Horizontal Directional Drilling (HDD) and Boring

Business Name:	ABN:	
Business Address:		
Contact Person:	Phone:	Email:

THIS RISK ASSESSMENT IS APPROVED BY THE PCBU OF THE PROJECT

Under the Work Health and Safety Regulation (WHS Regulation), a person conducting a business or undertaking (PCBU) is required to ensure that a RISK ASSESSMENT is prepared before the proposed work starts.

Full Name:		
Signature:	Title:	Date:

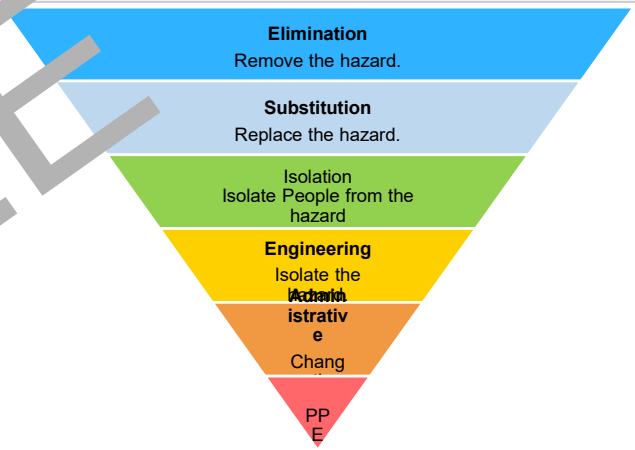
CLIENT OR PRINCIPAL CONTRACTOR DETAILS

Client:	SCOPE OF WORKS
Project Name:	
Project Address:	
Project Manager:	
Contact Phone:	
Date Risk Assessment supplied to Project Manager:	

RISK MATRIX

LIKELIHOOD	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC	SCORE	ACTION
ALMOST CERTAIN	3 HIGH	3 HIGH	4 ACUTE	4 ACUTE	4 ACUTE		
LIKELY	2 MODERATE	3 HIGH	3 HIGH	4 ACUTE	4 ACUTE	4A ACUTE	DO NOT PROCEED
POSSIBLE	1 LOW	2 MODERATE	3 HIGH	4 ACUTE	4 ACUTE	3H HIGH	Rev before work
UNLIKELY	1 LOW	1 LOW	2 MODERATE	3 HIGH	4 ACU	2M MO RATE	Ensure control measures in place.
RARE	1 LOW	1 LOW	2 MODERATE	3 HIGH	3 H	1L LOW	Monitor and keep records.

HIERARCHY OF CONTROLS



Risk Rating & Required Action:

4A	Stop work. The risk is intolerable. E inate the hazar redesign the activity before proceeding. A Safe Work Method Statement (SWMS) or hi er-level authorisati is required.
3H	Review and approve additional c rols b ask arts. Senior supervisor sign-off needed.
2M	Ensure all nominated controls are in ace and effe ive. Proceed with caution; monitor conditions.
1L	Proceed, following standard operating procedures Monitor and keep records.

Consequence Scale:

Consequence	People (injury/illness)	Project / Assets	Compliance / Reputation
Catastrophic	Fatality or permanent total disability	project shutdown	Significant regulator intervention; criminal prosecution
Major	Serious injury/illness (hospital > 5 days)	critical delay	Improvement notice; major media coverage
Moderate	Medical-treatment injury; lost-time > 1 day	moderate delay	Minor breach; adverse client comment
Minor	First-aid only, no lost time	negligible delay	Isolated non-conformance
Insignificant	No injury	no schedule impact	Deviation caught and corrected on site

Notes on Hierarchy of Controls:
Remember to apply controls in the preferred order shown by the coloured pyramid:

1. **Eliminate**
2. Substitute
3. Isolate
4. Engineering
5. Administrative
6. PPE

Always document **why** a lower-order control is accepted if elimination or substitution is not reasonably practicable.

aligned with Safe Work Australia's Managing the risk of fatigue at work *(2023) and ISO 45001:2018 clauses 6–8.*

