Vehicle Technical Bulletin VTB-181A

Gross Combination Mass Re-rating

AUSTRALIAN AUTOMOTIVE AFTERMARKET ASSOCIATION

Summary	This Bulletin defines the Western Australian (WA) Department of Transport (DoT) standard for the re-rating of the Gross Combination Mass (GCM) of an eligible light vehicle with a Gross Vehicle Mass (GVM) rating that does not exceed 4,500 kg. It is based on Queensland LS16 Modification Code and has been developed in conjunction with the Australian Automotive Aftermarket Association (AAAA). Re-rating the Braked Towed Capacity (BTC) of a vehicle is prohibited in WA by the *Road Traffic (Vehicles) Act 2012* and is not covered in this bulletin. The WA standard for re-rating of the GVM of an eligible light vehicle is covered in VTB-180.

Purpose of this Bulletin

This Vehicle Technical bulletin (VTB) defines the Western Australian (WA) Department of Transport (DoT) standard which specifies requirements for re-rating of the Gross Combination Mass (GCM) of a light vehicle, that is a vehicle with a Gross Vehicle Mass (GVM) rating that does not exceed 4,500 kg.

This VTB-181 is based upon Queensland's Vehicle Modifications Code LS16: Gross Combination Mass Re-rating and has been developed in conjunction with the Australian Automotive Aftermarket Association (AAAA).

1 Abbreviations & Definitions

ADRs means Australian Design Rules, which are national standards for vehicle safety, anti–theft and emissions.

AC means Automotive Consultant, an individual or business that has been recognised by DoT as being able to produce engineering evidence and/or reports. (refer to Information Bulletin IB-102 Automotive Consultants, available at www.transport.wa.gov.au)

Light vehicle means a motor vehicle that has a Gross Vehicle Mass (GVM) of 4.5 tonnes or less.

RAV means Register of Approved Vehicles, an online publicly searchable database of vehicles that have been approved to be provided to the Australian market.

Regulations means *Road Traffic (Vehicles) Regulations 2014* (WA legislation).

ROVER means the online portal for applications and approvals under the federal Road Vehicle Standards legislation.

RVSA means *Road Vehicle Standards Act 2018* (Federal legislation).

VSB14 means Vehicle Standards Bulletin 14 — National Code of Practice for Light Vehicle Construction and Modification.

2 Scope

Re-rating of GCM under this VTB-181 is permitted only on a light vehicle that is constructed on a ladder type chassis frame with a cabin and/or body mounted on it. Vehicles with integrated frame and body, commonly known as unitary or monocoque construction, are not eligible.

The original equipment manufacturer (OEM) is the entity holding the First Stage Identification Plate Approval (IPA) or Vehicle Type Approval (VTA). An entity holding the Second Stage Manufacture (SSM) Approval or Registered Automotive Workshop Scheme (RAWS) Approval is not the OEM.

The OEM GCM for the vehicle must be used as the baseline to undertake this modification. No re-rating of GCM using this VTB may be undertaken without confirmation of the OEM GCM. This information must be obtained from a reliable and traceable source. If no GCM is readily available, check with your transport agency before designing or performing the GCM modification.

A SSM approval cannot be used for re-rating a vehicle's GCM in-service under this VTB .A complete design package must be included and documented for use under this VTB

This GCM re-rating VTB can be used in conjunction with VTB-180, which is the WA GVM re-rating standard.

The Road Vehicle Descriptor (RVD) continues to be valid under the Road Vehicle Standards Act 2018 and is referenced in the Road Vehicle Regulator (ROVER) system. Note that evidence of the design package for the SSM approval must be supplied to the Chief Executive Officer (CEO) of the Department of Transport (DoT) via the Vehicle Safety and Standard section (VSS). Simply citing the SSM IPA is not deemed sufficient to provide the certification.

Appendix A of this VTB-181 contains important information and guidance for the Automotive Consultant (AC) using this VTB.

2.1 What is permitted

Modifications that may be certified under this VTB-181 are:

- GCM rating changes for a vehicle that has an alternative specification by the OEM.
- GCM rating changes for a vehicle that has been inspected and confirmed to conform to a design approval issued by WA DoT.
- GCM rating changes in accordance with an appropriately approved GVM re-rating, without changing the OEM Braked Towing Capacity (BTC).
- Restoring the GCM rating to the OEM rating but only after ensuring that all vehicle components are also restored to the OEM specification.

