



# Transforming Tunnelling Safety

Tunnel safety doesn't happen  
by accident

Skills

Knowledge

Attitude

Training

Experience

SKATE Matrix

Jan 2021 Edition

Next revision due: Jan 2022

SKATE [Skills, Knowledge, Attitude, Training, Experience] Competence Matrix for Tunnelling - January 2021 Edition

Role Family by Qualification Level	Roles	S Skills	K Knowledge	A Attitude	T Training	E Experience	Comments
Operative / Craft (Level 2)	Tunnel Support Staff Cleaners, Tally persons, etc.	Skills in line with employment task	Knowledge in line with employment task	<p>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</p>	<p>TSTS C&amp;G 6151 [When working underground] CSCS Labourer Card Health and Safety Awareness Certificate</p>		Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2)	TBM Miner/Ring Builder [Machine Tunnelling Operative]	<p>Level 2 NVQ Diploma in Tunnelling Operations [Machine Tunnelling Operative pathway preferred] Interpret the given information relating to work and resources when excavating for and building temporary or permanent tunnel linings. Select the required quantity and quality of resources for the methods of work to complete the work in the allocated time and to the required specifications.</p>	<p>Level 2 NVQ Diploma in Tunnelling Operations [Machine Tunnelling Operative pathway preferred] Know the relevant legislation and official guidance when excavating for and building temporary or permanent tunnel linings whilst maintaining safe and healthy working practices. Understand how emergencies should be responded to and when and how health and safety control equipment should be used.</p>	<p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p>CSCS - Skilled Worker Card TSTS C&amp;G 6151 [When working underground]</p>	Familiar with specific TBM being used and method of tunnelling.	Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2)	Tunnelling Machine Operator [Plant operator involved in the excavation/formation of the shaft/tunnel]	<p>Level 2 NVQ Diploma in Tunnelling Operations [Tunnelling Machine Operator pathways preferred] Interpret the given information relating to work and resources when excavating for and building temporary or permanent tunnel linings. Select the required quantity and quality of resources for the methods of work to complete the work in the allocated time and to the required specifications.</p>	<p>Level 2 NVQ Diploma in Tunnelling Operations [Tunnelling Machine Operator pathways preferred] Know the relevant legislation and official guidance when excavating for and building temporary or permanent tunnel linings whilst maintaining safe and healthy working practices. Understand how emergencies should be responded to and when and how health and safety control equipment should be used.</p>	<p>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</p>	<p>CSCS - Skilled Worker Card In Blue CPCS Card for Tunnelling Machine being operated if the machine falls into a Plant Category in the CPCS Scheme. TSTS C&amp;G 6151</p>	Familiar with specific tunnelling plant and equipment operation and method of tunnelling. Relevant plant categories held on a CPCS card, where applicable	Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2)	Hand Miner, Shaft Miner	<p>Level 2 NVQ Diploma in Tunnelling Operations [Hand Mining or Shaft Mining pathways preferred, as appropriate] Interpret the given information relating to work and resources when excavating for and building temporary or permanent tunnel linings. Select the required quantity and quality of resources for the methods of work to complete the work in the allocated time and to the required specifications.</p>	<p>Level 2 NVQ Diploma in Tunnelling Operations [Hand Mining or Shaft Mining pathways preferred, as appropriate] Know the relevant legislation and official guidance when excavating for and building temporary or permanent tunnel linings whilst maintaining safe and healthy working practices. Understand how emergencies should be responded to and when and how health and safety control equipment should be used.</p>	<p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p>CSCS - Skilled Worker Card TSTS C&amp;G 6151</p>	Appropriate excavation and support setting techniques for different timber headings, shafts or ground conditions	Also required Project/Contract specific induction provided by the Principal Contractor  Hand Miners in timber headings should hold a relevant slinger/signaller qualification. Pit bosses/lead miners should hold an appropriate Appointed Person for Lifting or Crane Supervisor qualification where steel sections, etc. are being winched/lifted into position.
Operative / Craft (Level 2)	SCL Nozzle Person	<p>EFNARC C2 certificate - aligned to the 2020 updated training plan <a href="https://efnarc.org/s/ENC-C2-V11-20200128_ENG-93z2.pdf">https://efnarc.org/s/ENC-C2-V11-20200128_ENG-93z2.pdf</a> and Level 2 NVQ Diploma in Tunnelling Operations - Sprayed Concrete Lining Tunnelling Nozzleman pathway - Operating Robotic Spraying Equipment EFNARC C2 - Key practical skills and knowledge: - Recognise, Implement and Control safe systems for SCL works - Manage Quality Control and Assurance of SCL - Understand and manage the risks associated with the application of SCL - Recognise and implement current Standards and Specifications - Understand and operate to Inspection and Test Plans - Recognise Mix design and effect on quality - State correct pre to post application techniques and effect on safety and quality - Recognised key components and state the reasons for key components of SCL Equipment - Understand the reasons and procedures for early strength testing - State the requirements for Post application Quality Control and Assurance - List the reasons for and actions to be carried out in the event of concrete fall-outs NVQ - Key practical skills and knowledge: - Conforming to General Health, Safety and Welfare in the Workplace - Conforming to Productive Working Practices in the Workplace - Moving, Handling and Storing Resources in the Workplace - Preparing and operating specialist tunnelling plant to form tunnels in the workplace - Preparing substrate for sprayed concrete in the workplace - Applying sprayed concrete in the workplace</p>	<p>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</p>	<p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p>EFNARC C2 course CSCS - Skilled Worker Card TSTS C&amp;G 6151</p>	Familiarity with ground conditions and familiarity of equipment being used. Relevant plant categories held on a CPCS card, where applicable	Also required Project/Contract specific induction provided by the Principal Contractor  There is a transition period from EFNARC Certification to EFNARC C2. The EFNARC C2 certificate includes a five-day course, VR and practical assessment and evidence of at least 40 days of robotic spraying experience: <a href="https://efnarc.org/information-efnarc2">https://efnarc.org/information-efnarc2</a>  Official EFNARC C2, training and certification plan: <a href="https://efnarc.org/s/ENC-C2-V11-20200128_ENG-93z2.pdf">https://efnarc.org/s/ENC-C2-V11-20200128_ENG-93z2.pdf</a>