JOB STEP	POTENTIAL HAZARDS	IR	CONTROL MEASURES	RR
SPECIFIC WORK STEPS	HAZARDS THAT MAY ARISE	INITIAL RISK	SPECIFIC MEASURES TO BE PUT IN PLACE TO ELIMINATE OR CONTROL THE RISKS	RESIDUAL RISK
1. WHS Governance, Legal Compliance & Consultation	• Lack of documented WHS management system for HDD and boring activities • Inadequate understanding of duties under WHS Act 2011 and WHS Regulations • Insufficient consultation with workers, HSRs and contractors on HDD-specific risks • Failure to coordinate WHS responsibilities between principal contractor, HDD contractor and utility asset owners • No process to monitor changes in legislation, standards and industry guidelines relevant to trenchless works • Inadequate consultation with local council, road authorities and regulators regarding non-disturbance zones and drilling permits	4A	• Establish and maintain a documented WHS Management System aligned with WHS Act 2011, WHS Regulations, and AS/NZS 4801 / ISO 4500 principles covering all HDD and boring activities • Define and document PCBU roles, responsibilities and due diligence obligations specific to directional drilling and non-disturbance zone drilling • Implement formal consultation mechanisms (toolbox talks, WHS committee, HSR forums) with workers and subcontractors regarding HDD system risks, changes to methods and lessons learned • Develop written WHS responsibility matrix for principal contractor, HDD contractor, designers, subcontractors and utility owners clarifying interfaces and shared duties • Implement a legal and standards register for HDD-related requirements (e.g. utility protection codes, road opening permits, environmental approvals) with scheduled review • Require pre-start coordination meetings with councils, road authorities and relevant utilities where HDD intersects public roads, easements or non-disturbance zones • Conduct periodic management reviews of HDD operations, incident trends and audit outcomes with documented actions and follow-up	3H
2. Design, Engineering Review & Work Planning	• Inadequate geotechnical and subsurface investigation prior to designing drill path • Poorly defined bore alignment, depth and entry/exit angles leading to clashes with underground services or non-disturbance zones • Failure to design around critical assets, easements and environmental constraints • No formal design verification or independent engineering review for complex or high-risk drills • Insufficient consideration of hydrofracture, frac-out or ground heave in design phase • Inadequate assessment of drill rig capacity and tooling relative to ground conditions and bore length	4A	• Require formal design process for all HDD works including drawings, design calculations and risk assessment for bore paths, entry and exit pits • Mandate geotechnical investigation and/or utility owner data review for subsurface conditions, including rock, groundwater and fill, before finalising design • Implement design review procedure requiring verification of clearance to existing services, structures, protected zones and non-disturbance corridors • For complex, long or critical crossings, require independent engineering review and sign-off by a competent engineer experienced in HDD design • Incorporate hydrofracture risk assessment (soil type, drilling fluid pressure, depth of cover) and mitigation strategies into design documentation • Ensure design includes rig selection criteria (pullback capacity, torque, thrust, rod limits) matched to calculated loads and bore profile • Document contingency plans in the project HDD plan for bore collapse, steering failure, inadvertent returns and partial completion scenarios • Require that any significant design change (alignment, depth, diameter) undergoes formal change management and re-approval	2M

