

**Introduction**

**Federal Democratic Republic of Ethiopia**

**Occupational Standard**

**Water Supply and Sanitation Operation NTQF Level iI and iii**



*Ministry of Education*

*february2017*

Ethiopia has embarked on a process of reforming its TVET-System. Within the policies and strategies of the Ethiopian Government, technology transformation – by using international standards and international best practices as the basis, and, adopting, adapting and verifying them in the Ethiopian context – is a pivotal element. TVET is given an important role with regard to technology transfer. The new paradigm in the outcome-based TVET system is the orientation at the current and anticipated future demand of the economy and the labor market.

The Ethiopia Occupational Standard (EOS) is the core element of the Ethiopian National TVET-Strategy and an important factor within the context of the National TVET-Qualification Framework (NTQF).They are national Ethiopian standards, which define the occupational requirements and expected outcome related to a specific occupation without taking TVET delivery into account.

This document details the mandatory format, sequencing, wording and layout for the Ethiopian Occupational Standard comprised of Units of Competence.

A Unit of Competence describes a distinct work activity. It is documented in a standard format that comprises:

* Occupational title, NTQF level
* Unit code
* Unit title
* Unit descriptor
* Elements and Performance criteria
* Variables and Range statement
* Evidence guide

Together all the parts of a Unit of Competence guide the assessor in determining whether the candidate is competent.

The ensuing sections of this EOS document comprise a description of the respective occupation with all the key components of a Unit of Competence:

* chart with an overview of all Units of Competence for the respective level including the Unit Codes and the Unit Titles
* contents of each Unit of Competence (competence standard)
* occupational map providing the technical and vocational education and training (TVET) providers with information and important requirements to consider when designing training programs for this standards, and for the individual, a career path

**UNIT OF COMPETENCE STANDARD CHART**

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** |
| **Occupational Code: EIS WSO** |
| ***NTQF level II***  [EIS WSO2 01 0217](#EIS_WSO2_01)  Construct and Install Water and Wastewater Distribution Assets and Pipelines  [EIS WSO2 03 0217](#EIS_WSO2_03)  Sample And Test Water Quality  [EIS WSO2 02 0217](#EIS_WSO2_02)  Install and repair water services  [EIS WSO2 15 0217](#EIS_WSO2_15)  Standardize and Sustain 3S  [EIS WSO2 14 0217](#EIS_WSO2_14)  Develop Business Practice  [EIS WSO2 09 0217](#EIS_WSO2_09)  Operate and report wastewater pre-treatment processes  [EIS WSO2 10 0217](#EIS_WSO2_10)  Use Maps, Plans, Drawings And Specifications  [EIS WSO2 13 0217](#EIS_WSO2_13)  Work in team environment  [EIS WSO2 05 0217](#EIS_WSO2_05)  Operate water reticulation and distribution system  [EIS WSO2 04 0217](#EIS_WSO2_04)  Operate and maintain water treatment plant and equipment  [EIS WSO2 06 0217](#EIS_WSO2_06)  Install, maintain and replace basic volumetric metering equipment  [EIS WSO2 08 0217](#EIS_WSO2_08)  Maintain tanks and water storage asset  [EIS WSO2 07 0217](#EIS_WSO2_07)  Operate basic flow control and regulating devices in water treatment network systems  [EIS WSO2 12 0217](#EIS_WSO2_12)  Participate in work place communication  [EIS WSO2 11 0217](#EIS_WSO2_11)  Operate application software packages |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** |
| **Occupational Code: EIS WTD** |
| ***NTQF Level III***  [EIS WSO3 01 0217](#EIS_WSO3_01)  Design Basic Water System Model  [EIS WSO3 02 0217](#EIS_WSO3_02)  Install polyethylene pipe laying  [EIS WSO3 03 0217](#EIS_WSO3_04)  Perform leak detection |
| [EIS WSO3 06 0217](#EIS_WSO3_05)  Monitor, operate and control wastewater lagoon processes  [EIS WSO3 05 0217](#EIS_WSO3_03)  Monitor and control rural water distribution operations  [EIS WSO3 04 0217](#EIS_WSO3_02)  Monitor, operate and control water treatment processes  [EIS WSO3 07 0217](#EIS_WSO3_06)  Inspect and maintain public facilities  [EIS WSO3 09 0217](#EIS_WSO3_14)  Disinfect networks asset and respond to blue green algae outbreak  [EIS WSO3 08 0217](#EIS_WSO3_07)  Provide and promote customer service  [EIS WSO3 12 0217](#EIS_WSO3_12)  Monitor, operate and control system of water and wastewater assets  [EIS WSO3 11 0217](#EIS_WSO3_11)  estimate cost of water construction works  [EIS WSO3 10 0217](#EIS_WSO3_12)  Assess household water use and water treatment techniques  [EIS WSO3 13 0217](#EIS_WSO3_13)  Control water quality test in distribution systems  [EIS WSO3 15 0217](#EIS_WSO3_14)  Implement and monitor environmentally sustainable work practices  [EIS WSO3 14 0217](#EIS_WSO3_14)  Use Computer Aided Drafting Systems To Produce Basic Engineering Drawings  [EIS WSO3 16 0217](#EIS_WSO3_16)  Monitor Implementation of Work Plan/Activities  [EIS WSO3 18 0217](#EIS_WSO3_18)  Lead Workplace Communication  [EIS WSO3 17 0217](#EIS_WSO3_17)  Apply Quality Control  [EIS WSO3 21 0217](#EIS_WSO3_20)  Improve Business Practice  [EIS WSO3 19 0217](#EIS_WSO3_21)  Prevent and Eliminate MUDA  [EIS WSO3 20 0217](#EIS_WSO3_19)  Lead Small Teams |

**NTQF level II**

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Construct and Install Water Distribution Assets and Wastewater Pipelines to Grade** |
| **Unit Code** | **[EIS WSO2 01 0217](#EIS_WSO2_01_0217)** |
| **Unit Descriptor** | This unit of competence describes the outcomes required to construct and install water distribution and wastewater collection assets . |

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| **Elements** | **Performance Criteria** |
| 1.Plan and prepare for construction and installation**.** | 1.1 Work requirements for construction and installation of water distribution and wastewater collection system pipes and assets are determined from plans, specifications and instructions.  1.2 Site checks are performed according to legislative and organizational requirements to prevent damage to other utilities.  1.3 Equipment and tools are selected and checked to meet safety and work requirements of task and site.  1.4 Personal protective equipment is selected, fitted and used. |
| 2.Construct and install distribution and collection assets**,** pipes and associated fittings**.** | 2.1 Trenches are excavated and prepared according to specifications and legislative and organizational requirements.  2.2 Bedding or foundation is laid according to specifications.  2.3 Pipes and fittings are inspected, laid or joined according to manufacturer guidelines and organizational requirements.  2.4 Prefabricated components are installed or placed according to manufacturer guidelines, legislative and organizational requirements.  2.5 Excavations are backfilled according to specifications. |
| 3.Confirm work quality**.** | 3.1 Constructed and installed distribution and collection assets, pipes and fittings are checked to ensure that specifications are met.  3.2 Water quality testing results are checked to ensure that organizational requirements are met. |
| 4.Finalize work**.** | 4.1 Equipment, tools and materials are checked, maintained and stored according to manufacturer guidelines and organizational procedures.  4.2 ***Work requirement*** site is restored to meet environmental and organizational requirements.  4.3 Workplace records and as constructed drawings, and process are completed as required. |

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| **Variable** | **Range** |
| Work requirements | May include:   * location and extent of job * risk assessment recommendations * involvement of subcontractors * equipment specifications * materials specifications * utilities location procedures * environmental protection requirements * boundary protection, signage and traffic management |
| Water distribution and waste collection system pipes and assets | May include:   * water mains * services * valves * meters * Distribution and collection system pipe work, including:: * polyvinyl chloride (PVC) * polyethylene * mild steel cement lined * asbestos cement * vitrified clay * ductile iron cement lined * cast iron * copper * glass reinforced piping * fittings, including: * jointing systems for pipe types, e.g. gibault * tapping bands * tension bands * solvent joins * compression ring joints * bolted flanges * catholic protection * structures, including: * meter pits * person access pits * regulators * erosion barriers * head walls * thrust blocks * maintenance holes, chambers, traps or pits * valve chambers |
| Equipment and tools | May include:   * personal protective equipment * hand and power tools * lifting and winching equipment * mechanical excavation equipment * pneumatic and motorised equipment, including: * compressors * pneumatic spades and attachments * motorised cutting equipment * communication equipment |
| Legislative and organisational requirements | May include:   * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| Work requirements | May include:   * location and extent of job * risk assessment recommendations * involvement of subcontractors * equipment specifications * materials specifications * utilities location procedures * environmental protection requirements * boundary protection, signage and traffic management |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * planning work and preparing work site safely * constructing and installing pipes according to specifications and instructions * checking quality of work * clearing work site * completing documentation |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * OHS procedures * personal work site safety * risk factors and potential hazards of construction and installation processes * equipment operation, capacity and limitations * safe use of lasers * use of automatic levels * basic levelling techniques * profiles and boning rods * pipe laying techniques * effects of weather and conditions on operation of site or plant * environmental aspects of construction and installation * component parts * shoring and levelling * construction and installation procedures and materials |
| Underpinning Skills | Demonstrates skills to:   * install components specified for wastewater collection system, including requirements for protection * construct appropriate assets * install junctions and side lines * identify and respond to operational problems * use communication systems * follow plans, instructions, standards and standard operating procedures * perform work-related calculations * use safety equipment and personal protective equipment * use tools and machinery * identify hazards * give and receive instructions * work effectively as part of a team * use literacy skills in regard to verbal and written communication in the workplace * communicate with customers and other employees |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Install and repair water services** |
| **Unit Code** | [EIS WSO2 02 0217](#EIS_WSO2_02_0217) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to install and repair water service pipes running from the main supply to the consumer connection |

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| **Elements** | **Performance Criteria** |
| 1Plan and prepare for service installation**.** | 1.1 Determine work requirements for installation of services from plans, specifications and organizational procedures.  1.2 Determine materials and configuration from plans, specifications and organizational procedures.  1.3 Determine location of other utilities and services according to legislative and organizational requirements.  1.4 Identify and apply system operation requirements.  1.5 Select, fit and use equipment, including personal protective equipment.  1.6 Determine location, size and number of tapings from plans, specifications and organizational procedures. |
| 2Drill and tap main pipe**.** | 2.1 Set up and operate tapping machine according to manufacturer specifications and organizational procedures.  2.2 Install main tap according to specifications and organizational requirements.  2.3 Recognize and correct faults or malfunctions in drilling and tapping.  2.4 Apply corrosion protection measures where required. |
| 3Install conduits under roads and pathways**.** | 3.1 Coordinate installation of conduits with road and path construction.  3.2 Install conduits according to specifications, drawings and organizational requirements. |
| 4Install pipes and fittings**.** | 4.1 Measure pipes and cut to length within acceptable tolerance for length and squareness.  4.2 Prepare pipe ends and make joints according to manufacturer specifications.  4.3 Set out configuration of pipes and fittings according to plans, specifications and organizational requirements, with allowance for thermal movement if required.  4.4 Recognize and correct joining faults or malfunctions.  4.5 Select bedding and backfill material and place according to manufacturer specifications and organizational requirements. |
| 5Maintain water system hygiene**.** | 5.1 Store service pipes and fittings clear of potential pollutants or damaging substances and remove debris or filling from pipes before installation.  5.2 Flush service pipe work before final commissioning.  5.3 Plug pipe openings during work breaks. |
| 6Locate and repair leaks**.** | 6.1 Determine locations of leaks and isolate and dewater.  6.2 Identify and apply electrical safety procedures.  6.3 Identify and apply appropriate repair techniques to maintain integrity of service. |
| 7Test water service**.** | 7.1 Apply test or operational pressures to service and all joints.  7.2 Check pipes, connections and fittings are operable without leakage under test or operational conditions. |
| 8Finalize work**.** | 8.1 Check, maintain and store equipment, tools and materials according to manufacturer guidelines and organizational procedures.  8.2 Restore work site to meet environmental and organizational requirements.  8.3 Complete workplace records and process as required. |

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| **Variable** | **Range** |
| Work requirements | May include:   * confined spaces * lifting and moving materials in a trench |
| Legislative and organisational requirements | May include:   * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| Equipment | May include:   * hand and power tools * lifting and winching equipment * mechanical excavation equipment * pneumatic and motorised equipment * pressure drilling and tapping machines * pipe cutting and bending apparatus * thread cutting equipment * communication equipment * bridging clamps * insulating gloves * personal protective equipment |
| Pipes | May include:   * copper * polybutylene * brass * polyethylene * HDPE * PPR * polyvinyl chloride (PVC) * galvanised steel |
| Joints | May include:   * threaded * electro fusion * push fit * solvent welded * butt welded * compression * silver soldered |
| Fittings | May include:   * tapping bands * main taps * ferrules * ball valves * dirt boxes * meter boxes * Elbow * nipples * union * adaptors(male and female) * collar * reducer * faucet * gate valve * water meter |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * planning work and preparing work site * performing installation and repair tasks according to manufacturer specifications and legislative and organisational requirements * ensuring system hygiene and operational performance * checking work, restoring work site, storing equipment and completing documentation |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * OHS procedures * personal work site safety * risk factors * equipment operation * environmental aspects of service installation * pipe systems and installation requirements * characteristics of pipe materials * work-related calculations * systems' operation * testing systems * corrosion principles applicable to service pipes and fittings * operation of water meters |
| Underpinning Skills | Demonstrates skills to:   * install and repair service pipes and fittings * identify control system faults * use safety equipment and personal protective equipment * use tools and equipment * identify hazards * work effectively as part of a team * perform work-related calculations * identify and respond to operational problems * use communication systems * interpret plans, instructions and procedures * follow procedures and standards * complete documentation * use literacy skills in regard to verbal and written communication in the workplace * communicate with customers and other employees |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | | |
| **Unit Title** | **Sample And Test Water Quality** | |
| **Unit Code** | [EIS WSO2 03 0217](#EIS_WSO2_03_0217) | |
| **Unit Descriptor** | | This unit covers knowledge, skills and attitude competence required to collect and prepare water samples, perform water flow and quality tests, and basic wastewater tests according to specified standards and parameters relevant to water quality standards. This unit supports the attainment of skills and knowledge required for field and operational staff with responsibility for preparing for, conducting and reporting on basic wastewater tests in wastewater treatment and system operations. It also supports those who are preparing to enter or considering entry to the water industry workforce or undertaking assignment and field work related to water research. |

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| **Elements** | **Performance Criteria** |
| 1Conduct water quality sampling | 1.1 Sampling plan documenting required and samples, sampling locations and sampling schedules are developed to meet assignment requirements.  1.2 Appropriate sampling equipment is selected and checked for the task prior to use.  1.3 Samples are collected according to sampling plan and ensure safety procedures are followed to limit hazards and contamination to self, work area and environment.  1.4 Integrity of samples is maintained during sampling and sample containers labeled according to organizational requirements.  1.5 Sample information is checked and recorded.  1.6 Results of repeat sampling are recorded to identify trends. |
| 2Conduct water quality tests | 1. Instructions for conducting and recording water quality tests and plan testing work are received and confirmed according to standard practice. 2. Testing details and plan testing work are confirmed according to legislative and organizational requirements. 3. Required testing equipment are prepared and checked according to organizational requirements. 4. Personal protective clothing and equipment are selected, checked, and used specified for routine tests. 5. Correct samples for testing are identified and recorded. 6. t Water quality tests are conducted according to standard procedures, ensuring that sample integrity is maintained during the testing process. |
| 3Conduct basic waste-water tests**.** | 1. Correct samples for testing are located and identified and abnormal sample characteristics are reported. 2. Basic wastewatertests are conducted according to organizational requirements. 3. Integrity of samples is maintained during testing. 4. Atypical data is identified and appropriate action is taken. |
| 4Finalize work | 1. Records are made according to assignment requirements. 2. Relevant information is recorded according to organizational requirements. 3. Observations or measurements that are outside established organizational guidelines are reported for further action. 4. of samples are disposed and test equipment is cleaned and stored according to organizational procedures. 5. Work area is cleared and restored according to organizational requirements. |

