Title	**Demonstrate knowledge of tunnelling methods, and selection of plant and equipment for tunnelling**		
Level	**5**	**Credits**	**15**

Purpose	People credited with this unit standard are able to: demonstrate knowledge of geological features in relation to tunnelling methods; describe support requirements and potential hazards in tunnels; and demonstrate knowledge of tunnelling methods and selection of plant and equipment.

Classification	Extractive Industries > Underground Extraction

Available grade	Achieved

Guidance Information

1 Performance of the outcomes of this unit standard must comply with the following:
Health and Safety at Work Act 2015 (HSW);
Health and Safety at Work (General Risk and Workplace Management) Regulations 2016;
Health and Safety at Work (Mining Operations and Quarrying Operations) Regulations 2016;
Health and Safety at Work (Worker Engagement, Participation, and Representation) Regulations 2016;
approved codes of practice issued pursuant to the HSW Act.

2 Any new, amended or replacement Acts, regulations, standards, codes of practice, guidelines, or authority requirements or conditions affecting this unit standard will take precedence for assessment purposes, pending review of this unit standard.

3 Definition
TBM refers to a tunnel boring machine.

4 Range
Tunnelling plant and equipment includes but is not limited to – roadheader, TBM, pipe-jacking equipment.
Transportation plant and equipment includes but is not limited to – conveyors, rail transport, rope haulage, diesel haulage, scraper drives, shaft hoisting, slurry systems.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of geological features in relation to tunnelling methods.

Performance criteria

1.1 The effects of geological features are described in relation to the selected tunnelling method.

Range includes but is not limited to – structure, rock properties, sedimentary characteristics.

Outcome 2

Describe support requirements and potential hazards in tunnels.

Performance criteria

2.1 Support requirements are described in terms of the stability of the tunnel.

Range includes but is not limited to – rock bolting methods, timber support, steel support, side support, mesh, grout, shotcrete, lining, pre-cast lining.

2.2 Potential hazards are described in terms of tunnelling safety.

Range includes but is not limited to – gas, dust, rock instability, water inundations, unconsolidated ground, water bearing strata, fracture planes, faulted ground, ground stability for underground and surface located plant, dynamics of load bearing, surface stability in proximity to underground excavations.

Outcome 3

Demonstrate knowledge of tunnelling methods and selection of plant and equipment.

Performance criteria

3.1 Tunnelling methods are described in relation to the host rock.

Range includes but is not limited to – hand mining, drill and blast, mechanical loading, roadheader, TBM, pipe-jacking, surface excavation, shaft sinking.

3.2 The procedures to be adopted in development of shafts, connections, and underground facilities are described in relation to their intended use and safety.

Range includes but is not limited to – pump chambers, ventilation, escape routes, refuge chambers, special use chambers.

3.3 The design and attributes of plant and equipment are identified and evaluated in terms of the host rock and the profile of tunnelling sites.

Range plant and equipment includes – tunnelling plant and equipment, transportation plant and equipment.

3.4 Other factors that impact the selection of tunnelling methods, plant and equipment are explained.

Range may include but is not limited to – risk assessment, financial considerations, safety considerations and requirements (e.g. guarding), equipment compatibility, job requirements;
plant and equipment includes – tunnelling plant and equipment, transportation plant and equipment.

Planned review date	31 December 2022

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 July 1999	31 December 2019
Review	2	24 November 2005	31 December 2019
Rollover and Revision	3	16 July 2010	31 December 2019
Review	4	1 March 2018	N/A

Consent and Moderation Requirements (CMR) reference	0114

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact MITO New Zealand Incorporated info@mito.org.nz if you wish to suggest changes to the content of this unit standard.