2.2 What is not permitted

Modifications that must not be certified under this VTB-181 are:

- Modifications other than those described in Section 1.1.
- GCM rating changes in accordance with the following:
  - retaining the OEM GVM and re-rating the Braked Towing Capacity (BTC)
  - with an appropriately approved GVM re-rating and an appropriately approved BTC rating.
- GCM re-rating increase of a vehicle where it is unmodified (other than where it is in accordance with the OEM specifications).
- Where a complete design approval has not been issued, or a copy of the specification has not been provided to the CEO of DoT via VSS, prior to certification of the design approval.
- Testing has not been completed to determine the GCM rating as specified in this VTB.

2.3 Towing Capacity

In WA, the *Road Traffic (Vehicles) Act 2012* prevents the towing capacity of a vehicle from being re-rated by anyone except the vehicle OEM. Therefore, as a result;

- This VTB can only be used for re-rating the GCM of a vehicle, retaining the OEM BTC rating where a GVM increase has also been performed.
- The BTC of a vehicle cannot be re-rated.
- The GCM of a vehicle cannot be re-rated to include any BTC re-rating.

3 General Requirements

All work must comply with the requirements contained in sub-section 2 General Requirements of Section LS of the National Code of Practice (NCOP) – Light Vehicle Construction and Modification (VSB14).

3.1 Compliance with applicable vehicle standards

3.1.1 The modified vehicle must continue to comply with the ADRs that apply to it.

3.1.2 If different or additional ADRs apply to the modified vehicle, it must comply with those ADRs that apply to it.

Vehicle owners, registered operators, builders and modifiers of vehicles need to be aware that compliance with this VTB does not guarantee that a vehicle will be acceptable for continued registration as a modified registered production vehicle. If, for example, a vehicle does not handle or brake satisfactorily or has any other feature that renders the vehicle unsafe or not roadworthy, it will not be accepted for registration.

Builders and owners need to keep abreast of changes to legislation and vehicle registration policy in their jurisdiction, particularly in cases where a project is expected to take some years to complete. Similarly, regulations pertaining to vehicle modifications, vehicle standards or registration policy may change causing certain vehicle modifications to become unacceptable in the future.

3.1.3 A modified pre-ADR vehicle must continue to comply with the *Road Traffic (Vehicles) Regulations 2014*.

3.1.4 Outlined in Table 1, are areas of the vehicle that may be affected by the modifications and may require re-certification, testing and/or data to show compliance of the modified vehicle.

Table 1: List of items and likely affected ADRs

DETAIL	REQUIREMENTS
Tyre and Rim Selection	ADR 42/…, ADR 95/…, ADR 96/…
Braking Systems	ADR 31/…or ADR 35/…
Brake Performance (for non-ADR vehicles)	Please refer to the Department of Transport for pertinent regulation and standards

The above is not an exhaustive list and compliance with other ADRs may also be affected.

Section 2.2 and 2.3 relate to the general requirements applying to the selected pathway required to re-rate a vehicle's GCM using this VTB.

3.2 Pathway 1: GCM re-rating based on OEM's alternative rating.

3.2.1 The GCM of a light vehicle may be re-rated to match the OEM's rating for another variant of the same make/model/chassis series.

3.2.2 All components, including suspension, transmission, engine, brakes, engine and transmission cooling systems, tyres and rims must be the same as those specified for the reference variant.

3.2.3 All components, including suspension, transmission, engine, brakes, engine and transmission cooling systems, tyres and rims should be fitted with equivalent components as those specified for the reference variant.

3.3 Pathway 2: GCM rating changes for a vehicle that has been inspected and confirmed to conform to a design approval issued by DoT.

3.3.1 The GCM of a light vehicle may be re-rated subject to a confirmed design approval that has been issued and approved by the CEO of DoT.

4 Specific Requirements

The following specific requirements apply to all pathways.

4.1 Chassis

4.1.1 Chassis modifications should be performed in accordance with VSB-14 (Section LH5). If the necessary information is not available in section LH5, then the relevant sections of H code of the Vehicle Standards Bulletin 6: National Code of Practice for Heavy Vehicle Modifications (VSB-6) may be consulted, as appropriate.