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| **Variable** | **Range** |
| Samples | May include:   * grab, composite or flow-weighted composite samples for:   microbiological testing  testing for chemical and physical characteristics |
| Sampling locations | May include:   * raw water supply, including:   surface water  groundwater   * water distribution and treatment systems |
| Assignment requirements *for* sampling procedures | May include:   * standard procedures * state Environment Protection Authority sampling guidelines * legislative requirements * safety procedures |
| Sampling equipment | May include:   * buckets or wide-mouthed containers * depth samplers * sample dippers * sterile sample containers:   plastic  glass  test-specific (such as acid washed)   * weighted sample bottles * dip tubes * composite and discrete automatic samplers * equipment for preservation of samples, including:   refrigeration  cool storage devices  screw top containers  containers for storing and carrying samples safely |
| Integrity of samplesis maintained | May include:   * application of correct:   holding time  storage procedures  sub-sampling procedures   * sub-sampling procedures may include application of correct: * holding time * storage procedures * sub-sampling procedures |
| Plan testing work to address a range of requirements | May include:   * timelines * communication with other team members and individuals * interpretation of organisational and statutory requirements * locations, such as:   on-site testing  field-based testing  laboratory   * range of testing procedures and techniques that applies to organisational, plant or field sites * variety of samples to be tested * testing equipment to be used * test reporting systems |
| Standard practice for testing procedures | May include:   * standard procedures for testing * equipment manufacturers' operations manuals * methods recommended by Ethiopian Public Health professionals reference document: 'Standard methods for the examination of water and wastewater' * safety procedures, including: * risk and hazard assessment * safe handling of samples and chemicals * use of personal protective clothing and equipment * relevant organisational policies * local authority regulations and federal, state legislative requirements |
| Basic water quality tests | May include:   * the range of tests required for competent performance of work tasks in an organisational context, and should comprise at least the following types of test: * pH * temperature * electrical conductivity * microscopy * turbidity * colour * chlorine residue * jar testing * alkalinity * hardness * dissolved oxygen * thirty minute settle ability * settle able solids concentration (cone test) |
| Testing details | May include:   * locations, including: * on-site testing * field-based testing * laboratory * range of testing procedures and techniques that apply to organisational, plant or field sites * variety of samples to be tested * testing equipment * test reporting systems |
| Planning of testing work | May include:   * interpretation of instructions and directions * timelines * interaction and communication with team members and individuals * interpretation of legislative and organisational requirements |
| Legislative and organisational requirements | May include:   * relevant legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| Testing equipment | May include:   * portable meters, such as: * pH meters * electrical conductivity meters * thermistors * comparators * pocket colorimeters * dissolved oxygen meters * test kits * microscopes * thermometers * Imhoff cones * graduated cylinders and settling apparatus |
| Abnormal sample characteristics | May include:   * insufficient sample volume * odour * visible contaminants, such as: * scum * debris * discolouration |
| Atypical data | May include:   * results that fall outside organisational range requirements * results that fall outside legislated range requirements |
| Records | May include:   * sample records, field detail sheets or chain of custody forms, including information such as: * time sample was taken * details of person collecting sample * sample point * volume of sample * data gathered at time of collection * pre-treatment * preservation * instructions to transporters * time and logging of sample receipt and testing * visual observations * equipment identification * atypical results * test results |
| Information | May include:   * time and logging of sample receipt and testing * visual observations * equipment identification * atypical results * test results |

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| **Evidence Guide** | |
| Critical aspects of Competence | Must confirm appropriate knowledge and skills in:   * identifying potential hazards in water sampling * planning and organising sampling and testing assignment * preparing, checking and using appropriate sampling and testing equipment and personal protective clothing and equipment correctly * understanding and applying procedures for water sampling and testing * interpreting testing requirements and procedures * conducting at least three different tests safely while maintaining the integrity of samples * recording all relevant information, determining and reporting accurate and relevant results from testing |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * relevant policies, procedures, standards and organisational requirements * types and purposes of water samples * procedures and techniques for water sampling * sub-sampling and basic wastewater test methods * abnormal characteristics of water samples * requirements for maintaining sample integrity * range and purpose of basic water quality testing * test procedures * procedures for the use of instruments and other field-testing equipment * maintenance and storage of reagents * procedures for disposal of excess water samples and wastes * relevant task-related calculations * assignment planning processes * atypical test result data * documentation procedures for test results |
| Underpinning Skills | Demonstrate skills to:   * prepare, collect, label and preserve water samples * dispose of waste and spent samples correctly * conduct sub-sampling * plan work activities * interpret work requirements * follow plans and instructions * apply procedures and standards * calibrate and operate/ use testing equipment * use personal protective clothing and equipment * conduct basic water quality and wastewater tests * work effectively as part of a team * perform relevant work/ task-related calculations * produce reports and logs * communicate effectively (literacy skills for verbal and written) in the workplace |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Operate and maintain water and waste water treatment plant and equipment** |
| **Unit Code** | **[EIS WSO2 04 0217](#EIS_WSO2_04_0217)** |
| **Unit Descriptor** | This unit of competency describes the outcomes required to operate and maintain water and wastewater treatment processes within domestic and industrial in urban and rural areas. The ability to operate water and wastewater treatment processes and to ensure that wastewater disposal or re-use meets licensing requirements is essential to performance |

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| **Elements** | **Performance Criteria** |
| 1Operate water and waste treatment processes | 1.1 Identify reasons and requirements for treatment of water and waste water.  1.2 Identify major components of Waste water and water treatment processes.  1.3 Identify and apply practices undertaken in water and waste water treatment processes.  1.4 Operate mechanical equipment used in water and waste water treatment according to manufacturer specifications and organizational requirements.  1.5 Handle, use, store and dose chemicals according to organizational procedures. |
| 2Maintain items of equipment used in water and waste water treatment processes**.** | 2.1 Identify maintenance requirements and schedules according to standard operating procedures.  2.2 Complete maintenance and cleaning requirements of equipment. |
| 3Follow safety requirements for work in a water and waste water treatment plant**.** | 3.1 Identify and record hazards of working in a water treatment plant.  3.2 Identify and record operational requirements for the safe and effective use of equipment.  3.3 Select, fit and use safety equipment, including personal protective equipment.  3.4 Identify and apply safe work practices when handling chemicals and working in a water and waste water treatment plant. |
| 4Complete documentation**.** | 4.1 Complete records required for effective operation of a water treatment plant according to organizational requirements.  4.2 Identify and record range of data routinely collected.  4.3 Identify data that falls outside normal operating parameters and report for further action. |

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| **Variable** | **Range** |
| Reasons and requirements | May include:   * ensuring conformity with standards and guidelines, including Ethiopia Drinking Water and waste water Guidelines * removal of impurities, contaminants and pollution * Removing impact of impurities on water treatment processes, environment and public health * relevant environmental protection and water legislation and regulations relating to water , environment and trade waste agreements * hazard analysis critical control point (HACCP) operational philosophy |
| Water and waste treatment processes | May include:   * screens * coagulation and flocculation * sedimentation clarification * dissolved air flotation * granular and membrane filtration * disinfection * aeration and oxidation * fluoridation * grit removal * thickening and dewatering * anoxic processes * sludge digestion * suspended and fixed media aerobic bioreactor processes * anaerobic processes * lagoons and wetlands * gas scrubbers * biosolids and effluent disposal and re-use * dilution * reverse osmosis * ion exchange * activated carbon adsorption * calibration of dosing equipment * softening * backwash water treatment |
| Mechanical equipment | May include:   * pump * centrifugal * positive displacement * airlift * blowers and compressors * mixers and chemical batching facilities * control valves * electronic digital monitoring systems * recording systems * chemical testing and analysis equipment * communication equipment * flow meters * alarms and process control systems * centrifuge * belt filter press * screens, including raked bar screens * manual or hydraulic equipment |
| Chemicals | May include:   * lime * soda ash * aluminium and iron coagulants * polymers * chlorine * fluoride * carbon dioxide |
| Reasons and requirements | May include:   * ensuring conformity with standards and guidelines, including Ethiopia Drinking Water and waste water Guidelines * removal of impurities, contaminants and pollution * Removing impact of impurities on water treatment processes, environment and public health * relevant environmental protection and water legislation and regulations relating to water , environment and trade waste agreements * hazard analysis critical control point (HACCP) operational philosophy |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * applying water and Waste Water treatment processes, including operating mechanical equipment * using chemicals safely and according to organisational procedures * conducting regular routine inspection of mechanical equipment * identifying hazards and applying appropriate safety procedures * gathering and recording data * reporting anomalies |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * water cycle * sources and characteristics of water and waste water * uses of water, both domestic and industrial * physical, chemical and microbiological characteristics of water within the water and waste water treatment process * water quality characteristics * reasons for water and waste water treatment * types of water and waste water treatment plants and processes * major chemicals and equipment used * water and waste water treatment plant hazards * safety equipment * reasons for data and information collection |
| Underpinning Skills | Demonstrates skills to:   * apply policies, procedures and standards * recognise and report operational problems * use safety equipment and personal protective equipment * collect and test samples * interpret material safety data sheets (MSDS) * receive and apply instructions * use literacy skills in regard to verbal and written communication in the workplace * communicate with other employees and people that interact within work environment |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Operate water reticulation, distribution and bulk water transfer system** |
| **Unit Code** | **[EIS WSO2 05 0217](#EIS_WSO2_05_0217)** |
| **Unit Descriptor** | This unit of competency describes the outcomes required to operate and adjust water reticulation and distribution system devices and monitor and operate bulk water transfer systems to meet organisational requirements. |

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| **Elements** | **Performance Criteria** |
| 1Establish system constraints and prepare work site**.** | 1.1 Determine system layout and operational problem areas.  1.2 Plan work required to operate and adjust water reticulation  system according to legislative and organizational requirements.  1.3 Work requirements for operation and monitoring of bulk water transfer systems are determined in line with specifications and instructions.  1.4 Site check is performed to prevent damage to other utilities  and the environment, according to legislative and  organizational requirements  1.5 Select and check equipment and personal protective equipment to meet safety requirements of task and site.  1.6 Identify and locate isolation valves and hydrants and follow standard organizational procedures for their operation.  1.7 Pumping stations are identified and correct operating  procedures followed |
| 2Monitor system performance and usage | 2.1 Routine monitoring programs are conducted according to organizational maintenance schedules  2.2 Identify fluctuations in supply, system changes, community demands and water quality complaints.  2.3 Collect and report data on system performance and usage according to organizational requirements.  2.4 Water samples are collected and recorded according to  organizational requirements |
| 3Regulate flow**.** | 3.1 Flow regulating systems are monitored and adjusted to meet demand requirements, according to organizational procedures.  3.2 Flows are regulated and diverted to facilitate repair or emergency activities  3.2 Isolation and inspection of transfer systems are conducted |
| 4Regulate pressure**.** | 4.1 Monitor and adjust pressure to meet optimum delivery.  4.2 Investigate pressure fluctuations and report according to legislative and organizational requirements.  4.3 Document and report reticulation and distribution information according to organizational procedures. |

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| **Variable** | **Range** |
| Water reticulation system | May include:   * scours * chambers * hydrants * sluices * valves * main taps * fire services * service reservoirs |
| Legislative and organisational requirements | May include:   * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| bulk water  transfer systems | May include:   * in-line pumping stations * high and low range pumps * incline meters * scour chambers and air valves * service reservoirs * pipes, including: * polyvinyl chloride (PVC) * polyethylene * mild steel cement lined * ductile iron cement lined * cast iron cement lined * asbestos cement * copper * glass reinforced piping * structures, including: * pumping stations * meter pits * person access chambers or pits * valve chambers * regulators * erosion barriers * head walls * thrust blocks |
| Equipment | May include:   * hand and power tools * lifting equipment * on- and off-road vehicles * metering equipment * sluices * control devices * portable pumps * communication equipment * disinfection and sampling equipment * gas detection equipment * rescue equipment * appropriate personal protective equipment |
| Flow regulating systems | May include:   * valving systems, such as: * sluice * gate * blade * non-return * electronic and manual controlling systems * service reservoirs |
| Adjustment | May include:   * use of rating tables to determine: * release rates * valve positions |
| Regulation | May include:   * Pumping systems * centrifugal * submersible * positive displacement * valving systems, including: * sluice * gate * blade * non-return * electronic and manual controlling systems * service reservoirs |
| Pressure fluctuations | May include:   * high * low * outside acceptable limits |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * identifying conditions of system * preparing work site * monitoring system performance and usage * monitoring and diverting flow * monitoring and regulating pressure * monitoring transfer system performance * collecting and recording data * regulating water flow |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * impact of the principles of hydraulics on the operation of flows * system layout and performance * standard operating procedures * water hammer * water quality and disinfection requirements * environmental aspects of operation * electrical safety for disconnecting and changing meters and fittings * lock-out procedures for mechanical and electrical installations * organisational communication systems * hazardous materials handling * landscape and ground structure of work area * risk factors and potential hazards of operating water distribution systems * conditions for connection to live water mains * equipment operation, capacity and limitations * effects of weather and conditions on systems, site or plant * control systems * relevant utilities and service bodies |
| Underpinning Skills | Demonstrates skills to:   * identify and respond to operational problems * operate bulk water systems * collect data * produce reports and logs * use safety equipment and personal protective equipment * use tools and machinery * follow plans, charts and instructions * perform work-related calculations * work effectively as part of a team * apply procedures and standards * communicate with employees and customers * use communication equipment * install and operate a stand pipe or fire plug * record water losses * give and receive instructions * communicate effectively with utilities and service bodies * identify system faults * identify hazards * use literacy skills in regard to verbal and written communication in the workplace * implement remedial action to maintain supply |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Install, maintain and replace basic volumetric metering equipment** |
| **Unit Code** | **[EIS WSO2 06 0217](#EIS_WSO2_06_0217)** |
| **Unit Descriptor** | This unit of competency describes the outcomes required to install and replace basic volumetric metering equipment for domestic, industrial and commercial premises. The unit also includes the identification of defects and the reporting, replacement and adjustment of metering equipment. |

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| **Elements** | **Performance Criteria** |
| 1Plan and prepare to install or replace basic volumetric metering equipment**.** | 1.1 Determine work requirements and work site boundaries from specifications or instructions.  1.2 Plan work according to job and safety requirements using relevant plans, drawings, standards and technical data.  1.3 Select and use electrical safety equipment according to legislative and organizational requirements.  1.4 Check coordination issues, including permission to access third-party sites, isolations and permits to work with relevant personnel.  1.5 Identify, check and prepare materials, equipment and resources required to satisfy job plan according to organizational requirements.  1.6 Identify basic metering equipment and recognize specifications for operation.  1.7 Select, fit and use personal protective equipment. |
| 2Read metering equipment**.** | 2.1 Read meters according to the organization's operational requirements.  2.2 Report readings outside normal parameters and faulty meters and apply organizational procedures for estimating consumption.  2.3 Collect and report information on performance metering equipment according to organizational requirements. |
| 3 Finalize work and complete documentation. | 3.1 Check, maintain and store equipment, tools and materials according to manufacturer guidelines and organizational requirements.  3.2 Restore work site to meet environmental and organizational requirements.  3.3 Maintain compliance reports and relevant workplace records as required. |

