Training Package	Civil Construction (BCC03)	HSC Requirements and Advice
Title	**Drain and dewater site**	
Unit code **BCCCM2004B**	**Unit Descriptor** This unit specifies the competency required to drain and/or dewater civil construction project sites for environmental protection purposes and the control of water which may effect construction. It includes the minimum criteria for competency assessment. This unit includes the drainage of surface water and the dewatering of trenches, excavations, pits, wells, ponds and coffer dams.	**HSC Indicative Hours** 15

Evidence Guide

The Evidence Guide identifies the critical aspects, knowledge and skills to be demonstrated to confirm competency for this unit. This is an integral part of the assessment of competency and should be read in conjunction with the Performance Criteria, the Range Statement, and the Assessment Guidelines of the Training Package.

Specific knowledge required to achieve the performance criteria	Relationship to other units	Specific resource requirements for this unit	HSC Requirements and Advice
A knowledge of: • site and equipment safety requirements • drainage and dewatering • sedimentation controls • grading and levelling • free water • pumps • environmental considerations • construction principles • processes for interpreting engineering drawings • equipment types, characteristics, technical capabilities and limitations • operational, maintenance and basic diagnostic procedures • site isolation and traffic control responsibilities and authorities • Materials Safety Data Sheets and materials handling methods • project quality requirements • civil construction terminology • JSA's/Safe work method statement.	Pre-requisite units are: • BCCCM1001B Follow OH&S policies and procedures. Competency in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.	The following resources should be made available: • workplace location or simulated workplace • materials required to drain and dewater a site • hand and power tools, small plant and equipment appropriate to drain and dewater a site • specifications and work instructions.	**Key Terms and Concepts** • area/s to be dewatered • barriers • clean up • cleaning, maintenance and storage of tools and equipment • communication • construct sump/well • dewatering techniques • discharge of water • drainage systems • environmental protection • features, purpose and operation of tools and equipment • free water • geo-fabrics and woven wire • identify and rectify/report faults • installation of pumps • occupational health and safety (OHS)

Context of assessment	Critical aspects of evidence required to demonstrate competency in this unit	Methods of assessment	HSC Requirements and Advice
The application of competency is to be assessed in the workplace or realistically simulated workplace. Assessment is to occur under standard and authorised work practices, safety requirements and environmental constraints. Assessment of essential underpinning knowledge, other than confirmatory questions, will usually be conducted in an off-site context. Assessment is to comply with relevant regulatory or Australian Standards requirements.	Location, interpretation and application of relevant information, standards and specifications. Compliance with site safety plan, OH&S regulations and State/Territory legislation applicable to workplace operations. Compliance with organisational policies and procedures including quality requirements. *As a minimum, drain surface water from a site using surface drains and dewater a trench or pit, using at least one type of pump on two separate projects.* *Establishment of sedimentation controls for at least one project.* *Construct a sump.* *Safe and effective operational use of tools, plant and equipment.* *Communication and working effectively and safely with others.*	Assessment must satisfy the endorsed assessment guidelines of the Building and Construction industry's Civil Construction Training Package. Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. Assessment must be by direct observation of tasks, with questioning on underpinning knowledge and it must also reinforce the integration of key competencies. Assessment methods must confirm the ability to access and correctly interpret and apply the essential underpinning knowledge. Assessment may be applied under project related conditions (real or simulated) and require evidence of process. Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. Assessment may be in conjunction with assessment of other units of competency, including those listed above.	• project environment management plan • project/site safety plan • quality assurance • safe work practices • sedimentation • sedimentation control barriers • sedimentation controls • signage • silt • site location/s • sub-surface water • surface holes and depressions • surface or submersible pumps • surface water • traffic management plan • waste management • water drainage system • work instructions.

Specific key competencies, underpinning and employability skills required to achieve the performance criteria

These include a number of processes that are learned throughout work and life, which are required in most jobs. Some of these are covered by the national key competencies, although others may be added. The details below highlight how these competencies are to be applied in the attainment of this unit.

