	ASSMENCE.	N	OEM TMM type specification Visibility risk Vis															VerreSauver						
Ite	n TMM Type	OEM	TMM type specification	Visibility risk	Visibility risk travel	Visibility aid (camera)	Articulation / Swing	Beacon	Attachment lift	Areas of operation	Previous incidents					V-V auto retard	V-V auto stop			Antenna placement cover for machine movement	Antenna placement Risk	Beacon		Specific controls
:	Dump truck	Epiroc / Caterpillar (Diesel)	All	High	High	Medium	Extreme	High	High	High	High	Extreme	Yes	Yes	Yes	Yes	No	Yes	Yes	1) Must cover articulation and reverse	Damage when placed at rear of vehicle	when parked in high	11 Workshop 21 Parking area 31 Hauf cods 41 Mining cycle 51 Tips 61 Tye bay 71 Refuelling 81 Main decline when moving between shafts	1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and CoO date and time stamp are accurate 5) Enclusion some inside operator cablo 5) Enclusion some inside operator cablo 6) Enclusion some inside operator cablo 6) Enclusion some inside operator cablo 6) Enclusion some inside operator cablo 7) Beacon to limit speed on decline (may be an inclinometer) and in workshops 7) Beacon to limit speed on decline (may be an inclinometer) and in workshops 7) Beacon to limit speed on decline (may be an inclinometer) and in workshops 7) Beacon to limit speed on decline (may be an inclinometer) and in manuals specifically define risks with equipment use 1) OFM manuals specifically define risks with equipment use 1) Poor visibility of what or who could be in the vicinity of the machine 1) Interaction with pedestrains 4) High speed of machine and large machine size 5) Yolkbillity when driving forward or reverse 6) Pedestrain crushed in articulation
:	Dump truck	Epiroc (BEV)	MT42	High	High	Medium	Extreme	High	High	High	High	Extreme	Yes	Yes	Yes	Yes	No	Yes	Yes	1) Must cover articulation and reverse	Damage when placed at rear of vehicle		1) Workshop 2) Parking area 3) Hauf roads 4) Mining cycle 5) Tips 5) Tips 5) Tips 7) Refuelling 8) Mini decline when moving between shafts	1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and Cut date and time stamp are accurate 5) Exclusion zone inside operator calino 6) Articulation and attachment? Jook lock when in safe park or podestrain enters adapter zone 7) Beacon to limit speed on decline (may be inclinometer) and in workshops 7) Beacon to limit speed on decline (may be inclinometer) and 7) Dear mortalist speed super zone 7) Dear mortalist speed super zone 7) Dear mortalist speed super zone 8) Dear mortalist speed super zone 8) John mortalist speed zone 8) Jo
:	LHD	Epiroc (Diesel)	All	Extreme	Extreme	Extreme	Extreme	High	High	High	Extreme	Extreme	Yes	Yes	Yes	Yes	No	Yes	Yes	1) Must cover articulation and reverse	Damage through rocks falling on CPS	Must act a beacon when parked in high risk area	All areas other than inside stopes (panels).	1) Basieline controls 2) Dynamic zoning 3) Act a beazon when in a safe park state in a high risk area 4) finsure machine and CSD date and time stamp are accurate 5) Exclusion zone inside operator cabin 6) Articulation and attachment / Dox lock when in safe park or pedestrian enters danger zone 7) Beazon to limit speed on decline(may be an inclinometer) and in workshops Reasons for 19 decision: 1) OEM manuals specifically define risks with equipment use 2) Poor visibility of what or who could be in the vicinity of the 3) Interaction with pedestrians 4) High speed of machine and large machine size 5) Visibility when driving forward or reverse 6) Pedestrian crushed in articulation
