



Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**

Traffic management fundamentals audit – guide

Approved: July 2018

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Introduction

The 'traffic management fundamentals' audit was developed in 2017. It has been trialled and assessed by the Department, and made available to industry in October 2017 to support the 'Traffic Management' focus of the Department in 2017.

This audit has been updated in 2018 based on the learnings and feedback. It has been approved for publishing in July 2018.

The scope of the 'traffic management fundamentals' audit is designed to provide a relatively quick assessment of important traffic management fundamentals, and complement the existing suite of four 'mobile equipment' audits covering traffic management safety at mining operations.

The four existing 'traffic management and mobile equipment' audits are designed to include operating standards associated with the management of traffic and mobile equipment in mine operations, and to cover this in far more detail. The four 'traffic management and mobile equipment' audits cover:

- traffic management (Part 1),
- mining operations and equipment selection (Part 2),
- surface and underground operations with site deliveries (Part 3), and
- management of mobile equipment maintenance (Part 4).

The purpose of this audit is to:

1. Allow an assessment that can be carried out on a site in one day;
2. Help evaluate a sites performance in regard to appropriateness and priority for conducting other 'traffic management and mobile equipment' audits; and
3. Provide a basic traffic management audit for smaller sites with a low risk profile for traffic management.

The audit is split up into sections covering safe systems for traffic management, safe vehicles, and ensuring personnel are competent and fit for work.

Autonomous equipment operations are not covered in any of the above audits.

Where, in the intent, the word "verify" is used, this means that it is a regulatory requirement, which is mandatory and has to be complied with. Where, in the intent, the word "ensure" is used, it is not a mandatory requirement, but it does set out a recommended practice which, if followed, should minimise the potential for an adverse incident to take place.

List of abbreviations

AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
DMIRS	Department of Mines, Industry Regulation and Safety
HME	Heavy mobile equipment
HOF	Human and organisational factors
ISO	International Standards Organisation
LV	Light vehicle(s)
MSIA	<i>Mines Safety and Inspection Act 1994</i>
MSIR	Mines Safety and Inspection Regulations 1995
OEM	Original equipment manufacturer
r.	Regulation (of the MSIR)
rr.	Regulations (of the MSIR)
s.	Section (of the MSIA)
SRS	The Department of Mines, Industry Regulation and Safety's online Safety Regulation System
ss.	Sections (of the MSIA)

Supporting documentation

- Selected mining safety bulletins, mines safety significant incident reports, and safety alerts from:
 - www.dmirs.wa.gov.au
 - www.dme.qld.gov.au
 - www.dpi.nsw.gov.au
- Australian and other standards, SAI Global <http://infostore.saiglobal.com/store/>
 - AS 1742.2:2009 *Manual of uniform traffic control devices – Traffic control devices for general use*
 - AS/NZS 1906.1:2017 *Retroreflective materials and devices for road traffic control purposes – Retroreflective sheeting*
- WA Main Roads “Road and Traffic Engineering Standards”
- Austroads guides (austroads.com.au)
 - Guide to Road Design
 - Guide to Road Safety
- Unsealed Roads Manual: ARRB 2009
- Design of Surface Mine Haul Roads (US Department of Interior, Bureau of Mines) information circular 8758, 1977:1-50
- Haul Road Inspection handbook (US MSHA) <http://www.cdc.gov/niosh/srchpage.html>

1 Systems

To ensure there are safe systems for traffic management.