Application of the key competencies in this unit are to satisfy the nominated level in which:
Level 1 – relates to working effectively within set conditions and processes;
Level 2 – relates to the management or facilitation of conditions and processes; and
Level 3 – relates to the design, development and evaluation of conditions or process.

How will the candidate apply the following key competency in this unit? **The candidate will need to:**

Collect, analyse and organise information	Level 1	Collect, organise, interpret and understand the information required for the preparation and application of drain and dewater site, including work instructions, quality assurance procedures, manufacturers' instructions, material safety data sheets and equipment instructions
Communicate ideas and information	Level 1	Communicate ideas and information in simple English to enable confirmation of work requirements, passage of information and requests to other workers during operations and the reporting and recording of work outcomes
Plan and organise activities	Level 1	Plan and organise activities associated with the preparation and application of drain and dewater site, including the scheduling and use of equipment, materials and tools to avoid backtracking and rework
Work with others and in a team	Level 1	Work with others and in a team by recognising dependencies and using co-operative approaches to optimise satisfaction and productivity
Solve problems	Level 1	Establish safe and effective work processes which anticipate likely problems and blockages and systematically work around these to avoid or minimise reworking and avoid wastage/damage
Use mathematical ideas and techniques	Level 1	Use mathematical ideas and techniques to correctly calculate time to complete tasks, complete measurements, calculate material requirements and establish quality checks
Use technology	Level 1	Use workplace technology related to determining requirements, the planning and application of drain and dewater site, including the use of calculators, levelling equipment and the reporting/recording of results

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
1 Plan and prepare	1.1 Work instructions, including plans, specifications, quality requirements and operational details relevant to the tasks are obtained, confirmed and applied to the allotted task	The Range Statement provides advice to interpret the scope and context of this unit of competency allowing for differences between enterprises and workplaces. It relates to the unit as a whole and facilitates holistic assessment. The following variables relate to this particular unit: **Unit scope** • Drainage **is to include** but not be limited to graded surface level gutters and ditches excavated manually or by machine and various types of plastic piping • Areas to be dewatered and/or drained **are to include** but not be limited to control of surface water, bores, coffer dam, springs, creeks, wetland water, seepage water in trenches and pits and low lying natural ground where water may not escape • Dewatering techniques **are to include** but not be limited to sumps, wells, submersible pumps, vacuum pumps, surface pumps and sludge pumps • Planning and preparation **is to include** but not be limited to worksite inspection, equipment defect identification, assessment of conditions and hazards and determination of work requirements • Site locations **are to include** but not be limited to road construction sites, excavation projects and construction sites in close proximity of wetlands or active water **Quality Requirements** • Quality requirements *may include* but not be limited to dimensions, tolerances, standards of work and material standards as detailed in the project drawings, specifications and project documentation to meet client satisfaction **Communications** • Communications **are to include** but not be limited to verbal instructions and fault reporting and *may include* two way radio, hand signals, mobile phone, site specific	**Learning experiences for the HSC must address:** A range of sources for work instructions including: • work schedules • job sheet/plans/specifications • organisation/company bulletins/memos • Material Safety Data Sheets (MSDS) • diagrams/sketches/maps • job safety analysis (JSA)/safe work method statements • regulations/legislation • manufacturer/organisation/site guidelines, policies and procedures • Australian Standards. An awareness of various modes of communication to receive work instructions including: • verbal - face-to-face (supervisor to employee) - telephone/mobile phone - two-way radio - on-site meetings • written communication - work plans - memos/messages - job descriptions/statements - workplace forms - rosters - facsimile - email - intranet • non-verbal - gestures - signals - signage - diagrams. Planning and preparation for a range of site drainage and dewatering projects. A basic overview of the role of employees in quality assurance.