	LHD	Epiroc (BEV)	ST 14	Extreme	Extreme	Extreme	Extreme	High	High	High	Extreme	Extreme	Yes	Yes	Yes	Yes	No	Yes	Yes	1) Must cover articulation and reverse	Damage through rocks falling on CPS	Must act a beacon when parked in high risk area	All areas other than inside stopes (panels).	13 Baseline controls 21 Dynamic zoning 23 Dynamic zoning 31 Act a beacon when in a safe park state in a high risk area 4) Ensure machine and Cu0 date and time stamp are accurate 5) Exclusion zone inside operator cash 6) Articulation and attachment? box lock when in safe park or pedestrain enters danger zone 7) Beacon to limit speed on decline (may be an inclinometer) and in workshops Reasons for 19 decision: 3) Poor visibility of what or who could be in the vicinity of the 31 Poor visibility of what or who could be in the vicinity of the 31 Interaction whip bedestrains 41 High speed of machine and large machine size 5) Visibility when driving florward or reverse 6) Pedestrain crushed in articulation 7 BetV accelerates and articulates quicker than diesel machines- articulation lock is essential (see risk diagram)

	ASSMING.	N	ote: this is T	MM ha	zard re	ating a	nd not	risk r	ating		,	MM risk bas	sed approac	CAS Projec h - hazard ra		rground TI	MMs							VerreSauver
Ite	m TMM Type	ОЕМ	TMM type specification	Visibility risk	Visibility risk travel	Visibility aid (camera)	Articulation / Swing	Beacon	Attachment lift	Areas of operation	Previous incidents	TMM Type Hazard rating	V-V interaction (Y/N)	V-P interaction (Y/N)	V-E interaction (Y/N)	V-V auto retard	V-V auto stop	V-P auto retard and stop	V-E auto retard and stop	Antenna placement cover for machine movement	Antenna placement Risk	Beacon	Areas of operation expanded-Route going between sites	Specific controls
	Drills	Epiroc	All	Medium	Medium	Low	Medium	High	High	High	Extreme	High	Yes	Yes	Yes	Yes	No	Yes	No	Must cover articulation and reverse Must cover Tool extremities	Extremity cover (particularly when navigating around comers). Limitation of operator to move into tool working area	Must act a beacon when parked in high risk area or when operating.	All areas.	1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and CuD date and time stamp are accurate 5) Exclusion zone sinside operator called the safe park state in a high risk area 4) Ensure machine and CuD date and time stamp are accurate 5) Exclusion zone sinside operator called the safe in workshops 6) Beacon to warn of speed limit on decline and in workshops 6) Exclusion to warn of speed limit on decline and in workshops 1) OMM meanuss specifically define risks with equipment use 2) Good visibility of what or who could be in the vicinity of the machine. 3) Note: Should drill not be fitted with pedestrian detection devices that prevent the pedestrian being entangled in drill rotation or movement - stop machine hydraulics automatically should pedestrian walk into "danger one" while drilling: Administration should pedestrian walk into "danger one" while drilling: Administration should pedestrian walk into "danger one" while drilling: Administration should prove the state of the provention of the state of th
	Roof boiter	Epiroc	Bottec	Medium	Medium	Low	Medium	High	High	High	High	High	Yes	Yes	Yes	Yes	No	Yes	No	1) Must cover articulation and reverse 2) Must cover Tool extremities	Extremity cover (particularly when navigating around comens). Operation of operation to move electronic operation of the operation of	Must act a beacon when parked in high risk area or when operating.	All areas .	11 Baseline controls 21 Dynamic zoning 31 Act a beacon when in a safe park state in a high risk area 41 Ensure machine and CuD date and time stamp are accurate 51 Exclusion zone insisted persent or called in the control of the con
	LDV	Toyota	Toyota Land cruiser Single cab	Low	Low	Low	Low	High	Low	High	High	Medium	Yes	Yes	Yes	No	No	No	No	1) Must have effective exclusion zone inside vehicle	None	Must act a beacon when parked in high risk area or when operating.		1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and CuD date and time stamp are accurate 5) Educians note inside operator calcine and in workshops Bassons for effective warning only decision. 1) OTM manuals soperationally denies with equipment use 2) Good visibility of what or who could be in the vicinity of the machine. 3) Interaction with pedestrians is at a low speed of 3.4km/hr and research show limited impact at such low speed (need to check after sales fitment - bull bar etc.) - must be risk assessed.