Point	Standard	Guideline
1.1	The operation has prepared and approved a traffic management system i.e. policy(ies), plan(s) and procedures.	<p>Intent:</p> <p>To verify that rules have been developed for the safety of all vehicles, operators and pedestrians at the mine (based on a risk assessment). The traffic management system or associated documentation should;</p> <ol style="list-style-type: none"> 1. Be current and identify periods for review 2. Have responsibilities clearly defined 3. Include fitness for work requirements 4. Include road design standards 5. Include driving rules 6. Include communication procedures 7. Include traffic plans / schematics 8. Include the management of restricted areas 9. Include driving to off-site locations or off-site locations(journey management) 10. Include standards for escorting vehicles on site 11. Be regularly monitored and audited 12. Include a change management process for the document and traffic changes <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Review the traffic management plan documentation. If a substantial proportion of the above is available then compliance may be met subject to a commitment to comply with the audit recommendations. Refer to MSIA s. 9</p>

Point	Standard	Guideline
1.2	The traffic management plan sets out the standard design requirements for mine roads, open pit roads and other vehicle operating areas within the mine.	<p>Intent:</p> <p>To verify that road design requirements are developed for the safe operation of vehicles within the mine. Road design standards should include;</p> <ol style="list-style-type: none"> 1. Intersections 2. Road widths 3. Gradients, camber, vertical and horizontal alignment 4. Line of sight stopping distances 5. HME & LV separation 6. Pedestrian separation and crossings 7. Parking areas 8. Windrows for edge protection 9. Signage 10. Guideposts / delineation <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Review the traffic management plan documentation. Verify if controls are observed and adequate. Refer to MSIA s. 9, MSIR rr. 13.6 and 13.7</p>
1.3	The traffic management system sets out the design requirements and standards for traffic signage, guideposts and other traffic control devices within all areas of the mine.	<p>Intent:</p> <p>To verify that requirements are developed for the signage and devices to be used for the control and safe operation of all vehicles at the mine. Considerations should include;</p> <ol style="list-style-type: none"> 1. Australian standards 2. Height 3. Night time conditions 4. Signage clutter 5. Control of customised signs <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Review the traffic management plan documentation. Verify if controls are observed and adequate. Refer to MSIR r. 4.10, AS 1742.2:2009 <i>Manual of uniform traffic control devices – Traffic control devices for general use</i>, and AS/NZS 1906.1:2017 <i>Retroreflective materials and devices for road traffic control purposes – Retroreflective sheeting</i>.</p>

Point	Standard	Guideline
1.4	<p>The traffic management plan includes a risk assessment to identify adequate speed controls.</p> <p>Speed limit variances are limited, controlled and appropriate for the prevailing road conditions and pedestrian hazards.</p>	<p>Intent:</p> <p>To ensure that speed limits are risk assessed, consistent, practical and relevant.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Review the traffic management plan documentation for speed controls.</p> <p>Inspect risk assessment documents on speed controls. A speed limit zone map should identify the speed variances. The number of speed limits is limited to a maximum of three or four, the speed limits utilised are in multiples of 10 km/h, signage is installed on the left hand side as a minimum, or preferentially on both sides of the road, and repeater signs are installed. Verify if controls are observed and adequate.</p>
1.5	<p>Adequate windrows/bunds are provided on the outer edge of each road in the open pit adjacent to a bank or steep slope.</p> <p>In other areas a risk assessment should assess the need for a windrow or other effective control.</p>	<p>Intent:</p> <p>To verify that adequate structures are constructed or installed to prevent vehicles leaving the road.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect the traffic management plan and roads. The size of windrows should be determined by risk analysis, but should be at least half (50%) the wheel height of the largest vehicle operating on that road adjacent to a bank or steep slope. Verify if controls are observed and adequate.</p> <p>Refer to MSIR r. 13.7(5)</p>
1.6	<p>Parking areas are designed and constructed to an appropriate standard.</p>	<p>Intent:</p> <p>To ensure that parking areas have been designed and constructed to an appropriate standard. The standards should consider;</p> <ol style="list-style-type: none"> 1. Gradients 2. Capacity 3. Traffic flow 4. Segregation for pedestrians 5. Segregation of HME /LV 6. Shared zones 7. Segregation for buses 8. Driving out forwards 9. Signage 10. Driver change outs <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect the vehicle parking areas. View a plan of the parking design.</p> <p>Verify if controls are observed and adequate.</p>