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	• Omission of contingency plans for bore failure, steering loss or equipment immobilisation			
3. Underground Service Location & Non-Disturbance Zone Management	• Incomplete or inaccurate identification of underground utilities and assets • Reliance solely on Dial Before You Dig (DBYD) / Before You Dig Australia plans without field verification • Unclear definition or communication of non-disturbance zones for critical infrastructure or environmental areas • Failure to maintain service location data control (updates, revisions, field mark-ups) • Poor coordination with asset owners leading to unmarked or mis-marked services • No system to verify actual bore path relative to planned clearances and exclusion zones • Inadequate treatment of abandoned, unknown or historical services encountered during dri[illegible]g	4A	• Implement a documented underground se[illegible]e locati[illegible]rocedure including DBYD requests, survey review, on-site validation and potholing where [illegible]acti[illegible]ble • Mandate physical verificatio[illegible](e.g. vacuum exc[illegible]tion, hand[illegible]gging) of critical services and within defined non-disturbance zone[illegible]rior to drilling • Develop project-sp[illegible]on-di[illegible]bance zone plans[illegible]learly marking no-go corridors, minimum clearance distanc[illegible]and p[illegible]ibited[illegible]illing envelo[illegible]es on drawings and in GIS where available • Require wr[illegible]n confirmati[illegible]and se[illegible]e p[illegible]s from all relevant utilities and asset owners, with clash analysis record[illegible]in the H[illegible]D work plan • Use [illegible]ntrolled[illegible]ment register for service location plans, ensuring version control, field mark-ups, and sig[illegible]by a co[illegible]etent supervisor • Establ[illegible]h pr[illegible]edure [illegible]real-time recording and validation of as-built bore path (e.g. tracking logs, survey data) ag[illegible]nst p[illegible]ned clearances • D[illegible]e e[illegible]calation and stop-work criteria if unknown services are identified or service positions differ from plans, i[illegible]ding mandatory consultation with asset owners • [illegible]tain and archive as-built records and service clash reports for continuous improvement and future wo[illegible]s	2M
4. Geotechnical, Environmental & Hydrofracture Risk Management	• Unanticipated gr[illegible]nd conditio[illegible]uch as voids, boulders, [illegible]ured [illegible]k or aggressive soils • Ground instability leading to subsidence, heave, surfa[illegible]pse or sinkholes along bore path • Hydrofracture (frac-out) causing drilling fluid release to surface, waterways or sensitive habitats • Inadequate consideration of groundwater levels and artesian pressures • Inadequate controls for drilling through contaminated or acid sulphate soils • Environmental damage in non-disturbance zones, riparian areas or conservation reserves	4A	[redacted]	2M

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	• Lack of monitoring and response systems for inadvertent fluid returns or ground movement		[redacted]	
5. Plant & Equipment Procurement, Design & Guarding	• Use of HDD rigs, mud pumps and boring equipment that are not fit for purpose or not compliant with Australian standards • Inadequate guarding of rotating equipment, drill rods, augers, and high-pressure hoses • Lack of redundancy or fail-safe systems on critical plant (e.g. emergency stop, interlocks, rod lock systems) • Unsafe modifications or aftermarket attachments without engineering assessment • Non-compliant pressure systems, hoses and connections for drilling fluids and hydraulics • Poor ergonomics of controls leading to operator error or fatigue • Absence of plant registration, inspection regimes required by legislation	4A	[redacted]	2M
6. Preventative Maintenance, Inspection & Pre-Start Systems	• Inadequate maintenance program for HDD rigs, drill rods, mud systems and locating equipment • Failure to detect worn or damaged components such as rods, swivels, reamers, high-pressure hoses and connections • Unplanned plant breakdowns causing urgent repairs, shortcuts or unsafe improvisations • No structured pre-start inspection process or poor-quality checks	3H	[redacted]	2M

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	• Lack of calibration and servicing of electronic guidance, tracking and pressure monitoring systems • Insufficient spare parts or replacement plant leading to use of defective equipment • Maintenance activities occurring without lockout/tagout or isolation procedures		[redacted]	
7. Competency, Training & Authorisation for HDD Operations	• Operators and offsiders lacking specific HDD theoretical and practical training • Insufficient competency in reading and interpreting bore plans, drill profiles and non-disturbance zone diagrams • Inadequate training in locating systems, walk-over tracking, wireline guidance and pressure control • No formal authorisation or verification of competency (VOC) process for critical roles such as drill operator, locator and mud engineer • Supervisors unfamiliar with WHS legal obligations, due diligence, and HDD risk controls • Lack of training for emergency response to service strike, frac-out, plant failure or environmental incident • Contractor personnel inducted but not verified as competent for specialised HDD tasks	4A	[redacted]	2M
8. Project Risk Assessment, HDD Work Planning & Change Management	• Absence of project-specific risk assessment for HDD and boring activities • Generic Safe Work Method Statements (SWMS) not reflecting site-specific conditions, non-disturbance zones or complex crossings • Poor integration of HDD plan with broader construction staging, traffic management and environmental plans	4A	[redacted]	2M

