

Site Investigation Drilling Operations

Issue date: 19/02/10

Review date: 18/02/13

SWMS number: SMS-06-SW-1325	SWMS Name: Site Investigation – Drilling Operations			SWMS Team: John Lesiw, Investigation Supervisor Peter Gall, Diamond Driller David Gordon, Diamond Driller Steve Tucker, Diamond Driller John Pace, Monitoring Leader Robert Coventry, Geotechnical Officer Cynthia Lee, Safety Coordinator
Custodian (Position): Investigation Supervisor	Assumptions: Site specific risks addressed in Pre-work briefing			
Approving Authority (Position): Principal Geotechnical Engineer	Plant/Equipment/Tools: <ul style="list-style-type: none">Truck Mounted Drilling RigsPortable Drilling RigPenetration Testing EquipmentSupport VehicleWater Pressure Pumps	Records/Reporting: Worksite Protection Plan SMS-06-GD-0333 SMS-06-FM-0163 Pre-work Briefing	Permits/licences required: Bobcat/Skidsteer Licence Hiab Crane Permit	
Applicable Standards, Codes of Practice and guidance: <ul style="list-style-type: none">OHS Regulation 2000 Working with Plant clause 134-144AS 1726 Geotechnical Site InvestigationsCode of Practice: Noise Management and Protection of Hearing at WorkCode of Practice: Working in Hot & Cold EnvironmentsNational Code of Practice for Manual HandlingCode of Practice: Electrical practices for Construction WorkCOP: Control of Hazardous SubstancesSMS-06-GD-0372 Working on or near Public RoadsRTA Traffic Control at Worksites	Inspection requirements <ul style="list-style-type: none">SMS-16-FM-0085 Plant Equipment Inspection & MaintenanceSMS-16-FM-0089 Lifting Equipment InspectionSMS-16-FM-0716 Mobile Plant Pre-start Daily Checklist	Service schedule: Investigation Supervisor to search underground services	Training/Qualifications required: 1.RISI Rail Industry Safety Induction 2.Electrical Safety Awareness 3.First Aid Certificate 4.Rail Safety Competency PO2 5.Drillers Certificate (ADITC) 6.Traffic Controller Certificate RTA 7.CV Vehicle Loading Crane Certificate (<10 Tonnes)	Content reviewed by Technical expert (SME) and RailCorp safety professional (position including Div/Group) Jatinder Singh, Geotechnical Group Leader Rob Jackson, Manager Compliance & Information
		PPE required: <ul style="list-style-type: none">Safety BootsHigh Visibility VestsHard HatProtective ClothingMedium Impact Safety GlassesHigh level cut resistant glovesUV Protective CreamEar Muff or ear plugsP2 Face mask PPE requirements shall meet PPE SMS-06-GD-0323		

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1	Site establishing. Organise resources, check Hazardous Locations Register, load vehicle and drive to worksite	Muscular stress or strain	C+	Ensure all personnel are already trained in manual handling and use correct tools Job rotation to avoid constant exposure Use other personnel to share load Use correct tools where appropriate	D	Drillers / Site Controller	SMS-06-FM-0635 Manual Handling ID Risk Assessment Checklist SMS-06-GD-0001 Guide to Manual Handling
2	Arriving on site and receive Pre-Work Briefing	Possible Train, Vehicular and Pedestrian hazards	B+	Pre-work Briefing covering hazards	C+	Drillers / Site Controller	SMS-06-FM-0163 Pre-work Briefing SMS-06-FM-0774 Worksite Protection Plan
		Slips, trips and falls	C+	Safety boots	D	Drillers / Site Controller	SMS-06-FM-0163 PPE
3	Set up Worksite Protection for rail corridor Or Traffic Control roadside	Struck by train, track machine or vehicle	B+	Implement Worksite Protection Plan Pre-work Briefing Local Safety Induction	C+	Protection Officer	RailCorp Network Rules & Procedures SMS-06-FM-0774 Worksite Protection Plan SMS-06-GD-0372 Work on or Near Public Roads SMS-11-FM-0925 Local Safety Induction