Point	Standard	Guideline
1.7	Pedestrian controls are designed and provided in all operational areas where vehicles are present.	<p>Intent:</p> <p>To ensure that walkways are provided for pedestrians to avoid being hit by vehicles. The considerations include;</p> <ol style="list-style-type: none"> 1. Hi-visibility clothing 2. Suitable walkways 3. Protection of walkways 4. Appropriate separation from vehicles 5. Suitable steps and handrails 6. Signage 7. Crossing areas <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect high pedestrian traffic areas on the site. Confirm whether a pedestrian network of walkways is provided. Verify if controls are observed and adequate.</p>
1.8	The traffic management plan sets out the requirement for the standard of communication and equipment to be utilised in mobile equipment and in pedestrian interface areas.	<p>Intent:</p> <p>To verify that the traffic management plan outlines the requirements for the provision and usage of communication devices within mobile equipment operational areas.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Review the traffic management plan documentation. Confirm two-way radio communication is maintained and available within vehicles and carried by personnel working on foot in mobile equipment areas. Verify if controls are observed and adequate. Refer to MSIA s. 9.</p>
1.9	Measures are implemented at all mine access points for preventing inadvertent access and controlling contractors, customers and visitors to site.	<p>Intent:</p> <p>To verify the existence of a means to prevent inadvertent access of unauthorised persons into the mine.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect the mine access road signage and control measures utilised to restrict access. Mines in close proximity to local communities or where there is a likelihood of the public inadvertently accessing the mine operations should provide security fences, gates and/or earth bunding to restrict access. Verify if controls are observed and adequate. Refer to MSIR rr. 4.10 and 13.11.</p>

Point	Standard	Guideline
1.10	<p>The traffic management system sets out the design requirements for the standard of lighting for all low light/ night operations.</p> <p>Standards include road markings and clear zones free from hazards on each side of the road.</p>	<p>Intent:</p> <p>To verify that adequate lighting is provided within the mine. Particular consideration needs to be given to;</p> <ol style="list-style-type: none"> 1. Pedestrian and parking facilities 2. Intersections 3. Dumping areas 4. Excavation areas 5. Areas of high activity <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Review the traffic management system documentation to identify lighting standards. Verify if controls are observed and adequate. Refer to MSIR r. 13.6(1).</p>
1.11	<p>A maintenance programme has been established for the inspection, repair and resurfacing of all sealed and unsealed roads. The maintenance activities are managed in a safe manner.</p>	<p>Intent:</p> <p>To verify that sealed and unsealed roads are maintained in a safe condition and there are systems in place to ensure road maintenance activities are carried in a safe manner. Considerations should include;</p> <ol style="list-style-type: none"> 1. Temporary road works 2. Pedestrians on the roadways installing or cleaning and guideposts or signage 3. Control of single lane roads 4. Vegetation growth obscuring signage/guideposts/traffic 5. Repair of roads affected adverse weather 6. Providing adequate drainage <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect the mine haul roads and other vehicle operating areas. Confirm roads are regularly inspected for damage, instability, and potential collapse, etc. Confirm road maintenance equipment is available and roads are maintained in a safe condition. Verify if controls are observed and adequate. Refer to MSIR rr. 3.18 and 13.7(3), and mines safety significant incident report 121.</p>

