

DEVELOPMENT OF A VEHICLE LOAD CONTROL STRATEGY FOR MALAWI FOR THE PERIOD 2016 TO 2020

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ABSTRACT

In an effort to improve the effectiveness of overload control the Malawi Directorate of Road Transport and Safety Services (DRTSS) appointed two Short Term Experts from the CSIR to assist with the updating of the DRTSS's 2005 Axle Load Control Strategy and development of a five-year implementation plan for significantly improving the Directorate's current capacity to effectively manage and enforce axle load control. Specific objectives were to:

- Assist the DRTSS to undertake an extensive nationwide survey to assess the extent of the overloading problem on the paved road network;
- Review and update the 2005 "Vehicle Weights and Axle Load Control Strategy", based on the outcome of this survey;
- Produce a Five-year Implementation (Business) Plan that will provide a "roadmap" for the expansion of the current overload control system;
- Strengthen the overall management and monitoring of axle load control operations through the introduction of adequate monitoring and reporting; and
- Ensure that the underlying legislation adequately supports axle load control operations.

The output of the project was a Vehicle Load Control (VLC) Strategy for Malawi for the period 2016 to 2020. The VLC strategy presents the strategic direction that the DRTSS will take for the next five years with regards its vehicle load control mandate. The VLC Strategy will form the basis for the planning and execution of vehicle load control infrastructure and operations.

This paper covers the process followed in developing the strategy; the situational analysis undertaken prior to the development of the strategy; and the steps followed in the development of the strategy. The paper then presents the strategic outcomes, outcome targets and outputs that have to be implemented and achieved in terms of this strategy.

1 INTRODUCTION

1.1 Background

Overloading of trucks is a major problem in many countries throughout the world and the continent of Africa and the Republic of Malawi in particular, are no exception. Uncontrolled and widespread overloading of trucks causes premature deterioration of the road network, negatively impacts on road safety and creates a distorted market for transport operators, consignors and consignees. Attempts to control overloading of trucks in Africa have, generally speaking, had limited success. In many countries effective overload control strategies have been developed over the years, but lack of implementation of these strategies is usually the problem. Constraints to implementation are often sustainable funding (particularly for operations and maintenance of weighing equipment) and human capacity.

1.2 Problem Statement

During the past 15 years or so, the responsibility for axle load control has moved between the Malawi Directorate of Road Transport and Safety Services (DRTSS) and the Malawi Road Authority (RA) on two occasions: from the DRTSS to the RA in 2003 and then back to the DRTSS in 2007. An Axle Load Control Strategy for Malawi was prepared in 2005 while the load control function resided with the RA. In 2009, after the load control function moved back to the DRTSS, a study was undertaken with a focus on management and operation proposals to effectively operate the weighbridges in Malawi. Some of the proposals emanating from the strategy and the study have been successfully implemented, including the recruitment of additional staff for managing load control operations and the upgrading of the weighbridge software at the weighbridges. However, there are still a number of areas where there has been little or no progress, primarily due to insufficient funding. A need was therefore identified for the updating of Malawi's 2005 Axle Load Control Strategy and to provide a five-year implementation plan based on the updated strategy. This project formed part of a European Union funded project entitled *Technical Assistance to the Road Sector Policy Support Programme*.

The objectives set for the project to update the Vehicle Load Control Strategy were to:

- Assist the DRTSS to undertake an extensive nationwide survey to assess the extent of the overloading problem on the paved road network;
- Review and update the 2005 "Vehicle Weights and Axle Load Control Strategy", based on the outcome of this survey;
- Produce a Five-year Implementation (Business) Plan that will provide a "roadmap" for the expansion of the current overload control system;
- Strengthen the overall management and monitoring of axle load control operations through the introduction of adequate monitoring and reporting; and
- Ensure that the underlying legislation adequately supports axle load control operations.

1.3 Aim of the Paper

The aim of the paper is to describe the process followed in the development of a Vehicle Load Control Strategy for Malawi for the period 2016 to 2020 and to describe the strategic outcomes, outcome targets and outputs that have to be implemented and achieved in terms of this strategy.