4.1.2 For calculating chassis strength, VSB-6 may be consulted.

4.2 Engine/Transmission/Driveline

4.2.1 Ensure that any supporting modifications are performed in accordance with section LA and LB of VSB14.

4.3 Axle and suspension Ratings

A GVM upgrade may be performed in accordance with the requirements of VTB-180 and must comply with the following points:

4.3.1 If no GVM re-rating increase has been performed on the towing vehicle, the OEM axle and suspension ratings must not be exceeded.

4.3.2 If a GVM re-rating increase has been performed, or is being performed, on the towing vehicle through an approved method of certification (for example VTB-180 or SSM), the re-rated axle capacity must not be exceeded.

4.3.3 The revised axle component load, if different from the OEM rating, must be recorded on the Modification Approval Permit, the Load Capacity Label and updated in the owner's handbook.

4.4 Brakes

4.4.1 A vehicle's braking performance is directly affected by changes to its mass ratings. Therefore, the towing vehicle's braking system must be assessed to determine if the performance of the original system is adequate for the re-rated GCM, or the braking system requires to be modified or replaced with appropriately rated components.

Ensure that any supporting modifications are performed in accordance with VSB-14 (Section LG).

Refer to the applicable parts of Section 2 Performance of Braking Systems in Annex 3 of ADR 31/.. for unbraked tow capacity test requirements. This is also covered in VTB-180.

4.5 Steering

4.5.1 If the steering system is modified or a new steering system is fitted, it must be certified under VSB-14 (Section LS).

4.6 Tyres and Rims

4.6.1 The tyres and rims must be selected to comply with the requirements of the relevant ADRs and VSB14 (Section LS) at the re-rated GVM.

4.6.2 The initial rating will be given by the OEM, if required an *AC* may assess and specify alternative rims. The certification must be to an applicable standard. In addition, if the GCM re-rating is performed in conjunction with a GVM upgrade or on a vehicle that has already had a GVM upgrade, the tyres and rims must meet the loading requirements.

4.6.3 The revised tyre and rim size and load ratings must not exceed VSB14 limits.

4.6.4 The load carrying capacity of all tyres and rims must not be exceeded when the combination is loaded to the re-rated GCM, and the load is evenly distributed.

4.6.5 The load capacity of the tyres (and rims) on each axle must be adequate to support the potential maximum mass on that axle.

4.6.6 The revised tyre size and load rating must also appear on the Modification Approval Permit and in the owner's handbook. A tyre and rim assessment report must be provided to the CEO of DoT.

4.6.7 The effect of alternative tyres on the compliance of the speedometer and odometer accuracy must be considered and maintained in accordance with the relevant ADR when manufactured.

5 Performance Requirements

The design of the GCM modification must be validated to key performance criteria specified below (5.1 – 5.4). These performance criteria are based upon the documented test procedures in SAE J2807 and associated performance standards.

Where a design package is delivered, the design package shall be physically validated to provide a baseline for any computer simulation activity.

5.1 Tow vehicle structural performance

The towing vehicle shall be tested to, and meet, the requirements of SAE J2807 for structural performance.

5.2 Tow vehicle propulsion performance

5.2.1 Level road acceleration

The towing vehicle shall be tested to, and meet, the requirements documented in SAE J2807 for level road acceleration.

5.2.2 Startability

Startability is the ability of a vehicle to start moving on a grade when the vehicle is laden to the GVM and GCM to assess any difficulties and resulting performance. Vehicles shall demonstrate startability of a minimum grade of 12% (as per J2807).

For light vehicles, the following variation is accepted; *a transmission efficiency factor of 1.42 may be utilized for automatic transmission vehicles.* Design may be derived through calculation and validated through physical testing; the calculation can be performed using the equations:

$GCM_{max} = \frac{T \times R \times M \times E}{19.87 \times g_S}$	*Eq. 1*
$g_{smax} = \frac{T \times R \times M \times E}{19.87 \times GCM}$	*Eq. 2*

Where:		
T = Engine torque at clutch engagement RPM (Nm)		
R = Overall gear reduction between engine and driven wheels		
M = Tyre revolutions per kilometre		
E = Transmission efficiency	for manual transmission.	**E = 1**
	for automatic transmission.	**E = 1.42**
gs = Maximum grade (%)		

5.2.3 Gradeability

Gradeability is the ability of a vehicle to climb a grade when the vehicle is loaded to the GVM and GCM to assess any difficulties and resulting performance. Vehicles shall demonstrate the minimum grade requirement of 23%.

