

Embankment Stabilisation And Shotcreting

Issue date: 20/07/09
Review date: 19/07/12

SWMS number: SMS-06-SW-0974	SWMS Name: Embankment Stabilisation And Shotcreting	SWMS Team: Civil Construction Review Team	
Custodian (Position): Services Manager Civil	Assumptions: Site specific risks are addressed and assessed in pre- work briefing	Content reviewed by Technical expert (SME) and RailCorp safety professional (position including Div/Group) GM Civil Services and SEQ Coordinator Asset Management, Commercial Renewals.	
Approving Authority (Position): Safety and Quality Manager, Commercial / Renewals	Equipment/Plant/Tools: <ul style="list-style-type: none"> Crane, Lifting Equipment, Excavator, Backhoe, Bobcat, Drilling Rig, Elevated Work Platform, Concrete Pump, Concrete Truck, Trolley Electrical Power Tools, Pipe Glue, Sealants, Concrete, Grout Bags, Construction Equipment, Drainage Equipment Barricades, Demarcation Fencing, Separation Fencing, Signs, Markers Straps, Ties, Plywood, Safety Tape, Steel Plates, Shoring, Benching No-Spill Fuel Cans, Spill Response Kit Silt Fencing, Hay Bales, Bungs, Sediment Cloth Fire Extinguisher 	Records/Reporting: <ul style="list-style-type: none"> Worksite Protection Plan Pre-work Brief Electrical Test Tags Site Specific Management Plan Daily Plant Checklist Services searches Environmental Protection Plan Electrical Permits Hazardous Substance Register MSDS Pollution Control Approval 	Permits/licences required: <ul style="list-style-type: none"> Electrical Permit Holder Dogman Certificate Crane / Excavator / Backhoe / Bobcat / Drilling Rig / Elevated Work Platform / Concrete Pump Operators Certificate
Applicable Standards, Codes of Practice and guidance: <ul style="list-style-type: none"> OH&S Act 2000 OH&S Regulation 2001 Rail Safety Regulation 2003 RailCorp Network Rules & Procedures RailCorp Safety Management System. MSDS for all chemicals and hazardous Substances used on site Working near Overhead Power Lines EC14 – Guide to Electrical Workers Safety Equipment AS 2550.5-2002 Cranes, hoists and winches - Safe use - Mobile cranes AS 2550.10 -2006 Cranes, hoists and winches -safe use- Elevating work Platforms AS 2958.0 2000 Earth Moving Machinery WorkCover NSW Plant Guide WorkCover Code of Practice Excavation 2000 	Inspection requirements Nil	Service schedule: Nil	Personal Protective Equipment required: <ul style="list-style-type: none"> Safety Boots High Visibility Vests Hardhats Protective Clothing Safety Glasses / Goggles / Face Shield And as specified below. <ul style="list-style-type: none"> Fall Arrest Devices Gloves During all Site Works a FIRST AIDER MUST be Present
		MIMS or METRE Ref: Nil	Training/Qualification required: <ul style="list-style-type: none"> Construction Industry Induction RISI (Rail Industry Safety Induction)

Number	Step	Hazard or human error (Safety/Environmental hazards identified, including physical environment, human errors, plant and equipment)	Risk ranking before controls	Control (to be Implemented to eliminate or reduce the risk to the lowest practicable level)	Risk ranking after controls	Responsibility	Job step to be completed In accordance with (name associated documentation)
1	Delivery Of Materials	Contact with O/H wires	A	Maintain regulated clearances on wires at all times. Isolate power when in side Safe approach distance (SAD).	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits
		Manual handling injuries	B-	Correct manual handling procedures. "back-safe" training. Plant to move heavy and/or bulky items. As per Risk assessment.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0001 Guide to Manual Handling
		Personnel Struck By Plant & Equipment	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leaders Work Group Leaders.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
		Struck By Load	B+	Implement exclusion zones (6M). Keep clear of suspended loads, Reversing beepers. Ticketed operators, Competent operators.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
		Failure Of Lifting Equipment From Overloading	B+	Competent operators to assess loads carefully prior to lifting. Equipment to be properly maintained and tagged and tested.	C+	Workcover Ticketed Operator And Dogman SMS-11-GD-0243 Plant and Equipment Certificates of Competency	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-16-FM-0089 Lifting Equipment Inspection
		Plant roll-over	B+	Ensure that outriggers or stabilisers in position prior to lifting.	C-	Ticketed Operator, Competent operators.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
2	Track Access	Plant or trucks hit by train	B+	Operators to be made aware of extent of safe-working area. Pilots used when necessary.	C+	Wha02, Wpo04	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-11-GD-0243 Plant and Equipment Certificates of Competency