1.4 Scope of the Paper

This paper reports on the process followed in developing the strategy; the situational analysis undertaken prior to the development of the strategy; and the steps followed in the development of the strategy. The paper then presents the strategic outcomes, outcome targets and outputs that have to be implemented and achieved in terms of this strategy.

2 PROCESS FOLLOWED IN DEVELOPING THE STRATEGY

The development of the strategy was undertaken in four missions of four weeks each during the period September 2013 to March 2015.

2.1 First Mission

The first mission took place in September/October 2013. The first mission focused on the planning and preparation for DRTSS staff to undertake the baseline survey; reviewing the 2005 strategy and the 2009 study; reviewing the management and operations of the current axle load control system (including site visits to four of the existing five axle load control centres); and reviewing the legal framework underpinning load control in Malawi.

2.2 Second Mission

The second mission was undertaken as two two-week visits, with the first two-week visit in November/December 2013 and the second two-week visit in March 2014. This mission focussed on the training of DRTSS staff to undertake the baseline axle load survey; and supervising and monitoring the activities of DRTSS staff during the initial stages of the axle load survey. During the first visit, staff from the northern and central regions were trained and during the second visit, staff from the southern/eastern region.

The DRTSS staff members who conducted the axle load surveys are Road Transport Officers (RTO) employed at the five fixed weighbridges in Malawi. RTOs do not receive any formal training before or after employment and have to rely on in-service training at the weighbridge station where they are deployed. The training conducted prior to the axle load survey was therefore used as an opportunity to provide some formal theoretical and practical training on vehicle load control in addition to training dealing specifically with the axle load survey.

2.3 Third Mission

The third mission took place in September/October 2014 during which the results of the baseline survey were analysed along with other data (such as traffic flow data and data from fixed weighbridges) and the 2005 Vehicle Weights and Axle Load Control Strategy was updated and converted to the Vehicle Load Control Strategy for Malawi (2014/2015 – 2019/2020). It also included an underlying Five-year Implementation (Business) Plan.

2.4 Fourth Mission

The fourth mission took place in February/March 2015. During this mission, the Vehicle Load Control Strategy for Malawi (2014/2015 – 2019/2020) that was prepared during the third mission was presented and discussed at a four-day Axle Load Control Strategy Internal Review Workshop. The workshop was attended by staff members from the DRTSS, the Ministry of Transport and Public Works and the Road Authority. Based on the discussions and deliberations at this workshop, the strategy was refined and then converted into the format as prescribed in the handbook for government planners for integrated strategic and implementation planning in the government of Malawi (Government of Malawi, 2007).

During the fourth mission, the vehicle load control indicators and targets for the Transport Sector Performance Monitoring Indicator Framework (TSPMIF) were also reviewed.

3 SITUATIONAL ANALYSIS

The development of the vehicle load control strategy was preceded by a situation analysis, which involved an assessment of the current incidence of overloading and the current state of load control in Malawi. This included the baseline axle load survey; reviewing the 2005 strategy and the 2009 study; reviewing the management and operations of the current axle load control system (including site visits to four of the existing five axle load control centres); and reviewing the legal framework underpinning load control in Malawi.

3.1 The Baseline Axle Load Survey

The axle load survey was undertaken by staff members from the DRTSS using three sets of portable scales procured by the DRTSS. Heavy vehicles were weighed at 17 sites. The sites were chosen as far as possible to be on road links carrying the highest number of heavy vehicles, but also to ensure widespread coverage of the Malawi main road network. 2 691 heavy vehicles were weighed on 68 weigh days at an average of 39 heavy vehicles per day. Of the 2 691 vehicles weighed, 1 356 were overloaded, which represents an extent of overloading of 50.4%. The average overloaded mass on the 1 356 overloaded vehicles was 4 264 kg, representing an average degree of overloading of 26.1% (Roux *et. al.*, 2015).