	ASSMENICA LANGUAGE BACK BOX MAD DIFFERENCE	THIM TISK DESCU APPLICENT FIREZED FORMS OF THE PROPERTY OF THE															VerreSauver							
It	TMM Type	ОЕМ	TMM type specification	Visibility risk	Visibility risk travel	Visibility aid (camera)	Articulation / Swing	Beacon	Attachment lift	Areas of operation	Previous incidents	TMM Type Hazard rating	V-V interaction (Y/N)	V-P interaction (Y/N)	V-E interaction (Y/N)	V-V auto retard	V-V auto stop		V-E auto retard and stop	Antenna placement cover for machine movement	Antenna placement Risk	Beacon	Areas of operation expanded-Route going between sites	Specific controls
	3 Scaler	Aard	Rock Scaler 220E Gen 1	Extreme	Extreme	Extreme	Extreme	Medium	High	Extreme	Extreme	Extreme	Yes	Yes	No	Yes	No	Yes	No	1) Must cover tool extremities 2) Must cover tool head changes 3) Must cover turning on own aus 4) Must have an effective exclusion zone inside vehicle	1) Flasher to be positioned in pedestrian and operator line of site 2) Prox mod to be positioned away from heat of exhaust outlet	risk area or when operating.	Mainly in mining cycle activities	1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and C.O date and time stamp are accurate 5) Exclusion zone inside operator cabin 6) Turning on axis must be specifically catered for in CAS control 7) Beacon to limit speed on decline (may be inclinometer for decline) and in workshops 10 EMM manuals specifically define risks with equipment use 2) Poor visibility of what or who could be in the visicinity of the machine control of the property of the property of the control o
	9 Scaler	peli .	Rock Scaler 220E Gen 2	Extreme	Extreme	Extreme	Extreme	Medium	High	Extreme	Extreme	Extreme	Yes	Yes	No	Yes	No	Yes	No	1) Must cover tool extremities 2) Must cover tool head chaped 3) Must cover turning on one asis 4) Must have an effective exclusion zone inside vehicle	1) Flasher to be positioned in pedestrian and operator line of site 2) Prox mod to be positioned away from heat of exhaust outlet	risk area or when operating.	Mainly in mining cycle activities	1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and CAD date and time stamp are accurate 5) Exclusion zone inside operator cabin 6) Turning on ask smut be specifically catered for in CAS control 7) Beacon to limit speed on decline (may be inclinometer for decline) and in workshops Reasons for 19 decision: 1) IOAM manuals specifically define risks with equipment use 2) Poor visibility of what or who could be in the vicinity of the machine 3) Interaction with pedestrians 4) High rotational speed of machine and poor visibility 5) Visibility when firm flowward or reverse 6) Pedestrian ending flowward or reverse 6) Pedestrian end in quick rotation of machine 7) Lock of machine during tool changes.
	0 Grader	CAT	120 G	Medium	Medium	High	Low	Medium	High	Extreme	Medium	High	Yes	Yes	No	Yes	No	Yes	No	1) Must cover both forward and reverse extremities 2) Note: Grader can travel in forward and reverse at same 1990 the consult and reverse at same 1990 the consult and reverse at same 1990 the consultation zone. 4) Must act as beacon when parked in high first kares (such as mining cycle or haul roads)	(to include speeds)	Must act a beacon when parked in high risk area or when operating.	Mainly in areas when haul roads must be maintained	11 Baseline controls 21 Dynamic zoning 31 Act a beazon when in a safe park state in a high risk area 41 frauter machine and CID date and time stamp are accurate 51 Exclusion zone inside operator cabin 61 Turning radius of 7m must catered for in CAS control 71 Beazon to limit speed on decline (may be inclinomater for decline) and in softshops 31 CHD and the decline fram the decline of the control of the contr

	ASS,WING.	CAS Project TMM risk based approach - hazard rating for underground TMMs TORM TMM two specification Visibility risk Visibility risk Visibility risk Visibility and Articulation / Beacon attachment lift Areas of Previous Table Type (V-V-V-V-V-V-V-V-V-V-V-V-V-V-V-V-V-V-V-															VerreSauver							
Iten	ТММ Туре	OEM	TMM type specification	Visibility risk	Visibility risk travel	Visibility aid (camera)	Articulation / Swing	Beacon	Attachment lift	Areas of operation	Previous incidents	TMM Type Hazard rating	V-V interaction (Y/N)	V-P interaction (Y/N)	V-E interaction (Y/N)	V-V auto retard	V-V auto stop	V-P auto retard and stop		Antenna placement cover for machine movement	Antenna placement Risk	Beacon	Areas of operation expanded-Route going between sites	Specific controls
