NSW Resources Regulator
Department of Regional NSW

Identifying and Managing Pedestrian, Light Vehicle and HME Interactions

Looking at Principal Hazard Roads and Other Vehicle Operating Area risk assessment

Small Mines Roadshow 2023

February to March 2023

regional.nsw.gov.au

Contents

We are still having near misses and incidents

NSW GOVERNMENT

NSW Resources Regulator

SAFETY ALERT

DATE: September 2020

Operating mobile plant – incidents and near misses

This safety alert provides safety advice for the NSW mining industry.

Issue

Several incidents have been reported to the Resources Regulator recently where people have been exposed to significant health and safety risks due to collisions, rollovers, and interaction of mobile plant within surface operations. The severity of the outcomes of these incidents have ranged from a near miss to minor injuries of personnel involved. The potential outcome of all these incidents however could have been severe and/or fatal injuries.

Circumstances

The Resources Regulator has identified several contributing factors in each of these incidents. As highlighted in the video (see link below), the operation of vehicles - specifically the interaction between vehicles of all size and types - is a major risk in surface mining.

Watch video: Hazards in surface mining operations: Roads or other vehicle operating areas

Figure 1 Light vehicle rollover on mine rehabilitation

Recommendations

It is recommended that mine operators ensure:

- all mining areas including roadways, intersections and park up areas are designed, constructed and maintained to safely manage:

SAFETY ALERT

Operating mobile plant - Incidents and near misses

NSW Resources Regulator

- interactions between mobile plant and light vehicles
- interactions between mobile plant and equipment
- interactions between mobile plant and fixed plant and structures
- interactions between vehicles, mobile plant and pedestrians.

- pre-use inspections are conducted on vehicles and equipment, and all defects are reported and repaired
- workers are trained and competent to operate vehicles and equipment
- vehicle and equipment operators attend work, physically and mentally capable of performing their duties (fitness for work)
- vehicles and equipment are operated within their design limits
- vehicles and equipment are operated according to the environment (drive to conditions)
- positive communication (the use of equipment numbers) is always applied when operating vehicles and equipment.

Figure 1 Light vehicle rollover in mining area

Figure 2 Contact between haul truck and grader

NOTE: Please ensure all relevant people in your organisation receive a copy of this safety alert and are informed of its content and recommendations. This safety alert should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's common area, such as your notice board where appropriate.

Visit our website to:

Legal Obligations ALL Mines

General Duties of mine operator involving the control of plant

WHS Reg Clause 203 - *A person with management or control of plant at a workplace must manage risks to health and safety associated with plant, in accordance with Part 3.1.* Managing risks to health and safety

WHS Reg Clause 214
The person with management or control of powered mobile plant at a workplace **must** in accordance with Part 3.1, manage risks to health and safety associated with the following —

(a) the plant overturning,

(b) things falling on the operator of the plant,

(c) the operator being ejected from the plant,

(d) the plant colliding with any person or thing,

(e) mechanical failure of pressurised elements of plant that may release fluids that pose a risk to health and safety.

Legal Obligations Tier 1 & 2 Mines

Principal Hazard ~ Roads and Other Vehicle Operating Areas Risk Assessments

WHS (M&PS) Reg section 27

*(1) The operator of a mine or petroleum site **must identify** all principal hazards associated with mining operations or petroleum operations at the mine or petroleum site.*

*(2) The operator **must conduct**, in relation to each principal hazard identified, **a risk assessment** that involves a comprehensive and systematic investigation and analysis of all aspects of risk to health and safety associated with the principal hazard.*

(3) The operator, in conducting a risk assessment under subsection (2), must —

(a) use investigation and analysis methods appropriate to the principal hazard being considered, and

(b) consider the principal hazard individually and also cumulatively with other hazards at the mine or petroleum site.

Legal Obligations Tier 3 Mines

SMS must have procedures, plans and other control measures

WHS (M&PS) Reg Section 178(3)

The safety management system document for a mine to which this section applies is not required to set out the matters in section 19(2)(c) i.e. -

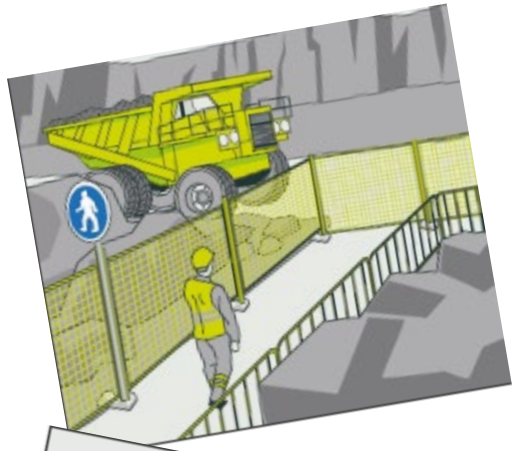
i. the principal hazard management plans for the mine or petroleum site prepared under Division 2,