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Operative / Craft (Level 2)	SCL Hand sprayer	Level 2 NVQ Diploma in Tunnelling Operations - Sprayed Concrete Lining Tunnelling Nozzleman pathway - Operating Hand-held spraying equipment or L2 NVQ Diploma in Specialist Concrete Occupations (Construction) - Sprayed Concrete - Operating Hand-held spraying equipment NVQ - Key practical skills and knowledge: - Conforming to General Health, Safety and Welfare in the Workplace - Conforming to Productive Working Practices in the Workplace - Moving, Handling and Storing Resources in the Workplace - Preparing and operating specialist tunnelling plant to form tunnels in the workplace - Preparing substrate for sprayed concrete in the workplace - Applying sprayed concrete in the workplace		<p>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</p> <p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p>CPCS - Skilled Worker Card IS15 R&amp;G 6151</p>	Familiarity with ground conditions. Hand spraying experience Relevant plant categories held on a CPCS card, where applicable	Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2)	Tunnelling Operative, Pipejacking or Micro-Tunnelling Operative, Spoil Removal Conveyor Operative, Separation Plant Operative	Level 2 NVQ Diploma in Tunnelling Operations [Relevant pathway preferred to suit job role, as appropriate] Interpret the given information relating to work and resources for tunnelling activities specific and relevant to job role. Select the required quantity and quality of resources for the methods of work to complete the work in the allocated time and to the required specifications.	Level 2 NVQ Diploma in Tunnelling Operations [Relevant pathway preferred to suit job role, as appropriate] Know the relevant legislation and official guidance for tunnelling activities specific and relevant to job role. Understand how emergencies should be responded to and when and how health and safety control equipment should be used.	<p>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</p>	<p>CPCS - Skilled Worker Card IS15 R&amp;G 6151</p>	Relevant plant categories held on a CPCS card, where applicable	Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2)	SCL Pump Operator [above and below ground]	CPCS Technical Test A44 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows successful completion of the full Technical Test) or Level 2 NVQ Diploma in Plant Operations (Construction) – Transporting Loads Plant (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A44 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Plant Operations (Construction) – Transporting Loads Plant (achievement of a Blue CPCS card follows achievement of NVQ)	<p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p>CPCS Card - Red or Blue Training and authorisation to operate specific concrete pump IS15 R&amp;G 6151</p>	Familiarity with specific pump operation/method	<p>Also required Project/Contract specific induction provided by the Principal Contractor</p> <p>Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed.</p>
Operative / Craft (Level 2)	Loco Driver	CPCS Technical Test A67 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Tunnelling Operations (Construction) – Tunnel Transport Operator (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A67 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Tunnelling Operations (Construction) – Tunnel Transport Operator (achievement of a Blue CPCS card follows achievement of NVQ)	<p>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</p>	<p>CPCS Card - Red or Blue Training and authorisation to operate specific tunnel loco IS15 R&amp;G 6151</p>	Familiarity with specific tunnel loco operation/method	<p>Also required Project/Contract specific induction provided by the Principal Contractor</p> <p>Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed. Note 3: The CPCS A67 category includes endorsements for Electric and Diesel locomotives, up to 10 tonnes and all sizes, and Tandem locomotives. Operators must hold a CPCS card showing the correct relevant endorsement/s for the locomotive/s being operated. NOTE: Discussions regarding the increased use of MSVs [Multi Service Vehicles] in tunnelling are currently taking place with a view to adding MSVs as a plant category into the CPCS scheme</p>
Operative / Craft (Level 2)	Pit Top / Slinger Signaller	CPCS Technical Test A40 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Controlling Lifting Operations - Slinger/Signaller (Construction) (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A40 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Controlling Lifting Operations - Slinger/Signaller (Construction) (achievement of a Blue CPCS card follows achievement of NVQ)	<p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p>CPCS Card - Red or Blue IS15</p>	Log Book or similar record of Slinger/Signaller duties	<p>Also required Project/Contract specific induction provided by the Principal Contractor</p> <p>Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed.</p>
Operative / Craft (Level 2)	Pit Bottom	CPCS Technical Test A40 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Controlling Lifting Operations - Slinger/Signaller (Construction) (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A40 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Controlling Lifting Operations - Slinger/Signaller (Construction) (achievement of a Blue CPCS card follows achievement of NVQ)		<p>CPCS Card - Red or Blue IS15 R&amp;G 6151</p>	Log Book or similar record of Slinger/Signaller duties	<p>Also required Project/Contract specific induction provided by the Principal Contractor</p> <p>Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed.</p>