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	• Uncontrolled changes to bore alignment, rig location, tooling or drilling parameters during works • Inadequate communication of changes to field teams, leading to work proceeding on superseded plans • No formal process to approve and record deviations from the HDD plan, risk controls or permit conditions		[redacted]	
9. Drilling Fluid, Spoil & Waste Management Systems	• Uncontrolled storage, mixing and handling of drilling fluids and additives • Inadequate containment of drilling mud leading to spills, slip hazards and environmental harm • Incorrect classification and disposal of drilling fluids, cuttings and contaminated spoil • Drilling fluid system over-pressurisat due to poor monitoring or inadequate relief systems • Exposure of workers t icals, additives, silica or c aminated ground material • Insufficient capac ing o containment systems for long bores high-volume returns	3H	[redacted]	2M
10. Utility Strike, Asset Damage & Emergency Response Management	• Inadequate systems to prevent, detect and respond to contact with live services (gas, electricity, water, sewer, communications) • No clear escalation and notification procedures following suspected or actual service strikes • Lack of emergency coordination with asset owners, emergency services and local authorities • Failure to rehearse emergency scenarios relevant to HDD works (gas	4A	[redacted]	2M

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	leak, electrocution risk, major water main rupture) • Inadequate provision of emergency equipment (e.g. gas detectors, fire extinguishers, spill kits) at HDD sites • Confusion over roles and responsibilities during incidents due to lack of planning		[redacted]	
11. Site Layout, Traffic Interface & Public Safety Management	• Poor site layout resulting in interaction between HDD plant, other construction vehicles and pedestrians • Inadequate exclusion zones around drilling rig, rods, support vehicles and exit pits • Insufficient traffic management where HDD works interface with public roads, footpaths or shared pathways • Uncontrolled public access to bore alignment, exit points or non-disturbance zones • Inadequate lighting and signage for night or low-visibility work • Conflicts with adjacent businesses, residents or other contractors in constrained urban [redacted]	3H	[redacted]	2M
12. Remote/Confined Site Access, Fatigue & Journey Management	• HDD works in remote or difficult-to-access locations without adequate communication and emergency access • Long shifts and extended commuting leading to worker fatigue and reduced vigilance • Single-person or small teams working in isolation near bores, pits or plant with limited supervision • Inadequate journey management for movement between multiple HDD sites in a day • Poor planning for weather, flood or fire events affecting access to drill sites	3H	[redacted]	2M

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	• Insufficient welfare facilities impacting hydration, heat stress and general wellbeing		[redacted]	
13. Noise, Vibration, Ergonomics & Occupational Health Management	• Prolonged exposure to noise from HDD rigs, pumps and auxiliary plant exceeding exposure standards • Vibration impacts on adjacent structures, existing underground assets and sensitive receptors • Manual handling of drill rods, tooling, hoses and ancillary equipment leading to musculoskeletal disorders • Whole body vibration for plant operators over extended periods • Insufficient monitoring of occupational exposure to diesel particulates, silica other airborne contaminants • Lack of health surveillance for workers performing repetitive or [redacted] tasks	3H	[redacted]	2M
14. Contractor Management & Subcontractor Control	• Use of HDD subcon[redacted]tors without adequate WHS systems or experien[redacted] in directional drilling and non-disturbance zones • Inconsistent safety standards and procedures between principal contractor and HDD subcontractor • Poor oversight of subcontractor compliance with HDD plans, permits and risk controls • Lack of clarity regarding incident reporting, investigation and corrective action responsibilities • Inadequate induction and onboarding of subcontractor personnel	3H	[redacted]	2M

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SPECIFIC WORK STEPS	HAZARDS THAT MAY ARISE	INITIAL RISK	SPECIFIC MEASURES TO BE PUT IN PLACE TO ELIMINATE OR CONTROL THE RISKS	RESIDUAL RISK
	• Commercial pressures leading to risk-taking or deviation from agreed controls		[redacted]	
15. Documentation, Monitoring, Auditing & Continuous Improvement	• Incomplete or inaccurate WHS documentation for HDD activities (plans, risk assessments, permits, records) • Failure to detect systemic weaknesses due to lack of inspections and audits • Poor data collection on incidents, near-misses and non-conformances specific to HDD operations • Repetition of similar incidents due to inadequate root cause analysis and follow-up • Lack of performance indicators for HDD safety and environmental controls • Inadequate retention a[redacted]sfer of knowledge between [redacted]DD projects and teams	3H	[redacted]	2M

EMERGENCY RESPONSE – CALL 000 FOR EMERGENCIES

Ensure to have an Emergency Management Plan in place as well as adequate numbers of trained first aid staff with easy access to fully stocked first aid kits, rescue equipment, material safety data sheets, adequate access to emergency communication equipment and fire-fighting equipment suitable for all classes of fire and ignition sources.