The following variation to VSB6 is accepted; *a transmission efficiency factor of 1.42 may be utilised for automatic transmission vehicles*. Design may be derived through calculation and validated through physical testing; the calculation can be performed using the equations:

$GCM_{max} = \frac{K \times R \times M \times T \times E}{(g_g + 1)}$	*Eq. 1*
$g_{gmax} = \frac{K \times R \times M \times T \times E}{GCM} - 1$	*Eq. 2*

Where:		
K = Drive efficiency for type of drive axle fitted to the towing vehicle	for single drive axles.	**K = 0.055**
	for single drive tandem axles.	**K = 0.053**
	for dual drive tandem axles.	**K = 0.051**
R = Overall gear reduction between engine and driven wheels		
M = Tyre revolutions per kilometre		
T = Maximum engine net torque (Nm)		
E = Transmission efficiency	for manual transmission. **E = 1**	
	for automatic transmission. **E = 1.42**	
gg = Maximum grade (%)		

5.2.4 Highway gradeability

In addition to the requirement in 4.2.3, the highway gradeability portion of SAE J2807 shall be carried out with the use of a towing dynamometer or a suitable programmable chassis dynamometer, with the Davis Dam profile, utilised to validate the thermal loading and durability of the towing combination.

If a chassis dynamometer is used, the simulated airflow over the front of the vehicle must be adjusted and controlled so that it represents the ambient conditions specified in SAE J2807 and the airflow rate is similar or less than what would be encountered if a physical road test were to be conducted.

5.3 Handling

The towing combination must be tested in accordance with, and meet, the combination handling test requirements in SAE J2807.

5.4 Braking

The towing combination must be tested in accordance with, and meet, the combination braking test requirements in SAE J2807.

SAE J2807 requires the tow vehicle park brake performance to be tested on a 12% grade with the combination at GCM. This contradicts the requirements in ADR 31/... and ADR 35/…

Therefore, successfully passing the ADR park brake performance tests, which require an 18% slope and the tow vehicle at the re-rated GVM, will be deemed to be a suitable alternative test method.

5.5 Mechanical connections

Devices utilised for fastening a trailer to a towing vehicle and relevant towing vehicle structures shall satisfy the requirements of *ADR62/.. Mechanical connections between vehicles.*

The vehicle's towbar must be suitably rated for the modification. A towbar cannot be re-rated to a higher load capacity, other than by the original OEM towbar manufacturer and then only in accordance with the relevant mandatory Australian Standard (AS) or ADR. The AS or ADR requirement also applies to any replacement bar with a higher rating to suit the vehicle modification, be it a new design or modification of an existing towbar design.

For the fitting of gooseneck and fifth wheel couplings and their mounting systems, VSB-6 may be used as a reference. If possible, these types of couplings must be mounted direct to the chassis rails. If dimensions for a light vehicle means this is not possible, an auxiliary subframe mounting system that is attached directly to the chassis rails may be utilised for attachment, subject to full assessment by the AC as part of the design package. Refer to Vehicle Safety and Standards section of DoT for any clarification.

6 Owner's Handbook and Load Capacity Label

The vehicle operator must be adequately informed of the changes.

6.1 Owner's Handbook

6.1.1 To inform the vehicle operator about the vehicle's load capacity and tyre and rim requirements, the vehicle handbook must be updated. The update must provide specific details of any changes to the tyres, rims and the load capacity.

6.1.2 If the vehicle handbook is not available, this information must be provided in written form to the owner of the vehicle.

6.1.3 A copy of all the information provided to the vehicle owner must be retained as part of the evidence of this approval. The owner must be made aware of this requirement. This evidence must be provided when requested by an authorised officer.

6.2 Load Capacity Label

6.2.1 A Load Capacity Label must be fitted to display information as illustrated below (Figure 1). A sticker issued by Queensland in conformance with LS16 Modification code requirements will be deemed as an acceptable alternative.

6.2.2 The certifying engineer or automotive consultant must ensure that the revised ratings are communicated to the purchaser of the modification and that the GCM component must not be exceeded.

6.2.3 The Load Capacity Label must be made of durable material.

6.2.4 Letter size and contrast should be similar to the tyre placard.

6.2.5 The Load Capacity Label must be fitted as close as practicable to the vehicle's tyre placard.

6.2.6 This is in addition to any identification and certification plates fitted on the Towbar.

Figure 1 - Load Capacity Label

Item	Information
DoT WA Approval Number	
SSM Approval Number (if applicable)[1]	
Re-rated GVM[2]	kg
GCM Rating by Original Vehicle Manufacturer (if available)[3]	kg
Re-rated GCM[4]	kg
Maximum Allowed Front Axle/s Rating[5]	kg
Maximum Allowed Rear Axle/s Rating[6]	kg
Original Equipment Manufacturer BTC[7]	kg
For further information regarding towing capacity and operation please refer to the vehicle owner's handbook.	