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Operative / Craft (Level 2)	Overhead Crane Operator	CPCS Technical Test A64 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Plant Operations - Cranes and Specialist Lifting (Construction) (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A64 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 2 NVQ Diploma in Plant Operations - Cranes and Specialist Lifting (Construction) (achievement of a Blue CPCS card follows achievement of NVQ)	<p><b>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</b></p> <p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions</p>	<p><b>Health, Safety and Wellbeing are core behavioural values.</b> All are expected to: Have a sense of responsibility and ownership for day-to-day health, safety &amp; wellbeing Strive to continuously improve and find more effective ways of working Actively collaborate with other team members and teams Communicate openly and effectively: share knowledge and experience, stop and ask questions and challenge behaviours, when required Show a willingness to learn new processes, methodologies, equipment, etc. that can have a positive dynamic impact on attitudes and behaviours</p>	CPCS Card - Red or Blue TS15	Log Book or similar record of overhead crane operation activities	Also required Project/Contract specific induction provided by the Principal Contractor  Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed.
Operative / Craft (Level 2) + Advanced Craft (Level 3)	Tunnel Fitter	Relevant Apprenticeship at Level 2 or Level 3 or Relevant Plant Maintenance Competence Qualification at Level 2 or Level 3	Relevant Apprenticeship at Level 2 or Level 3 or Relevant Plant Maintenance Knowledge Qualification at Level 2 or Level 3			CSCS Skilled Worker or Gold Card TS15 C&G 6151	EngTech professional registration with IMechE or similar relevant professional body + Record of ongoing CPD	Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2) + Advanced Craft (Level 3)	Tunnel Welder	Relevant Apprenticeship at Level 2 or Level 3 or Relevant Welding Competence Qualification at Level 2 or Level 3	Relevant Apprenticeship at Level 2 or Level 3 or Relevant Welding Knowledge Qualification at Level 2 or Level 3			CSCS Skilled Worker or Gold Card TS15 C&G 6151	Records of completing and achieving relevant Welding procedures qualification tests plus record of ongoing testing	Also required Project/Contract specific induction provided by the Principal Contractor
Operative / Craft (Level 2) + Advanced Craft (Level 3)	Tunnel Fabricator	Relevant Apprenticeship at Level 2 or Level 3 or Relevant Fabrication Competence Qualification at Level 2 or Level 3	Relevant Apprenticeship at Level 2 or Level 3 or Relevant Fabrication Knowledge Qualification at Level 2 or Level 3			CSCS Skilled Worker or Gold Card TS15 C&G 6151	Records of completing and achieving relevant Welding procedures qualification tests plus record of ongoing testing, where required H17:117	Also required Project/Contract specific induction provided by the Principal Contractor
Advanced Craft (Level 3)	TBM Operator	Level 3 NVQ Diploma in Tunnelling Operations [Tunnel Boring Machine Operator] Team work and communication. Record and report information Identify the characteristics of Earth Pressure Balance and Slurry TBM used for the construction and formation of tunnels. Carry out function checks for the tunnelling operation and operate TBM hydraulic systems taking account of ground pressure and strata, geological, environmental and material changes. Interpret, analyse and process the TBM visual display and computer data systems to advance the TBM's operation and to identify alignment and rate of advance and adjust TBM settings to maintain alignment. Safely shut down and secure the TBM and record and report information.	Level 3 NVQ Diploma in Tunnelling Operations [Tunnel Boring Machine Operator] Know the relevant legislation and official guidance when building temporary or permanent tunnel linings whilst maintaining safe and healthy working practices. Understand how emergencies should be responded to and when and how health and safety control equipment should be used.	<p><b>Many project Clients, Principal Contractors, Contractors and Employers within the sector have cultural development and/or behavioural based safety programmes</b></p> <p>Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and by observing, correcting and recording unsafe conditions</p>	CSCS - Gold Card TBM manufacturer specific training TS15 C&G 6151	Familiarity with specific TBM operation/method (for Slurry TBM's to include communication protocols with Separation Plant Operatives)	Also required Project/Contract specific induction provided by the Principal Contractor	
Advanced Craft (Level 3)	Tunnel Electrician	Relevant Apprenticeship at Level 3 or Relevant Electrotechnical Competence Qualification at Level 2 or Level 3	Relevant Apprenticeship at Level 3 or Relevant Electrotechnical Knowledge Qualification at Level 2 or Level 3	<p><b>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</b></p> <p>Supervisors should support the programmes and be willing and engaged and should actively encourage involvement of the workforce. They should monitor activities for compliance with written systems of work and required standards and should consistently demonstrate, recognise and reward good practice and appropriate behaviours. Where any shortfalls are identified, a consistent respectful, fair and just approach to dealing with all personnel is required</p>	ECS Installation or Maintenance Electrician Card 18th Edition IEE Regs Qualification TS15 C&G 6151	Hold ECS Registered Electrician Status + maintain record of ongoing CPD	Also required Project/Contract specific induction provided by the Principal Contractor	
Work Supervision (Level 3)	Chargehand / Foreman Fitter	Hold relevant mechanical apprenticeship / competence / knowledge qualifications + Level 3 NVQ Diploma in Occupational Work Supervision (Construction) + Level 2 Certificate in Team Leading			SSSTS CSCS - Gold Card TS15 C&G 6151	EngTech professional registration with IMechE or similar relevant professional body + Record of ongoing CPD	Also required Project/Contract specific induction provided by the Principal Contractor	
Work Supervision (Level 3)	Chargehand / Foreman Electrician	Hold relevant Electrotechnical apprenticeship / competence / knowledge qualifications + Level 3 NVQ Diploma in Occupational Work Supervision (Construction) + Level 2 Certificate in Team Leading			ECS Technician Card C4G 2391 Inspection and Testing Qualification SSSTS TS15 C&G 6151	Hold ECS Registered Electrician Status and/or EngTech professional registration with IET or similar relevant professional body + maintain record of ongoing CPD	Also required Project/Contract specific induction provided by the Principal Contractor	
Work Supervision (Level 3)	Lead Miner / Pit Boss Tunnelling Inspector / NEC Inspector	Hold relevant Tunnelling competence qualification + Level 3 NVQ Diploma in Occupational Work Supervision (Construction) + Level 2 Certificate in Team Leading			SSSTS [SMSTS for Pit Bosses and Inspectors] TS15 C&G 6151	EngTech professional registration with ICE or similar relevant professional body + Record of ongoing CPD	Also required Project/Contract specific induction provided by the Principal Contractor	
Supervisory (Level 4)	Crane Supervisor	CPCS Technical Test A62 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 4 NVQ Diploma in Controlling Lifting Operations - Supervising (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A62 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 4 NVQ Diploma in Controlling Lifting Operations - Supervising (achievement of a Blue CPCS card follows achievement of NVQ)		CPCS Card - Red or Blue TS15 C&G 6151 [if working underground]	Log Book or similar record of supervised lifts	Also required Project/Contract specific induction provided by the Principal Contractor  Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed.	