LEGISLATIVE REFERENCES

RELEVANT LEGISLATION AND CODES OF PRACTICE. DELETE THE LEGISLATIVE REFERENCES FOR ANY STATE THAT ARE NOT APPLICABLE

Queensland & Australian Capital Territory
Work Health and Safety Act 2011
Work Health and Safety Regulations 2011
Legislation QLD: https://www.worksafe.qld.gov.au/laws-and-compliance/work-health-and-safety-laws
Codes of Practice QLD: https://www.worksafe.qld.gov.au/laws-and-compliance/codes-of-practice
Legislation ACT: https://www.worksafe.act.gov.au/laws-and-compliance/acts-and-regulations
Codes of Practice ACT: https://www.worksafe.act.gov.au/laws-and-compliance/codes-of-practice

New South Wales
Work Health and Safety Act 2011
Work Health and Safety Regulations 2025
Legislation NSW: https://www.safework.nsw.gov.au/legal-obligations/legislation
Codes of Practice NSW: https://www.safework.nsw.gov.au/resource-library/list-of-codes-of-practice

Northern Territory
Work Health and Safety (National Uniform Legislation) Act 2011
Work Health and Safety (National Uniform Legislation) Regulations 2011
Legislation NT: https://worksafe.nt.gov.au/laws-and-compliance/workplace-safety-laws
Codes of Practice NT: https://worksafe.nt.gov.au/forms-and-resources/codes-of-practice

South Australia
Work Health and Safety Act 2012 (SA)
Work Health and Safety Regulations 2012 (SA)
Legislation for SA: https://www.safework.sa.gov.au/resources/legislation
Codes of Practice for SA: https://www.safework.sa.gov.au/workplaces/codes-of-practice#COPs

Tasmania
Work Health and Safety Act 2012
Work Health and Safety (Transitional and Consequential Provisions) Act 2012
Work Health and Safety Regulations 2012
Work Health and Safety (Transitional) Regulations 2012
Legislation for TAS: https://worksafe.tas.gov.au/topics/laws-and-compliance/acts-and-regulations
Codes of Practice for TAS: https://worksafe.tas.gov.au/topics/laws-and-compliance/codes-of-practice

Details of permits, licenses or access required by regulatory bodies (add or delete as required):

- Permits from local council
- Authorisation to commence work
- Any required documents.

Victoria
Occupational Health and Safety Act 2004
Occupational Health and Safety Regulations 2017
Legislation VIC: https://www.worksafe.vic.gov.au/occupational-health-and-safety-act-and-regulations
Codes of Practice VIC: https://www.worksafe.vic.gov.au/compliance-codes-and-codes-practice

Western Australia
Work Health and Safety Act 2020
Work Health and Safety Regulations 2022
Legislation Western Australia: https://www.commerce.wa.gov.au/worksafe/legislation
Codes of Practice WA: https://www.commerce.wa.gov.au/worksafe/codes-practice

Safe Work Australia Links
Law and Regulation (All States): https://www.safeworkaustralia.gov.au/law-and-regulation
Model Codes of Practice: https://www.safeworkaustralia.gov.au/resources-publications/model-codes-of-practice

Model Codes of Practice

- Managing noise and preventing hearing loss at work
- Confined spaces
- Labelling of workplace hazardous chemicals
- Managing risks of hazardous chemicals in the workplace
- Welding processes
- First aid in the workplace
- Managing the risk of falls at workplaces
- Hazardous manual tasks
- Managing the risk of falls in housing construction
- Managing electrical risks in the workplace
- Demolition work
- Excavation work
- Work health and safety consultation, cooperation and coordination
- Managing the work environment and facilities
- How to manage work health and safety risks
- Managing risks of plant in the workplace
- Construction work