3.2 Current State of the Malawi Road Network

The primary purpose of vehicle load control is to protect the road network against damage by overloaded vehicles. Malawi has a designated road network of 15 451 km of which approximately 26% are paved and 74% have an earth/gravel surface. Roads serve as the country's most dominant mode of transport, which handles more than 70% of the internal freight traffic and 99% of passenger traffic. Road transport is also important for international trade as it handles more than 90% of cross-border freight and passenger traffic (including transit). Based on a condition assessment, the state of the country's roads is gradually deteriorating. A survey carried out on the paved network in 2008 showed that 77% of the country's paved road network was in good condition and 2% in poor condition. A similar survey in 2014 showed that only 41% is in good condition whereas 17% is in poor condition. This shows a deteriorating trend. Through the implementation of this VLC Strategy, the DTRSS will contribute to the preservation of the Malawi road network.

3.3 Overview of Vehicle Load Control Management in Malawi

The DRTSS currently operates five permanent weighbridges, of which four are border post weighbridges at Mchinji, Songwe, Muloza and Mwanza and one is an internal weighbridge at Balaka along the M1. All of these weighbridges are currently operational and in use on a daily basis. The use of portable vehicle scales is allowed for law enforcement purposes in Malawi and the DRTSS procured five sets of portable vehicle scales for the axle load survey that will now be used for law enforcement purposes.

3.4 Incidence of Vehicle Overloading in Malawi

The incidence of vehicle overloading as measured at the permanent weighbridges shows an extent of overloading of only 3% and an average degree of overloading of 5%. In contrast, the baseline axle load survey, undertaken as part of the preparation of the load control strategy, showed that on average 50% of the vehicles on the network could be overloaded and that these overloaded vehicles are on average overloaded by 26%. The extent of overloading measured during the baseline survey is much higher than previously thought, mainly because the estimate of the extent of overloading prior to the baseline survey was based on statistics from the permanent weighbridges. In this regard, both the extent and degree of overloading measured at the permanent weighbridges are not at all representative of the actual overloading situation on the Malawi road network. This is mainly as a result of the lack of vehicle load control facilities on the internal network.

3.5 Review of the legal framework underpinning load control in Malawi

Legal loads on vehicles in Malawi are specified in the Road Traffic Act (RTA, 1997) and Road Traffic (Construction, Equipment and Use) Regulations (CEU Regulations, 2000). The review of the legal framework underpinning overload control in Malawi has shown that in general the regulations dealing with the control of loads on vehicles and with overloaded vehicles are comprehensive and adequately address this matter. Minor changes to some of the regulations to make corrections or to address omissions were identified. These changes include a recommendation to

include a requirement in terms of the power of the drawing vehicle in relation to the total mass of the vehicle or combination of vehicles; the inclusion of an axle unit consisting of three axles (tridem) with two wheels on each axle; the rewording of a regulation to clarify the requirement in terms of the ratio between the mass of the steer axle of a vehicle and the total mass of a combination of vehicles.

A positive aspect of the legal framework in Malawi is the decriminalisation of overload offences. These offences are addressed by way of an administrative system incorporating fees as provided for in the CEU Regulations.

The legal framework in Malawi was also compared with the SADC load control requirements and subsequently with the requirements contained in the Memorandum of Understanding on Vehicle Load Management adopted by the three Regional Economic Communities (RECs) of EAC, COMESA and SADC (the Tripartite). It was found that the Act and CEU regulations are mostly aligned with these requirements, with only minor adjustments required.

4 VEHICLE LOAD CONTROL STRATEGY FOR MALAWI (2015 – 2020)

The final Vehicle Load Control Strategy for Malawi (2015 – 2020) (the Strategy), compiled during the fourth mission, followed the six-step integrated strategic implementation planning process as illustrated in Figure 1 as prescribed in the handbook for government planners for integrated strategic and implementation planning in the Government of Malawi (Government of Malawi, 2007). Steps 1 to 3 only are described in this paper.