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3	Excavation Of Embankment	Contact with O/H wires	A	Maintain regulated clearances on wires at all times. Isolate power when in side Safe approach distance (SAD).	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request
		Contact With Services	B+	Carry out services search before work, locate and mark services prior to starting work. Use qualified plant operators, hand dig close to services, Pot hole to locate services if required	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request
		Personnel Struck By Plant & Equipment	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leaders Work Group Leaders.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
		Oil/fuel spillage	C-	Plant to be inspected daily. Use correct methods for filling plant. Spill response kits on-site.	D	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing Environmental Management Plan
3	Excavation Of Embankment	Personnel Struck By Plant & Equipment	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leaders Work Group Leaders.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
		Contact With Services	B+	Carry out services search before work, locate and mark services prior to starting work. Use qualified plant operators, hand dig close to services, Pot hole to locate services if required	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request

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	Contact with O/H wires	A	Maintain regulated clearances on wires at all times. Isolate power when in side Safe approach distance (SAD).	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request	
	Damage to rail infrastructure	B+	Report any damage/disturbance. Cover and Protect.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant	
	Plant roll-over	B+	SWL of machinery not to be exceeded. ROPS / FOPS.	C-	Ticketed Operator, Competent operators.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant	
	Personal Injuries	B+	Keep clear when machine is operating, Signage, Correct PPE	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0323 Personal Protective Equipment	
	Fall in excavation	B+	Fill excavation as soon as practical. Implement exclusion zones. Erect barrier if left unattended. Cover if possible.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0378 Excavation and Earthworks	
	Excavation collapse	B+	Shoring, benching, keep plant and employees clear of edges.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0378 Excavation and Earthworks	
4	Positioning Of Drilling Rig	Personnel Struck By Plant & Equipment	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leaders Work Group Leaders.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant

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	Plant roll-over	B+	SWL of machinery not to be exceeded. ROPS / FOPS.	C-	Ticketed Operator, Competent operators.		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
	Contact with O/H wires	A	Maintain regulated clearances on wires at all times. Isolate power when in side Safe approach distance (SAD).	C+	Permit Holder Qel29 Team Leader Work Group Leader		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits
	Oil/fuel spillage	C-	Plant to be inspected daily. Use correct methods for filling plant. Spill response kits on-site.	D	Work Group Leader		SSMP, SMS-06-FM-0163 Pre-Work Briefing Environmental Management Plan
	Contact With Services	B+	Carry out services search before work, locate and mark services prior to starting work. Use qualified plant operators, hand dig close to services, Pot hole to locate services if required	C+	Permit Holder Qel29 Team Leader Work Group Leader		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request
	Fall from Heights	B+	All work to be carried out from approved man-basket / elevated working platform	C+	Team Leader Work Group Leader WorkCover Ticketed Operator SMS-11-GD-0243 Plant and Equipment Certificates of Competency		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0240 Working At Heights SMS-06-GD-0241 Fall Arrest Systems SMS-06-GD-0323 Personal Protective Equipment SMS-06-SW-0310 Elevating Work Platforms SMS-06-SW-0255 Fall Arrest Systems (Fall Arrest Devices)

Number	Step	Hazard or human error (Safety/Environmental hazards identified, including physical environment, human errors, plant and equipment)	Risk ranking before controls	Control (to be Implemented to eliminate or reduce the risk to the lowest practicable level)	Risk ranking after controls	Responsibility	Job step to be completed In accordance with (name associated documentation)
		Electric Shock	B+	All electrical equipment to be tagged /tested, earth leakage units to be used with all tools. Equipment to be fitted with effective safe guards, * training *. Correct use of PPE	C-	Work Group Leader, Competent Person	SSMP,SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-FM-0278 Electrical equipment inspection and test record
		Manual Handling Injuries	B-	Correct manual handling procedures. "back-safe" training. Plant to move heavy and/or bulky items. As per Risk assessment.	C+	Work Group Leader	SSMP,SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0001 Guide to Manual Handling
6	Grouting Of Anchors	Use of hazardous/ Non hazardous materials e.g. Pipe glue, Sealants, Concrete etc.	B+	Refer to MSDS and/or manufacturers instructions before using. Avoid spills. Use PPE. Identification and separation of materials. Use in ventilated areas	C-	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing Manual Handling SMS-06GD-0001
		Fall from Heights	B+	All work to be carried out from approved man-basket / elevated working platform	C+	Team Leader Work Group Leader WorkCover Ticketed Operator SMS-11-GD-0243 Plant and Equipment Certificates of Competency	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0240 Working At Heights SMS-06-GD-0241 Fall Arrest Systems SMS-06-GD-0323 Personal Protective Equipment SMS-06-SW-0310 Elevating Work Platforms SMS-06-SW-0255 Fall Arrest Systems (Fall Arrest Devices)
		Grout in eyes	C+	Wear glasses/goggles. Appropriate PPE	D	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0240 Working At Heights SMS-06-GD-0323 Personal Protective Equipment
		Muscle strain	B-	Correct manual handling procedures. "back-safe" training. Plant to move heavy and/or bulky items. As per Risk assessment.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing MSDS SMS-06-GD-0323 Personal Protective Equipment