Explanatory Notes

1. Applicable only if GVM re-rating is based upon a SSM approval. If not applicable, indicate XXXX.
2. Re-rated GVM certified under VTB-180.
3. GCM rating, if published by the OEM in owner's handbook or on OEM website. Contact DoT if there is no documented GCM.
4. Re-rated GCM certified using this VTB-181.
5. Front axle rating as published by the OEM in owner's handbook/OEM website, or if assessed by the AC, the re-rated axle load.
6. Rear axle rating as published by the OEM in owner's handbook/OEM website, or if assessed by the AC, the re-rated axle load.
7. BTC rating, if published by the OEM in owner's handbook or on OEM website. Contact DoT if there is no documented BTC.

7 Limitations

Section 2.2 of this VTB provides information about which types of modifications are not permitted to be certified using this VTB. In addition, the following limitations apply.

7.1 Electronic Stability Control

If the vehicle is fitted with an Electronic Stability Control (ESC) system by the OEM, the following requirements must be met:

7.1.1 The ESC system must not be disabled.

7.1.2 It must be ensured that the modifications being certified do not reduce the effectiveness of the ESC system.

7.1.3 It must be ensured that the modifications being certified do not reduce the effectiveness of any trailer sway control elements or ESC systems on a trailer.

8 Additional Modifications and Changes to Vehicle Category

8.1 Additional modifications that are not essential for GCM re-rating must be assessed separately and certified using appropriate sections of VSB-14 or specific approvals. For example, GVM requires certification using VTB-180.

8.2 If the vehicle's category has changed due to the GVM re-rating, the vehicle must maintain all OEM safety systems as well as complying with the vehicle standards applicable to the upgraded vehicle category. Certification of such compliance must be provided.

9 Use of VTB-181 to provide Design Certification for GCM re-rating

The VTB-181 may be used to provide design certification for GCM re-rating of vehicles of a particular make/model/variant/chassis series.

9.1 Design Package

This output must result in a set of documents that clearly and comprehensively address the following four requirements:

9.1.1 Scope of what is eligible

The design package must clearly identify which make/model/variant/chassis series it applies to. If its applicability is restricted to specific build years that also must be mentioned. Reference must be made to Identification Plate Approval/Vehicle Type Approval Number, eligible typical VIN(s) and eligible variants/chassis series.

Since the certification under the VTB-181 is being provided on in-service vehicles, the condition of the vehicle is important when providing the certification. The design package must include instructions about what is to be inspected and the acceptance criteria to decide that the vehicle is in a safe and serviceable condition at the point of certification. Condition of the shock absorbers, suspension, frame, tow equipment and brakes are key areas to inspect. Absence of cracks, deformations, leaks and structural damage due to previous overloading, accidents or rust are critical.

The design and certification package must include a template checklist for use by the DoT approved modifier, to confirm that the vehicle was inspected and was found in safe and serviceable condition at the point of modification.

9.1.2 Evidence package

The design package must include all the test reports and engineering calculations that validate the re-rating, when modified as prescribed. Test reports must be from a recognised test laboratory and be signed and dated. All test reports must make unambiguous reference to the specific make/model/variants of the vehicle or component to which they apply. The test reports must contain the criteria or standard against which testing is performed and clear conclusion about pass or fail outcome according to the relevant criteria or standard.

The design package must also include a signed and completed Design Checklist (see Appendix 1)

Engineering calculations must be legible and must include assumptions, if any. They must be compiled under a unique identifier document that is dated and signed.

If any evidence is sourced from a third party, the evidence package must include a written permission from that party for use of its reports as evidence.

Any Intellectual Property provided to DoT as part of a type approval process will be held subject to the relevant DoT Standards for privacy and confidentiality, in accordance with the requirements of the DoT Code of Conduct.

9.1.3 Work instructions for modification

The design package must include clear and comprehensive work instructions on how to modify the vehicle, what parts to be used, the sequence of actions to be performed, precautions to be taken and what process controls to be applied.

The work instructions must include details of any (non-destructive) testing and inspections to be carried out to ensure that the modification standards are met.