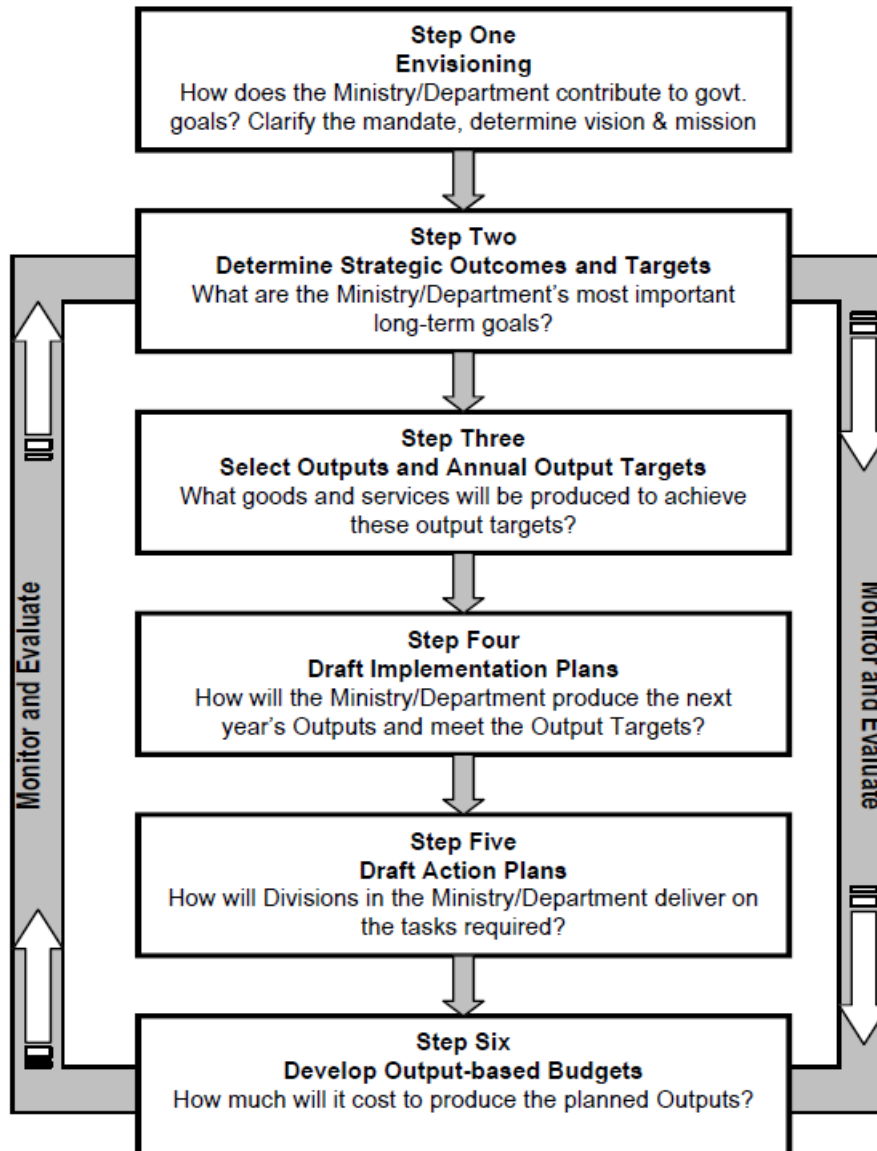


Figure 1: Six-Step Integrated Strategic Implementation Planning Process
 (Source: *Government of Malawi (2007)*)

4.1 Step 1: Envisioning

The DTRSS has the mandate to manage vehicle and axle load control and to enforce the regulations dealing with the control of vehicle loading. These powers are derived from the Road Traffic Act (RTA, 1997) and Road Traffic (Construction, Equipment and Use) Regulations (CEU Regulations, 2000). The RTA and CEU Regulations further lay down the maximum mass limits of vehicles used on public roads and the powers of transport officers regarding the enforcement of these mass limits. The act and regulations also deal with the calculation of overloads and penalties and with the weighing of vehicles and weighing procedures.