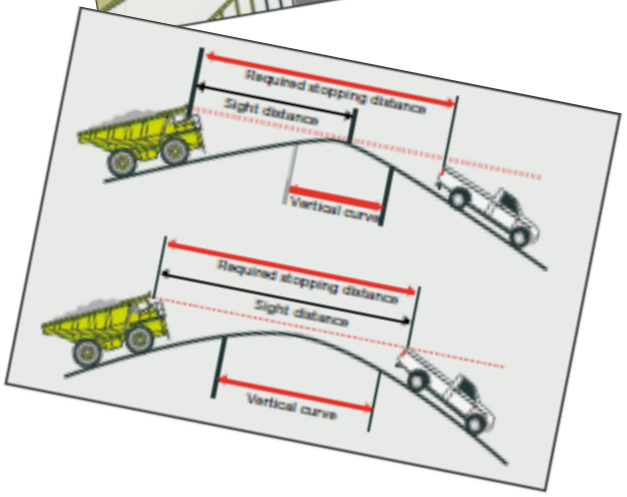
ii. the principal control plans for the mine or petroleum site,

<u>But must</u> instead set out the systems, procedures, plans and other control measures that will be used to control risks to health and safety at the mine associated with the roads or other vehicle operating areas

Control measures considerations

Considerations





a) mobile plant characteristics, including stopping distances, manoeuvrability, operating speeds, driver position, driver line of sight and remote-control mobile plant,

b) the effect on road conditions of expected environmental conditions during operating periods, including time of day, weather, temperature and visibility,

c) the impact of road design and characteristics, including grade, camber, surface, radius of curves and intersections,

d) the impact of mine design, including banks and steep drops adjacent to vehicle operating areas,

e) the volume and speed of traffic and the potential for interactions between mobile plant with different operating characteristics, including heavy and light vehicles,

f) the potential for interactions between mobile plant and pedestrians, including consideration of park up areas and driver access,

g) the potential for interaction between mobile plant and public traffic,

See any problems here?

See any problems here?

Exercise - What to consider?

Considerations

Considerations
Mobile plant interactions Between mobile plant and pedestrians, including park up areas and driver access Between mobile plant and public traffic

Form 19C: Roads or other vehicle operating areas

Principal hazard management plan	Roads or other vehicle operating areas	Review date:

Hierarchy of controls (HoC): 1. Eliminate, 2. Substitute, 3. Isolate, 4. Engineering, 5. Administrative, 6. PPE

Other hazards associated with the principal hazard:

-
-
-

Considerations	Potential hazard	L	C	Risk	Controls used to manage hazard	HoC

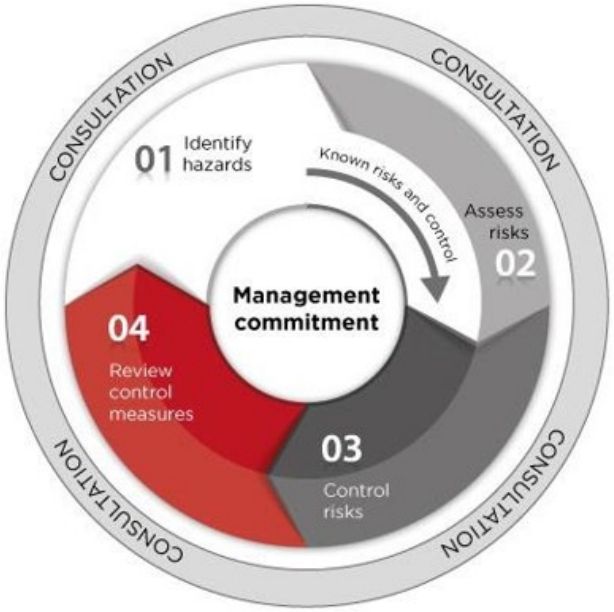
Mobile plant characteristics	• Vehicles not operating in accordance with their OEM (Original Equipment Manufacturer) design criteria
	  ○ Stopping distances
	  ○ Manoeuvrability
	  ○ Operating speeds
	  ○ Operating gradient
	  ○ Line of sight
	  ○ Matched payload
	• Vehicles not designed and maintained in accordance with industry standards
	  ○ ROPs (Roll Over Protection)
	  ○ FOPs (Fall on Protection)
	  ○ OPG (Operator Protective Guards)
	  ○ Defective tray up warning devices
	  ○ Compliant access ways
	  ○ Appropriate fire suppression systems considered
	  ○ Load bearing alterations not adequately designed and undertaken
					•	•

f) the potential for interactions between mobile plant and pedestrians, including consideration of park up areas and driver access,

g) the potential for interaction between mobile plant and public traffic,

Exercise Step 01 ~ Hazard identification

Hazard identification



Considerations	Potential hazard
Mobile plant interactions Between mobile plant and pedestrians, including park up areas and driver access Between mobile plant and public traffic	

Step 02 Rank the risks

Risk = Likelihood (probability) x consequence

Step 1 Assess the Likelihood				Step 2 Assess the Consequences		
L 1	Happens every time we operate	Almost Certain	Common or repeating occurrence	C1	Fatality	Catastrophic
L 2	Happens regularly (often)	Likely	Known to have occurred "has happened"	C2	Permanent disability	Major
L 3	Has happened (occasionally)	Possible	Could occur or "heard of it happening"	C3	Medical/hospital or lost time	Moderate
L 4	Happens irregularly (almost never)	Unlikely	Not likely to occur	C4	First aid or no lost time	Minor
L 5	Improbable (never)	Rare	Practically impossible	C5	No injury	Insignificant