The work instructions must be easy to understand, unambiguous and should include sufficient pictorials such as photos and graphics.

10 Vehicle Modification

10.1 Approved Modifiers

Only DoT approved modifiers or their preferred agents are authorised to install and verify an approved kit to re-rate the GCM of a vehicle.

Modifiers wishing to gain approval from DoT should contact VSS for further information.

10.2 Installation Checklist.

Once the vehicle has been modified, it must be presented for inspection.

The person presenting the vehicle must provide a copy of the Installation Checklist, completed and signed by the modifier (see Appendix 2).

A modification permit will be issued following a passed inspection. Modification and inspection fees are payable.

Appendix 1

VTB 181: Design Checklist – Gross Combination Mass Re-rating

Note: For informative content and guidance, refer to Appendix 3.			
Modification Certificate Number:			
1	**Design**		
1.1	DoT WA Approval Number ..... (the design)		
1.2	Is a comprehensive design package provided?	Y	N
1.3	Does the design package have a unique identification number?	Y	N
1.4	Does the design package clearly describe which make/model/variant/chassis series is covered?	Y	N
1.5	Does the design package include guidance on what to inspect and criteria to decide if the vehicle is in safe and serviceable condition for re-rating?	Y	N
1.6	Does the design package include a complete Evidence Package that forms the basis of this certification?	Y	N
1.7	Does the design package include comprehensive work instructions including work to be done, precautions to be taken, control of processes and tests to be conducted?	Y	N
1.8	Does the design package include a checklist for the modifier of the vehicle?	Y	N
1.9	Does the design package include a checklist for the certifier of the modified vehicle?	Y	N
1.10	Does the design package meet all the requirements of this VTB?	Y	N
1.11	Has the vehicle been modified exactly in accordance with the plans and specifications issued under the DoT WA Design Approval Number above?	Y	N
1.12	Have the new ratings been communicated by the AC?	Y	N
2	**Suspension**		
2.1	Is the vehicle's suspension suitable for the re-rated GCM?	Y	N
3	**Chassis**		
3.1	Is the chassis frame suitable for the re-rated GCM?	Y	N
4	**Axles and Driveshafts**		
4.1	Are the axles and driveshafts suitable for the re-rated GCM?	Y	N
5	**Engine / Transmission / and mountings**		
5.1	Are the engine/transmission and mountings suitable for the re-rated GCM?	Y	N
6	**Braking System**		
6.1	Has a brake test been carried out on the modified vehicle to ensure compliance with ADR 31/… or 35/… for the design package?	Y	N
6.2	Is the vehicle trailer brake control system suitable for the re-rated GCM?	Y	N
6.3	Has the vehicle been tested to the requirements in SAE J2807?	Y	N
7	**Tyres and Rims**		
7.1	Does the Modification Plate record the correct tyre and rim sizes and load ratings for the modified vehicle?	Y	N
7.2	If a revised tyre placard is required, has it been fitted to the vehicle and a copy attached to this checklist? Indicate Y if a revised tyre placard is NOT relevant.	Y	N
7.3	Do the tyres and rims fitted conform to the modification plate and the tyre placard?	Y	N
7.4	Are load ratings of the tyres and rims adequate for the vehicle's re- rated GCM and the potential axle masses?	Y	N

8	**Electronic Stability Control System (if fitted)**		
8.1	Is it ensured that the ESC system is not disabled?	Y	N
8.2	Is it ensured that the ESC system is not made less effective due to modifications carried out for GCM re-rating?	Y	N
8.3	Trailer sway control systems unaffected?	Y	N
9	**Load Capacity Information**		
9.1	Is the Load Capacity label attached to the vehicle?	Y	N
9.2	Has the vehicle's handbook been amended, and a copy of the relevant modified content attached to this checklist?	Y	N
10	**Re-rating based on Manufacturer's Optional GCM (complete if applicable)**		
10.1	Does the re-rated GCM match an alternative option for the same make, model produced by the vehicle manufacturer?	Y	N
10.2	Are all components relevant to the GCM re-rating (brake, engine, transmission, suspension, chassis, tyres and rims etc) identical to the original vehicle manufacturer's alternative specification?	Y	N
11	**Re-rating based on fitting of an additional axle (complete if applicable)**		
11.1	If the re-rated GCM is more than 110% of the OEM rating, does the additional axle share load within its group? (Respond Y if the re-rated GVM is within 110% limit)	Y	N
Note:	Y=Yes, N=No. If the answer to any question is **N (No)** the design cannot be certified using this VTB.		