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
		instructions, written instructions or instructions related to job/task **Information** Information sources *may include* but not be limited to • verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, charts and hand drawings, memos, maps, material safety data sheets (MSDS) and diagrams or sketches • safe work procedures or equivalent related to draining and dewatering sites • environmental requirements pertaining to draining and dewatering sites • manufacturers' specifications and instructions • organisation work specifications and requirements • instructions issued by authorised organisational or external personnel • relevant Australian Standards	
	1.2 Safety requirements are obtained from the site safety plan and organisational policies and procedures, confirmed and applied to the allotted task	**Safety (OH&S)** • OH&S requirements **are** to be in accordance with State or Territory legislation and regulations, organisational safety policies and procedures, and project safety plan. This *may include* protective clothing and equipment, use of tools and equipment, workplace environment and safety, handling of materials, use of fire fighting equipment, use of first aid equipment, hazard control and hazardous materials and substances • Personal protective equipment **is to include** that prescribed under legislation, regulation and workplace policies and practices • Safe operating procedures **are to include** but not be limited to recognising and preventing hazards associated with underground services, other machines, personnel, traffic control, working in proximity to others, worksite visitors and the public • Hazards and risks *may include* but not be limited to uneven/unstable terrain, trees, fires,	**Learning experiences for the HSC must address:** A basic awareness of occupational health and safety (OHS) regulations and legislation relevant to the construction industry. An awareness of project/site safety plan. An awareness of safe work practices including: • OHS induction training (general, work activity and site-specific) • selection, use and maintenance of personal protective equipment (PPE) • access to appropriate communication devices • selection of appropriate tools for the task • correct use, maintenance and storage of tools, equipment and machinery • correct handling, application, transport and storage of hazardous and non-hazardous materials • safe posture (sitting, standing, bending, twisting and lifting)

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
		• overhead and underground services, bridges, buildings, excavations, traffic, embankments, cuttings, structures and hazardous materials • Emergency procedures related to equipment operation **are to include** but may not be limited to emergency shutdown and stopping, extinguishing equipment fires, organisational first aid requirements and evacuation **Statutory/Regulatory Authorities** • State/Regulatory Authorities *may include* Federal, State and Local Authorities.	• correct manual handling (lifting and transferring) • correct selection and use of fire fighting equipment - fire blanket - fire extinguisher/s - fire hydrant and hose • hazard identification and risk control • basic first aid training and access to first aid kits • access to sufficient drinking water • procedures to follow in the event of an emergency • effective communication and teamwork • adherence to work instructions and organisation/ company policy and standard operating procedures. An awareness of site isolation and traffic control responsibilities and authorities.
	1.3 Signage requirements are identified and obtained from the project traffic management plan and implemented	**Unit scope** • Traffic signs and devices **are to include** but not be limited to temporary warning signs, regulatory and traffic cones. Signs and devices *may include* highway traffic signs, site safety signage, guide signs, warning signs, barriers, hazard markers, portable traffic signals, bollards, arrow boards, vehicle mounted signs, flashing lights, barricades, and traffic conditions signage **Communications** • Communications **are to include** but not be limited to verbal instructions and fault reporting and *may include* two way radio, hand signals, mobile phone, site specific instructions, written instructions or instructions related to job/task **Statutory/Regulatory Authorities** • State/Regulatory Authorities *may include* Federal, State and Local Authorities	**Learning experiences for the HSC must address:** Symbols/abbreviations/terminology to indicate signage requirements on project traffic management plan. Selection and use of standard signage and barricades common to the general construction industry as well as specific to site drainage and dewatering projects: • legislative requirements • meaning of colour and shape • appropriate placement and positioning.

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
	1.4 Plant, tools and equipment selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported	**Tools and Equipment** • Tools and equipment **are to include** but not be limited to hoses, shovels and pumps **Communications** • Communications **are to include** but not be limited to verbal instructions and fault reporting and may include two way radio, hand signals, mobile phone, site specific instructions, written instructions or instructions related to job/task	**Learning experiences for the HSC must address:** General features, purpose, maintenance and working knowledge of a range of site drainage and dewatering tools and equipment. Procedures and documentation for identifying faulty tools and equipment including: • malfunctions • worn, broken or missing components • broken or missing safety guards. An awareness of the signs of poor performance and inefficiency including: • noise • quality of end product • appearance • vibration • rough running • failure to start • presence of smoke and odours • consumption of fuel and other consumables • blockages • amount of maintenance required • time taken to complete the job. The importance of acting within level of authority in terms of: • taking initiative • problem-solving • decision-making. Personnel to whom problems should be reported: • supervisor/manager • supplier/manufacturer. Reporting of serious faults including: • verbal notification to appropriate personnel • recorded on job card/maintenance log • safety/lockout tagging where appropriate. Reasons for safety/lockout tagging including: • ease of identification • evidence of serviceability • preventing use until repaired. Solutions to a range of potential faults.