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| **Variable** | **Range** |
| Safety requirements | May include:   * where relevant, meeting requirements to work in confined spaces and at heights * use of appropriate personal protective equipment * organisational electrical safety procedures * adherence to OHS policies, and statutory and regulatory requirements |
| Legislative and organisational requirements | May include:   * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| Basic metering equipment | May include:   * domestic * industrial * commercial * volumetric metering equipment |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * planning and preparing for installation or replacement of basic volumetric metering equipment * installing or replacing meters * reading meters and report faults * completing reports |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * relevant utilities and service bodies * organisation's communication systems * materials handling * environmental, landscape and ground structure of water and wastewater systems * risk factors and potential hazards involved with water systems * equipment operation, capacity and limitations * effects of weather and conditions on site * meter types * equipment placement and operation * metering measurement procedures * data collection and recording system * lock-out procedures for mechanical and electrical installations |
| Underpinning Skills | Demonstrates skills to:   * identify and respond to operational problems * produce reports and logs * operate communications equipment * give and receive instructions * follow plans, charts and instructions * perform work-related calculations * use safety equipment and personal protective equipment * communicate with customers and other employees * work effectively as part of a team * use literacy skills in regard to verbal and written communication in the workplace * secure metering devices |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Operate basic flow control and regulating devices in water treatment network systems** |
| **Unit Code** | **[EIS WSO2 07 0217](#EIS_WSO2_07_0217)** |
| **Unit Descriptor** | This unit of competency describes the outcomes required to operate basic flow control and regulating devices in water or wastewater treatment network systems. |

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| **Elements** | **Performance Criteria** |
| 1 Monitor required flows in water or wastewater treatment network systems**.** | 1.1 Apply operating parameters and requirements for flows in water or wastewater treatment network systems.  1.2 Use equipment to support the monitoring process in water or wastewater treatment network systems according to OHS, organizational and manufacturer requirements.  1.3 Monitor, measure and record flows at designated locations and systems according to agreed schedule and procedures.  1.4 Identify potential operational problems in water or wastewater treatment network systems and provide proactive advice to relevant personnel. |
| 2 Regulate flows in water or wastewater treatment network systems**.** | 2.1 Adjust flow regulation and control mechanisms in water or wastewater treatment network systems to increase and decrease flow according to organizational procedures.  2.2 Secure flow regulation devices in water or wastewater treatment network systems to maintain a constant flow and meet legislative and organizational requirements. |
| 3 Record and report system adjustments**.** | 3.1 Produce information relating to flow adjustments in water or wastewater treatment network systems according to organizational procedures.  3.2 Collect, record and report information on flows and abnormalities in water or wastewater treatment network systems according to organizational requirements. |
| 4 Respond to contingencies**.** | 4.1 Identify and assess potential risks and contingencies in operation of flow control and regulating devices within water or wastewater treatment systems.  4.2 Identify and apply organizational standards and procedures for responding to potential and actual risks and contingencies.  4.3 Apply organizational standards and procedures for informing relevant personnel of potential risks within the organization. |

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| **Variable** | **Range** |
| Equipment | May include:   * personal protective equipment * electronic digital monitoring and metering systems * basic hand and power tools * valves, pumps and flow meters * mechanical meters and flow devices * hydrants * recording systems * communication equipment, including: * two-way radio * telephone * fax * internet * lifting and winching equipment * on- and off-road vehicles |
| monitored***,*** measured and recorded | May include:   * interaction and communication with other employees, other authorities and general public * visual observation * implementation of reporting procedures that may also include procedures for implementation of by-laws, organisational policies and statutory requirements |
| Designated locations and systems | May include:   * urban locations * rural locations * ground and surface water source systems * wastewater collection and transfer systems * trade waste systems |
| Flow regulation***:*** | May include:   * valuing systems, including: * sluice * blade * gate * non-return * pressure reducing * supervisory control and data acquisition (SCADA) systems * pumping systems, including: * centrifugal * Archimedes screw type * submersible * positive displacement * electronic and manual controlling systems * service reservoirs |
| Legislative and organisational requirements | May include:   * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * identify flow requirements * prepare for and conduct flow monitoring * identify and report operational problems * adjust and regulate flows according to organisational requirements * complete records and reports |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * impact of the principles of hydraulics on the operation of flows * system layout * role of relevant utilities and service bodies * risk factors and potential hazards * equipment operation, capacity and limitations * effects of weather and conditions on operation of system and site * system flow control mechanisms * relevant lock-out procedures for mechanical and electrical installations |
| Underpinning Skills | Demonstrates skills to:   * collect and report system performance information * adjust and maintain flow system control mechanisms * secure flow regulation devices * use literacy skills in regard to verbal and written communication in the workplace * use personal protective equipment |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Maintain tanks and water storage asset** |
| **Unit Code** | [EIS WSO2 08 0217](#EIS_WSO2_08_0217) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to maintain and repair tanks and water storage assets, including reservoirs, balancing storages, sand dams and ring dams |

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| **Elements** | **Performance Criteria** |
| 1Plan and prepare for work**.** | 1.1 Determine work requirements for maintenance and repair of tanks and water storage assets from specifications and instructions.  1.2 Plan work according to job requirements using relevant plans, drawings, standards and technical data.  1.3 Check coordination issues with relevant personnel, including isolations and permits to work.  1.4 Identify, check and prepare materials, equipment and resources required to satisfy job plan according to legislative and organizational requirements.  1.5 Select, fit and use personal protective equipment. |
| 2Clean and maintain water tanks and water storage assets**.** | 2.1 Monitor, operate and tag flow-regulating devices to isolate tanks according to organizational requirements.  2.2 Use safety equipment and follow safety procedures for entry into storages.  2.3 Carry out de-silting processes and clean and flush assets according to organizational requirements.  2.4 Repair minor structural damage to storage assets and tanks and identify and report major faults according to organisational procedures.  2.5 Check and operate flow-regulating devices to return tank to service.  2.6 Check maintenance and repairs to tanks and water storage assets to ensure specifications are met.  2.7 Check level sensing equipment and alarms to ensure effective operation. |
| 3Review**,** report and record work**.** | 3.1 Check, maintain and store equipment, tools and materials according to manufacturer guidelines and organizational procedures.  3.2 Restore work site to meet environmental and organizational requirements.  3.3 Maintain workplace records as required. |

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| **Variable** | **Range** |
| Work requirements | May include:   * work site boundaries * types of tanks and assets to be maintained or repaired * methods to be used * risk assessment and preventative measures |
| Tanks and water storage assets | May include:   * pipes * valves * controlling equipment of polyvinyl chloride (PVC) * polyethylene * mild steel cement lined * ductile iron cement lined * cast iron cement lined * asbestos cement * copper * glass reinforced piping * structures, including: * meter pits * person access chambers or pits * valve chambers * regulators * erosion barriers * head walls * thrust blocks * fittings, including: * hydrants * Elbows * Coupling or union * adapter * sluices * scours * main taps * jointing systems for pipe types, e.g. gibault * tapping bands * tension bands * solvent cement joints * compression ring joints * bolted flanges * electro fusion * welded * cathodic protection |
| Equipment | * hand and power tools * lifting and winching equipment * mechanical excavation equipment * pneumatic and motorised equipment, including: * compressors * pneumatic spades and attachments * motorized cutting equipment * on- and off-road vehicles * portable pumps * communication equipment * breathing apparatus * gas detection equipment * rescue equipment * appropriate personal protective equipment |
| Legislative and organisational requirements | * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organisational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * planning and preparing work site * performing maintenance and repair tasks according to manufacturer specifications and organisational requirements * checking work, restoring work site, storing equipment and completing documentation |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * system hydraulics basics * system layout * environmental aspects of maintenance * lock-out procedures for mechanical and electrical installations * relevant utilities and service bodies * communication systems * hazardous materials handling * material safety data sheets (MSDS) * landscape and ground structure of work area * risk factors and potential hazards of maintenance processes * equipment operation, capacity and limitations * control systems * pipes and fittings * disinfection of systems and chemical usage |
| Underpinning Skills | Demonstrates skills to:   * maintain structures, fittings and assets * conduct earthworks * identify and respond to operational problems * produce reports and logs * use safety and personal protective equipment * use tools and equipment * follow plans and instructions * perform work-related calculations * apply procedures and standards * communicate with employees and customers * work effectively as part of a team * use communication systems * give and receive instructions * identify system faults * use literacy skills in regard to verbal and written communication in the workplace * identify hazards |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Operate and report wastewater pre-treatment processes** |
| **Unit Code** | **[EIS WSO2 09 0217](#EIS_WSO2_09_0217)** |
| **Unit Descriptor** | This unit of competence describes the outcomes required to operate and report on wastewater pre-treatment processes, including separation processes such as screens and grit removal, used in industrial or domestic wastewater treatment plants prior to biological treatments |

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| **Elements** | **Performance Criteria** |
| 1.Plan and prepare for work | 1. Work requirements are determined from specifications and instructions. 2. Potential risks are identified and reported to self, other employees, public and environment. 3. Work site equipment, tools and safety materials are selected and checked as appropriate to meet task and safety specifications. 4. Personal protective equipment is selected, fitted and used according to organizational requirements. |
| 2.Monitor pre-treatment processes | 1. Routine plant inspections are carried out according to standard operating procedures. 2. Processes are monitored to maintain parameters of operation. 3. Process samples are collected and standard tests conducted. 4. Process data are collected, recorded and reported according to organizational and plant requirements. 5. Process faults and operational condition of plant are identified and reported according to organizational requirements. |
| 3.Operate pre-treatment processes | 1. Pre-treatment processes are operated according to specifications and organizational procedures. 2. System adjustments are initiated to enhance system performance according to system specifications and organizational procedures. 3. Chemicals are handled, used, stored and dosed according to organizational procedures. |
| 4.Review**,** report and record work | 1. Equipment, tools and materials are checked, maintained and stored according to manufacturers’ guidelines and environmental and organizational procedures. 2. Reports from plant and system data are compiled to meet organizational requirements. 3. Observations outside defined parameters are reported for further action. |

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| **Variable** | **Range** |
| Equipment***,*** tools and safety materials | May include:   * electronic monitoring and metering systems * recording systems * basic hand and power tools * sampling and laboratory testing and equipment * computerised equipment * communication equipment * personal protective equipment |
| Organizational requirements | May include:   * codes of practice, associated standards and guidance material * documented organizational policies, manuals and induction programs which may refer to legislation and/or regulations * relevant community planning and development agreements, such as land care agreements |
| Routine plant inspections | May include:   * interaction and communication with other employees, other authorities and general public * visual observation * identification of corrosion damage |
| Processes | May include:   * screening * gravity and aerated grit chambers * gross pollution traps * removal and disposal of screenings * shredding * odour removal * oily water separators * riffle plate separators |
| Tests | May include:   * settling tests * pH * dissolved oxygen * suspended solids * chemical oxygen demand |
| System adjustments | May include:   * pH correction * dissolved oxygen levels * flow control * screen rotation frequency * solids removal * chemical additions |
| Reports | May include:   * plant performance data * chemical usage |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * planning and preparing for work * collecting and labelling samples and performing tests * inspecting plant and monitoring processes * collecting and recording data * operating and adjusting processes * recording all required information |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * principles of and need for effective pre-treatment * system layout * lock-out procedures for mechanical and electrical installations * policies, procedures and legislation applied to wastewater pre-treatment processes * relevant utilities and service bodies * communication systems * work-related calculations * chemicals for odour or pH control * hazardous materials handling * environment, landscape and ground structure of work area * risk factors and potential hazards related to water or wastewater treatment * chemical dosing processes * equipment operation, capacity and limitations * pumping and valving systems * control systems * impacts of hydraulic loads on processes |
| Underpinning Skills | Demonstrates skills to:   * identify and report operational problems * produce reports and logs * use safety and personal protective equipment * follow plans, charts, specifications and instructions * sample and test process stream * perform work-related calculations * apply procedures and standards * communicate with employees and customers * work effectively as part of a team * use communication equipment * give and receive instructions * identify control system faults * use literacy skills in regard to verbal and written communication in the workplace * sample and test products |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and sanitation operation Level II** | |
| **Unit Title** | **Use** **Maps, Plans, Drawings And Specifications** |
| **Unit Code** | **[EISWSO2 10 0217](#EIS_WSO2_10_0217)** |
| **Unit Descriptor** | This unit of competence covers knowledge, skills and attitudes required to read and interpret maps, plans, technical drawings and specifications; and identify the drawing requirements, prepare a simple map or plan, making changes to engineering drawings, preparing an engineering parts list and issuing the drawings applying to any of the full range engineering and applied sciences disciplines. It includes the identification of types of plans and drawings and their functions, the recognition of commonly used symbols and abbreviations, the identification of key features and specifications on a site plan, the comprehension of written job specifications and the recognition of document status and amendment detail. The unit applies to the field and operational staff involved in mechanical, electrical/ electronic, fabrication, construction, and fluid power construction and maintenance or repair of assets work environment, such as plants, waterworks, infrastructure and an automotive environment. |

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| **Elements** | **Performance Criteria** |
| 1Interpret maps**,** plans and drawings | 1. Find out what types of maps, plans and drawings and specifications are used to support work tasks. 2. Parts of work systems and their interrelationship on a range of drawing types are identified. 3. key features of maps and site plans and commonly used symbols and abbreviations are checked and interpreted. 4. Function of the legend is identified and explained. 5. Natural and man-made features on maps, plans and drawings are checked and explained. 6. Environmental requirements and controls are identified from job plans, specifications and environmental plan. |
| 2. Read and interpret engineering drawings and specifications**.** | 1. Symbols, codes, legends and diagrammatic representations in the drawing are identified correctly with ***relevant personnel*** 2. Job specifications are identified from drawings, notes and descriptions. 3. Standards of work, finishes and tolerances are identified from the project specifications. 4. Material specifications/finish and dimensions/ tolerances are identified as appropriate to field of employment. 5. Components, assemblies or objects are identified as required. 6. Specifications are related to particular maps and plans and identify quality standards. 7. Types of details from works specifications are identified and determined. 8. Product/system/component/item represented by the drawing correctly is identified with relevant personnel |
| 3Draw a map or plan | 1. Requirements and purpose of drawing are ddetermined from customer and/or work specification and associated documents. 2. All data necessary to produce the drawing are identified and collected 3. Drawing requirements are confirmed with relevant personnel and timeframes for completion is established 4. Product/system/component/item to be manufactured/ modified is identified 5. . A simple map or plan, including selecting tools and equipment and a workable scale, key and abbreviations is prepared. 6. Real world measurements are taken and features on a drawing are recorded. 7. Field notes and measures are used to draw a local area map. 8. Legend is located on project drawings, and symbols and abbreviations are correctly interpreted. |
| 4. Prepare engineering drawing and parts list | 1. ***Drafting equipment*** appropriate to the drawing method chosen is selected. 2. ***Drafting principles*** to produce a drawing that is consistent with standard operating procedures within the enterprise is applied. 3. All work safely measures are undertaken to prescribed procedure. 4. Approval of completed drawing is received in accordance with standard operating procedures. 5. Components parts and organized by component type are identified in accordance with organization/customer requirements. 6. Drawings and/ or parts lists ***records*** are completed in accordance with standard operating procedures. 7. Approved drawings and/or parts lists are copied and ***issued*** to relevant personnel in accordance with standard operating procedures. 8. Approved drawings and/ or parts lists are stored and catalogued in accordance with standard operating procedures. |
| 5**.** Prepare for work | 1. Work instructions are identified, follow and used to determine job requirements 2. Job specifications are read and interpreted 3. Engineering drawings relevant to ***information*** required are selected 4. The latest version of map, plan or drawing is checked and validated against job requirements or equipment.. 5. Title panel of project documentation is checked to verify latest amendments to drawing. 6. Amendments to specifications are checked to ensure currency of information and conveyed to others where appropriate 7. Correct equipment for safe use is identified and checked |
| 6Use maps and site plans to support work activities**.** | 1. Organization's system for managing maps and plans is applied. 2. Relevant technologies used to gather, record and monitor, map and plan data are applied. 3. Function and key features of maps and site plansin the planning of work are identified. 4. Key features of the site is identified and the orientation of sites is explained. 5. A map or plan is followed to find identified features in the real world 6. Access to site is gained and services, main features, contours and datum are identified 7. Access from roadways to work site is identified and isolated. 8. Materials and distances are determined from plans and drawings. 9. Real world distances are calculated using maps and plans with a range of scales. |
| 7. Clean up work area and maintain equipment | 1. Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures 2. Unserviceable equipment is tagged and faults are identified in accordance with workplace procedures 3. Operator maintenance is completed in accordance with manufacturer/component supplier specifications and site procedures |