Risk Rank Likelihood x Consequence	L1 Almost Certain	L2 Likely	L3 Possible	L4 Unlikely	L5 Rare
C1 Catastrophic	1	2	4	7	11
C2 Major	3	5	8	12	16
C3 Moderate	6	9	13	17	20
C4 Minor	10	14	18	21	23
C5 Insignificant	15	19	22	24	25

Exercise Step 02 ~ Assess the Risks

Risk Rank

Considerations	Potential hazard	L	C	Risk
Mobile plant interactions Between mobile plant and pedestrians, including park up areas and driver access Between mobile plant and public traffic	• Pedestrians o No designated pedestrian walk ways o No designated parking areas o No pedestrian signage o No communication systems with pedestrians • Other vehicles o No separation of light and heavy vehicles o No separation of light vehicles and quarrying activities o No vehicle identification systems (flashing light, reversing beeper/ cameras, flags) o No procedures to control approaching and parking adjacent to heavy vehicles o No defined communication systems for overtaking • Public traffic o No separation of public traffic and heavy vehicles o No signage to direct customers vehicles o No parking area for public traffic o No mechanical assessment of public vehicles (minimum standard)	L4 L4	C1 C1	7 M 7 M

Control the risk

Controlling risk

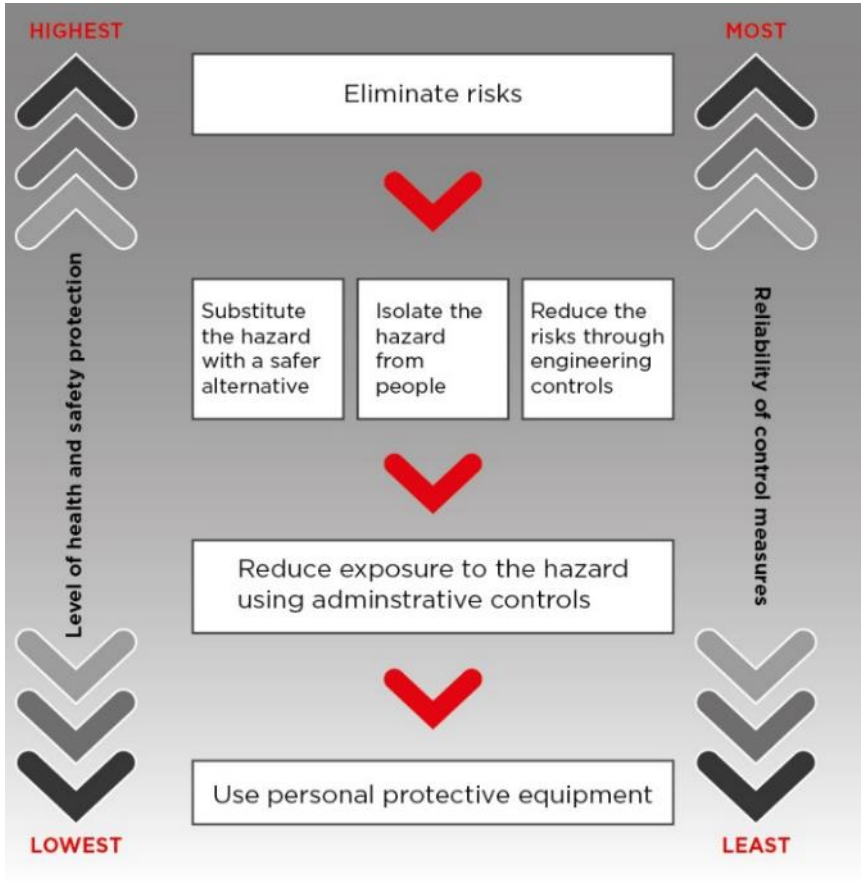
This is the most important step

We do this by

- *Eliminating the risk so far as reasonably practicable*

  Or if that is not reasonably practicable then

- *Minimise the risks so far as reasonably practicable*



Exercise Step 03 ~ Control the Risks

Risk Control

Considerations	Potential hazard	L	C	Risk	Controls used to manage hazard
Mobile plant interactions Between mobile plant and pedestrians, including park up areas and driver access Between mobile plant and public traffic	• Pedestrians o No designated pedestrian walk ways o No designated parking areas o No pedestrian signage o No communication systems with pedestrians • Other vehicles o No separation of light and heavy vehicles o No separation of light vehicles and quarrying activities o No vehicle identification systems (flashing light, reversing beeper/ cameras, flags) o No procedures to control approaching and parking adjacent to heavy vehicles o No defined communication systems for overtaking • Public traffic o No separation of public traffic and heavy vehicles o No signage to direct customers vehicles o No parking area for public traffic o No mechanical assessment of public vehicles (minimum standard)	L4 L4	C1 C1	7 M 7 M	***Build a designated pedestrian walkway between common areas using bunding rules with signage indicating pedestrian access –*** • ***office to workshop*** • ***office to light vehicle carpark*** • ***light vehicle car park to HVE go line*** ***Ensure that pedestrians wear Hi-Viz as per our PPE requirements*** ***Etc …..***

Exercise

Exercise


One Way Traffic -
Crushing Zone -
Pull Up Bay -
Light Vehicle Parking -
Heavy Vehicle Parking –
Parking –
HME Parking-
SPEED LIMIT
20
WATCH OUT FOR PEDESTRIANS