Point	Standard	Guideline
1.12	Suitable protection or segregation is in place at every vehicle interface with infrastructure and ground level hazards such as covered sumps, soak wells, and drains not designed to support any vehicle.	<p>Intent:</p> <p>To ensure that adequate protection is provided to prevent damage to the installed infrastructure in vehicle access areas and to prevent vehicle access to hazardous installations such as covered soak wells, sumps, and drains where the cover is not designed to support any vehicle. The following items should also be considered;</p> <ol style="list-style-type: none"> 1. Restricted height areas 2. Falling object protection <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect buildings, tanks, hydrants, lighting towers, covered drains, soak wells and sumps etc. Confirm bollard devices or segregation barriers are installed. Verify if controls are observed and adequate.</p>
1.13	Movement around high voltage installations and overhead powerline corridors is restricted and controlled to prevent inadvertent contact by mobile plant.	<p>Intent:</p> <p>To verify that adequate controls are provided to prevent vehicles contacting, or coming too close to, high voltage equipment and overhead powerlines. This includes ensuring high voltage installations and overhead powerline corridors are identified, signposted / delineated and access restricted to prevent inadvertent contact by mobile plant.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect the high voltage areas and powerline corridors. Confirm that high voltage installations are located away from roadways and other vehicle operating areas. Verify the installation of marker bollards, height clearance signage or warning signage at each vehicle and powerline crossing and/or high voltage installation access point. Verify if controls are observed and adequate. Refer to MSIR r. 5.28 and mining safety bulletin 51.</p>

Point	Standard	Guideline
1.14	There is standard procedure and design for loading, dumping, ROMs and stockpile operations.	<p>Intent:</p> <p>To ensure that loading and dumping operations are carried out in a safe and consistent manner. These procedures and controls should include:</p> <ol style="list-style-type: none"> 1. The size and configuration of the benches, digging, tipping and stockpile areas 2. Bench and stockpile height 3. The segregation of HVs, LVs and pedestrians 4. Vehicle control and flow 5. Geotechnical considerations 6. Control of dumping limits 7. Appropriate signage 8. Positive Communications <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Sight procedure. Verify if controls are observed and adequate.</p>
1.15	Resources are available and used for dust suppression on unsealed roads.	<p>Intent:</p> <p>To verify that driver visibility is maintained by managing and suppressing dust on operational roads.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Inspect the mine haul roads. Confirm whether there is adequate means and equipment available for dust suppression, that it is being utilised to minimise dust creation and there is a maintenance program in place. Verify if controls are observed and adequate. Refer to MSIR rr. 3.18 and 13.7(3).</p>
1.16	The traffic management system considers significant environmental factors.	<p>Intent:</p> <p>To ensure that procedures and controls take into account;</p> <ol style="list-style-type: none"> 1. General wet weather conditions 2. Severe weather events e.g. Cyclones and electrical storms 3. Glare and sunstrike <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>Sight procedure/controls (e.g. run culverts and flood ways). Verify if controls are observed and adequate</p>

2 Vehicles

To ensure vehicles are safe and fit for purpose.

Point	Standard	Guideline
2.1	There is a register of mobile equipment, including permanent contractor's equipment and a system to manage the condition and maintenance of itinerant mobile equipment on the mine site.	<p>Intent:</p> <p>To ensure that all the relevant equipment details are readily available. Considerations include;</p> <ol style="list-style-type: none"> 1. Register is current 2. Equipment is uniquely identifiable <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>View the register of mobile equipment. Check that all relevant mobile plant is included.</p>
2.2	The mobile equipment is fit for purpose i.e. selected according to the limitations imposed by the site operating conditions. The equipment is operated within its design capacity. A system to identify hazards associated with mobile equipment is in place. Any modifications to vehicles are designed by a competent person.	<p>Intent:</p> <p>Vehicle considerations;</p> <ol style="list-style-type: none"> 1. Selection process for vehicles 2. Compatible with the site conditions 3. Used within its design specifications 4. A risk assessment process for mobile equipment is in place 5. OEM manuals are accessible <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>View a selection of documents, consider road widths, gradients, curves, braking characteristics, compaction rates. Consider the configuration of primary haulage units, water trucks, service trucks and etc., which may not always be suitable to operating conditions. Interview operations and engineering management. Verify if controls are observed and adequate.</p>