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| **Variable** | **Range** |
| Types of maps***,*** plans and drawings | May include:   * urban and rural topographical maps * site plans and elevations * process flow sheets * survey plans * sectional plans and elevations * channel drainage plans * pipe system plans * location of assets plans * details and specifications providing illustrations and dimensions |
| Specifications | May include:   * design information, * customer requirements, * sketches and preliminary layouts. |
| Key features of maps and site plans | May include:   * shape and orientation of site * roads * railways * easements * existing buildings and structures * services, including: * drainage * sewerage * water * electricity * telecommunications * dimensions * grades of pipelines and channels * tree preservation orders * geographical features * power and transmission lines * heritage and cultural features * types of structures, including: * buildings * bridges * fabricated towers * fences * pipelines * regulators * poles * environmental barriers * environmental features, including: * fauna and flora habitats * cultural features * heritage features * water catchments * shape of structure and building * service requirements * location of plant and equipment * vertical and horizontal measurements * clearance distance * geological features * service layouts * bore and casing details |
| Relevant personnel | May include:   * Technical personnel, supervisors, manufacturers, suppliers, contractors, customers |
| Drafting equipment | May include:   * Drafting and drawing equipment includes the use of Computer Aided Drafting systems |
| Drafting principles | May include:   * Drawings are prepared in accordance with Ethiopian Standard 1100.101, or equivalent, as required |
| Records | May include:   * Drawing records may include cataloguing, issuing security classifications, filing, preparing distribution lists |
| Issued | May include:   * hard copy, photographic, slide or transparency form including presentation as a single drawing and/or with other drawings, support documentation as a package |
| Information**/**documents | May include:   * Sources of information/documents may include: * schedules/plans/specifications, memos, material safety data sheets, diagrams or sketches * regulatory/legislative requirements pertaining to the automotive industry, including Design Rules * organisation work specifications and requirements * instructions issued by authorised enterprise or external persons * Ethiopian Standards |
| System for managing maps and plans | May include:   * used within organisation * geographic information systems * electronic plans management systems * manual systems * hard copy systems |
| Technologies | May include:   * used to gather, record and monitor map and plan data * vary across organisations * include use of global positioning system (GPS) technology and require the use of portable navigation devices by operators |
| Orientation of sites | May include:   * relationship to north * currency of plan * relationship between plan and site |
| Methods of identification | May include:   * Methods are to include identification of symbols, codes, legends and diagrammatic representations |
| Interpretation | May include:   * Interpretation of manufacture/modification specifications |
| Resources | May include:   * Resources may include manual and electronic viewing aids |
| Communications | May include:   * Communications are to include, but are not limited to verbal and visual instructions and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers |
| Interpret technical drawing | May include:   * would usually be in line with standard operating procedures; interpretation may require guidance particularly in respect to any geometric tolerance |

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| **Evidence Guide** | |
| Critical aspects of Competence | Demonstrate knowledge and skills competence in:   * preparing a simple map or plan that represents a real world local environment. * reading and interpreting a range of engineering maps, plans, drawings and specifications including: * locating correct maps, plans, drawings and specifications for work tasks * interpreting correctly all relevant information in maps, plans, drawings and specifications to enable the work to be performed correctly, effectively and according to organisational quality standards * observing safety procedures and requirements * communicating effectively with others involved in or affected by the work * selecting methods and techniques appropriate to the circumstances * completing preparatory activity in a systematic manner * applying the competence in new and different situations and contexts. |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * OH&S and environmental regulations/requirements, equipment, material and personal safety requirements * ISO standards and/or Ethiopian Design Rules and equipment safety requirements * design theory and its application to the workplace * engineering drawing procedures and interpretive techniques * the range of maps, plans and drawings to different assignment situations * relationship between the views contained in the drawing * objects represented in the drawing * units of measurement used in the preparation of the drawing * dimensions of the key features of the objects depicted in the drawing * understanding of the instructions contained in the drawing * the actions to be undertaken in response to those instructions * the materials from which the object(s) are made * any symbols used in the drawing as described in range statement * features of maps, plans drawings and specifications such as: * contours * datum points * planes * gradients * sections * orthographic projections * symbols * codes, * legends and diagrammatic representations * dimensions * Common terminology * measurements and calculations * site reporting procedures * work organisation and planning processes * enterprise quality processes * requirements and purpose of the drawing to be produced * requirements and purpose of the engineering parts list * sources of relevant data/ information * timeframe for completion of the drawing(s) * person(s) who can confirm drawing requirements * method of drawing preparation * the reasons for selecting the chosen drawing method * procedures for producing an initial drawing and changing an existing drawing * drafting principles to be applied to the production/changing of a drawing * standards to which the drawing is to be produced * procedures for checking drawings * the persons responsible for checking and approving drawings * consequences of inappropriate/incomplete components parts lists. * procedures and reasons for recording completed drawings and or parts lists. * procedures for copying approved drawings and or parts lists. * procedures for issuing approved drawings and or parts lists. * the personnel to whom copies of approved drawings and or parts lists can be issued * procedures for filing approved drawings and or parts lists * procedures for safe handling and storage of drawings and or parts lists * consequences of inappropriate handling and storage of approved drawings and or parts lists * safe work practices and procedures |
| Underpinning Skills | Demonstrate skills to:   * collect, organise and understand information related to work orders, plans and safety procedures for viewing engineering drawings * read and interpret plans, drawings and specifications * use workplace technology related to the reading and interpretation of engineering drawings, including the use of specialist tooling, measuring equipment, computerised technology and communication devices * read, interpret information on the drawing, written job instructions, specifications, standard operating procedures, charts, lists and other applicable reference documents * use information provided in maps, plans and drawings to complete a job in different work situations * measure accurately * undertake numerical operations, geometry and calculations/formulae within the scope of this unit * use mathematical ideas and techniques to correctly interpret drawing specifications * communicate effectively (use literacy skills for verbal and written communication) in the workplace * communicate ideas and information to enable confirmation of work requirements and specifications, with site supervisor, other workers and customers, and the reporting of work outcomes and problems * check the drawing against job requirements/ related equipment in accordance with standard operating procedures * confirm the drawing version as being current in accordance with standard operating procedures * check and clarify task related information * Prepare maps, plans and engineering parts list * obtain all relevant job requirements, data/ information and specifications necessary to produce the drawing in accordance with workplace procedures * using drafting equipment appropriate to the drawing method chosen * produce/change the drawing to conform with the relevant standard * check the completed drawing in accordance with standard operating procedures * produce the component parts list with part name, description of part, material specification or part number, quantities and all other details specified by the customer and/or organisational procedures * record, handle and store completed drawings, approved drawings and or parts lists in accordance with standard operating procedures * where appropriate, copying and issuing approved drawings and or parts lists in accordance with standard operating procedures * plan and sequence operations * report/ document of results |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competency may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competency may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation level II** | |
| **Unit Title** | **Operate application software packages** |
| **Unit Code** | **[EIS WSO2 11 0217](#EIS_WSO2_11_0217)** |
| **Unit Descriptor** | This unit describes the skills and knowledge required to identify, select and operate three commercial software packages basic operations, including a word-processing application (creating and formatting documents, creating tables and printing labels); spreadsheet applications( creating and formatting spreadsheet data, incorporating charts and objects, and customizing and printing spreadsheets); and database applications and create and develop simple relational databases using pre-existing data  It applies to individuals who utilise different software applications (word-processing, spreadsheets and database) in a range of routine tasks in the workplace within a small to large office environment to produce diverse documents under direct supervision or with limited responsibility within a wide range of industry occupations. |

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| **Elements** | **Performance Criteria** |
| 1. Use appropriate word-processing software. | 1. Select ***word-processing software*** appropriate to perform activity 2. Open word-processing application, create document and add data according to ***information*** ***requirements*** 3. Identify ***document*** purpose, audience and presentation requirements, and clarify with personnel as required 4. Identify ***organisational requirements*** for text-based business documents, and design ***document structure and layout*** to ensure consistency of style and image 5. Match document requirements with software functions to provide efficient production of documents |
| 2. Customise basic settings and format documents to meet page layout conventions. | 1. Adjust ***page layout*** to meet information requirements or special needs 2. Open and view different ***toolbars*** 3. Change ***font format*** /***font settings*** to suit document purpose of the word document/spreadsheets/ database entries 4. Change ***alignment*** and line spacing, and modify margins of the document (word / spreadsheet/ database/ according to document information requirements and formatting features 5. Align information in a selected cell as required 6. Open and switch between several word documents / spreadsheets/ database/ 7. Use ***formatting features*** and styles to customise basic settings and ***format*** cell or documents, create table and add images as required 8. Use ***technical functions***, ***other data and formatting tools,*** document templates as required to finalise documents/or within the spreadsheet 9. Highlight and copy text from another area in the document or from another active document; or selected *formatting features* from another cell in the spreadsheet or from another active spreadsheet 10. Insert headers and footers to incorporate necessary data using formatting features 11. Save document in another ***file format*** or spreadsheet as another file type and close document and spreadsheet to a ***storage device*** |
| 3. Create tables and add images to word document | 1. Insert standard table into document 2. Change cells (insert and delete columns and rows) to meet information requirements 3. Insert appropriate **images** into document and customise as necessary 4. Position and resize images to meet document formatting needs 5. Ensure the ***naming and storing***/ saving of documents in appropriate directories or folders and the **printing** of documents to the required specifications |
| 4. Use appropriate spreadsheet software | 1. Select ***spreadsheet software*** appropriate to perform activity 2. Identify document purpose, audience and presentation requirements, and clarify with personnel as required 3. Open the spreadsheet application, create spreadsheet files and enter numbers, text and symbols into cells according to information requirements 4. Enter ***simple formulas and functions*** using cell referencing where required and correct formulas when error messages occur 5. Use a range of common ***tools*** during spreadsheet development 6. ***Edit*** columns and rows within the spreadsheet 7. Use the auto-fill function to increment data where required 8. Ensure the naming and storing of documents in appropriate directories or folders and the printing of documents to the required specifications |
| 5. Incorporate object and chart in spreadsheet | 1. Import an ***object*** into an active spreadsheet 2. Manipulate imported object by using formatting features 3. Create a chart using selected ***data*** in the spreadsheet 4. Display selected data in a different chart 5. Modify chart using formatting features |
| 6. Create database | 1. Open a database application and design a two-table, simple relational database incorporating basic ***design principles*** 2. Develop a table with fields and ***attributes*** according to database usage, as well as user requirements 3. Create a primary key and establish an index for each table 4. Modify table ***layout*** and field attributes as required 5. Create a ***relationship*** between the two tables 6. Add and modify data in a table according to information requirements 7. Add and delete records as required 8. 1.8 Save and close down database to ***storage area*** |
| 7. Create reports and forms | 1. Design reports to present data in a logical sequence 2. Modify reports to include or exclude additional requirements 3. Distribute reports to appropriate person in a suitable format 4. Use a wizard to create a simple form 5. Open existing database and modify records through a simple form 6. Rearrange ***objects*** within the form to accommodate information requirements |
| 8. Retrieve information | 1. Access existing database and locate required records 2. Create simple query and retrieve required information 3. Develop query with multiple criteria and retrieve required information 4. Select data and display appropriately |
| 9. Print documents | 1. Preview document/ spreadsheet in print preview mode 2. Select basic ***print settings/*** options 3. Print document/spreadsheet or part of document/ spreadsheet from printer 4. Submit the spreadsheet to ***appropriate person*** for approval or feedback |

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| **Variable** | **Range** |
| Word-processing software | May include:   * Apple Work * Microsoft Word * Open Office. |
| Information requirements | May include:   * agendas * letters * memos * minutes * other business documents required by the organisation. |
| Document | May include:   * captions * different odd and even pages * document protection * drawing * hyperlinks * linked and embedded objects * mail-merge data documents * master documents * MS WordArt * templates. |
| Organisational requirements | May include:   * company colour scheme * company logo * consistent corporate image * content restrictions * established guidelines and procedures for document production * house styles * observing copyright legislation * organisation name, time, date, document title and filename in header or footer * templates. |
| Document structure and layout | May include:   * annotated references * borders * boxes * bullet or number lists * captions * colour * columns * consistency with other business documents * cropping * drawing * footnotes * endnotes * graphics * headings * indentations * layout * page numbers * position related to other text * size * spacings * typeface styles and point size. |
| Page layout | May include:   * landscape * portrait. |
| Toolbars | May include:   * buttons * menus * a combination of both. |
| Font format | May include:   * combination of typeface and other attributes: * pitch * size * spacing character * symbol. |
| Font settings | May include:   * colour * size * type. |
| Alignment | May include:   * centred * justified * left * right. |
| Formatting features | May include:   * bold * hyphenation * italics * underline. |
| Format | May include:   * saving the spreadsheet as another type of document:   comma separated values or text  HTML  XML. |
| Technical functions, other data and formatting | May include:   * alignment * clip art * comments * data from other software applications * digital photographs * digital signatures * display features * embedding * exporting * fields * fills or shading * formulas * graphics * importing * lines and borders * linking * merge cells * page and section breaks * permissions * reviewing * sharing * sort criteria * sorting contents * split cell * table of contents * templates * text direction * versioning. |
| Technical functions | May include:   * animations * arranging slides * charts * customising masters * illustrations * linking content * sharing * SmartArt * tables. |
| Formatting tools | May include:   * menu commands within the application: * borders * copy, cut and paste * help * find and replace * shading * spell check * undo. |
| File format | May include:   * CSV files * doc files * HTML pages * PDF files * SXW (star office) files * RTF files * text files. |
| Storage device/area | May include:   * disks * CD * DVD * external hard drive, including universal serial bus (USB) flash drive * internal hard drive * web storage space. |
| Images | May include:   * clip art * graphics * pictures. |
| Naming and storing documents | May include:   * authorised access * filenames according to organisational procedure * filenames that are easily identifiable related to the content * file or directory names which identify the operator, author, section and date * filing locations * organisational policy for backing up files and filing hard copies of documents * security * storage in folders and sub-folders * storage on: * hard disk drives * CD-ROM * tape backup. |
| Printing | May include:   * comments * drawing objects * field codes * hidden text * print merge * print to file * to fit a specific number of pages. |
| Spreadsheet software | May include:   * Apple iWorks, such as Numbers * Gnumeric * Microsoft Excel * Open Office. |
| Spreadsheet settings | May include:   * cell alignment * charts * font settings * formatting tools * graphics * objects * page layout * print * share * simple formulas and functions * sort * toolbars * views * worksheets. |
| Simple formulas and functions | May include:   * addition * conditional logic * conditional summation * division * lookup * multiplication * subtraction * summation * application of the above to a series of cells. |
| Tools | May include:   * help * search and replace * simple formatting tools * spell check * undo. |
| Edit | May include:   * adding * copying * deleting * moving * pasting * selecting. |
| Object | May include:   * items that can be inserted into the spreadsheet, such as:   other documents  pictures  sound. |
| Data | May include:   * symbols added to the document * text added to the document. |
| Design principles | May include:   * data layout * formatting * naming conventions. |
| Attributes | May include:   * data type * name * size. |
| Layout | May include:   * display modes * orientation * size. |
| Relationship | May include:   * one-to-one * one-to-many * many-to-many. |
| Objects | May include:   * buttons * checkboxes * drop down lists * option buttons * text boxes. |
| Print settings | May include:   * layout * number of copies * orientation * paper size * sides. |
| Appropriate person | May include:   * authorized business representative * client * supervisor. |
| Software application package | May include:   * database * email * graphics * spreadsheet * word processing. |