11	Dozer (Underground)	Epiroc	1) Epiroc ST1030 wheel dozer	Extreme	Extreme	Extreme	Extreme	High	High	High	Extreme	Extreme	Yes	Yes	Yes	Yes	No	Yes	Yes	1) Must cover articulation and reverse 2) Must cover Tool extremitties 3) Must have an effective exclusion zone	Damage through rocks falling on CPS	Must act a beacon when parked in high risk area	All areas other than inside stopes (panels).	1) Baseline controls 2) Dynamic zoning 3) Act a beacon when in a safe park state in a high risk area 4) Ensure machine and CxO date and time stamp are accurate 5) Exclusion zone inside operator cabin 6) Articulation and attachment / box lock when in safe park or pedestrian enters danger zone 7) Beacon to limit paged on decline (many be inclinometer for decline) and in workshops 30 JOH annuals aspect leady define risks with equipment use 2) Poor visibility of what or who could be in the vicinity of the machine 3) Interaction with pedestrians 4) High speed of machine and large machine size 5) Visibility when driving forward or reverse 6) Pedestrian crushed in articulation
12	Dozer (SOT)	Sell (CAT?)	1) Bell (CAT?) DBR	Medium	Medium	High	Medium	Medium	High	Medium	Low	High	Yes	Yes	Yes	Yes	Yes	No	Yes	1) Must cover both forward and reverse extremities 2) Note: Dozer can travel in forward and reverse at same speed. 3) Must have an effective exclusion zone. 4) Must at at a beacon when parked in high risk areas (such as mining cycle or hauf roads)	Must cover when blade is raised	Must act a beacon when parked in high risk area	Mainly on dumps	1) Baseline controls 2) Dynamic zoning (not critical) 3) Act a beacon when in a safe park state in a high risk area (smaller wehicles running time to bezel) 4) Exclusion zone inside operator calbin if PADs are used 5) Exclusion zone inside operator calbin if PADs are used 6) Exclusion zone inside operator calbin if PADs are used 6) Exclusion zone inside operator calbin if PADs are used 6) Exclusion zone inside operator calbin if PADs are used 6) Reasons for 19 decision: 7) Reasons for 19 decision: 70 Assert and the part of 19 decision: 70 Assert and 19 decision: 70 JOEAN INFORMITY STATE ASSERT ASS
13	uv	Aard, SECO, Fermel, Toyota, Bird	1) Aard UV 80 lube 2) Aard UV 80 emulsion 3) Fermel Carr/MKIII RORO 3) Fermel Carr/MKIII RORO 4) Fermel flatbes 6) Fermel Kizbes 6) Fermel Kizbes 10) Fermel May K/Cab 12mpot 10) Fermel May K/Cab 12mpot 11) Fermel May K/Cab 13mpot 11) Fermel May K/Cab 13mpot 13i Fermel Jaccer dumper 12) Fermel single cab man lift 13) Fermel S/Cab Stad load Bin 131 Fermel JCab Stad Ioad Bin 140 Aard UV 120 water 150 Aard UV 20 water 150 Aard UV 80 scissor lift 17) Fermel UV 80 Liberator	High	Extreme	High	High	High	High	Extreme	Medium	Extreme	Yes	Yes	Yes	Yes	No	Yes	No	1) Note: due to the varied operations of the different UV types, antenna placement must make allowance for 1.1.1 Scissor lift operation, 2.1.2 Water and fuel bowser operation, 2.1.3 Camusion and lube operation, 3.1.3 Limusion and lube operation, 3.1.3 Limusion and lube operation, 3.1.3 Limusion and lube operation, 3.2.3 Limusion and search operation of each markel allowance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for the extreme reaches and operation of each markel lubewance for each property of the extreme for eac	and cable protection must be	1) Acting as a beacon is critical for most of these machines. Example: excess of it, luke section of the control of the contro	throughout all areas of the underground operations as well as regularly ascending and	13 Baseline controls 23 Dynamic scroing 23 Act a beacon when in a safe park state in a high risk area 43 Ensire machine and C.s.O date and time stamp are accurate 55 Ecclusion sone inside operator calls 60 Articulation and attachment? box lock when in safe park or 60 pedestrian enters anger zone 77 Beacon to limit speed on decline (may be inclinometer for 60 decline) and in workshops 60 Reasons for 15 decision: 20 Dott manuals specifically define risks with equipment use 20 Poor visibility of what or who could be in the visinity of the machine 31 Interaction with pedestrians 31 Interaction with pedestrians 31 Visibility of when of which is a decision of the second or everse 53 Yisolity when driving forecard or everse 64 Pedestrian crushed in articulation