Exercise

Considerations	Potential hazard	L	C	Risk	Controls used to manage hazard	HoC

Mobile plant interactions between mobile plant and pedestrians	• **Pedestrians**
	  ○ Office
	  ○ Pit
	  ○ Fixed or mobile processing areas
	  ○ Workshop
	  ○ Go lines
	• **Light Vehicles/HME**
	  ○ Go Lines
	  ○ Breakdowns/maintenance activities
						•

Potential for interactions between mobile plant and public traffic	• **Public traffic** ○ Visitors entering and exiting the site				•	

Lets see how we went

Considerations	Potential hazard	L	C	Risk	Controls used to manage hazard	HoC
Mobile plant interactions between mobile plant and pedestrians	• **Pedestrians** ○ Office				• *Visitor Car Park with dedicated walkways (before entry to office/ mine if possible)* • *Clear prominent signage.* • *TMP with reduced speed limit around car park/office area* • *Induction required before driving on mine roads*	• *3* • *5* • *5* • *5*
	○ Pit				• *No visitor/pedestrian access to pit unless accompanied by site representative.* • *Only mine spec vehicles to enter pit area flashing light, flag, and two-way radio and reversing camera.* • *Delineated/separated in and out roads One lane roads call up system pos comms where required (TMP)* • *All workers, contractors, and visitors to be inducted to site including the TMP.* • *Create designated parking areas within the pit with appropriate bunding and signage.* • *Pos Comms when entering a work area or approaching plant.* • *Reduce or eliminate reversing where possible,* • *Sound horn before moving plant or light vehicle.*	• *1&5* • *4* • *4&6* • *5* • *4* • *5* • *1&5* • *5*

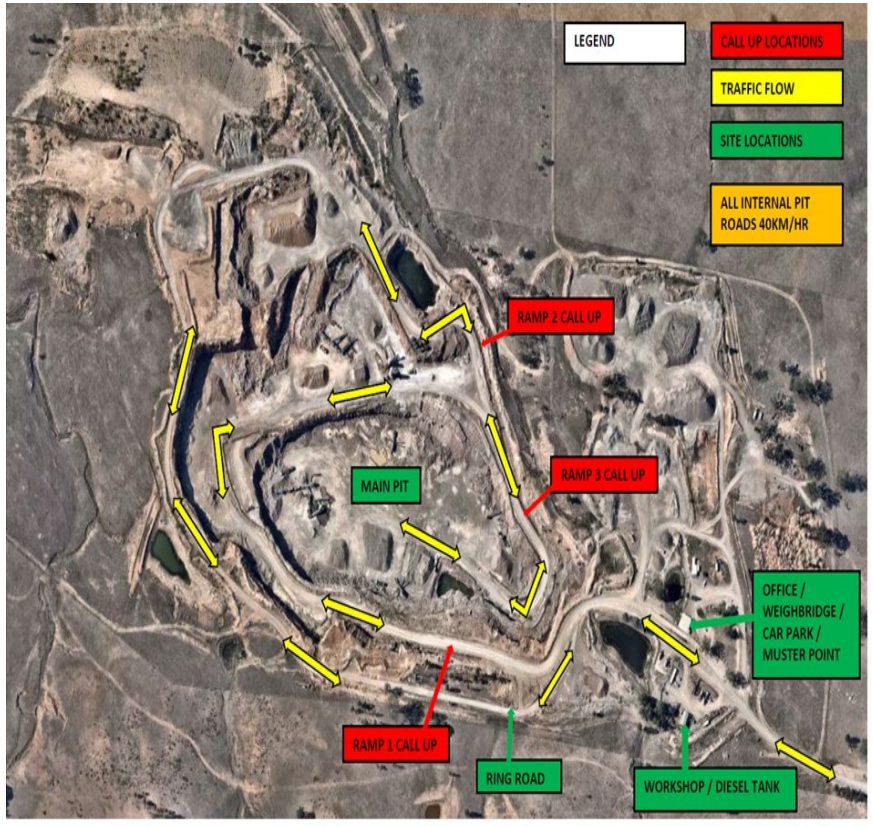
Potential for interactions between mobile plant and public traffic	○ Fixed or mobile processing areas				• *No pedestrian access to mine processing areas unless accompanied by site representative.* • *Only mine spec vehicles to enter pit area flashing light, flag, two-way radio and reversing camera.* • *All workers, contractors, and visitors to be inducted to site including the TMP.* • *Create designated parking areas at the processing areas with appropriate bunding and signage.* • *Pos Comms when entering a work area or approaching plant.* • *Sound horn before moving plant or light vehicle*	
	○ Workshop				• *Similar to processing areas* • *Use spotters when reversing HME in and out of workshop*	
	○					
	○ Go lines				• *Separate HME parking area (go line)* • *Dedicated pedestrian access from office/crib room to HME.* • *Gate and signage if crossing a road* • *Pre-Starts on HME* • *Pos Comm Check* • *Sound horn before moving off* • *Revering Camera fitted and working*	