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		Skin irritations	C-	Protective clothing. Gloves, PPE	D	Work Group Leader	SSMP,SMS-06-FM-0163 Pre-Work Briefing MSDS
7	Placement Of Reinforcement	Manual handling injuries	B-	Correct manual handling procedures. "back-safe" training. Plant to move heavy and/or bulky items. As per Risk assessment.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0001 Guide to Manual Handling
		Struck By Crane Or Load	B+	Implement exclusion zones (6M). Wear correct PPE.	C+	Workcover Ticketed Operator And Dogman Trained Demolition Supervisor (If Required) SMS-11-GD-0243 Plant and Equipment Certificates of Competency	SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0323 Personal Protective Equipment
		Fall from Heights	B+	All work to be carried out from approved man-basket / elevated working platform	C+	Team Leader Work Group Leader WorkCover Ticketed Operator SMS-11-GD-0243 Plant and Equipment Certificates of Competency	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0240 Working At Heights SMS-06-GD-0241 Fall Arrest Systems SMS-06-GD-0323 Personal Protective Equipment SMS-06-SW-0310 Elevating Work Platforms SMS-06-SW-0255 Fall Arrest Systems (Fall Arrest Devices)
		Cuts, scratches and abrasions	C-	Wear PPE and Industrial clothing	D	Work Group Leader	SSMP,SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0323 Personal Protective Equipment
8	Installation Of Drainage	Manual handling injuries	B-	Correct manual handling procedures. "back-safe" training. Plant to move heavy and/or bulky items. As per Risk assessment.	C+	Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0001 Guide to Manual Handling
		Struck by moving plant	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant

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	Fall from Heights	B+	All work to be carried out from approved man-basket / elevated working platform	C+	Team Leader Work Group Leader WorkCover Ticketed Operator SMS-11-GD-0243 Plant and Equipment Certificates of Competency		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0240 Working At Heights SMS-06-GD-0241 Fall Arrest Systems SMS-06-GD-0323 Personal Protective Equipment SMS-06-SW-0310 Elevating Work Platforms SMS-06-SW-0255 Fall Arrest Systems (Fall Arrest Devices)
9	Shot Crete Embankment Using Concrete Pump	Concrete Burns	C-	Protective clothing. Gloves, PPE	D	Work Group Leader, Competent Person	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0323 Personal Protective Equipment MSDS
	Skin irritations	C-	Protective clothing. Gloves, PPE	D	All Staff		SSMP, SMS-06-FM-0163 Pre-Work Briefing MSDS
	Fall from Heights	B+	All work to be carried out from approved man-basket / elevated working platform	C+	Team Leader Work Group Leader WorkCover Ticketed Operator SMS-11-GD-0243 Plant and Equipment Certificates of Competency		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0240 Working At Heights SMS-06-GD-0241 Fall Arrest Systems SMS-06-GD-0323 Personal Protective Equipment SMS-06-SW-0310 Elevating Work Platforms SMS-06-SW-0255 Fall Arrest Systems (Fall Arrest Devices)
	Concrete in eyes	C-	Wear glasses/goggles, Face shields	D	Work Group Leader		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0323 Personal Protective Equipment MSDS
	Manual handling injuries	B-	Correct manual handling procedures. "back-safe" training. Plant to move heavy and/or bulky items. As per Risk assessment.	C+	Work Group Leader		SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0001 Guide to Manual Handling MSDS

