innovative vehicle combinations can be considered, and where agreed included into the reference vehicle guide and harmonised networks assigned across all roads. Industry and road managers have a common platform from which to discuss access demand against asset preservation for the whole community. Networks can be readily expanded when agreed between the operators and road manager and also reduced where network is no longer able to accommodate the vehicle impact.

The intent of the framework was to consistently permit the significant majority (upwards of 80%) of OSOM access under gazette notice. This has been achieved.

There is always a balance to be struck between over-prescriptive requirements being applied to a broad spectrum of vehicles and the level of risk management applied to individual vehicles. The work undertaken in Tasmania has indicated that a significant level of detail can be included into the broader approach (i.e. gazette notices) to manage a large proportion of the heavy vehicle fleet. The benefits derived from a certain and transparent, albeit a necessarily detailed approach, appear to outweigh an individual vehicle risk-management approach (i.e. individual permits) at this point in time.

It should be noted that this exercise has also allowed a great deal of detailed data to be acquired and utilised on the network. Future direction will be data-driven and the somewhat intangible benefit of this work is the cultural change towards collecting and more effectively utilising these new datasets.

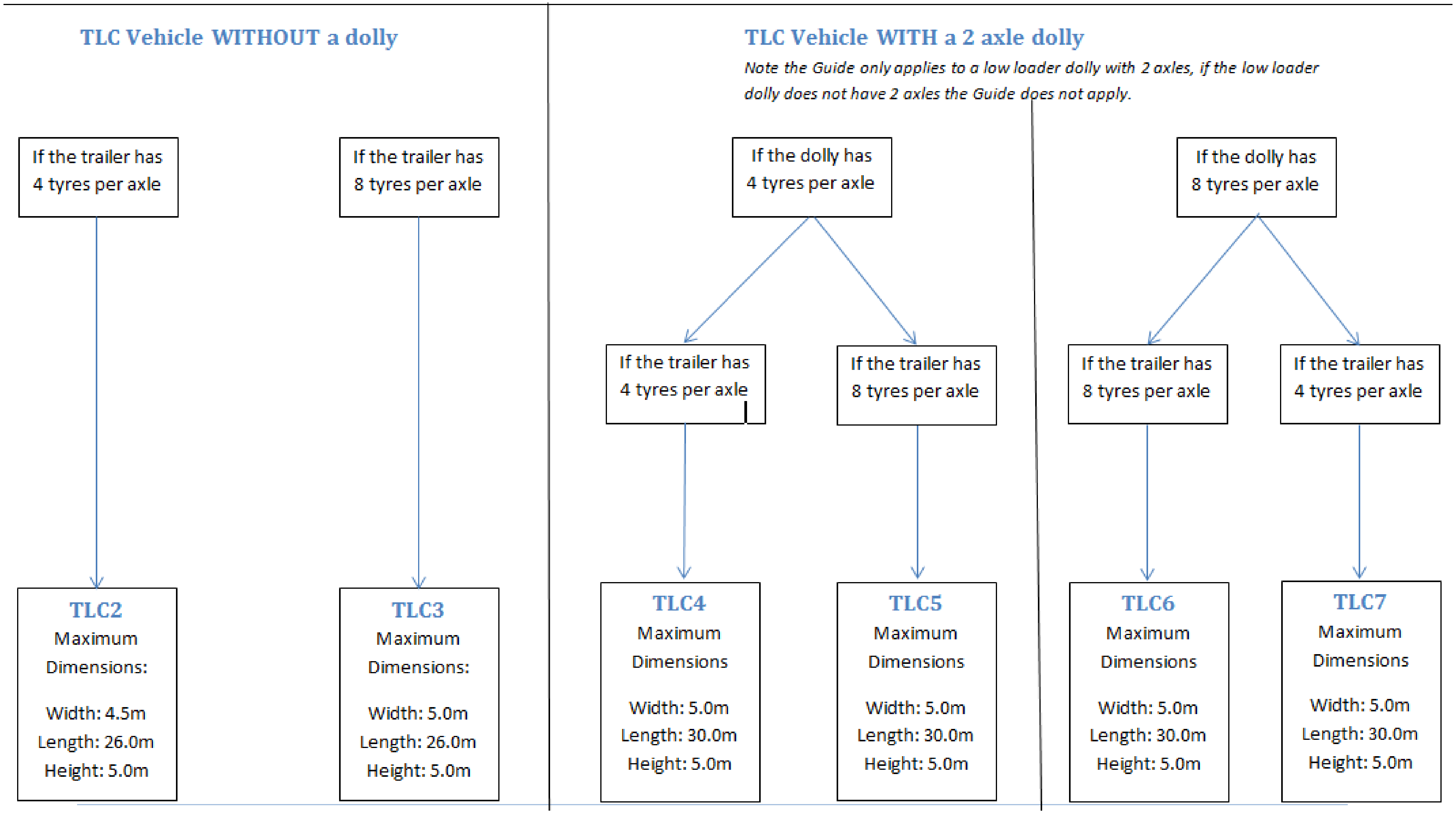
Further benefits are expected to include:

- Influencing fleet procurements that provide greater access and are less damaging to infrastructure
- Influencing capital investment programs and funding submissions
- Influencing bridge inspection regimes

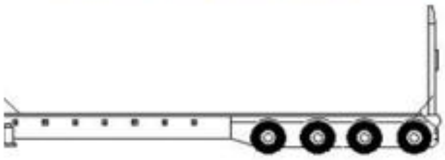
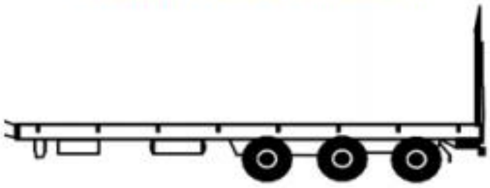
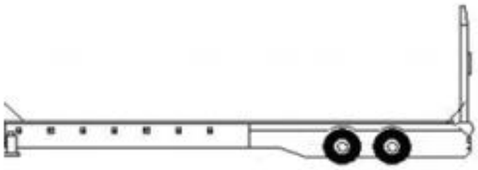
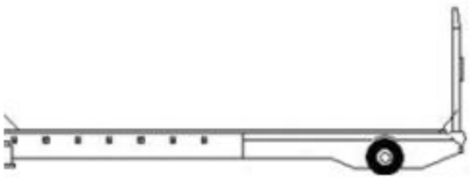
8. References

- Tasmanian Department of StateGrowth (DSG) (2016), “Tasmanian Class 1 Network Map”, http://data.stategrowth.tas.gov.au/Networks/?mapName=TLC1, viewed 11 September 2016
- National Heavy Vehicle Regulator (NHVR) (2015a), “Tasmania Class 1 (Load Carrying) Heavy Vehicle Mass and Dimension Exemption (Notice) 2016”, March 2016, NHVR, Brisbane, Australia
- National Heavy Vehicle Regulator (NHVR) (2015b), “Tasmanian Class One Load Carrying Vehicle Guide”, March 2016, NHVR, Brisbane, Australia
- National Heavy Vehicle Regulator (NHVR) (2015c), Annual Report 2014-2015, Sept 2016, NHVR, Brisbane, Australia
- National Transport Commission (NTC) (2006), Road Transport Reform (Oversize and Overmass Vehicles) Regulations, 2006, Commonwealth of Australia

Appendix 1: OSOM vehicle categorisation flowchart



Use the information below to select the TLC ***'SUB-CATEGORY'***

Sub category	Diagram	Axle Spacing
1	**Spread Quad Axle Low Loader** 	1.2m, 2.4m, 1.2m minimum trailer axle spacing
2	**Closed Quad Axle Low Loader** 	1.2m minimum trailer axle spacing
3	**Spread Tri Axle Semitrailer** 	1.8m minimum trailer axle spacing
4	**Closed Tri Axle Semitrailer** 	1.2m minimum trailer axle spacing
5	**Closed Tandem Axle Semitrailer** 	1.2m minimum trailer axle spacing
6	**Single Axle Semitrailer** 	Not applicable