The DRTSS' vision formulated during the Axle Load Control Strategy Internal Review Workshop is to have a vehicle overload free nation and the mission is to ensure vehicle loading compliance through effective vehicle load control operations and management in order to preserve road infrastructure and enhance road safety

4.2 Step 2: Strategic Outcomes and Targets

Through the implementation of the Strategy, the DRTSS aims to accomplish the following two Strategic Outcomes:

Strategic Outcome 1: Road infrastructure protected against damage caused by overloaded vehicles.

Strategic Outcome 2: Reduced number of unsafe vehicles on the roads of Malawi.

To enable the Directorate to measure its progress towards achieving these Strategic Outcomes, a number of output targets with both a quantity and a time element have been set. Monitoring of progress with the implementation of these output targets will also allow the Directorate to revise its goals as circumstances change without changing the Strategic Outcomes that are most important.

4.2.1 Outcome Targets for Strategic Outcome 1

- I. 70% of the main road network covered by a weighing facility by 2020.
- II. 100% of permanent weighbridges operating 24 hours per day by 2020.
- III. Downtime at weighbridges reduced to under 10% by 2020.
- IV. Human resource capacity and effectiveness improved by 80% by 2020.
- V. 15% of other recurrent transactions (ORT) funding is channelled to vehicle load control operations by 2018.
- VI. 100% of load control operations monitored by 2020.
- VII. Enhanced regulatory framework for axle load control by 2017.
- VIII. 90% of hauliers aware of load control regulations by 2020.

4.2.2 Outcome Target for Strategic Outcome 2

- I. Key safety checks conducted on 70% of drivers and their weighed vehicles by 2020

4.3 Step 3: Outputs and Output Targets

The Outputs – the tangible goods and services – that have to be produced by the DRTSS in order to achieve its Strategic Outcomes were identified during Step 3. Outputs are set against each Outcome Target and for each Output an annual Target is set. Detailed implementation plans have been drawn up for the 2016 financial year's list of Output Targets.

4.3.1 Outputs for the Outcome Targets of Strategic Outcome 1

Strategic Outcome 1 deals with the protection of road infrastructure against damage caused by overloaded vehicles and has 8 outcome targets.

Outcome Target 1: 70% of the main road network covered by a weighing facility by 2020

- Output 1: Two fixed inland weighbridges constructed by 2020
- Output 2: Ten semi-permanent stations constructed by 2020.
- Output 3: Five new fixed weighbridges established at border posts by 2020.
- Output 4: Patrols to restrict the use of by-pass roads at current fixed weighbridges by heavy vehicles implemented by 2017.
- Output 5: Commencing in 2017, weigh teams, using portable scales, to operate at least 15 days per month.
- Output 6: One pilot high-speed Weigh-in-Motion facility constructed by 2017.

Outcome Target 2: 100% of permanent weighbridges operating 24 hours per day by 2020

- Output 1: 100% of bilateral border post agreements reviewed and implemented by 2017.
- Output 2: 100% of fixed weighbridges are fully equipped with night enforcement equipment by 2017.

Outcome Target 3: Downtime at weighbridges reduced to less than 10% by 2020.

- Output 1: Commencing in 2016, the generators at all fixed weighbridges must be regularly maintained and supplied with fuel.
- Output 2: Continue with the annual verification of scales at all fixed weighbridges.
- Output 3: 100% of computers at fixed weighbridges replaced by 2020.
- Output 4: Commencing in 2016, adequate stationery provided to all weighbridge stations on a monthly basis.
- Output 5: Down time of equipment due to breakages reduced to less than 5% of operational hours by 2020.
- Output 6: 5 existing portable scales replaced by 2020.
- Output 7: 5 generators to be procured for use with portable scales in 2016.

- Output 8 9 vehicles procured by 2020.
- Output 9 2 Stand-by generators procured for existing fixed weighbridges by 2017.

Outcome Target 4: Human resource capacity and effectiveness improved by 80% by 2020

- Output 1 100% of current vacant positions filled by 2020.
- Output 2 15 persons for new weighbridges recruited and deployed per weighbridge prior to completion of weighbridge.
- Output 3 (Technical) Training Needs Assessment conducted for 100% of staff by 2016.
- Output 4 Commencing in 2016, 100% of Road Transport Officers trained annually in all aspects of vehicle load control.
- Output 5 Commencing in 2016, Road Transport Officers performing exceptionally to be recognised.