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| **Evidence Guide** | |
| Critical aspects of Competence | Must confirm appropriate knowledge and skills to:   * identify application software packages used by the organisation and list the purpose of each * produce workplace documents using a minimum of three different software application packages * create, open and retrieve documents using customised basic settings * format documents by creating tables and adding text, objects and images * Interpret specific information to determine and complete work required * Prepare simple correspondence that incorporates key information in a format and style relevant to requirements * open, amend and save files and documents * explain basic technical terminology related to reading help files and responding to system help prompts * list features and functions of commercial computing packages * describe import and export software functions * describe the process of linking documents * explain the purpose of input and output devices. * Interprets and comprehends symbolic, textual and numerical information and data * create spreadsheets, customise basic settings, format spreadsheets and * create basic formulas * insert objects and charts in spreadsheets, save and print spreadsheets. * explain the effect of formatting and appearance on the readability and usability of spreadsheets * outline log-in procedures relating to accessing a personal computer (PC) * describe the purpose, use and function of spreadsheet applications * outline basic database design principles * discuss the purposes of forms, reports and queries for retrieving and displaying information * outline the reasons for relationships between tables (cardinality) * describe the purpose, use and function of database software. * design and develop a simple database using a standard database package * add data * create and use a query with multiple criteria * create and modify reports and forms. |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * formatting styles and their effect on formatting, readability and appearance of documents * organisational requirements for ergonomics, such as work periods and breaks * organisational style guide * purpose, use and function of word-processing software. * Vocabulary, basic technical terminology and naming conventions related to reading help files and responding to system help prompts * basic knowledge of system usage * current business practices related to using software to prepare reports * features and functions of commercial computing packages * import and export software functions * linking documents * OHS principles and responsibilities for ergonomics, such as work periods and breaks * purpose, use and functions of applications * use of input and output devices. * personal responsibility for adherence to legal and regulatory requirements * vocabulary, syntax, terminology, labelling and naming conventions suitable for the program * purposes, specific functions and key features of common digital systems and tools, and operates them effectively to complete routine tasks, adapting some functions to improve personal efficiency * formatting styles and their effect on formatting, readability and appearance of spreadsheets * log-in procedures relating to accessing a PC * purpose, use and function of spreadsheet application. * the purpose and specific functions of common digital tools used in work contexts * Identifying and comprehending the specific numeric data needed to create charts * responsibility for routine low-impact decisions within familiar situations * basic database design * forms, reports and queries for retrieving and displaying information * relationships between tables (cardinality) * purpose, use and function of database software. * the purpose and specific functions of common digital tools used in work contexts * database related terminology and protocols when designing tables, queries, reports and forms * Identifying and comprehending the specific numeric data needed, and uses logical functions, mathematical symbols and applies the order of operations in calculations when developing queries * responsibility for routine, low-impact decisions within familiar situations |
| Underpinning Skills | Demonstrate skills to:   * communication skills to: * communicate with peers and supervisors * seek assistance and expert advice * literacy skills to: * interpret user manuals and help functions * read and write basic workplace documents * numeracy skills to: * enter simple formulas into spreadsheet * create simple queries * problem-solving skills to: * manage applications and use help functions * address common operational problems when using word-processing applications, spreadsheet applications * address inconsistencies in data and issues in database * technical skills to: * operate a personal computer (PC) and printer * operate a keyboard to enter text and numerical data technical skills to create a simple database. * use application software packages. * Recognise and interpret textual information to determine organisational standards and job requirements * Interpret and comprehend symbols, icons and text associated with applications software * Enter both written and verbally received information and data into a format suitable for the software application * Apply the order of operations in calculations * Follows routine procedures for using digital technology to enter, store and retrieve information directly relevant to role * Plan routine tasks with familiar goals and outcomes, taking some limited responsibility for decisions regarding sequencing * apply workplace health and safety (WHS) principles and responsibilities for ergonomics, such as work periods and breaks * use help manuals and online help. * Recognises and responds to common operational problems when using word-processing applications * Identify data specifically needed for the spreadsheet from information received * Enter both written and verbally received information and data into a format suitable for spreadsheet analysis * Add, subtract, multiply and divide whole numbers and decimals, identifying and selecting the correct formulas and functions to use * Apply the order of operations in calculations * Identify and analyse a wide range of hard copy and on-line forms, reports and other end-user documentation to identify end-user needs and data * Select the appropriate form, channel and mode of communication for a specific purpose relevant to own role * identify and implement standard solutions for a number of routine problems * Follows routine procedures for using digital technology to enter, store and retrieve information directly relevant to role |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation level II** | |
| **Unit Title** | **Participate in Workplace Communication** |
| **Unit Code** | [EIS WSO2 12 0217](#EIS_WSO2_12_0217) |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required to gather, interpret and convey information in response to workplace requirements. |

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| **Elements** | **Performance Criteria** |
| 1. Obtain and convey workplace information | 1. Specific and relevant information is accessed from ***appropriate sources*** 2. Effective questioning , active listening and speaking skills are used to gather and convey information 3. Appropriate ***medium*** is used to transfer information and ideas 4. Appropriate non- verbal communication is used 5. Appropriate lines of communicationwith supervisors and colleagues are identified and followed 6. Defined workplace procedures for the location and ***storage*** of information are used 7. Personal interaction is carried out clearly and concisely |
| 1. Participate in workplace meetings and discussions | 1. Team meetings are attended on time 2. Own opinions are clearly expressed and those of others are listened to without interruption 3. Meeting inputs are consistent with the meeting purpose and established ***protocols*** 4. ***Workplace interactions*** are conducted in a courteous manner 5. Questions about simple routine workplace procedures and matters concerning working conditions of employment are asked and responded to 6. Meetings outcomes are interpreted and implemented |
| 1. Complete relevant work related documents | 1. Range of ***forms*** relating to conditions of employment are completed accurately and legibly 2. Workplace data is recorded on standard workplace forms and documents 3. Basic mathematical processesare used for routine calculations 4. Errors in recording information on forms/ documents are identified and properly acted upon 5. Reporting requirements to supervisor are completed according to organizational guidelines |

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| **Variable** | **Range** |
| Appropriate sources | May include:   * + Team members   + Suppliers   + Trade personnel   + Local government   + Industry bodies |
| Medium | May include:   * + Memorandum   + Circular   + Notice   + Information discussion   + Follow-up or verbal instructions   + Face to face communication |
| Storage | May include:   * + Manual filing system   + Computer-based filing system |
| Protocols | * + Observing meeting   + Compliance with meeting decisions   + Obeying meeting instructions |
| Workplace interactions | May include:   * + Face to face   + Telephone   + Electronic and two way radio   + Written including electronic, memos, instruction and forms, non-verbal including gestures, signals, signs and diagrams |
| Forms | May include:   * + Personnel forms, telephone message forms, safety reports |

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| **Evidence Guide** | |
| Critical Aspects of Competency | Assessment requires evidence that the candidate:   * + Prepared written communication following standard format of the organization   + Accessed information using communication equipment   + Made use of relevant terms as an aid to transfer information effectively   + Conveyed information effectively adopting the formal or informal communication |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * + Effective communication   + Different modes of communication   + Written communication   + Organizational policies   + Communication procedures and systems   + Technology relevant to the enterprise and the individual’s work responsibilities |
| Underpinning Skills | Demonstrate skills to:   * + Follow simple spoken language   + Perform routine workplace duties following simple written notices   + Participate in workplace meetings and discussions   + Complete work related documents   + Estimate, calculate and record routine workplace measures   + Basic mathematical processes of addition, subtraction, division and multiplication   + Ability to relate to people of social range in the workplace   + Gather and provide information in response to workplace Requirements |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * + Interview / Written Test   + Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation level II** | |
| **Unit Title** | **Work in Team Environment** |
| **Unit Code** | [EIS WSO2 13 0217](#EIS_WSO2_13_0217) |
| **Unit Descriptor** | This unit covers the skills, knowledge and attitudes to identify role and responsibility as a member of a team. |

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| **Elements** | **Performance Criteria** |
| 1. Describe team role and scope | * 1. The ***role and objective of the team*** are identified from available ***sources of information***   2. Team parameters, reporting relationships and responsibilities are identified from team discussions and appropriate external sources |
| 1. Identify own role and responsibility within team | * 1. Individual role and responsibilities within the team environment are identified   2. Roles and responsibility of other team members are identified and recognized   3. Reporting relationships within team and external to team are identified |
| 1. Work as a team member | * 1. Effective and appropriate forms of communications used and interactions undertaken with team members who contribute to known team activities and objectives   2. Effective and appropriate contributions are made to complement team activities and objectives, based on individual skills and competencies and ***workplace context***   3. Protocols are observed in reporting using standard operating procedures   4. Contribute to the development of team work plans based on an understanding of team’s role and objectives and individual competencies of the members. |

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| **Variable** | **Range** |
| Role and objective of team | May include:   * + Work activities in a team environment with enterprise or specific sector   + Limited discretion, initiative and judgment maybe demonstrated on the job, either individually or in a team environment |
| Sources of information | May include:   * + Standard operating and/or other workplace procedures   + Job procedures   + Machine/equipment manufacturer’s specifications and instructions   + Organizational or external personnel   + Client/supplier instructions   + Quality standards   + OHS and environmental standards |
| Workplace context | * + Work procedures and practices   + Conditions of work environments   + Legislation and industrial agreements   + Standard work practice including the storage, safe handling and disposal of chemicals   + Safety, environmental, housekeeping and quality guidelines |

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| **Evidence Guide** | |
| Critical aspects of competence | Assessment requires evidence that the candidate:   * + Operated in a team to complete workplace activity   + Worked effectively with others   + Conveyed information in written or oral form   + Selected and used appropriate workplace language   + Followed designated work plan for the job   + Reported outcomes |
| Underpinning Knowledge and Attitude | Demonstrate knowledge of:   * Communication process * Team structure * Team roles * Group planning and decision making |
| Underpinning Skills | Demonstrate skills to:   * + Communicate appropriately, consistent with the culture of the workplace |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation level II** | |
| **Unit Title** | **Develop Business Practice** |
| **Unit Code** | [EIS WSO2 14 0217](#EIS_WSO2_14_0217) |
| **Unit Descriptor** | This unit covers knowledge, skills and attitude required to establish a business operation from a planned concept. It includes researching the feasibility of establishing a business operation, planning the setting up of the business, implementing the plan and reviewing operations once commenced, customer handling, developing and maintaining business relationships. |

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| **Elements** | **Performance Criteria** |
| 1. Identify business opportunities and business skills | 1. The concept of paradigm shift and means of divergent thinking are elaborated and strategies to look beyond the boundaries are discussed. 2. ***Unusual business opportunities*** are identified. 3. Feasibility on ***business skills and personal attributes***is assessed and matched against those perceived as necessary for a particular business opportunity. 4. New behavior on how problems can be the pivotal source of business opportunity is elaborated and experience taken. 5. Assistance sought with feasibility study of ***specialist and relevant parties*** is discussed,as required. 6. Impact of emerging or changing technology, including e-commerce, on business operations is evaluated. 7. Practicability of business opportunity is assessed in line with perceived ***business risks***, returns sought, personal preferences and resources available. 8. Business plan is revised in accordance with the identified opportunities. |
| 1. Plan for the establishment of business operation | * 1. Organizational structure and operations are determined and documented.   2. Procedures are developed and documented to guide operations.   3. Financial backing is secured for business operation.   4. Business legal and regulatory requirements are identified and compiled.   5. ***Human and physical resources***required to commence business operation are determined.   6. Recruitment and procurement strategies are developed. |
| 1. Implement Business Development Plan | * 1. Physical and human resources are obtained to implement business operation.   2. ***Operational unit***is established to support and coordinate business operation.   3. Simulations on the development plan are well discussed and understood.   4. Implementation manual is discussed and understood.   5. Marketing the business operation is undertaken.   6. Monitoring process is developed and implemented for managing operation.   7. ***Legal documents*** are carefully maintained and relevant records kept and updated to ensure validity and accessibility.   8. Contractual procurement rights for goods and services including ***contracts with relevant people***arenegotiated and secured as required in accordance with the business plan.   9. Options for leasing/ownership of business premises are identified and contractual arrangements completed in accordance with the business plan. |
| 1. Review implementation process and take corrective measures | * 1. Review process is developed and implemented for implementation of business operation.   2. Improvements in business operation and associated management process are identified.   3. Identified improvements are implemented and monitored for effectiveness. |
| 1. Establish contact with customers and clarify needs of customer | * 1. Persuasion strategies are developed and discussed.   2. Welcoming customer environment is maintained and Customer is greeted warmly according to enterprise policies and procedures.   3. Information is provided to satisfy customer needs.   4. Information on customers and service history is gathered for analysis.   5. Customer data is maintained to ensure database relevance and currency.   6. Customer needs are accurately assessed against the products/services of the enterprise.   7. Customer details are documented clearly and accurately in required format.   8. Negotiations are conducted in a business-like and professional manner.   9. Benefits for all parties are maximized in the ***negotiation through use of established techniques*** and in the context of establishing long term relationships.   10. The results of negotiations are communicated to appropriate colleagues and stakeholders within appropriate timeframes.   11. ***Opportunities to maintain regular contact*** with customers are identified and taken-up. |
| 1. Develop and Maintain Business Relationship | * 1. Features and benefits of products/services provided by the enterprise are described/ recommended to meet customer needs.   2. Alternative sources of information/advice are discussed with the customer.   3. Information needed is pro-actively sought, reviewed and acted upon to maintain sound business relationships.   4. Agreements are honored within the scope of individual responsibility.   5. Adjustments to agreements are made in consultation with the customer and information shared with appropriate colleagues.   6. Relationships are nurtured through regular contact and use of effective interpersonal and communication styles. |