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Management (Level 5)	Appointed Person for Lifting	CPCS Technical Test A61 - Practical (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 5 NVQ Diploma in Controlling Lifting Operations - Planning Lifts (achievement of a Blue CPCS card follows achievement of NVQ)	CPCS Technical Test A61 - Theory (mapped to the learning outcomes, achievement of a Red CPCS card follows the successful completion of the full Technical Test) or Level 5 NVQ Diploma in Controlling Lifting Operations - Planning Lifts (achievement of a Blue CPCS card follows achievement of NVQ)	<p><b>Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes</b></p> <p>Those in Management and Leadership roles should actively promote and be fully engaged and committed to the programmes. They should set an exceptional personal example and commitment to achieving a positive outcome, and should champion and promote workforce engagement and, recognise and reward good practice and behaviours. They should ensure and monitor that adequate resources and appropriate expectations, targets, standards and requirements are set and adhered to. Managers and Leaders should ensure that all personnel are being treated with respect and engaged in a consistently fair and just manner</p> <p><b>Many project Clients, Principal Contractors, Contractors and Employers within the sector have cultural development and/or behavioural based safety programmes</b></p> <p>Designers should be fully engaged and committed to cultural development, behavioural programmes and CPD. This should include keeping up-to-date with best practise and lessons learned in tunnelling and underground construction worldwide.</p>	<a href="#">SMSTS</a> <a href="#">CPCS Card - Red or Blue</a> <a href="#">ITIS</a> <a href="#">C&amp;G 6151</a>	Log Book or similar record of planned lifts	<p><b>Also required Project/Contract specific induction provided by the Principal Contractor</b></p> <p>Note 1: CPCS Red Trained Operator Card holders must register for the relevant Level 2 Plant Operations NVQ prior to the expiry of the card to upgrade to a Blue card. Note 2: Red Trained Operator cards are valid for two years. A CPCS Blue card via NVQ should infer a reasonable level of experience and that competence has been assessed.</p>
Supervisory and Management (Level 4 to Level 6)	Tunnel Superintendent / Shift Manager / Agent / Sub Agent	ILM Level 3 Qualification in Leadership and Management Practice for the Construction and Built Environment Sector - Award, Certificate or Diploma to include Supervision in Tunnelling Environments or NVQ Level 4 in Construction Site Supervision – Tunnelling or Level 6 NVQ Diploma in Construction Site Management (should include the optional unit - Planning tunnelling activities in the workplace)			<a href="#">SMSTS</a> <a href="#">CSCS Supervisor, Manager, AQP or POP Card</a> <a href="#">ITIS</a> <a href="#">C&amp;G 6151</a>	Appropriate level of professional registration with ICE or similar relevant professional body + Record of ongoing CPD	<p><b>Also required Project/Contract specific induction provided by the Principal Contractor</b></p>
Management (Level 5 to Level 7)	Tunnel Manager Tunnel Project Manager	Competence qualification or educational base at Level 5-7 + Relevant ILM Level 5 Qualification in Leadership and Management			<a href="#">SMSTS</a> <a href="#">CSCS Supervisor, Manager, AQP or POP Card</a> <a href="#">ITIS</a> <a href="#">C&amp;G 6151</a>	Appropriate level of professional registration with ICE or similar relevant professional body + Record of ongoing CPD + Tunnel experience relevant to the type of tunnel being managed	<p><b>Also required Project/Contract specific induction provided by the Principal Contractor</b></p>
Supervisory and Management (Level 3 to Level 7)	Shift Engineer Site Engineer Section Engineer	Competence qualification or educational base at Level 3-7; e.g. Level 3 = A levels/BTEC; Level 4 = HNC; Level 5 = Foundation Degree/HND, Level 6 = Ordinary Degree, Level 7 = Master's Degree			<a href="#">SSSTS for Site/Shift Engineers</a> <a href="#">SMSTS for Section Engineer and above</a> <a href="#">CSCS AQP or POP Card</a> <a href="#">ITIS</a> <a href="#">C&amp;G 6151</a>	Appropriate level of professional registration with ICE or similar relevant professional body + Record of ongoing CPD	<p><b>Also required Project/Contract specific induction provided by the Principal Contractor</b></p>
Technical, Supervisory and Management (Level 3 to Level 7)	Tunnel support staff - surveyors, quality engineers, geotechnical engineers, etc.	Competence qualification or educational base at Level 3-7; e.g. Level 3 = A levels/BTEC; Level 4 = HNC; Level 5 = Foundation Degree/HND, Level 6 = Ordinary Degree, Level 7 = Master's Degree			<a href="#">CSCS Supervisor, Manager, AQP or POP Card</a> <a href="#">ITIS</a> <a href="#">C&amp;G 6151</a>	Appropriate level of professional registration with a relevant professional body + Record of ongoing CPD	<p><b>Also required Project/Contract specific induction provided by the Principal Contractor</b></p>
Design (Level 5 to Level 8)	Design engineers and design-related staff - Site and Office-based	Educational base at Level 5-8; e.g. Level 5 = Foundation Degree/HND, Level 6 = Ordinary Degree, Level 7 = Master's Degree, Level 8 = PHD			<a href="#">For site-based staff - CSCS Supervisor, Manager, AQP or POP Card</a>  For those working in or regularly visiting shafts and tunnels under construction - <a href="#">ITIS</a> <a href="#">C&amp;G 6151</a>	Appropriate level of professional registration with a relevant professional body + Record of ongoing CPD	<p><b>Also required Project/Contract specific induction provided by the Principal Contractor</b></p>