Point	Standard	Guideline
2.3	Vehicle pre-start checks are carried out on all vehicles prior to use. (If this is not in place an adequate risk assessment should identify the frequency of pre-start checks). The operating procedures and machinery pre-start checks prohibit the use of mobile equipment in a mine where defective equipment presents an unacceptable risk (e.g. brakes, steering, warning signal, lights or seat belts are not in working order).	<p>Intent:</p> <p>To verify operators examine and confirm the vehicle is safe for use prior to operation. Considerations include;</p> <ol style="list-style-type: none"> 1. Braking systems 2. Steering systems 3. Lighting, flashing lights and indicators 4. Seating and seatbelts 5. Audible warning signals 6. Tyre condition 7. Equipment identification numbers for adequate positive communications <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>View procedures and vehicle prestart sheets. The standard is not met if the checking process does not include a means of reporting defects to management. Verify if controls are observed and adequate. Refer to MSIR r. 13.3</p>
2.4	There is an effective preventative maintenance program for mobile equipment which is carried out at predetermined intervals of time or distance.	<p>Intent:</p> <p>To verify that mobile equipment is maintained in a safe operating condition and in line with OEM requirements.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>View written program, maintenance records and interview maintenance personnel. Verify if controls are observed and adequate. Refer to MSIR rr. 6.2, 10.37 and 13.2.</p>
2.5	Vehicle critical systems (e.g. braking and steering) are inspected, maintained, repaired or replaced in accordance with the manufacturer's recommendations.	<p>Intent:</p> <p>To verify that the critical systems (e.g. brake and steering components) will function as designed.</p> <p>Personnel:</p> <p>Registered manager or delegate</p> <p>Method:</p> <p>View manufacturer's service documents and equipment service records to verify that components are checked and maintained to the required standard. Verify if controls are observed and adequate. Refer to MSIR rr. 10.37 and 13.3(4), mining safety bulletin No. 84, and mines safety significant incident report No. 128.</p>

3 People

To ensure personnel are competent and fit for work.

Point	Standard	Guideline
3.1	There is a system in place to ensure each vehicle driver is trained and competent for each type of vehicle they use.	<p>Intent: To verify that mobile equipment operations are carried out in a safe and consistent manner through the training and assessment of operators for their competency.</p> <p>Personnel: Registered manager or delegate</p> <p>Method: Sight training matrix and a sample of theory and practical vehicle operator assessments to confirm operators are being assessed for competency. Refer to MSIR r. 4.13</p>
3.2	The traffic management plan sets out the requirements for managing human and organisational factors and fitness for work requirements.	<p>Intent: To verify that the traffic management plan addresses operator suitability and fitness for work for operating vehicles. Considerations include;</p> <ol style="list-style-type: none"> 1. Pre-employment medicals 2. Random, and for cause, drug and alcohol testing 3. Fatigue 4. Distractions 5. Psychosocial factors <p>Personnel: Registered manager or delegate</p> <p>Method: Review the traffic management plan documentation. Confirm that pre-employment standards are established covering past experience, medical fitness and licence requirements. Identify whether the plan defines standards, monitoring and testing, for drugs and alcohol, fatigue and other employee safety factors. Verify if controls are observed and adequate. Refer to MSIA ss. 9 and 10.</p>
3.3	Driver monitoring for fatigue is undertaken.	<p>Intent: To ensure that a system is in place to monitor the fatigue of personnel operating mobile equipment.</p> <p>Personnel: Registered manager or delegate</p> <p>Method: Review the monitoring system, the results of this monitoring and actions taken as a result.</p>

Point	Standard	Guideline
3.4	Road standards and other traffic management controls are inspected on a shift and/or daily basis (as applicable).	<p>Intent: To verify that road standards and other traffic management controls are checked and maintained in a safe condition on a regular basis.</p> <p>Personnel: Registered manager or delegate</p> <p>Method: Inspect road standards and other traffic management controls (such as aspects addressed in audit point 1.1), and validate findings against those conducted by the shift supervisor and against daily inspection reports. Ensure appropriate actions are taken, in a timely manner, where required. Refer to MSIR rr. 3.18, 3.19, 3.21 and 3.22.</p>