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| **Variable** | **Range** |
| Unusual Business opportunities | May include but not limited to:   * Public holidays * Ceremonies * Natural disaster * Campaigns |
| Business opportunities | May include but not limited to:   * Expected financial viability * Skills of operator * Amount and types of finance available * Returns expected or required by owners * Likely return on investment * finance required * Lifestyle issues |
| Business skills and personal attributes | May include but not limited to:   * Technical and/ or specialist skills * Managerial skills * Entrepreneurial skills * Taking calculated risk skills * Willingness to take calculated risks * Willingness to work under pressure |
| Specialist and relevant parties | May include but not limited to:   * Chamber of commerce * Financial planners and financial institution representatives, business planning specialists and marketing specialists * Accountants * Lawyers and providers of legal advice * Government agencies * Industry/trade associations * Online gateways * Business brokers/business consultants |
| Business risks | May include but not limited to:   * Occupational health and safety * Environmental risks * Relevant legislative requirements * Security of investment * Market competition * Security of premises/location * Supply and demand * Resources available |
| Human and physical resources | May include but not limited to:   * Software and hardware * Office premises and equipment * Communications equipment * Specialist services through outsourcing, contracting and consultancy * Staff * Vehicles |
| Operational unit | May include but not limited to:   * different departments, sections, teams, divisions, etc. staffed with required personnel and equipped to service and support business |
| Legal documents | May include but not limited to:   * Partnership agreements, constitution documents, statutory books for companies (register of members, register of directors and minute books), certificate of Incorporation, franchise agreements and financial documentation, appropriate software for financial records * Occupational Health Safety (OHS) * Recordkeeping including personnel, financial, taxation, and environmental |
| Contracts with relevant people | May include but not limited to:   * business owners, suppliers, employees, agents, land owners, distributors, customers or any person with whom the business has, or seeks to have, a performance-based relationship |
| Negotiation techniques | May include but not limited to:   * Identification of goals, limits * Clarification of needs of all parties * Listening and questioning * Non-verbal communication techniques * Appropriate language and situation * Bargaining * Developing options * Appropriate cultural behavior * Confirming agreements |
| Opportunities to maintain  regular contact | to maintain regular contact with customers may include:   * Informal social occasions * Ceremonies * Exhibitions * Industry functions * Association membership * Co-operative promotions * Program of regular telephone contact |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates knowledge and skills in:   * that a business operation has been planned and implemented from initial research of feasibility of the business and completion of the plan, through implementing the plan and commencing operations * the ability to evaluate the results of research and assess the likely viability and practicability of a business opportunity, taking into account the current business/market climate and resources available * treating customers in a courteous and professional manner * building and maintaining relationships to achieve successful business outcomes |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * Paradigm shift * Unusual business opportunities * Feasibility study * Business structure * Federal and regional government legislative requirements affecting business operations, especially in regard to Occupational Health and Safety (OHS), Equal Employment Opportunity (EEO), industrial relations and anti-discrimination * Procurement and recruitment strategy * Operational unit * Monitoring process * Business systems and operations * Relevant marketing, management, sales and financial concepts * Options for financing * Business premises and ownership * Lease * Methods for researching business opportunities * Methods of identifying relevant specialist services to complement the business * Advertising and promotion * Distribution and logistics * Terms and conditions in contractual agreement * Record keeping duties * Operational factors relating to the business (provision of professional services, products) * Customer need assessment * Source of information * Operational knowledge of enterprise policies and procedures in regard to: * customer service * dealing with difficult customers * maintenance of customer databases * allocated duties/responsibilities * General knowledge of the range of enterprise merchandise and services, location of telephone extensions and departments/sections * Basic operational knowledge of industry/workplace codes of practice in relation to customer service * negotiation and communication techniques appropriate to negotiations that may be of significant commercial value |
| Underpinning Skills | Demonstrate skills of:   * Hunting and exploiting unusual business opportunities * Interpreting legal requirements, company policies and procedures and immediate, day-to-day demands * Conducting feasibility study * Developing new behavior * Using technology * Marketing skills * Business planning skills * Entrepreneurial skills * Time management skills * Customer handling skills * Communication skills including questioning, clarifying, reporting, and giving and receiving constructive feedback * Technical and analytical skills to interpret business documents, reports and financial statements and projections * Ability to relate to people from a range of social, cultural and ethnic backgrounds and physical and mental abilities * Problem solving skills to develop contingency plans * Using computers and software packages to record and manage data and to produce reports * Interpreting business information, numeracy skills for data analysis to aid research * Negotiation to conduct business activities * Research to identify a business opportunity and to conduct a feasibility study * Analytical skills to assess personal attributes and to identify business risks * Observation skills for identifying appropriate people, resources and to monitor work * Persuasion and networking skills * Welcoming customers * Information seeking skills to collect, organize and understand information related to collating and analyzing customer information to identify needs * Establish diagnostic processes which identify and recommend improvements to customer service |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation level II** | |
| **Unit Title** | **Standardize and Sustain 3S** |
| **Unit Code** | **[EIS WSO2 15 0217](#EIS_WSO2_15_0217)** |
| **Unit Descriptor** | This unit of competence covers the knowledge, skills and attitudes required by worker to standardize and sustain 3S to his/her workplace. It covers responsibility for the day- to-day operations of the workplace and ensuring that continuous improvements of Kaizen elements are initiated and institutionalized. |

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| **Elements** | **Performance Criteria** |
| 1. Prepare for work. | 1. Work instructions are used to determine job requirements, including method, material and equipment. 2. Job specifications are read and interpreted following working manual. 3. ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 4. ***Safety equipment and tools*** are identified and checked for safe and effective operation. 5. ***Tools and equipment*** are prepared and used to implement 3S. |
| 1. Standardize 3S. | 1. Plan is prepared and used to standardize 3S activities. 2. ***Tools and techniques*** to standardize 3S are prepared and implemented based on ***relevant procedures***. 3. Checklists are followed for standardize activities and ***reported*** to ***relevant personnel***. 4. The workplace is kept to the specified standard. 5. Problems are avoided by standardizing activities. |
| 1. Sustain 3S. | 1. Plan is prepared and followed to standardize 3S activities. 2. ***Tools and techniques*** to sustain 3S are discussed, prepared and implemented based on relevant procedures. 3. Workplace is inspected regularly for compliance to specified standard and sustainability of 3S techniques. 4. Workplace is cleaned up after completion of job and before commencing next job or end of shift. 5. Situations are identified where compliance to standards is unlikely and actions specified in procedures are taken. 6. Improvements are recommended to lift the level of compliance in the workplace. 7. Checklists are followed to sustain activities and reported to relevant personnel. 8. Problems are avoided by sustaining activities. |

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| **Variable** | **Range** |
| OHS requirements | May include but not limited to:   * Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. * Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. * Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. * Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation. |
| Safety equipment and tools | May include but not limited to:   * dust masks / goggles * glove * working cloth * first aid * safety shoes |
| Tools and equipment | May include but not limited to:   * paint * hook * sticker * signboard * nails * shelves * chip wood * sponge * broom * pencil * shadow board/ tools board |
| Tools and techniques | May include but not limited to:   * 5S Job Cycle Charts * Visual 5S * The Five Minute 5S * Standardization level checklist * 5S checklist * The five Whys and one How approach(5W1H) * Suspension * Incorporation * Use Elimination |
| Relevant procedures | May include but not limited to:   * Assign 3S responsibilities * Integrate 3S duties into regular work duties * Check on 3S maintenance level * OHS measures such as signage, symbols / coding and labeling of workplace and equipment * Creating conditions to sustain your plans * Roles in implementation |
| Reporting | May include but not limited to:   * verbal responses * data entry into enterprise database * brief written reports using enterprise report formats |
| Relevant personnel | May include but not limited to:   * supervisors, managers and quality managers * administrative, laboratory and production personnel * internal/external contractors, customers and suppliers |
| Tools and techniques | May include but not limited to:   * 5S slogans * 5S posters * 5S photo exhibits and storyboards * 5S newsletter * 5S maps * 5S pocket manuals * 5S department/benchmarking tours * 5S months * 5S audit * Awarding system * Big cleaning day * Patrolling system may include: * Top management Patrol * 5S Committee members and Promotion office Patrol * Mutual patrol * Self-patrol * Checklist patrol * Camera patrol |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge to:   * Discuss the relationship between Kaizen elements. * Standardize and sustain 3S activities by applying appropriate tools and techniques. |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * Elements of Kaizen * Ways to improve Kaizen elements * Benefits of improving kaizen elements * Relationship between Kaizen elements * The fourth pillar of 5S * Benefits of standardizing and sustaining 3S * Procedures for standardizing and sustaining 3S activities * Tools and techniques to sustain 3S * Relevant Occupational Health and Safety (OHS) and environment requirements * Plan and report * Method of communication |
| Underpinning Skills | Demonstrates skills of:   * improving Kaizen elements by applying 5S * standardizing and sustaining procedures and techniques to avoid problems * technical drawing * procedures to standardizing 3S activities * analyzing and preparing shop layout of the workplace * standardizing and sustaining checklists * working with others * reading and interpreting documents * observing situations * solving problems by applying 5S * communication skills * Preparing labels, slogans, etc. |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

**NTQF level III**

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| **Occupational Standard: Water Supply and Sanitation Operation Level II** | |
| **Unit Title** | **Design Basic Water System Model** |
| **Unit Code** | [EIS WSO3 01 0217](#EIS_WSO3_01_0217) |
| **Unit Descriptor** | This unit of competence describes the outcomes required to explore and apply the characteristics of basic water and wastewater systems to a system model. it includes understanding the characteristics of simple water and wastewater systems, together with the application of scientific principles to the development of a working water system model. |

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| **Elements** | **Performance Criteria** |
| 1. Investigate local water and wastewater systems. | 1.1 Source ***of local water supply system*** is found out and explained and its characteristics explored.  1.2 Local water distribution system is identified and its characteristics explained.  1.3 Water metering, allocation system and related water pricing system are found out and explained.  1.4 Local waste water collection and treatment systems are found out and their characteristics explained. |
| 1. Apply basic scientific principles to the operation of a water system | 2.1 Basic principles governing the natural flow of water are explored and explained.  2.2 ***Basic principles governing the distribution of water*** are found out through pipe networks and explained.  2.3 Scientific principles are used in the design, construction and operation of a working model of a water system.  2.4 Scientific principles are used to measure the flow of water. |
| 1. Investigate safe and effective operations of water and wastewater systems. | 3.1 Potential risks are found out to health of inappropriately installed, managed or used water systems and the risks explained.  3.2 Find out about potential risks to health of inappropriately installed, managed or used wastewater systems and explain the risks.  3.3 Find out about and explain ***ways to use water wisely and dispose of wastewater safely.***  3.4 Find out about and explain ways that communities can improve the efficiency and environmental impact of wastewater management. |

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| **Variable** | **Range** |
| Sourceof local water supply system | * May include: * groundwater systems * river systems * lakes * dams * spring |
| Basic principles governing the natural flow of water | * May include: * introduction to basic fluid mechanics * introduction to basic hydraulics * principles governing: * hydraulics gradient * pressure * current and flow * depth * dam design * river channel behavior * Slope * Elevation |
| Basic principles governing the distribution of water | * May include: * introduction to basic engineering principles governing the operation of valves and pumps * introduction to basic hydraulic principles governing pipe network design and layout * flow measurement |
| Ways to use water wisely and dispose of wastewater safely | * May include: * water recycling * storm water catchment and reuse * onsite treatment * water watch program * water wise program * greening Ethiopia program * landrace program |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrate skills and knowledge to:   * investigating, interpreting and communicating the essential characteristics of local water and wastewater systems * selecting and applying basic scientific principles associated with the design and construction of a water system model * problem solving sound practices that can be adopted by householders and communities for the safe and effective management of a water and wastewater system |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * mathematical calculations and techniques * relevant scientific knowledge, including basic principles of hydraulics, valve operation and pipe layout * procedures for identifying and using relevant technology when carrying out calculations * typical problems in the design of simple water systems and appropriate actions and solutions |
| Underpinning Skills | Demonstrates skills to:   * use research and investigation to gather information and test models and hypotheses * use literacy skills for verbal and written communication * use interpersonal and communication skills, including listening, questioning and receiving feedback * work cooperatively and collaboratively with others to complete project tasks * adapt and modify activities depending on differing project contexts and environments * use appropriate techniques to solve or report problems identified when completing project tasks * carry out calculations that may be required when completing tasks, particularly those including the four basic mathematical operations * apply basic principles of science, including hydraulics, to develop an understanding of the flow of water * take appropriate initiative to deal with problems and complete tasks * identify and use equipment, tools and other technology required to complete project tasks * recognize limitations, ask for help and seek clarification or information about requirements and procedures |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Install polyethylene pipe pressure line and electro fusion** |
| **Unit Code** | [EIS WSO3 02 0217](#EIS_WSO3_02_0217) |
| **Unit Descriptor** | This competency covers the installing of relevant elements of polyethylene (PE) plastic pressure pipes, electro fusion welding and pipeline components under industrial conditions in the field. |

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| **Elements** | **Performance Criteria** |
| 1. Identify PE pipe materials as being suitable for specific pressure applications and electro fusion welding. | 1.1 Identify materials as PE grades from national standards, job specifications and work site instructions.  1.2 Determine PE materials properties from national standards and material data sheets.  1.3 Identify job needs from worksite instructions and specifications.  1.4 Identify PE materials and pipes supplied as being compatible for welding from specifications. |
| 2. Identify applications for alternative jointing technologies. | 2.1 Identify properties and limitations of mechanical jointing systems.  2.2 Identify properties and limitations of thermal welding jointing systems.  2.3 Perform trial jointing for all methods, identify non conformance, report, and rectify.  2.4 Assess quality against specification requirements. |
| 3. Identify compatibility of commercial electro fusion control systems. | 3.1 Identify electro fusion welding control unit type and operating data.  3.2 Identify pipe material and dimension compatibility with electro fusion fittings.  3.3 Identify control unit compatibility with electro fusion fitting control. |
| 4. Maintain and calibrate electro fusion control unit equipment. | 4.1 Set up electro fusion welding equipment and work area as per enterprise procedures.  4.2 Ensure safety equipment is available and operational as per enterprise procedures.  4.3 Identify non-conformance, report and rectify according to enterprise procedures.  4.4 Determine ***tools and equipment*** is operational according to specifications. |
| 5. Determine methods for handling, storage, transport and installation of PE pipeline components. | 5.1 Identify requirements for handling and transport of PE and ***hazardous*** materials.  5.2 Determine requirements for long term storage.  5.3 Determine requirements for installation, including additional materials. |
| 6. Identify appropriate service connection and repair techniques. | 6.1 Determine service connection requirements.  6.2 Identify alternative service connection methods to meet requirements.  6.3 Perform service connection to meet requirements.  6.4 Determine repair requirements.  6.5 Identify alternative repair options.  6.6 Perform repair installation to meet requirements. |
| 7. Perform electro fusion welding to required standard. | 7.1 Prepare pipe and fitting as per specification.  7.2 Perform heating, welding and cooling phases using selected elecro fusion welding parameters.  7.3 Monitor and record achieved electro fusion weld parameters for each joint as per enterprise procedures.  7.4 Clean up equipment when completed as per enterprise procedures.  7.5 Cleanup work site, dispose of scrap materials as per operational procedures. |
| 8. Assess quality of completed installation, electro fusion joints. by determining appropriate testing and commissioning procedures. | 8.1 Determine specific installation test requirements.  8.2 Identify alternative test procedures to meet requirements.  8.3 Identify quality requirements for electro fusion joints as per specifications.  8.4 Assess joints against specification requirements and report results.  8.5 Identify and report non-conformances according to enterprise requirements. |
| 9.Identify PE pipe materials as being suitable for specific pressure applications | 9.1 Identify materials as PE grades from national standards, job specifications and work site instructions.  9.2 Determine PE materials properties from national standards ***procedure*** and material data sheets.  9.3 Identify job needs from worksite ***context*** and specifications. |

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| **Variable** | **Range** |
| Tools and equipment | * May include: * Mechanical and thermal jointing equipment, ancillary jigs and fixtures. * measurement devices, including pressure gauges, times, temperature probes, calipers and computer based monitors * calculators * service connection and repair equipment and products * relevant safety equipment * Comprehensive work instructions. * electro fusion joints * Welding Machine * pipe and fitting |
| Hazards | * May include: * hazardous cleaning fluids * pipe material handling * heavy stationary and moving machinery * Cutting and heating components. |
| Context | * May include: * This competency unit includes the installation of relevant elements of polyethylene (PE) pressure pipeline components. * The end applications include pipelines used for transmission of gaseous and water based fluids. * The operation of alternative jointing procedures, service connections repairs using all relevant ancillary equipment. * Specifications include national standards for materials workplace specifications and instructions, and government codes and regulations. |
| Procedure | * May include: * All operations are performed in accordance with procedures. * Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards. |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * identifying materials being used in the installation as compatible for welding * calculating appropriate welding parameters to be used * maintaining and calibrating welding equipment * performing welding * assessing quality of welded joints made. * identifying materials being used in the installation as being suitable for specific applications * identifying applications for alternative jointing technologies * determining appropriate methods of handling, storage and transport of PE plastics components * identifying and carrying out service connection and repair techniques * assessing quality of completed installations by determining appropriate testing and commissioning procedures. |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * identify types of materials and components being used * establish specific job needs and completion test requirements * set up and maintain safe working environment * set up and maintain required storage, handling, and transport procedures * establish installation requirements * perform jointing and installation to meet required quality levels * identify and rectify fault causes arising from application and component variables * identify compatibility of commercial operating systems * select electro fusion welding parameters for individual control units and fittings components * prepare electro fusion joint assemblies * set up and maintain safe working environment * operate control unit within required parameters * identify and rectify fault causes arising from machine operation and component variables * establish and maintain quality records as relevant for the practical completion of work required |
| Underpinning Skills | Demonstrates skills to:   * identify types of materials and components being used * establish specific job needs and completion test requirements * set up and maintain safe working environment * set up and maintain required storage, handling, and transport procedures * establish installation requirements * perform jointing and installation to meet required quality levels * identify and rectify fault causes arising from application and component variables * identify compatibility of commercial operating systems * select electro fusion welding parameters for individual control units and fittings components * prepare electro fusion joint assemblies * set up and maintain safe working environment * operate control unit within required parameters * identify and rectify fault causes arising from machine operation and component variables * establish and maintain quality records as relevant for the practical completion of work required |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Perform leak detection** |
| **Unit Code** | [EIS WSO3 03 0217](#EIS_WSO3_04_1116) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to plan leak detection activities and to locate, identify and report leaks in water distribution networks (pressure mains). |