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
	1.5 Environmental protection requirements are identified from the project environmental management plan, confirmed and applied to the allotted task	**Environmental Requirements** • Environmental requirements **are to include** but are not limited to organisational/project environmental management plan, waste management, water quality protection, noise, vibration, dust and clean-up management **Statutory/Regulatory Authorities** • State/Regulatory Authorities *may include* Federal, State and Local Authorities	**Learning experiences for the HSC must address:** Environmental hazards/threats including: • chemical/gas spillage/leakage • faulty tools, equipment and machinery • flood • fire • wildlife habitat destruction • discharge into waterways • pollution • soil erosion. Consequences of poor environmental planning for the following: • waterways • wildlife habitats • neighbouring properties • roads and amenities. An awareness of project environment management plan. Strategies for minimisation of potential negative environmental impacts including: • environmental hazard identification and risk minimisation and reporting • minimisation strategies - regular maintenance of machinery and equipment - use of biodegradable/non-toxic materials - silt control - habitat protection • re-vegetation and stabilisation • waste minimisation - accurate measurements and calculations - recycling - using recyclable products - resource efficiency • improvement strategies • environmental monitoring • emergency procedures. A basic awareness of the roles and responsibilities of the:

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			• NSW Department of Environment and Conservation [incorporating Environment Protection Authority (EPA)] • local council/government.
2 Position sedimentation control	2.1 Sedimentation controls are positioned according to project environmental management plan	**Environmental Requirements** • Environmental requirements **are to include** but are not limited to organisational/project environmental management plan, waste management, water quality protection, noise, vibration, dust and clean-up management **Materials** • Materials are **to include** but not be limited to various types of plastic piping, silt fences, rocks or straw bales	**Learning experiences for the HSC must address:** Causes of sedimentation including: • disturbance of soil and/or vegetation • loose construction materials on site • water run-off. Awareness of the consequences of poor sedimentation control. Knowledge of symbols, abbreviations and terminology to indicate the position of controls on plans, drawings and specifications. A range of materials to establish sedimentation controls: • pipes • silt fences • rocks • straw bales • stakes/pegs.
	2.2 Sedimentation control barriers are constructed in accordance with the environmental management plan		
	2.3 Geo-fabrics and/or woven wire is positioned according to specification and to the environmental management plan		**Learning experiences for the HSC must address:** Features and correct use of geo-fabrics and woven wire.
3 Remove surface water	3.1 Temporary drainage systems are established to drain or divert surface and sub-surface water to the storm water drainage system	**Unit scope** • Drainage **is to include** but not be limited to graded surface level gutters and ditches excavated manually or by machine and various types of plastic piping • Areas to be dewatered and/or drained **are to include** but not be limited to control of surface water, bores, coffer dam, springs, creeks, wetland water, seepage water in trenches and pits and low lying natural ground where water may not escape	**Learning experiences for the HSC must address:** An awareness of basic diagnostic procedures to identify the need to drain sites. A basic knowledge of the design of: • surface drains • perforated pipe drains • plastic pipe drains. Methods to eliminate silt from drained water before entering storm water drainage.