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		Struck by boom / concrete truck	B+	Reversing beepers. Ticketed operators. Exclusion zones, Spotter if needed.	C+	Work Group Leader	SSMP,SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
10	Concrete Finish To Embankment Base And Dish Drains	Struck by moving plant	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
		Concrete Burns	C-	Protective clothing. Gloves, PPE	D	Work Group Leader, Competent Person	SSMP,SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0323 Personal Protective Equipment MSDS
		Skin irritations	C-	Protective clothing. Gloves, PPE	D	Work Group Leader	SSMP,SMS-06-FM-0163 Pre-Work Briefing MSDS
11	Remove Plant From Track	Personnel Struck By Plant & Equipment	B+	Implement restriction zones (6m). Use reversing beepers. Use ticketed operators. Plan work to avoid site congestion. Competent Operator	C+	Team Leaders Work Group Leaders.	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant
		Plant or trucks hit by train	B+	Operators to be made aware of extent of safe-working area. Pilots used when necessary.	C+	Wha02, Wpo04	SSMP,SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-11-GD-0243 Plant and Equipment Certificates of Competency
		Contact with O/H wires	A	Maintain regulated clearances on wires at all times. Isolate power when in side Safe approach distance (SAD).	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request

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		Contact With Services	B+	Carry out services search before work, locate and mark services prior to starting work. Use qualified plant operators, hand dig close to services, Pot hole to locate services if required	C+	Permit Holder Qel29 Team Leader Work Group Leader	SSMP, SMS-06-FM-0163 Pre-Work Briefing SMS-06-GD-0225 Plant SMS-06-GD-0268 Working Around Electrical Equipment SMS-06-EN-0577 Electrical Permits SMS-06-FM-0384 Services Search Request

NOTE: Each work group or team member must sign off on the SWMS to acknowledge they have been briefed about or instructed in the SWMS

Team member name (Please print)	Team Member signature	Instructor/ Briefer name	Date	Team member name (Please print)	Team Member signature	Instructor/ Briefer name	Date

RailCorp Level 2 Risk Matrix - Regional & Local (Workplace)		Likelihood/Frequency							Definition for Use - Regional & Local level (Workplace)
		Event Frequency	Less than once every 1000 years	Once every 100 to 1,000 years	Once every 10 to 100 years	Once every 1 to 10 years	More than once per year up to and including 10 times per year	More than 10 times per year	
Consequence	Historical (Likelihood)	Unheard of in the rail industry	Has occurred once or twice in the rail industry	Has occurred many times in the rail industry, but not in NSW	Has occurred once or twice in NSW	Has occurred frequently in NSW	Has occurred frequently at specific locations	Used for workplace hazards and safety risks that do not consider the whole of the network. Indicatively this matrix is appropriate for use where the hazards under consideration are up to 10% of the total network exposure. This includes regional and local workplace risk assessments.	
	Workplace Predictive (Likelihood)	Not expected to occur	May occur only in exceptional circumstances	Could occur at some time but not likely	You would expect it to occur at least once in the next 10 years performing similar activities	You would expect it to occur at least once this year performing similar activities	You would expect it to occur at least once this month performing similar activities	As an example, the Level 2 scale would be used when examining the risk of slips, trips and falls on specific RailCorp platforms within a region or at a particular station, or the risk of fire within a depot.	
		F1	F2	F3	F4	F5	F6	There are 3 options for descriptors which can be used to determine the frequency category. One set of descriptors is provided for frequency, one for historical likelihood, and one for predictive likelihood in the workplace. Choose the most appropriate.	
>10 Fatalities	C6	Disastrous	B-	B+	A	A	A	A	To score the risk, follow the steps:
2-10 Fatalities	C5	Catastrophic	C+	B-	B+	A	A	A	1. Identify the magnitude of the credible consequence if the risk were to occur. If applicable, risks should be considered in terms of the safety (this matrix), commercial and environmental impact (using other matrices).
1 Fatality (2-10 Major Injuries)	C4	Critical	C-	C+	B-	B+	A	A	2. Identify the likelihood of this level of consequence occurring. (This is done after considering the effectiveness of the current controls in place)
1 Major Injury	C3	Major	D	C-	C+	B-	B+	A	3. Score the risk using the combination of likelihood and consequence ranking.
1 or more Minor Injuries	C2	Minor	D	D	C-	C+	B-	B+	Note: Where there are a range of credible consequences which may lead to a different level of risks and/or where the controls may be different. It may be useful to score the risk more than once.
First aid treatment, or illness/injury not requiring treatment	C1	Negligible	D	D	D	C-	C+	B-	