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| **Elements** | **Performance Criteria** |
| 1Plan for leak detection**.** | 1.1 Determine work site boundaries and leak detection requirements from plans, specifications and instructions.  1.2 Select and check equipment according to organizational and statutory requirements.  1.3 Use site inspection and service search diagrams according to work site requirements. |
| 2Operate leak detection equipment**.** | 2.1 Determine and mark work site boundaries from plans and service search diagrams.  2.2 Select, fit and correctly use personal protective equipment.  2.3 Operate leak detection equipment according to organizational and statutory requirements.  2.4 Mark the location of leaks according to organizational requirements.  2.5 Expose leaks and arrange repair according to testing outcomes and organizational and statutory requirements. |
| 3Review**,** record and report work**.** | 3.1 Review and record work according to organizational requirements.  3.2 Compile reports according to organizational requirements. |

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| **Variable** | **Range** |
| Leak detection requirements | * May include: * location of leaks in pipes, including: * polyvinyl chloride (PVC) * reinforced concrete * polyethylene * cast iron cement lined * ductile iron cement lined * asbestos cement * mild steel cement lined * location of leaks in fittings, including: * jointing systems for pipe types e.g. gibault * tension bands * solvent cement joints * compression ring joints * bolted flanges * cathodic protection * electrofusion * butt-welding * location of leaks in structures, including: * meter pits * valve pits * drop structures * regulators * erosion barriers * head walls * thrust blocks, * inspection shafts * regulation of flow and pressure, including: * the adjustment of pumping systems * valving systems * gravity flow systems * service reservoirs * electronic and manual control systems. |
| Equipment | * May include: * leak detection equipment * pipe and cable locating equipment * hand and power tools * lifting equipment * mechanical excavation equipment * pneumatic and motorised equipment e.g. compressors, pneumatic spades and attachments * motorised cutting equipment * on- and off-road vehicles * portable pumps * communication systems * gas detection equipment * rescue equipment * appropriate personal protective equipment |
| Organisational and statutory requirements | * May include: * by-laws or organizational policies * procedures * environment protection * occupational health and safety * mines and subsidence * road signage * electrical safety * dangerous goods * manufacturer's guidelines |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * planning leak detection activities * operating leak detection equipment safely * locating and marking leaks and arranging repair activities * completing documentation |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * identification and repair procedures * system hydraulics * system layout * environmental aspects * lock out procedures for mechanical and electrical installations * relevant utilities and service bodies * communication systems * landscape and ground structure of work area * risk assessment and the identification of potential hazards * equipment operation, capacity and limitations * effects of weather and conditions on site or plant |
| Underpinning Skills | Demonstrates skills to:   * use leak detection equipment * identify and correct problems * regulate systems and flows * use basic mathematics for calculation and measurement * collect data * analyse data to take remedial action * produce reports and logs * use safety and personal protective equipment * use tools and machinery * interpret plans, specifications, policies and procedures * provide maintenance records for equipment * communicate with employees, other service providers and customers * use communication systems * give and receive instructions * identify safety risks and hazards |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Monitor, operate and control water treatment processes** |
| **Unit Code** | [EIS WSO3 04 0217](#EIS_WSO3_02_1116) |
| **Unit Descriptor** | This unit of competence describes the outcomes required to perform basic monitoring operation control and measurement of water treatment process and to report on water treatment plant system performance and process quality control |

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| **Elements** | **Performance Criteria** |
| 1Monitor treatment plant performance | 1.1 Carry out routine plant inspections according to the type of plant and organizational procedures and statutory requirements.  1.2 Select and check equipment and correctly fit and use personal protective equipment.  1.3 Collect water and other process samples and conduct standard tests.  1.4 Collect, record and report process data according to organizational and plant requirements. |
| 2Prepare chemical dosing**.** | 2.1 Use, handle and store chemicals according to organizational procedures and statutory requirements.  2.2 Determine and prepare chemical dosing according to plant procedures and statutory requirements.  2.3 Maintain information related to chemical supply and usage according to organizational procedures and statutory requirements. |
| 3Operate and control processes**.** | 3. 1 Conduct chemical dosing according to organizational procedures and statutory requirements.  3.2 Identify and report process faults and the operational condition of plant according to organizational procedures and statutory requirements.  3.3 Initiate basic system adjustments to improve system performance according to organizational procedures and statutory requirements. |
| 4Compile process records**.** | 4.1 Compile reports from plant and system data to meet organizational procedures and statutory requirements.  4.2 Report observations outside defined parameters for further action. |

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| **Variable** | **Range** |
| Routine plant inspections | * May include: * raw water * floc formation * sedimentation * filtration * filtered water * dosing equipment * interaction and communication with other employees, other authorities and the general public * implementation of reporting procedures that may also include procedures for the implementation of by-laws, organizational policies and statutory requirements |
| Organizational procedures and statutory requirements. | * May include: * by-laws and organizational policies * standard operating procedures * environment protection * occupational health and safety * chemicals * dangerous goods * electrical * lifts and cranes * World Health Organization standards * Ethiopian Drinking Water Guidelines * licensing agreements |
| Equipment | * May include: * electronic monitoring and metering systems * chart recording systems * basic hand tools * sampling and laboratory testing equipment * computerized equipment * communication equipment * personal protective equipment |
| Tests | * May include: * testing of raw, clarified, filtered and finished water for: * turbidity * color * pH * finished water should be tested for chlorine residual * other tests may include: * hardness * alkalinity * routine jar testing |
| Chemicals | * May include: * chlorine gas * sodium hypochlorite * calcium hypochlorite * carbon dioxide * Alum * powder activated carbon * polymers * lime * Coagulant Aids * Soda Ash |
| Processes | * May include: * pre-treatment, for example: * screen systems * lime * chlorination * chemical addition, for example: * coagulation * flocculation * flash-mixing * solids separation, for example: * sedimentation * flotation * filtration * membrane processes * disinfection, for example: * chlorination * ozonation * chloramination * post-treatment, for example: * fluoridation |
| System adjustments | * May include: * dosing adjustments * pH correction |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * conducting routine plant inspections, taking samples and performing basic tests * preparing and applying chemical dosing according to instructions * identifying and reporting system faults * making basic system adjustments according to instructions * completing required documentation |
| Underpinning Knowledge and Attitudes | * system hydraulics * system layout * lock out procedures for mechanical and electrical installations * policies, procedures and legislation * relevant utilities and service bodies * communication systems * hazardous materials handling * environmental, landscape and ground structure of work area * risk factors and potential hazards associated with the operation of water treatment processes * chemical dosing processes * process calculations * equipment operation, capacity and limitations * effects of weather and conditions on operation of site or plant * pumping and valving systems * mechanical and electrical control systems * policies and procedures for storing and handling dangerous goods and chemicals * interpretation and use of material safety data sheets * chemical and biological principles that form the basis of water treatment |
| Underpinning Skills | Demonstrates skills to:   * solve operational problems * perform process calculations * produce reports and logs * use safety equipment and personal protective equipment * interpret plans, charts and instructions * interpret policies, procedures and standards * communicate with employees and customers * work effectively as part of a team * use communication equipment * give and receive instructions * prepare and apply chemical dosing * operate computerised equipment * identify control system faults * sample and test products |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Monitor and control rural water distribution operations** |
| **Unit Code** | [EIS WSO3 05 0217](#EIS_WSO3_03_1116) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to monitor, control and coordinate rural water flow, scheduling and delivery and to report on rural water distribution, including domestic and stock supply systems. |

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| **Elements** | **Performance Criteria** |
| 1Monitor water delivery system**.** | 1.1 Perform routine inspections of channel flow rates, regulations and delivery according to demand and organizational and statutory requirements.  1.2 Gather and record system performance data according to organizational requirements.  1.3 Identify and correct system faults according to plans and service standards.  1.4 Correctly select, fit and use required safety equipment, including personal protective equipment. |
| 2Control processes**.** | 2.1 Determine and apply system adjustments required to meet demands.  2.2 Initiate and coordinate system adjustments required for delivery or channel flow rates according to organizational and demand requirements.  2.3 Integrate processes to improve the delivery network performance according to organizational requirements. |
| 3Analyze data and compile reports**.** | 3.1 Conduct analysis of actual against planned system performance using system data and records.  3.2 Compile reports from system performance data according to organizational requirements. |

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| **Variable** | **Range** |
| Routine inspections | * May include: * Distribution systems, including: * water mains * services * valves * meters * associated structures and fittings * May include: * pipes, including: * polyvinyl chloride (PVC) * polyethylene * mild steel cement lined * ductile iron cement lined * cast iron * copper * glass reinforced piping * May include: * structures, including: * meter pits * person access pits * regulators * erosion barriers * head walls * thrust blocks * May include: * fittings, including: * jointing systems for pipe types e.g. gibault * tapping band * tension bands * solvent joins * compression ring joints * bolted flanges * cathodic protection |
| Organisational and statutory requirements | * May include: * by-laws and organizational policies * standard operating procedures covering working with: * lifts and cranes * mines * road signage code * electrical sources * dangerous goods * environment protection * occupational health and safety, including the use of personal protective equipment |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * conducting system inspections * gathering and recording system performance data * identifying and correcting system faults * adjusting system to meet demand * integrating processes * analyzing system performance * completing required documentation |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * inspection of rural distribution systems * coordination processes * system layout * system processes * environmental aspects of rural distribution systems * safety procedures * lock out procedures for mechanical and electrical installations * policies and standard operating procedures * procedures and legislation * relevant utilities and service bodies * communication systems * risk factors and potential hazards * equipment operation, capacity and limitations * effects of weather and conditions on operation of rural water distribution systems * pipes and fittings * pumping and valving systems * gravity systems * control systems |
| Underpinning Skills | Demonstrates skills to:   * solve operational problems * produce reports and logs * interpret plans and instructions * communicate with employees and customers * control system operations and processes * use communication equipment * calculate water flows * identify control system faults * lay and join pipes * install associated fittings and components * identify and respond to operational problems * interpret plans, instructions and standard operating procedures * follow procedures and standards * use safety equipment and personal protective equipment * use tools and machinery * identify hazards * give and receive instructions |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Monitor, operate and control wastewater lagoon processes** |
| **Unit Code** | [EIS WSO3 06 0217](#EIS_WSO3_05_1116) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to monitor and operate wastewater lagoon processes and report on system performance. |

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| **Elements** | **Performance Criteria** |
| 1Plan and prepare for work**.** | 1.1 Determine work requirements according to legislative and organizational requirements.  1.2 Select and check equipment required to meet safety requirements of task and site.  1.3 Select, fit and use personal protective equipment. |
| 2Monitor performance**.** | 2.1 Carry out routine inspections according to particular lagoon system and organizational requirements.  2.2 Collect process samples and conduct standard tests.  2.3 Collect and report process data according to organizational and lagoon system requirements. |
| 3Operate and control lagoon processes**.** | 3.1 Monitor processes to maintain parameters of operation.  3.2 Identify and report process faults and operational condition of plant according to organizational requirements.  3.3 Carry out basic system adjustments within defined parameters to enhance system performance according to organizational requirements.  3.4 Handle, use and store chemicals according to organizational requirements. |
| 4. Complete documentation | 4.1 Maintain records of plant and system data according to organizational requirements.  4.2 Report observations outside defined parameters for further action. |

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| **Variable** | **Range** |
| Legislative and organisational requirements | * May include: * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organizational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| Equipment | * May include: * electronic monitoring and metering systems * recording systems * basic hand and power tools * sampling and laboratory testing equipment * computerized equipment * on- and off-road vehicles * communication equipment * personal protective equipment |
| Tests | * May include: * settling * microscopic observation * pH * dissolved oxygen * electrical conductivity * temperature * odour * visual observation of: * color * scum * insects * birdlife * weed growth * redox potential |
| Processes | * May include: * primary, secondary and maturation lagoons * aerated lagoons * winter storages |
| System adjustments | * May include: * pH correction * mixing * flow control * water level * dissolved oxygen levels * recirculation rates * chemical additives |
| Records | * May include: * plant performance data * chemical usage |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * should demonstrate the ability to monitor, operate and report on wastewater lagoon processes, including: * planning and conducting routine inspections * monitoring system processes * reporting process and structural faults * performing system adjustments * preparing and applying chemical dosing * completing system performance-monitoring documentation |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * biological principles of lagoon wastewater treatment processes * system hydraulics basics * system layout * lock-out procedures for mechanical and electrical installations * policies, procedures and legislation relating to wastewater management * communication systems * hazardous materials handling * environment, landscape and ground structure of work area * risk factors and potential hazards related to lagoon wastewater treatment * system calculations * chemical dosing processes * equipment operation, capacity and limitations * effects of weather and conditions on operation of site or plant * pumping and valving systems |
| Underpinning Skills | Demonstrates skills to:   * identify and respond to operational problems * produce reports and logs * use safety equipment and personal protective equipment * follow plans, charts and instructions * perform system calculations * apply procedures and standards * communicate with colleagues, other employees and customers * work effectively as part of a team * use communication equipment * give and receive instructions * identify control system faults * use literacy skills in regard to verbal and written communication in the workplace * sample and test products |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Inspect and maintain public facilities** |
| **Unit Code** | [EIS WSO3 07 0217](#EIS_WSO3_06_1116) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to inspect and perform or arrange, the cleaning and maintenance of public facilities, including the disposal of wastes at the facilities of water organisations. |

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| **Elements** | **Performance Criteria** |
| 1Inspect**,** plan and prepare work areas**.** | 1.1 Determine work site locations and boundaries and work requirements from instructions, inspection records, guidelines and specifications.  1.2 Inspect areas and facilities and identify, control and report potential hazards following OHS and organizational guidelines.  1.3 Select and check equipment to meet maintenance requirements of task and site. |
| 2Perform or arrange maintenance of public facilities**.** | 2.1 Perform or arrange cleaning or maintenance of areas and facilities to meet legislative and organizational requirements.  2.2 Order supplies as required.  2.3 Store, handle and use chemicals and equipment appropriately and according to legislative and organizational requirements.  2.4 Dispose of wastes, including dangerous materials, according to legislative and organizational requirements. |
| 3Record and report on work**.** | 3.1 Check, maintain and store equipment, tools and materials according to manufacturer guidelines and organizational procedures.  3.2 Restore work site to meet environmental and organizational requirements.  3.3 Maintain workplace records as required. |

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| **Variable** | **Range** |
| InspectionAreas and facilities | * May include: * Interaction and communication with other employees, other authorities and general public * visual observation * record keeping * implementation of reporting procedures that may also include procedures for implementation of by-laws, organizational policies and statutory requirements * will be dependent upon water organization’s infrastructure but areas such as dams, reservoirs and reserves * a range of facilities, such as: * toilet facilities, including septic systems * barbeques and surrounds * public recreation areas, including seating and picnic areas * boat ramps * jetties * observation decks * walkways |
| Equipment | * May include: * hand and power tools * motorized machinery * on- and off-road vehicles * small marine craft * chemicals and mixers * chemical spraying apparatus * mixing equipment and storage areas * appropriate personal protective equipment * communication equipment |
| Legislative and organisational requirements | * May include: * relevant federal and state or territory legislation and regulations * codes of practice, associated standards and guidance material * documented organizational policies, manuals and induction programs * relevant community planning and development agreements, such as land care agreements |
| Wastes | * May include: * hazardous waste, such as: * broken glass * syringes * biological hazards, such as: * wastewater * excrement * dead animals * noxious weeds * non-hazardous substances, such as: * paper * general household rubbish * garden waste, such as: * lawn clippings * weeds * branches * soil |
| Records | * May include: * records, such as: * manual or electronic data * copies of contractor permits to work, site inductions and OHS procedures * work orders * purchase orders * reporting, such as: * verbal reports * paper-based reports * electronic reports |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * interpreting work instructions and inspect sites * select appropriate equipment to maintain public facilities * cleaning or arranging cleaning of public facilities * maintaining or arranging the maintenance of public facilities * replenishing supplies * clearing and disposing of waste and debris safely * restoring work site and store equipment * completing relevant documentation |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * environmental aspects of inspecting and maintaining public facilities * use, storage, handling and transport of hazardous substances * landscape and ground structure of work area * risk factors and potential hazards of maintaining public facilities * relevant material safety data sheets (MSDS) * effects of weather and conditions on the use of disinfecting and cleaning products |
| Underpinning Skills | Demonstrates skills to:   * inspect and maintain public facilities * use safety equipment and personal protective equipment * store, transport, handle and use chemicals safely * perform work-related calculations * apply procedures and standards for maintenance of public facilities * communicate with employees, customers and the public * work effectively as part of a team * give and receive instructions * use literacy skills in regard to verbal and written communication in the workplace * use hand tools and equipment |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Provide and promote customer service** |
| **Unit Code** | [EIS WSO3 08 0217](#EIS_WSO3_07_1116) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to respond effectively to the needs of internal and external customers by the application of the organisation's standards and processes. The ability to solve problems, communicate effectively and seek opportunities to improve service to customers are essential to performance. |