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## Guidance Notes

### Considerations when using the matrix:

1	For non-UK qualifications, employers must map these qualifications against the UK qualifications and requirements defined in matrix tab, to evaluate suitability and currency and identify any skills gaps.
2	The matrix is a live document. It will be regularly updated based on any changes of context and new or updated qualifications and card schemes, as they become available. It will also take into account client and industry feedback.
3	The matrix reflects the CLC recommendation on Industry Card Schemes published in December 2020 that specifies and promotes card schemes carrying the CSCS logo for recognised construction occupations, with no equivalents accepted. The bulk of the tunnelling occupations in the SKATE matrix are directly covered by the CSCS and CPCS card schemes.
4	People can be enrolled on an NVQ but may not have completed it as it takes a period of time to complete the qualification and receive the certification. NVQs cannot be therefore be simply considered as a Y/N response, registration onto the qualification is also part of the process.
5	There can be alternative routes to competence for each occupation. There should be ways available for people to demonstrate this so that alternative routes can be appropriately reviewed.
6	If someone has completed a competence qualification a number of years ago, the currency of this qualification should be checked and assessed to understand if holders need any further support when starting a particular role. The client can ask for clarity of any qualification benchmarking processes used for this.
7	Potential challenges to consider: shortage of NVQs assessors for particular qualifications, poor quality of training, etc. This can be discussed with organisations who are involved and other stakeholders such as Awarding Bodies, training providers, CITB and TunnelSkills.

## Competence & Qualification Levels

### **Competence:**

The information below has been taken from eCOTOOL in March 2020 - [https://www.simongrant.org/pubs/resources/eCOTOOL\\_High\\_Level\\_Competence\\_Model\\_Explanation\\_EN.pdf](https://www.simongrant.org/pubs/resources/eCOTOOL_High_Level_Competence_Model_Explanation_EN.pdf)

<b>Level 1</b>	Abilities at level 1 recognise basic general knowledge and skills as well as the capacity to undertake simple and general tasks under supervision.
<b>Level 2</b>	Abilities at level 2 recognise field-specific practical and theoretical knowledge and skills as well as the capacity to carry out tasks under direction.
<b>Level 3</b>	Abilities at level 3 recognise broader theoretical and practical knowledge and skills as well as the capacity to apply knowledge and skills in developing strategic solutions to well-defined abstract and concrete problems.
<b>Level 4</b>	Abilities at level 4 recognise detailed theoretical and practical knowledge, skills and competences, some of which is at the forefront of the field.
<b>Level 5</b>	Abilities at level 5 recognise highly specialised self-directed, theoretical and practical knowledge and skills as well as the capacity for critical analysis, evaluation and synthesis of new and complex ideas including substantial research.