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		Struck by traffic or other vehicle	B+	<ul style="list-style-type: none"> • Arrange for Road Occupancy Licence (ROL) by Project Manager and use Traffic Controller • Traffic Control Plan • Wear high visibility vest • Pre-work Briefing with risk assessment on traffic conditions and access route • Use witches hats or barriers around worksite that may not impact on pedestrian walkways when worksite includes plan, equipment and tools 	D	Project Manager Traffic Controller	SMS-06-GD-0372 Working on or Near Public Roads RTA Traffic Control at Worksites
4	Positioning of drilling machine at borehole location to commence work	Contact with overhead electrical wire, electrical & signal structures	A	Use observer when setting up drilling rig & lifting mast. Have suitably trained person direct drilling rig into position Avoid travelling across steep slopes Obtain electrical power out permit beforehand	C+	Drillers / Site Controller	Working in Accordance with an Electrical Permit SMS-06-SW-0267 SMS-06-GD-0001 Manual Handling
		Tipping over	B+	Check site for stability and ground condition if ground condition too steep or wet, assess risks again Relocate to firm ground	C+	Drillers / Site Controller	SMS-11-FM- 0925 Local Safety Induction
5	Check borehole location for buried services	Electrocution, serious burns and damage to infrastructure & plant	A	Carry out Dial-Before-You-Dig search and have plans onsite Cable locators to mark services onsite Use hand auger for the first 1.5 metres and stand on LV rubber matt while augering Wear insulated gloves and safety boots	C+	Drillers / Site Controller	SMS-06-FM-0384 Services Search Request
6	Unload equipment using crane on truck	Strain muscles from handling equipment	C+	Share load with other drillers	D	Drillers with CVV Loading Licence	

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7	Unloading drilling equipment from drilling rig	Manual handling and mechanical handling equipment injuries	C+	Ensure all staff are trained in manual handling techniques and use of drilling tools Deploy job rotation avoid constant exposure Use other personnel to "share the load" All lifting equipment are inspected and tested 6 monthly Check all lifting slings prior to use	D	Drillers with CVV Loading Licence Site Controller	SMS-06-FM-0163 Pre-work Briefing
8	Coupling and lowering drilling equipment to commence drilling operations	Back and muscular strain from manual handling of plant and equipment Hand injury	C+	Use winches and mechanical rod and casing breaker Use Stilsons fit for purpose to lifting and undoing rods and casing Use cut resistant gloves to protect hands	D	Drillers / Site Controller Site Assistant	SMS-06-GD-0001 Manual Handling
		Caught by rotating spindle	B	Machine guard installed for protection Operating Driller stands one metre from spindle, others 6 metres away Loose hair tucked within hard hat No loose clothing Driller / Operator to check no personnel around drilling area prior to engaging for drilling	D	Drillers / Site Controller Site Assistant	SMS-06-GD-0225 Plant SMS-06-FM-0370 Plant Hazard ID and Risk Assessment on Drilling Rig
		Cut and crushed fingers	C+	Operating Driller stands one metre from spindle, others 6 metres away	D	Drillers / Site Controller Site Assistant	SMS-06-FM-0163 Pre-work Briefing
		Joint injuries	C+	Deploy job rotation to avoid constant exposure Use other personnel to "share the load"	D	Drillers / Site Controller Site Assistant	SMS-06-FM-0163 Pre-work Briefing SMS-06-GD-0225 Plant

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9	Removing core from core barrel	Hit by moving object	C+	Keep a clear distance from rotating drill head Barricade 6 metres of work area Stand on side of barrel when extracting core	D	Drillers / Site Controller Site Assistant	SMS-06-FM-0163 Pre-work Briefing SMS-06-GD-0225 Plant
		Blast of high water from pump – foreign body to eyes	C+	Ensure water hoses are in good order Correct fitting used Wear medium impact safety glasses	D	Drillers / Site Controller Site Assistant	SMS-06-GD-0323 PPE Guide SMS-06-FM-0163 Pre-work Briefing
10	Placing rock core from core barrel	Muscular strain to back, upper and lower limbs	C+	Ensure all staff are trained previously in manual handling techniques and use of drilling tools Deploy job rotation to avoid constant exposure Use other personnel to “share the load” Place core box near to receive rock core	D	Site Controller	SMS-06-GD-0001 Manual Handling
11	Carry out SPT Testing	Crushing injury from hammer	A	Double check if lifting hooks secured when attaching hammer to rods Check all lifting slings prior to use Use cut resistant gloves	D	Drillers / Site Controller Site Assistant	SMS-16-FM-0075 Pre-Job Plant Inspection SMS-16-FM-Lifting Equipment Inspection
		Injury to hands and fingers	C+	Operating driller stand in clear of one metre away from lifting equipment, others 6 metres	D	Drillers / Site Controller Site Assistant	SMS-06-FM-0163 Pre-work Briefing
		Exposure to noise above 85 dBA	C+	Wear ear muff or ear plugs	D	Drillers / Site Controller Site Assistant	SMS-06-GD-Noise Management
12	Carry out EFCP Testing	Hands and fingers caught in pushing ram while adding and removing pushing rods	C+	Ensure control in “Off” position	D	Drillers / Site Controller Site Assistant	SMS-06-FM-0163 Pre-work Briefing
		Exposure to noise above 85 dBA	C+	Wear ear muff or ear plugs	D	Drillers / Site Controller Site Assistant	SMS-06-GD-Noise Management