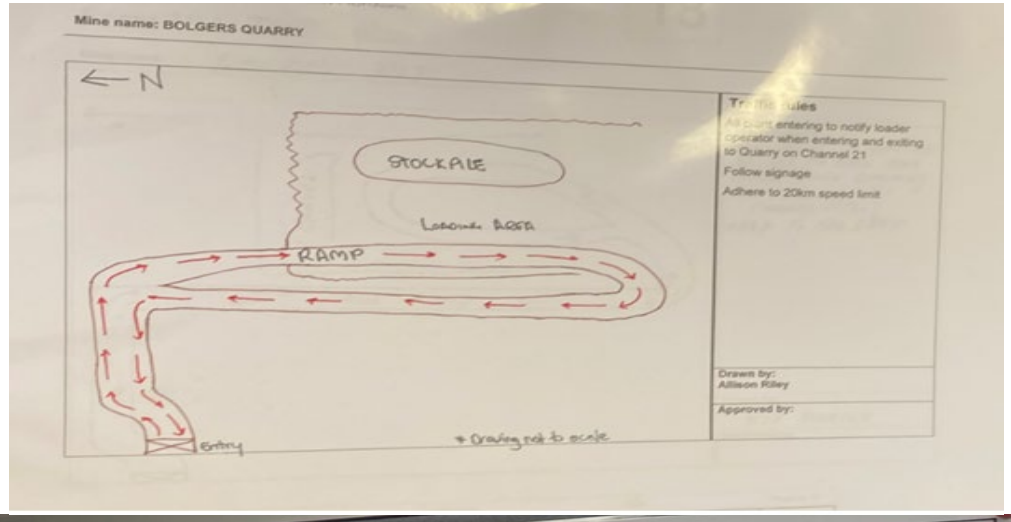
Did we think about these controls?

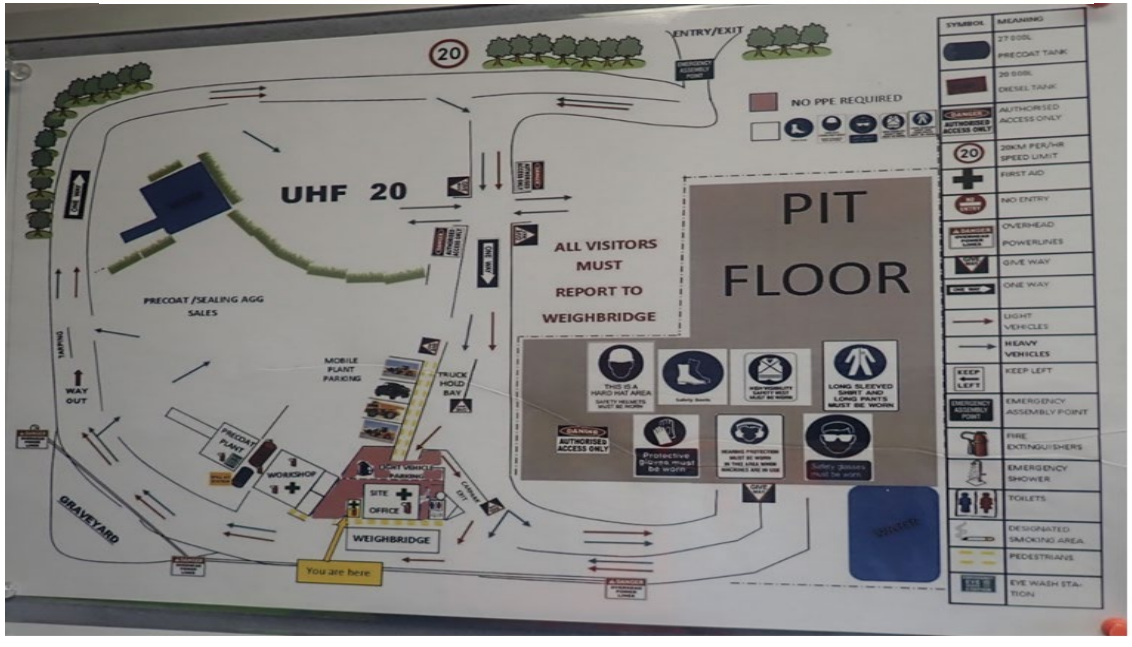
Risk Control

TYPE OF CONTROL	EXAMPLES OF CONTROLS
Eliminate need to reverse	> Implement one-way systems around site and in loading and unloading areas > Provide designated turning areas
Engineering controls	> Fit collision avoidance equipment that warns the operator of the presence of a pedestrian, object or another vehicle and stops the vehicle from operating when an object is within the collision zone
Reduce reversing operations	> Reduce the number of vehicle movements as far as possible > Instruct drivers not to reverse unless absolutely necessary
Adequate visibility and proximity devices for drivers	> Fit reversing cameras, radar, convex mirrors and so on to overcome restrictions to visibility from the driver's seat, particularly at the sides and rear of vehicles > Fit proximity devices to warn the driver of possible collision with an object or person
Make sure safe systems of work are followed	> Design vehicle reversing areas which: – allow adequate space for vehicles to manoeuvre safely – exclude pedestrians – are clearly signed – have suitable physical stops to warn drivers they have reached the limit of the safe reversing area – make sure everyone on site understands the vehicle rules > Fit all vehicles on site with appropriate warning devices such as: – reversing alarms – having controlled (or supervised) reversing systems such as the excavator – operator controlling the truck coming in to be loaded – using spotters – checking that procedures work in practice and are actually being followed