### **Qualifications:**

Explanations/Examples of qualifications at different level are available at the government website: <https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels>

Cards & Qualifications

Title	Details	Link
ROGEP	Register of Ground Engineering Professionals	<a href="https://www.ice.org.uk/careers-and-training/careers-advice-for-civil-engineers/specialist-professional-registers#RoGEP">https://www.ice.org.uk/careers-and-training/careers-advice-for-civil-engineers/specialist-professional-registers#RoGEP</a>
EFNARC	EFNARC Nozzleman Scheme	<a href="https://efnarc.org/nozzleman-scheme-1">https://efnarc.org/nozzleman-scheme-1</a>
	EFNARC Nozzleman C2 Certificate	<a href="https://efnarc.org/information-efnarc2">https://efnarc.org/information-efnarc2</a>
	EFNARC Examiner Certificate	<a href="https://efnarc.org/examiner-certificate">https://efnarc.org/examiner-certificate</a>
CSCS	Construction Skills Certification Scheme	<a href="https://www.cscs.uk.com/">https://www.cscs.uk.com/</a>
	Labourer	<a href="https://www.cscs.uk.com/card-type/labourer/">https://www.cscs.uk.com/card-type/labourer/</a>
	Apprentice	<a href="https://www.cscs.uk.com/card-type/apprentice/">https://www.cscs.uk.com/card-type/apprentice/</a>
	Experienced Technical Supervisor or Manager	<a href="https://www.cscs.uk.com/card-type/experienced-technical-supervisor-or-manager/">https://www.cscs.uk.com/card-type/experienced-technical-supervisor-or-manager/</a>
	Experienced Worker	<a href="https://www.cscs.uk.com/card-type/experienced-worker/">https://www.cscs.uk.com/card-type/experienced-worker/</a>
	Trainee	<a href="https://www.cscs.uk.com/card-type/trainee-card/">https://www.cscs.uk.com/card-type/trainee-card/</a>
	Skilled Worker	<a href="https://www.cscs.uk.com/card-type/skilled-worker/">https://www.cscs.uk.com/card-type/skilled-worker/</a>
	Advanced Craft	<a href="https://www.cscs.uk.com/card-type/advanced-craft/">https://www.cscs.uk.com/card-type/advanced-craft/</a>
	Supervisor	<a href="https://www.cscs.uk.com/card-type/supervisor/">https://www.cscs.uk.com/card-type/supervisor/</a>
	Manager	<a href="https://www.cscs.uk.com/card-type/manager/">https://www.cscs.uk.com/card-type/manager/</a>
AQP - Academically Qualified Person	<a href="https://www.cscs.uk.com/card-type/academically-qualified-person/">https://www.cscs.uk.com/card-type/academically-qualified-person/</a>	
PQP - Professionally Qualified Person	<a href="https://www.cscs.uk.com/card-type/professionally-qualified-person/">https://www.cscs.uk.com/card-type/professionally-qualified-person/</a>	
CPCS	Construction Plant Competence Scheme - Scheme Booklet for Operators	<a href="https://www.nocnjobcards.org/data/General_Downloads/CPCSschemeBookletforOperators0320.pdf">https://www.nocnjobcards.org/data/General_Downloads/CPCSschemeBookletforOperators0320.pdf</a>
	Plant Operator - Red Trained Operator Card	<a href="https://www.nocnjobcards.org/CPCS/cpcs-red-trained-operator-card/">https://www.nocnjobcards.org/CPCS/cpcs-red-trained-operator-card/</a>
	Plant Operator - Blue Competent Operator Card	<a href="https://www.nocnjobcards.org/CPCS/cpcs-blue-competent-operator-card/">https://www.nocnjobcards.org/CPCS/cpcs-blue-competent-operator-card/</a>
	Plant Tester	<a href="https://www.nocnjobcards.org/CPCS/cpcs-tester-card/">https://www.nocnjobcards.org/CPCS/cpcs-tester-card/</a>
Plant Tester - Scheme Booklet	<a href="https://www.nocnjobcards.org/data/General_Downloads/CPCSschemeBookletforTesters050620.pdf">https://www.nocnjobcards.org/data/General_Downloads/CPCSschemeBookletforTesters050620.pdf</a>	
SSP	Site Safety Plus - Principal Scheme Rules	<a href="https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/principal_scheme_rules.pdf">https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/principal_scheme_rules.pdf</a>
SSSTS	Site Safety Plus - Site Safety Plus - Site Supervisors' Safety Training Scheme	<a href="https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_c_site_supervision_safety_training_scheme_(sssts).pdf">https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_c_site_supervision_safety_training_scheme_(sssts).pdf</a>
SMSTS	Site Safety Plus - Site Managers' Safety Training Scheme	<a href="https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_g_site_management_safety_training_scheme_(smsts).pdf">https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_g_site_management_safety_training_scheme_(smsts).pdf</a>
TSTS	Site Safety Plus - Tunnelling Safety Training Scheme	<a href="https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_o_-_tunnelling_safety_training_scheme_january_2018.pdf">https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_o_-_tunnelling_safety_training_scheme_january_2018.pdf</a>
SEATS	Site Safety Plus - Site Environmental Training Scheme	<a href="https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix%20%20-%20site%20environmental%20awareness%20training%20scheme%20(seats).pdf">https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix%20%20-%20site%20environmental%20awareness%20training%20scheme%20(seats).pdf</a>
TWCTC	Site Safety Plus - Temporary Works Co-ordinator Training Course	<a href="https://www.citb.co.uk/documents/funding/appendix_1_temporary_works_co-ordinator_training_course_twctc.pdf">https://www.citb.co.uk/documents/funding/appendix_1_temporary_works_co-ordinator_training_course_twctc.pdf</a>