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13	Mixing Bentonite, Biogel with water	Manual handling	C	Ensure all staff are trained previously in manual handling techniques and use of drilling tools Deploy job rotation to avoid constant exposure Use other personnel to "share the load" Use lifting crane to handle recycling tank during preparation of mud Vigilance when handling drilling fluid	D	Drillers / Site Controller Site Assistant	SMS-06-GD-0199 Dangerous Goods & Hazardous Substances SMS-06-GD-0001 Manual Handling
		Respiratory inhalation of mist and vapour	C+	Wear P2 face mask	D	Drillers / Site Controller Site Assistant	SMS-06-GD-0199 Dangerous Goods & Hazardous Substances SMS-06-GD-0323 PPE
		Foreign body to eyes	C+	Wear medium impact safety glasses	D	Drillers / Site Controller Site Assistant	SMS-06-GD-0323 PPE
		Contact dermatitis from bentonite & Biogel clay	C+	Wear rubber gloves Maintain personal hygiene by washing hands and change of clean clothing Follow instruction from MSDS of Bentonite & Biogel	D	Drillers / Site Controller Site Assistant	Bentonite & Biogel MSDS SMS-06-FM-0202 Dangerous Goods & Hazardous Substances Risk Assessment
14	Reloading drilling equipment onto drilling rig	Strain muscles from handling equipment	C+	Share load with other drillers	D	Drillers with CVV Loading Licence	

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		Manual handling and mechanical handling equipment injuries	C+	Ensure all staff are trained in manual handling techniques and use of drilling tools Deploy job rotation avoid constant exposure Use other personnel to "share the load" All lifting equipment are inspected and tested 6 monthly Check all lifting slings prior to use	D	Drillers with CVV Loading Licence Site Controller	SMS-06-FM-0163 Pre-work Briefing
15	Clean up worksite	Strain muscles from handling equipment	C+	Share load with other drillers	D	Drillers with CVV Loading Licence	
		Manual handling and mechanical handling equipment injuries	C+	Ensure all staff are trained in manual handling techniques and use of drilling tools Deploy job rotation avoid constant exposure Use other personnel to "share the load" All lifting equipment are inspected and tested 6 monthly Check all lifting slings prior to use	D	Drillers with CVV Loading Licence Site Controller	SMS-06-FM-0163 Pre-work Briefing

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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							<u>Definition for Use - Regional & Local level (Workplace)</u> 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. 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. 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. To score the risk, follow the steps: 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). 2. Identify the likelihood of this level of consequence occurring. (This is done after considering the effectiveness of the current controls in place) 3. Score the risk using the combination of likelihood and consequence ranking. Note: Where there are a range of credible consequences which may lead to a different level or risks and/or where the controls may be different. It may be useful to score the risk more than once.
			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	
			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	
			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	
				F1	F2	F3	F4	F5	F6	
Consequence			Incredible	Improbable	Remote	Occasional	Probable	Frequent		
>10 Fatalities	C6	Disastrous	B-	B+	A	A	A	A		
2-10 Fatalities	C5	Catastrophic	C+	B-	B+	A	A	A		
1 Fatality (2-10 Major Injuries)	C4	Critical	C-	C+	B-	B+	A	A		
1 Major Injury	C3	Major	D	C-	C+	B-	B+	A		
1 or more Minor Injuries	C2	Minor	D	D	C-	C+	B-	B+		
First aid treatment, or illness/injury not requiring treatment	C1	Negligible	D	D	D	C-	C+	B-		