Outcome Target 5: 15% of ORT is channelled to vehicle load control operations by 2018

- Output 1 Commencing in 2016, 15% of ORT allocated to Vehicle Load Control Section and adhered to.

Outcome Target 6: 100% of load control operations monitored by 2020

- Output 1 Weighbridge module of Trafman procured and integrated with MALTIS at all weighbridges by 2017.
- Output 2 Central weighbridge database established by 2017.
- Output 3 Commencing in 2016, regular weigh activities reports for permanent weighbridges and portable scales to be enhanced.
- Output 4 Commencing in 2016, performance audits of weighbridge stations to be conducted annually at 100% of stations.
- Output 5 Commencing in 2016, weigh certificates are issued to 100% of vehicles weighed.
- Output 6 Commencing in 2016, annual monitoring overload surveys are undertaken.

Outcome Target 7: Enhanced regulatory framework for axle load control by 2017

- Output 1 Roles and responsibilities of officers expanded to include key vehicle safety and driver fitness checks.
- Output 2 Legislation aligned with the tripartite Memorandum of Understanding on Vehicle Load Management by 2017.
- Output 3 100% of mass load regulations enforced on the designated road network by 2017.

Outcome Target 8: 90% of operators aware of load control regulations by 2020

- Output 1 Information booklet and posters on load control regulations issued to 100% of registered operators by 2017.
- Output 2 Commencing in 2016, 4 press statements on vehicle load control issued annually.
- Output 3 Commencing in 2016, 2 vehicle load management and courses presented annually for registered operators.
- Output 4 Commencing in 2016, 80% of registered operators sensitized on vehicle load control through sensitization campaigns conducted annually.
- Output 5 Promotion of self-regulation by transport operators from 2017 onwards.

4.3.2 Outputs for the Outcome Targets of Strategic Outcome 2

Strategic Outcome 2 aims to reduce the number of unsafe vehicles on the roads of Malawi and has 1 outcome target.

Outcome Target 1: Key safety checks conducted on 70% of drivers and their weighed vehicles by 2020

- Output 1: Update Weighbridge Operators Manuals to include key vehicle safety and driver fitness checks developed by 2016
- Output 2: Weighbridge software at 100% of fixed weighbridges updated to capture key vehicle safety and driver fitness checks by 2017
- Output 3: 100% of Road Transport Officers trained on key vehicle safety and driver fitness checks by 2017
- Output 4: 100% of fixed weighbridges equipped for enforcement of key vehicle safety and driver fitness by 2017

5 RECOMMENDATIONS FOR WEIGH FACILITIES

Outcome Target 2 of Strategic Outcome 1 requires that 70% of the main road network must be covered by a weighing facility by 2020. In order to achieve this, additional permanent and semi-permanent weigh facilities have to be provided and the use of portable scales must be increased.

5.1 Permanent Weighbridges at Border Posts

A cordon approach for cross-border heavy vehicle traffic was recommended in the 2005 strategy and has been retained in the Strategy. The cordon approach involves the placing of weighbridges at border posts to check vehicles for compliance with load regulations on entering and leaving the country. The cordon approach is already in place to a large extent at the border post weighbridges of Songwe, Mchinji, Mwanza and Muloza. There are currently a number of regional corridor projects involving one-stop border posts in the planning phase. These one-stop border posts, once implemented, would lead to the full implementation of the cordon approach. The one-stop border posts being planned are at:

- Songwe (Malawi/Tanzania);
- Mchinji/Chipata (Malawi/Zambia);
- Mwanza/Zobue (Malawi/Mozambique);
- Dedza/Calomue (Malawi/Mozambique);
- Chiponde/Mandimba (Malawi/Mozambique); and
- Muloza/Milange (Malawi/Mozambique).