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Item TN	1М Туре	OEM	TMM type specification	Visibility risk	Visibility risk travel	Visibility aid (camera)	Articulation / Swing	Beacon	Attachment lift	Areas of operation	Previous incidents	TMM Type Hazard rating	V-V interaction (Y/N)	V-P interaction (Y/N)	V-E interaction (Y/N)	V-V auto retard	V-V auto stop	V-P auto retard and stop	V-E auto retard and stop	d Antenna placement cover for machine movement	Antenna placement Risk	Beacon	Areas of operation expanded-Route going between sites	Specific controls
14 forklit	andlers, its, cranes, andler	Manitou	MV1675T, Crane MHT-X 780 T Evolution, 8T MHT 780 Telescopic Handler,	High	Nigh	Medium	Medium	High	High	Extreme	Medium	High	Yes	Yes	Yes	Yes	No	Yes	Yes	1) Must cover extreme of boom extension. 2) Antenna placement must make allowance for the extreme make allowance for the extreme make allowance for the extreme make allowance of extension of each machine type of these operations antenna and cable protection must be considered. 3) Que to the nature of many of these operations antenna and cable protection must be considered. 4) Underground to surface fleet CPS must be enabled on some of the Manticus. 5 to extreme the Manticus of the Manticus	Must cater for boom extension	Must act as a beacon when parked or working it high risk area	Operates mainly in workshop areas (tyre handling forkitt operations, manifit etc)	1) Baseline controls 2) Dynamic zoning 3) Dynamic zoning 3) Act a Sector when in a safe park state in a high risk area 3) Act a Sector when in a safe park state in a high risk area 3) Act a Sector was and CAD data and time stamp are accurate 5) Exclusion zone inside operator cabin 6) Beacon to burn of speed limit not decline and in workshops 7) Speed to be limited to 14 km/hr (max speed when tramming) 8) Tramming to be done with boom done vilsability is impaired with boom raised) 8) Tramming to be done with boom done vilsability is impaired with Boom raised 1) Godn wisability of what or what could be in the vicinity of the 1) Godn wisability of what or who could be in the vicinity of the 3) Stopping machine with load could cause load to drop onto pedestrians (extreme risk)
15 Skid s loade	teer r	Bobcat	S650, \$770, TRS0.210	Low	Medium	Medium	Low	High	Medium	High	Medium	High	Yes	Yes	No	No	No	No	No	1) Must cover both forward and reverse extremities 2) Note: skid steer can travel in forward and reverse est same speed. The skid steer can travel and speed to the skid steer can be skid steer can show the skid skid skid skid skid skid skid skid	1) Little risk 2) Must cover extremes of extension (note: TRL 50.210 can rotate and has large boom extension)	Must act as a beacon when parked or working it high risk area 2) Must act as beacon when outriggers and liftin equipment.	1) Operates mainly in clean up limited space areas 2) Not sure about TRL 50.210	1) Baseline controls 2) Dynamic zoning 3) Dynamic zoning 3) Expression in safe park state in a high risk area 3) Expression in safe park state in a high risk area 3) Exclusion zone inside operator cash 5) Exclusion zone inside operator cash 6) Beacon to warn of speed limit on decline and in workshops 7) Speed to be limited to 14 km/h 8) Tramming to be done with boom down (visibility is impaired with boom raised) 7) Reasons for effective warning only decision: 1) OMF manuals specifically define risk with equipment use 2) Good visibility of what or who could be in the vicinity of the machine.
16											-							<u> </u>						
16 17 18						TMI	М					Pedesti	rian inte	raction	Veh	icle inte	eractio	n _						
19						Drill	ls						Level 9			Level	7							
20 21 22						-												_						
22						Roo	fbolters						Level 9			Level	/							
23						LHD)'s						Level 9		Le	evel 9 (C	rawl)	_						
24 25 26						Dun	nptrucks						Level 9		14	evel 9 (C	'roud'							
26						Dui	iiptiucks						Level 9											
27 28 29						Scal	ler						Level 9		Le	evel 9 (C	rawl)	_						
29						Gra	dor						Level 9		14	evel 9 (C	'raud'							
30 31						_																		
32						Doz	ers						Level 9		Le	evel 9 (C	rawl)	_						
33						Bob	ent.						Level 9			evel 9 (C								
34 35																			1				1	
36						Mar	nitou						Level 9		Le	evel 9 (C	Crawl)							
37						100	٧.																	
38				-		LDC	JS						Level 9			Level	/		+				1	
39 40						UV's	s						Level 9		16	evel 9 (C	rawl)	_	1					
41	Drate land strikes 100/										-													
41 42 43					Prot	Proto land cruiser- LDV						Level 7			Level	7								
43				-		E	orgona	obieles	- Ambuda	neo land e	ruicor		none			200			-					
45				1		Eme	ergency v	enicies	– Ambulai	ice iand c	ruiser		none			none			1	1				
46																								