CERTIFICATION DETAILS																			
Make				Model					Year(s) of Manufacture										
VIN																			
Chassis Number (If applicable)																			
Brief Description of Modification/s																			
Vehicle Modified By (If applicable)																			
Certificate Number																			
Vehicle/design Certified By (Print Name)																			
Approved Person's Employer (If applicable)																			
Approved Person's Signature															Date				

Appendix 2

VTB-181: Installation Checklist – Gross Combination Mass Re-rating

1	**Design**		
1.1	DoT WA Approval Number ..... (the design)		
1.2	Has the vehicle been modified exactly in accordance with the plans and specifications detailed in the design installation instructions?	Y	N
2	**Suspension**		
2.1	Is the vehicle's suspension in a serviceable condition and suitable for the re-rated GCM?	Y	N
3	**Chassis**		
3.1	Is the chassis frame in a serviceable condition and suitable for the re-rated GCM?	Y	N
4	**Axles and Driveshafts**		
4.1	Are the axles and driveshafts in a serviceable condition and suitable for the re-rated GCM?	Y	N
5	**Engine / Transmission / and mountings**		
5.1	Are the engine/transmission and mountings in a serviceable condition and suitable for the re-rated GCM?	Y	N
6	**Braking System**		
6.1	Is the braking system in a serviceable condition and suitable for the re-rated GCM?	Y	N
6.2	Is the vehicle trailer brake control system suitable for the re-rated GCM?	Y	N
7	**Tyres and Rims**		
7.1	Does the Modification Plate record the correct tyre and rim sizes and load ratings for the modified vehicle?	Y	N
7.2	If a revised tyre placard is required, has it been fitted to the vehicle and a copy attached to this checklist? Indicate Y if a revised tyre placard is NOT relevant.	Y	N
7.3	Do the tyres and rims fitted conform to the modification plate and the tyre placard?	Y	N
7.4	Are load ratings of the tyres and rims adequate for the vehicle's re-rated GCM and the potential axle masses?	Y	N
8	**Workmanship**		
8.1	Is all work of satisfactory quality and has all work been performed in accordance with recognised engineering standards?	Y	N
8.2	Do all new or replaced fasteners comply with the applicable requirements of Appendix A *Fasteners* in section LZ *Appendices* of VSB14?	Y	N
9	**Electronic Stability Control System (if fitted)**		
9.1	Is it ensured that the ESC system is not disabled?	Y	N
9.2	Is it ensured that the trailer sway control systems remain unaffected?	Y	N
10	**Load Capacity Information**		
10.1	Is the Load Capacity label attached to the vehicle?	Y	N
10.2	Has the vehicle's handbook been amended, and a copy of the relevant modified content attached to this checklist?	Y	N
11	**Additional work**		
11.1	Is any additional or replacement work certified (where necessary) under the appropriate sections and codes of VSB-14 ?	Y	N
11.2	Has it been confirmed that this additional or replacement work has not affected the GCM re-rating design approval?	Y	N
Note:	Y=Yes, N=No. If the answer to any question is **N (No)** the design cannot be certified using this VTB.		

CERTIFICATION DETAILS																			
Make				Model				Year of Manufacture											
VIN																			
Chassis Number (If applicable)																			
Brief Description of Modification/s																			
Vehicle Modified By (If applicable)																			
Design Approval Number																			
Vehicle GCM kit installed by (Print name)																			
Approved Person's Employer (If applicable)																			
Approved Person's Signature																Date			

Appendix 3

This Appendix contains supplementary guidance to the content of this VTB

1 General

1.1 The vehicle should be able to safely operate at the re-rated GCM. All affected components including the chassis frame, drivetrain, axles, suspension, brakes, steering, engine and transmission, cooling systems, rims and tyres should be assessed individually to ensure that they can safely support the loads resulting from the re-rated GCM.

1.2 It should also be noted that durability and endurance of components may be shortened through wear and tear and be subject to earlier repair or replacement. The OEM standard servicing intervals may no longer be applicable. The Design Approval holder/AC should clarify this point to the modifier, installer and the vehicle operator.

1.3 Increased GCM may affect the warranty provided by the OEM. It is the responsibility of the vehicle operator and the Design Approval holder/AC to consider any such effect on the warranty. Any effect this modification may have on the product warranty is outside the scope of this VTB. The Design Approval holder/AC should clarify this point to the modifier, installer and the vehicle operator.