5.2 Internal Permanent Weighbridges

The analysis of data from the axle load survey has confirmed that the incidence of overloading of domestic heavy vehicles is very high. Axle load control on the internal road network is therefore essential in order to adequately protect the national road network. Currently the only permanent weighbridge available for internal axle load control is the Balaka weighbridge on the M1 between Blantyre and Lilongwe. The main origins and destinations of heavy vehicle traffic in Malawi are Lilongwe and Blantyre and the placing of weighbridges at strategic points within the cities of Blantyre and Lilongwe was recommended. These weighbridges would be available for law enforcement purposes, but also for operators to check their vehicles for compliance with the load regulations prior to commencing a trip.

5.3 Semi-permanent Weigh Sites

The use of portable vehicle scales is allowed for law enforcement purposes in Malawi and the volume of heavy vehicle traffic is relatively low on the majority of the network. It was therefore recommended that semi-permanent weigh sites should form the backbone of the internal axle load control operations. Semi-permanent stations comprise a constructed lay-by with a concrete hard standing where heavy vehicles can be weighed using a portable axle scale that fits into a recess in the concrete hard standing. The lay-bys must be constructed in such a way that heavy

vehicles can safely leave the road to enter the lay-by and also exit the lay-by to safely join the road again. Provision must be made for an area where overloaded vehicles can park while arranging for payment of the penalties and for correcting loads. One such a lay-by has been constructed at Lirangwe on the M1 between Blantyre and Lilongwe. A network of 14 additional semi-permanent weigh sites has been recommended, with a focus on areas where there is a high incidence of overloading and/or high numbers of heavy vehicles, but also ensuring good coverage of the road network to minimize the opportunities for escape routes. It is recommended that at least two sites be constructed per financial year as part of the five-year Business Plan.

5.4 Portable Scales

Apart from using portable scales for weighing at the semi-permanent weigh sites, they should also be used for *ad hoc* weighing at other locations. For this application, the scales would be set up on the road surface in the travel way with levelling modules before and after the sensor. The portable scales should be used for weighing at the locations proposed for the establishment of semi-permanent weigh sites and on secondary and tertiary roads to expand the axle load control net. Secondary and tertiary roads where there is an increase in heavy vehicle traffic due to new developments or short-term activities should be identified and targeted.

5.5 Weigh-in-motion installations

It was recommended that consideration be given to the installation of one high speed weigh-in-motion (HSWIM) site as a pilot. A possible location is the M1 between Lilongwe and Dedza, but closer to Lilongwe. The main purpose of such an installation would be data collection. The installation, calibration and maintenance of WIM stations are highly specialised activities that require particular skills and extensive experience, which most WIM-data users do not possess. It was therefore recommended that the DRTSS follow the current practice in South Africa, whereby a WIM service provider is appointed to install and maintain the HSWIM equipment and the DRTSS would then buy the WIM data, rather than the equipment.

6 SUMMARY

An axle load survey conducted in Malawi during 2014 has shown that 50% of the vehicles on the network could be overloaded by an average of 26% per vehicle. To address this high incidence of vehicle overloading, a Vehicle Load Control Strategy for Malawi for the period 2015 to 2020 has been developed. The strategy presents the strategic direction that the Malawi Directorate of Road Transport and Safety Services will take for the next five years with regards its vehicle load control mandate. The strategy will form the basis for the planning and execution of vehicle load control infrastructure and operations.

The strategy was compiled in accordance with a six-step integrated strategic implementation planning process prescribed in the handbook for government planners for integrated strategic and implementation planning in the Government of Malawi. The strategy was finalised at a four-day Axle Load Control Strategy Internal

Review Workshop. The workshop was attended by staff members from the DRTSS, the Ministry of Transport and Public Works and the Road Authority, ensuring ownership of the strategy by the staff members responsible for the implementation of the strategy.

Through the implementation of the strategy, the DRTSS aims to accomplish two strategic outcomes, firstly to protect the road infrastructure against damage caused by overloaded vehicles and secondly to reduce the number of unsafe vehicles on the roads of Malawi. To enable the DRTSS to measure its progress towards achieving these strategic outcomes, a number of output targets with both a quantity and a time element have been set.

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