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
		Materials • Materials **are to include** but not be limited to various types of plastic piping, silt fences, rocks or straw bales	
	3.2 Slab and site surface water are removed and/or directed to the temporary drainage system		**Learning experiences for the HSC must address:** A range of methods for the removal of free water from the site or slab: • broom/squeegee • drains • ditches • buckets • sumps.
	3.3 Surface holes and depressions are filled		**Learning experiences for the HSC must address:** Appropriate materials to fill holes and depressions: • sand • rubble • clean fill • road base • recycled materials.
	3.4 Surface water is drained to drainage system using adequate fall		**Learning experiences for the HSC must address:** Procedures for grading and levelling of ground for adequate drainage.
4 Construct sump/wells	4.1 Sump and/or well is located at the lowest point to be drained to maximise pump efficiency	**Unit scope** • Dewatering techniques **are to include** but not be limited to sumps, wells, submersible pumps, vacuum pumps, surface pumps and sludge pumps	**Learning experiences for the HSC must address:** Understanding site plans/specifications to locate suitable point for sump and related pumps.
	4.2 Sumps and/or wells are constructed to work instructions		
5 Remove water from sumps/wells, trenches and pits	5.1 Surface or submersible pumps are installed	**Unit scope** • Dewatering techniques **are to include** but not be limited to sumps, wells, submersible pumps, vacuum pumps, surface pumps and sludge pumps	**Learning experiences for the HSC must address:** Awareness of manufacturers specifications for the location and installation of pumps with consideration for: • type of pump

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			• rise to outlet • materials being pumped • provision for clear inlet or filtration • discharge to appropriate drain or vessel.
	5.2 Surface pump is located as close as practicable to the sump or well		
	5.3 Water is pumped to temporary drainage system according to the project environmental management plan	**Environmental Requirements** • Environmental requirements **are to include** but are not limited to organisational/project environmental management plan, waste management, water quality protection, noise, vibration, dust and clean-up management	
	5.4 Discharged water is dispersed using approved procedures		**Learning experiences for the HSC must address:** A basic awareness of legislation/regulations and treatments required for discharge or containment of water from the site.
6 Clean up	6.1 Work area is cleared and materials disposed of or recycled in accordance with project environmental management plan	**Materials** • Materials **are to include** but not be limited to various types of plastic piping, silt fences, rocks or straw bales **Environmental Requirements** • Environmental requirements **are to include** but are not limited to organisational/project environmental management plan, waste management, water quality protection, noise, vibration, dust and clean-up management **Statutory/Regulatory Authorities** • State/Regulatory Authorities *may include* Federal, State and Local Authorities	**Learning experiences for the HSC must address:** An awareness of procedures for minimisation of impact on the environment including: • replacing disturbed or removed soil • removal and disposal of non-reusable materials in a responsible manner - work materials - plant debris and other organic matter - chemicals • safe storage of reusable materials in accordance with company policy • containment of loose materials on site (such as mud, dust, litter and waste material). Environmental requirements for dealing with waste including: • recycling - paper-based products - plastic - worn components - metal components - construction materials

Element	Performance Criteria	Range Statement	HSC Requirements and Advice
			- building components • approved disposal of - hazardous material - non-hazardous material.
	6.2 Plant, tools and equipment are cleaned, checked, maintained and stored in accordance with manufacturers' recommendations and standard work practices	**Tools and Equipment** • Tools and equipment **are to include** but not be limited to hoses, shovels and pumps **Environmental Requirements** • Environmental requirements **are to include** but are not limited to organisational/project environmental management plan, waste management, water quality protection, noise, vibration, dust and clean-up management **Statutory/Regulatory Authorities** • State/Regulatory Authorities *may include* Federal, State and Local Authorities	**Learning experiences for the HSC must address:** Clean-up procedures with due consideration to the environment and OHS. A range of cleaning techniques including: • wiping • washing • brushing • sweeping • use of cleaning agents (chemicals, solvents and detergents). Cleaning equipment including • high pressure water cleaner • wet/dry vacuum • brooms and brushes. Tools and equipment cleaning/maintenance requirements as necessary including: • removal of dirt, dust, grease and oil • sharpening • anti-rust treatments • repair/replacement of missing/damaged parts • scheduled servicing • refuel and top-up consumables. An awareness of issues relating to storage of tools and equipment including: • climatic effects • OHS considerations • stability • security • ease of access.