1.4 Increased GCM may affect the insurance cover provided by the vehicle insurer. It is the responsibility of the vehicle operator to consider any such effect on the insurance cover. Any effect this modification may have on the insurance cover is outside the scope of this VTB. The Design Approval holder/AC should clarify this point to the modifier, installer and the vehicle operator.

1.5 The provision of this GCM re-rating VTB is centered around the application of engineering principles or data and must be performed by appropriately qualified persons. Please check with VSS for requirements.

1.6 An engineering service is a service which is based on or requires the application of scientific and mathematical principles and data to the design, construction, maintenance and operation of man-made structures, machines, systems and processes.

1.7 The ADR applicability is according to the vehicle's category and date of manufacture. It is the responsibility of the certifying engineer/AC to refer to the appropriate ADRs applicable to the vehicle. The certification must include the vehicle date of manufacture in addition to the date of modification.

1.8 All components, including suspension, transmission, engine, brakes, engine and transmission, cooling systems, tyre and rims should be validated as fit for purpose for the means of re-rating the GCM.

2. Chassis

2.1 Ensure the vehicle chassis has adequate strength for the revised GCM rating. This will include, but not limited to, items such as torsional strength of the chassis with the increased load carrying and towing capacity. Chassis torsional strength is highly dependent on the type of crossmembers used in the design. These should be assessed for validity of the modification.

2.2 When modifications such as fitting of additional or replacement axle(s) with higher load rating are carried out, the vehicle frame should be analysed to ensure that it has sufficient strength to support the re-rated GCM. This may be completed through the use of finite element analysis and a physical test, for example, full chassis twist with Factor of Safety of +3.

3. Engine/transmission

3.1 The engine/transmission should be validated through the use of testing to ensure that these components are suitable for the re-rating of the GCM.

3.2 The engine and transmission mounting should be assessed for being suitable for the re- rating of the GCM. This may require replacement parts be fitted. If a replacement engine is fitted, with greater power and torque, the engineer/AC should ensure that the components are rated as capable of handling the torque loading.

4. Axle and suspension ratings

4.1 Axle loading at the re-rated GCM must be assessed to ensure that the axles are suitable for the increased loading and maximum torque, and that the vehicle is safe to operate on road.

4.2 Increased GCM will almost certainly result in increased gross mass on the tow vehicle and additional load on its systems such as axles, suspension and brakes. Suitability of the towing vehicle under the additional load should be considered.

4.3 Ensure that the GCM re-rating does not result in any axle, axle group or suspension rating being exceeded.

4.4 If a component manufacturer has published instructions to reduce the rating of a component for safety reasons, the reduced rating must apply.

4.5 All other suspension components should be assessed and suitably rated for the increased loads.

5. Tail Shaft

5.1 Changes associated with re-rated GCM may place additional load on a vehicle's tail shaft. For example:

- changes to vehicle's ride height which may alter the tail shaft and pinion angles.
- alterations to a vehicle's wheelbase may result in change in tail shaft length.
- changes to engine and/or transmissions may impose increased torsional loading on the tail shaft.

5.2 The vehicle’s tail shaft and bearing strength and its installation should be suitable to the vehicles re-rated GCM. Ensure that the maximum possible torque is within the capacity of the tail shaft and associated components.

6. Brakes

6.1 A GCM upgrade will potentially accommodate the towing of a larger trailer. The towing vehicle is required to have compatible controls for the trailer brakes to achieve suitable braking performance on the vehicle combination.

6.2 If a modified braking system is required, it must be designed, installed and certified appropriately in compliance with the applicable ADR's, vehicle standards and local regulations at the time of modification.

7. Tyres and rims

7.1 Alternative tyres and rims may be specified under a GVM increase if in accordance with an applicable standard.

7.2 The sum of the load carrying capacities of the tyres fitted must be at least equal to the re-rated GCM. The same applies to the load carrying capacities of the rims.

7.3 If re-rated GCM and axle masses require a different tyre and rim combination, a new tyre placard must be fitted to indicate the revised tyre and rim specifications for the vehicle at the re-rated GCM.

8. Mechanical connections

8.1 If a tow coupling component manufacturer has published instructions to reduce the rating of a component or the vehicles GVM/payload for safety reasons, the reduced rating must be taken into account.