TWSTC	Site Safety Plus - Temporary Works Supervisor Training Course	<a href="https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_m_temporary_works_supervisor_training_course_.pdf">https://www.citb.co.uk/documents/training_and_courses/site_safety_plus/scheme_rules/appendix_m_temporary_works_supervisor_training_course_.pdf</a>
City & Guilds 6151	City & Guilds 6151 - Tunnel Entry and Associated Emergency Procedures	<a href="https://www.cityandguilds.com/qualifications-and-apprenticeships/utilities/utilities/6151-tunnel-entry#tab=information">https://www.cityandguilds.com/qualifications-and-apprenticeships/utilities/utilities/6151-tunnel-entry#tab=information</a>
NOCN	National Open College Network	<a href="https://www.nocn.org.uk/">https://www.nocn.org.uk/</a>
NOCN Qualifications	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Sprayed Concrete Lining Tunnelling Nozzleman	<a href="#">NOCN_Cskills Awards Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Sprayed Concrete Lining Tunnelling Nozzleman</a>
	Level 2 NVQ Diploma in Specialist Concrete Occupations (Construction) - Sprayed Concrete	<a href="#">NOCN_Cskills Awards Level 2 NVQ Diploma in Specialist Concrete Occupations (Construction) - Sprayed Concrete</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Tunnelling Operative	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Tunnelling Operative</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Pipejacking/Micro-tunnelling Operative	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Pipejacking/Micro-tunnelling Operative</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Spoil Removal Conveyor Operative	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Spoil Removal Conveyor Operative</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Tunnel Transport Operator	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Tunnel Transport Operator</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Tunnelling Machine Operator	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Tunnelling Machine Operator</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Machine Tunnelling Operative	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Machine Tunnelling Operative</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Shaft Miner	<a href="#">NOCN Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Shaft Miner</a>
	Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Hand Miner	<a href="#">NOCN_Cskills Awards Level 2 NVQ Diploma in Tunnelling Operations (Construction) - Hand Miner</a>
	Level 6 NVQ Diploma in Construction Site Management - Building and Civil Engineering	<a href="#">NOCN Level 6 NVQ Diploma in Construction Site Management - Building and Civil Engineering</a>
	Level 4 NVQ Diploma in Construction Site Supervision - Tunnelling	<a href="#">NOCN_Cskills Awards Level 4 NVQ Diploma in Construction Site Supervision - Tunnelling</a>
	Level 3 NVQ Diploma in Tunnelling Operations - Tunnel Boring Machine Operator (Construction)	<a href="#">NOCN_Cskills Awards Level 3 NVQ Diploma in Tunnelling Operations - Tunnel Boring Machine Operator (Construction)</a>
Level 2 NVQ Certificate In Plant Operations (Construction) - Cranes and Specialist Lifting	<a href="#">NOCN Level 2 NVQ Certificate In Plant Operations (Construction) - Cranes and Specialist Lifting</a>	
Level 2 NVQ Diploma in Controlling Lifting Operations - Slinger/Signaller (Construction)	<a href="#">NOCN Level 2 NVQ Diploma in Controlling Lifting Operations - Slinger/Signaller (Construction)</a>	
Level 4 NVQ Diploma in Controlling Lifting Operations - Supervising Lifts (Construction)	<a href="#">NOCN Level 4 NVQ Diploma in Controlling Lifting Operations - Supervising Lifts (Construction)</a>	
Level 5 NVQ Diploma in Controlling Lifting Operations - Planning Lifts (Construction)	<a href="#">NOCN Level 5 NVQ Diploma in Controlling Lifting Operations - Planning Lifts (Construction)</a>	
ILM	Institute of Leadership and Management	<a href="https://www.ilm.com/">https://www.ilm.com/</a>
ILM Qualifications	Level 2 Certificate in Team Leading	<a href="#">ILM Level 2 Certificate in Team Leading</a>
	Level 3 Qualifications in Leadership and Management Practice for the Construction and Built Environment Sector	<a href="#">ILM Level 3 Qualifications in Leadership and Management Practice for the Construction and Built Environment Sector</a>
	Level 5 Qualifications in Leadership and Management	<a href="#">ILM Level 5 Qualifications in Leadership and Management</a>
Professional Bodies	ICE - Institution of Civil Engineers	<a href="https://www.ice.org.uk/">https://www.ice.org.uk/</a>
	IOM3 - Institute of Materials, Minerals and Mining	<a href="https://www.iom3.org/">https://www.iom3.org/</a>
	IMechE - Institution of Mechanical Engineers	<a href="https://www.imeche.org/">https://www.imeche.org/</a>
	IET - Institution of Engineering and Technology	<a href="https://www.theiet.org/">https://www.theiet.org/</a>
	CICES - Chartered Institution of Civil Engineering Surveyors	<a href="https://www.cices.org/">https://www.cices.org/</a>
	RICS - Royal Institution of Chartered Surveyors	<a href="https://www.rics.org/uk/">https://www.rics.org/uk/</a>
	CIOB - Chartered Institute of Building	<a href="https://ciob.org">https://ciob.org</a>
CIAT - Chartered Institute of Architectural Technologists	<a href="https://architecturaltechnology.com/">https://architecturaltechnology.com/</a>	