Traffic Management Plans

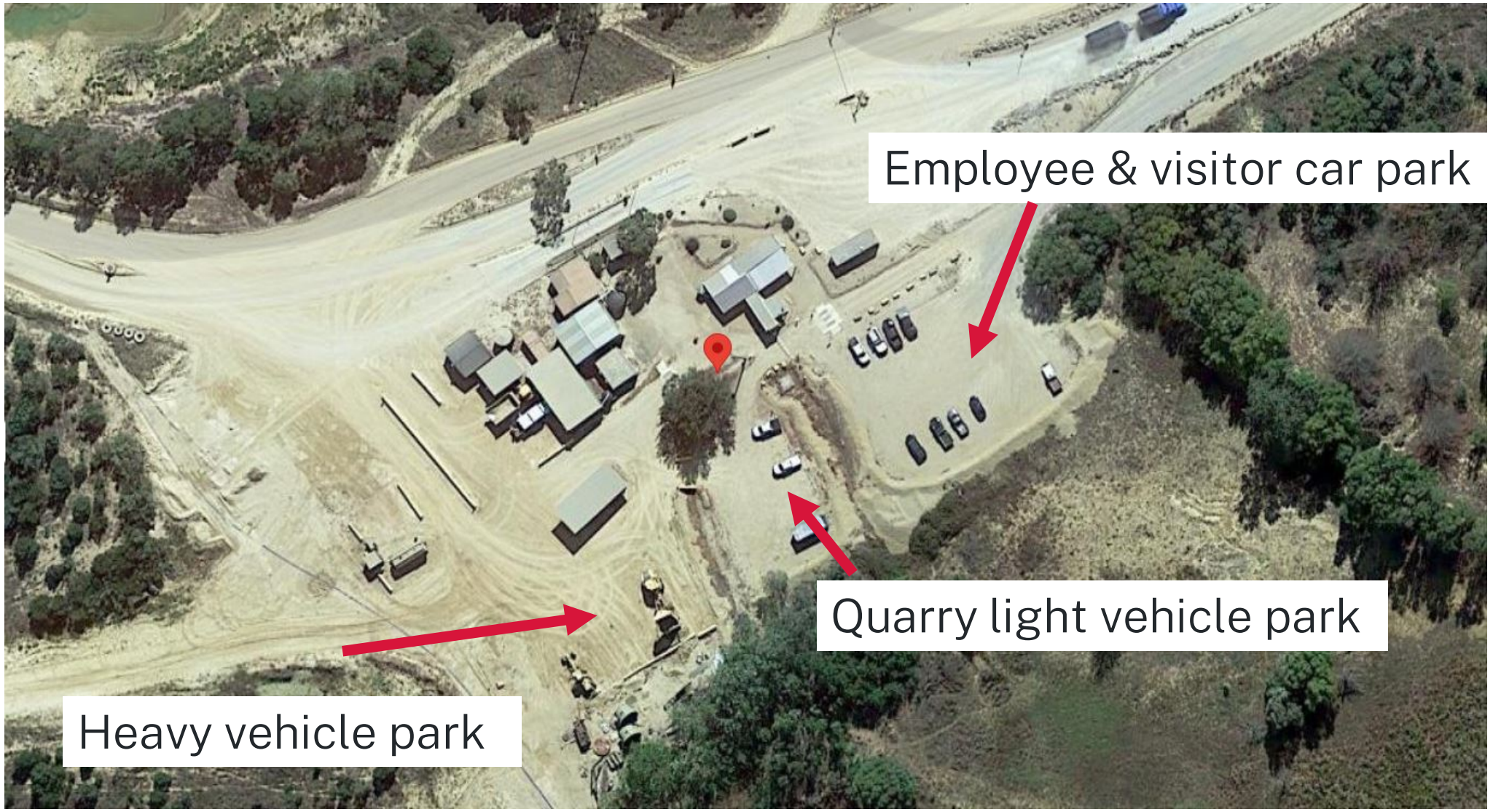






Light Vehicle Parking

Segregating vehicle parking



Pedestrian Management

More examples...

Go lines

Road delineation

Temporary vehicle parking

Flashing lights and flags

11.9.5 VISIBILITY OF LIGHT VEHICLES

Light vehicles are at risk of being crushed by heavy vehicles. They should be kept away from areas where heavy vehicles operate. Where this is not practicable they should be fitted with rotating or flashing beacons, high visibility buggy whips or flagged aerials, high visibility and reflective markings and other appropriate measures.

Two way communication

HME exclusion zones

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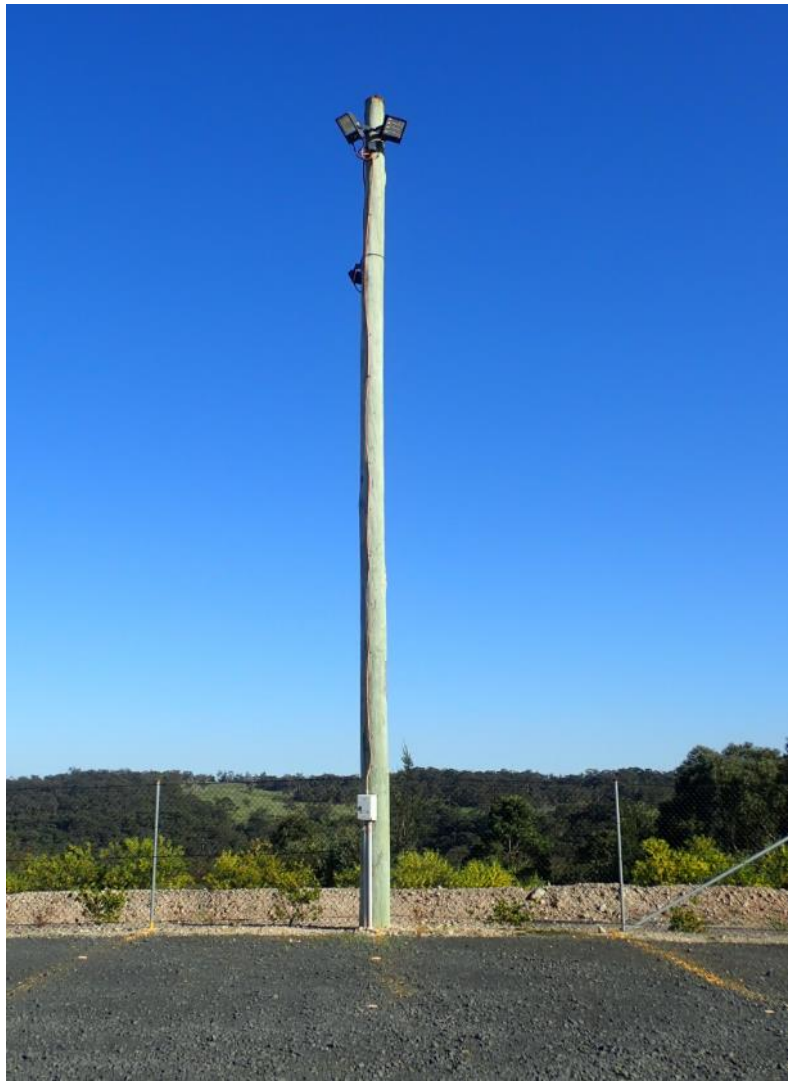
Lighting & visibility