**Behavioural, Leadership and Management Courses**

ILM Level 2 Diploma in Team Leading	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-2-diploma-in-team-leading-(combined-qualification)-ilm-q-card,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-2-diploma-in-team-leading-(combined-qualification)-ilm-q-card,-d,-pdf.ashx</a>
ILM Level 3 Diploma for Managers	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-3-diploma-for-managers-mapping-to-team-leader-supervisor-apprenticeship-behaviours,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-3-diploma-for-managers-mapping-to-team-leader-supervisor-apprenticeship-behaviours,-d,-pdf.ashx</a>
ILM Level 4 Qualifications in Leadership and Management	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-4-qualifications-in-leadership-and-management-ilm-q-card,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-4-qualifications-in-leadership-and-management-ilm-q-card,-d,-pdf.ashx</a>
ILM Level 5 Diploma for Leaders and Managers	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-5-diploma-for-leaders-and-managers-mapping-to-operations-departmental-manager-apprenticeship-behaviours,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-5-diploma-for-leaders-and-managers-mapping-to-operations-departmental-manager-apprenticeship-behaviours,-d,-pdf.ashx</a>
ILM Level 6 Award and Diploma in Management	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-6-award-and-diploma-in-management,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-6-award-and-diploma-in-management,-d,-pdf.ashx</a>
ILM Level 7 Qualifications in Leadership and Management	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/ilm_17qlm_v30517,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/ilm_17qlm_v30517,-d,-pdf.ashx</a>
ILM Level 7 Certificate and Diploma in Executive Coaching and Mentoring	<a href="https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-7-certificate-and-diploma-in-executive-coaching-and-mentoring-ilm-q-card,-d,-pdf.ashx">https://www.i-l-m.com/-/media/ilm-website/sharepoint-documents/published-documents/level-7-certificate-and-diploma-in-executive-coaching-and-mentoring-ilm-q-card,-d,-pdf.ashx</a>

**Many project Clients, Principal Contractors, Contractors, Employers and Designers within the sector have cultural development and/or behavioural based safety programmes.**

Operatives at all levels should be engaged in any cultural development programmes and show willingness to take part by consistently demonstrating good practice and reporting positive events and by observing, correcting and recording unsafe conditions

Supervisors should support cultural development programmes and be willing and engaged and actively encourage the involvement of all of the workforce. Supervisors should monitor activities for compliance with written systems of work and required standards and they should consistently demonstrate, recognise and reward good practice and appropriate behaviours. Where any shortfalls are identified, a consistent respectful, fair and just approach to dealing with all personnel is required.

Those in Management and Leadership roles should actively promote and be fully engaged and committed to cultural development programmes. They should set an exceptional personal example and commitment to achieving a positive outcome, and should champion and promote workforce engagement and, recognise and reward good practice and behaviours. They should ensure and monitor that adequate resources and appropriate expectations, targets, standards and requirements are set and adhered to. Managers and Leaders should ensure that all personnel are being treated with respect and engaged in a consistently fair and just manner.

Those in Design roles should be fully engaged and committed to cultural development, behavioural programmes and CPD. This should include keeping up-to-date with best practice and lessons learned in tunnelling and underground construction worldwide.

## TTSG Competence Subgroup in partnership with Tunnelskills

Gerry Keigher	Tunnelcraft	
Mark Thompson	TfL	
Mónica Lobo	Tideway	TTSG subgroup co-chair
Neil Hancox	ALIGN jv	
Paul Gallagher	Joseph Gallagher	
Roger Bridge	Balfour Beatty	
Steve Hails	Tideway	
Tom Lane	Morgan Sindall	TTSG subgroup co-chair
Tomislav Rogan	EDVIRT	

If you have any queries or comments on the matrix please email [tts@britishtunnelling.com](mailto:tts@britishtunnelling.com) or contact TunnelSkills via [chairman@tunnelskills.org](mailto:chairman@tunnelskills.org) or [fto@tunnelskills.org](mailto:fto@tunnelskills.org)