Reversing devices

Proximity systems

NSW Resources Regulator
Department of Regional NSW

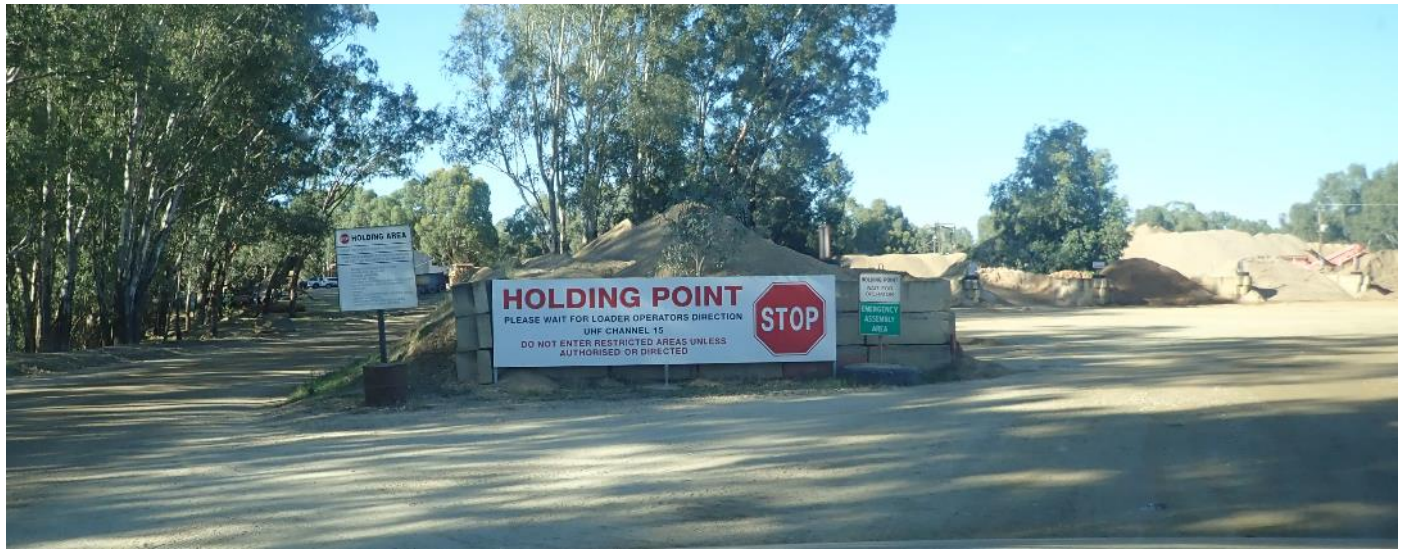
Safe reversing and spotting practices

Signage

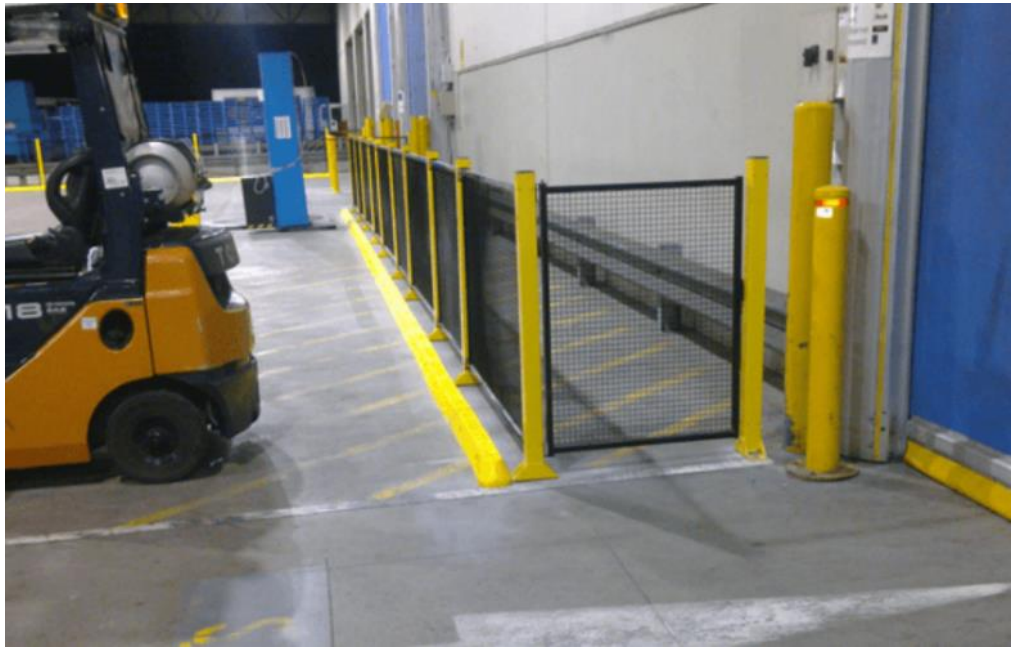

GIVE WAY
TO ALL
QUARRY
VEHICLES


ALL VISITORS MUST
REPORT TO
SITE OFFICE
20


VISITOR PARKING
DELIVERIES
LOADING AREA
WEIGHBRIDGE

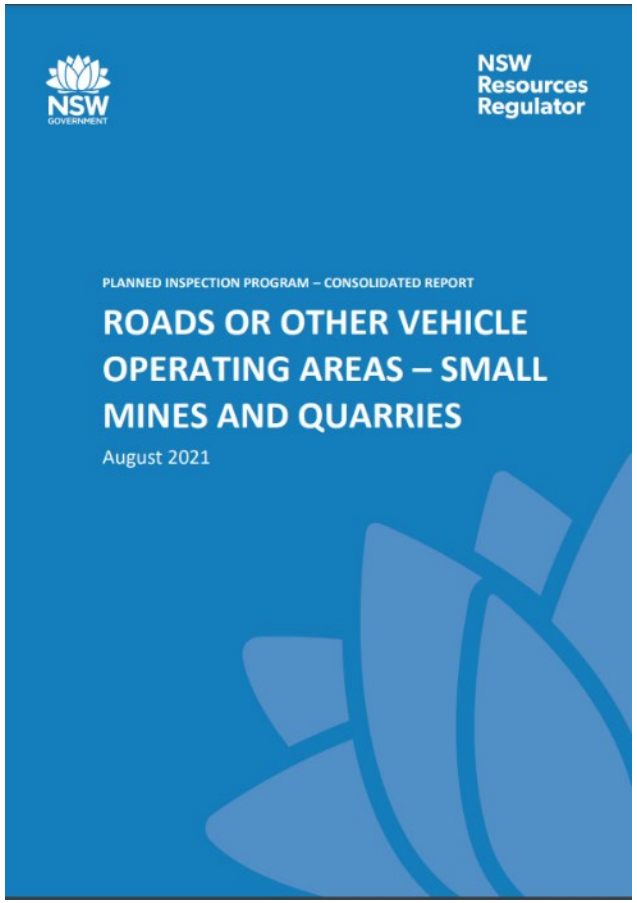

HOLDING AREA
HOLDING POINT
PLEASE WAIT FOR LOADER OPERATORS DIRECTION
UHF CHANNEL 15
DO NOT ENTER RESTRICTED AREAS UNLESS
AUTHORISED OR DIRECTED
STOP

Forklifts and pedestrians



Issues

Consolidated Report



- Some sites did not have any type of ROVOA PHMP and relied on controls listed in other safety documents e.g. Safe Work Method Statements, Safe Work Procedures and induction safety rules.
- Underpinning risk assessments lacked site specific content and were often shared between locations without consideration for specific site conditions and hazards.
- The inclusion of ‘road and other road related standards’ in the ROVOA PHMP was often poorly implemented and not well understood by workers.
- The inclusion of ‘intersection’ design standards in ROVOA PHMP documents was often missed and was rarely evaluated in the underpinning risk assessment.
- The acknowledgement and use of accepted industry road standards was often overlooked.
- Many examples were identified where site ROVOA standards did not meet the requirements of the mine operator’s documents.
- Opportunities for minimising and/or segregating vehicle interaction were not adequately assessed or implemented, particularly with respect to pedestrian segregation.

Any questions ?