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| **Elements** | **Performance Criteria** |
| 1Apply organizational customer service standards**.** | 1.1 Check the organization’s plans, policies and procedures relating to customer service and apply them.  1.2 Explain the features, benefits and application of the organization’s products and services to customers.  1.3 Apply the organization’s processes for handling customer queries, complaints and disputes.  1.4 Apply effective communication techniques with different types of customers and situations.  1.5 Plan and participate in team and work activities to meet customer satisfaction and minimize inconvenience.  1.6 Use available resources to meet customer requirements and services. |
| 2Respond to customer needs and concerns**.** | 2.1 Clarify customer needs and expectations.  2.2 Resolve customer concerns or complaints according to organizational policies and procedures.  2.3 Address customer needs or complaints clearly, politely and effectively.  2.4 Refer customer concerns related to organizational liability to appropriate persons or departments according to organizational policy.  2.5 Complete documentation and process it according to organizational and statutory requirements. |
| 3Contribute to customer service standards**.** | 3.1 Identify and explain opportunities to improve services or processes to team members.  3.2 Review personal work performance to improve services to customers.  3.3 Record evidence of customer satisfaction and report to team members.  3.4 Contribute to the development, and improvement of quality service policies and standards. |

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| **Variable** | **Range** |
| Plans***,*** policies and procedures | * May include: * specific documents relating to customer service: * service standards * dispute resolution processes * general organizational documentation: * mission statements * vision statements * strategic and annual plans |
| Processes for handling customer queries***,*** complaints and disputes | * May include: * interaction and communication with other employees and other authorities including the appropriate referral of problems for resolution that are outside the scope of the officer's level of responsibility * implementation of reporting procedures that may also include procedures for the implementation of by-laws, organizational policies and statutory requirements * access to appropriate records on hard copy or software systems |
| Effective communication techniques | * May include: * verbal or non-verbal language * two-way interaction * constructive feedback * active listening * questioning to clarify and confirm understanding * interpreting non-verbal and verbal messages * observation techniques * use of positive, confident and co-operative language * control of tone of voice and body language * use of language and concepts appropriate to cultural differences * use of clear presentations of options and consequences * demonstrating flexibility and willingness to negotiate |
| Documentation | * May include: * complaints handling forms * work site records * customer, interdepartmental or other organization’s correspondence |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * communicating effectively with internal and external customers according to organizational procedures and standards * preparing resources and planning work to meet customer requirements * managing and reporting customer complaints according to organizational procedures * reviewing customer service and customer satisfaction * contributing to improvements in customer service standards |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * relevant Acts and by-laws that impact customer service * organizational policies, procedures, standards and quality systems * problem-solving strategies * communication techniques * performance management systems |
| Underpinning Skills | Demonstrates skills to:   * communicate effectively with customers, staff members (internal clients) and suppliers * negotiate and resolve disputes or minimize the concerns of customers * apply interpersonal skills * communicate effectively in a diverse work force * apply problem-solving skills * apply dispute resolution skills * report on customer issues * apply customer relations policy and organizational standards * identify both internal and external customers |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Disinfect networks asset and respond to blue green algae outbreak** |
| **Unit Code** | [EIS WTO3 09 0217](#EIS_WSO3_14_1116) |
| **Unit Descriptor** | This unit describes the skills required to disinfect network assets including where additional disinfection of the supply is required. This includes planning and preparing the work site and performing volumetric calculations. Identify and confirm blue green algae outbreaks. |

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| **Elements** | **Performance Criteria** |
| 1. Plan and prepare work | 1.1 Determine work requirements from specifications, instructions and pre-work inspections.  1.2 Conduct risk assessment for environment, safety and water quality factors.  1.3 Select and check equipment and ***personal protective equipment*** to meet safety requirements of task and site.  1.4 Determine size of area to be disinfected.  1.5 Perform calculations to establish dose rate and target residual and contact time of disinfectants |
| 2 Prepare samples | 2.1 Receive, handle and prepare samples testing according to organizational and statutory requirements.  2.2 Prepare and check testing equipment for blue-green algae identification and enumeration according to organizational requirements. |
| 3 Conduct tests for blue green algae. | 3.1 Conduct blue green algae tests according to organizational requirements.  3.2 Identify and confirm blue green algae.  3.3 Report blue green algae test results according to organizational requirements. |
| 4. Conduct disinfection | 4.1 Set up equipment at injection point.  4.2 Commence dosing at predetermined dose rate.  4.3 Perform residual measurement to ensure the target residual is being met.  4.4 Achieve contact time and stop dosing.  4.5 Operate the dosing equipment. |
| 5. Finalize work | 5.1 Collect samples ensuring that types, locations and times comply with requirements.  5.2 Prepare samples for laboratory testing according to requirements.  5.3 Check, maintain and store equipment, ***tools and materials***.  5.4 Restore the worksite and complete and submit workplace records.  5.5 Compile reports to meet organizational requirements.  5.6 Report observations outside defined parameters for further action. |

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| **Variable** | **Range** |
| personal protective equipment | May include:   * headwear * gloves * safety shoes and work boots * Over coats * Mouth and nose cover (Mask) * Eye glass |
| disinfectants | May include:   * Potassium Hypochlorite * Chlorine * Ozone * Ultraviolet * Calcium Hypochlorite * Chlorine Gas * Sodium Hypochlorite |
| Organisational and statutory requirements | May include:   * by-laws and organizational policies * standard operating procedures * environment protection * occupational health and safety, including use of personal protective equipment * National Water Quality Management strategy * World Health Organization standards * licensing agreements * Environment Protection Authority regulations |
| Testing equipment’s | May include:   * microscope * Sedgwick-Rafter counting chamber * volumetric glassware * equipment and solutions for sample concentration * identification charts and photos |
| Tests | May include:   * blue green algae identification and enumeration * tests may also include: * Secchi clarity * odour testing |
| Tools and materials | May include:   * Spatula * Balance * Container * Mixer * Injection pump |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * conducting risk assessment * performing volumetric calculations * operating network mains * operating control valves and pump stations * handling of chlorine in different forms, including at least one of: * gas * liquid * solid * operating and maintaining chemical dosing equipment * operating of analytical equipment * reading maps and diagrams |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * safe limits of disinfectant residual * water network operation * principles of chlorination and chloramination * basic water chemistry * interrogation of SCADA system |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Assess household water use and water treatment techniques** |
| **Unit Code** | [EIS WSO3 10 10217](#EIS_WSO3_12_1116) |
| **Unit Descriptor** | This unit of competency specifies the outcomes required to collect and analyse information on household water use and provide advice on ways to improve water efficiency and conservation in the home and apply household water treatment techniques. |

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| **Elements** | **Performance Criteria** |
| 1. Plan and organize the assessment. | 1.1 Need for assessing water use in a residential building is clarified with client.  1.2 Effective communication strategies are employed to assist in establishing rapport with client and in responding to client questions and concerns.  1.3 Assessment is planned in line with ***National*** and local government legislation and regulations, and industry ethical and conduct standards.  1.4 Issues relating to national and territory legislation and regulations and industry ethical and conduct standards are identified and clarified with client.  1.5 Plan is established for the assessment in line with enterprise practice and client requirements.  1.6 Potential hazards are identified to ensure risks are suitably managed.  1.7 Assessment activities are planned to ensure they do not compromise the health and safety of self and others.  1.8 Assessment documentation is prepared in a manner consistent with enterprise practice.  1.9 Tools, equipment and other requirements for the assessment are identified and arrangements are made to ensure their availability on day of assessment.  1.10 Client is advised of information that should be obtained prior to assessment and details of assessment are confirmed.  1.11 Authority to proceed is obtained from client prior to commencement and reconfirmed as appropriate during the assessment. |
| 2.Gather data on household water use and costs. | 2.1 Information to be gathered on household water use and costs is confirmed.  2.2 Information on household water use and costs is collated.  2.3 Information on internal water services is gathered from resident, and from measurements and observations made during inspection of the residence.  2.4 Information on external water services is gathered from resident, and from measurements and observations made during inspection of the residence.  2.5 Information on behaviour and preferences of household members that impact on Need for assessing water use is gathered from resident, and from observations made during inspection of the residence.  2.6 Information is verified for accuracy and recorded using the relevant data collection tool***.*** |
| 3.Analyse data on household water use, costs and emissions. | 3.1 Information is analysed to identify key characteristics of household water use, costs and emissions.  3.2 Government rebates and other assistance programs related to improving efficiency of household water use are identified.  3.3 Options for improving efficiency of water use and reducing costs and emissions are evaluated***.***  3.4 Cost of options for improving household water efficiency is estimated in line with enterprise procedures.  3.5 Estimated water, emissions and cost savings generated from improving household water efficiency are estimated in line with enterprise procedures. |
| 4.Assess opportunities for rainwater harvesting, grey water use and other water conservation measures on the property. | 4.1 Sources of technical advice on incorporating rainwater harvesting***,*** grey water technologies and other water conservation measures in residential buildings are identified.  4.2 Advantages and disadvantages of rainwater harvesting***,*** grey water technologies and other water conservation measures are identified.  4.3 Rainwater harvesting, grey water technologies and other water conservation measures suitable for use in residential buildings are identified.  4.4 Government rebates and other assistance programs for incorporating rainwater harvesting, grey water technologies and other water conservation measures in residential buildings are identified.  4.5 Opportunities for rainwater harvesting, grey water technologies and other water conservation measures are evaluated***.***  4.6 Estimates of cost of installing rainwater harvesting, grey water technologies and other water conservation measures are produced and associated impact on household water efficiency and costs is determined in line with enterprise procedures. |
| 5.Report outcomes of water use assessment. | 5.1 Results and recommendations, along with supporting evidence, are collated and documented in line with enterprise and client requirements.  5.2 Estimated cost of proposed recommendations, associated reductions in household water costs and emissions, and improvements in household water efficiency are documented in line with enterprise procedures.  5.3 Results and recommendations, including estimated costs and improvements in household water efficiency, are explained to client in line with enterprise, legislative and client requirements. |
| 6.Apply household water treatment techniques. | 6.1 Identify the different types of household water treatment techniques applicable to the local community and house holds  6.2. Apply the appropriate house hold treatment methods  6.3. Follow the applicability and utilization of the techniques sustainably |

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| **Variable** | **Range** |
| Need for assessing water use | * May include: * determining water profile * opportunities for reducing water use and improving water efficiency * legislative, regulatory and compliance purposes * providing building design advice. |
| Residential building | * May include: * any building categorized as Class 1, 2, 4 and 10a of the Building Code of Australia or in accordance with jurisdictional requirements. |
| Client | * May include: * builder * community organization * construction manager * government agency * house owner * land owner * property developer * property manager * real estate agent * tenant * Water authority. |
| Effective communication strategies | * May include: * active listening * being non-judgmental * exploring problems * expressing an individual perspective * providing sufficient time for questions and responses * providing summarizing and reflective responses in conflict situations * using appropriate words, behavior and posture * using clarifying, summarizing questions * using clear and concise language * using culturally appropriate communication * using plain English * using verbal and non-verbal communication. |
| National ,local government legislation and regulations***,*** and industry ethical and conduct standards | * May include: * environment protection * ethical behavior * fair trading and consumer protection: * confidentiality * conflict of interest * duty of care * non-discriminatory practices * privacy * residential tenancies * OHS * water and water management * water use assessment: * accreditation * assessment procedures * certification * documentation. |
| Issues | * May include: * basis for need to conduct water use assessment * information required by assessor from client * information that assessor is required to document * objectives of assessment. |
| Hazards | * May include: * appliances: * electrocution * faults * biological waste: * black water * grey water * confined spaces * electricity * harassment, bullying and/or violence involving co-workers or customers * hazardous substances: * allergens * asbestos * chemicals * fibers * fumes * insulation * heat: * burns * scalds * manual handling: * carrying * lifting * pulling * pushing * machinery, including powered and non-powered equipment * skin penetrating injuries: * knives * sharps * syringes * work environment: * access * animals * dust * floor surfaces * lighting * noise * pollen * temperature * trips and falls * working alone * working at heights * Ventilation. |
| Assessment documentation | * May include: * building details * building plans and specifications * checklists * client details * company promotional materials * contact details * existing water bills * photographic evidence * risk assessment * site details * water meter readings. |
| Tools***,*** equipment and other requirements | * May include: * bucket * calculator * clipboard * clock * compass * digital camera * flow meter * ladder * personal protective equipment (PPE): * dust masks * eye protection * headwear * gloves * overalls * safety shoes and work boots * tape measure * thermometer * torch. |
| Information that should be obtained prior to assessment | * May include: * appliances: * age * capacity * number * type * household members: * number * water accounts: * billing history * plans * tariffs * water reduction, reuse and recycling strategies currently in place: * grey water collection and use * water tanks * other water conservation strategies. |
| Details of assessment | * May include: * address of residence * assessor name and contact details * cost of assessment * date and time of assessment * duration of assessment. |
| Information | * May include: * age, type and operation of appliances * behavior and preferences of household members that impact on water use * water costs * water use * water services: * internal water services * external water services. |
| Information on household water use and costs | * May include: * analysis of water meter readings: * conventional meters * smart meters * analysis of accounts to show daily, seasonal and trend data on water use and cost * analysis of costs of different water plans and tariff structures. |
| Information on internal water services | * May include: * characteristics of internal water services: * age * average daily use * capacity * condition * flow rate * grey water collection and use * leaks and drips * maintenance costs of system * number * suitability for size of household * water efficiency rating * water saving features * water use * number and type of internal water services: * baths * clothes washing machines * combination washer/dryer machines * dishwashers * hot water circulators * showers * spas * tap equipment * toilets. |
| Need for assessing water use | * May include: * determining water profile * opportunities for reducing water use and improving water efficiency * legislative, regulatory and compliance purposes * Providing building design advice. |
| Household water treatment techniques | * May include: * Bio sand filtration * Boiling * Solar disinfection-SODIS * Decantation * Filtration * Sedimentation * Chemical usage\_ water guard, Bishangari, aqua tab, etc * UV disinfection * Activated carbon |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * collect and analyses information on household water use and on ways to improve water efficiency in the home * assess opportunities for incorporating rainwater harvesting, greywater technologies and other water conservation measures in a residential building * comply with OHS requirements when conducting household water assessment * apply knowledge of: * trends in household water use and costs * ways of gathering information on household water use and costs * ways to improve household water efficiency. |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * commonwealth, state or territory, and local government legislation and regulations impacting on household water use and management related to: * anti-discrimination and equal employment opportunity * consumer protection, fair trading and trade practices * employment and industrial relations * environment protection * health * household rainwater harvesting, greywater use and other water conservation and restriction measures * occupational health and safety (OHS) * privacy * water restrictions * government rebates and other assistance programs related to improving water efficiency in residential buildings * greenhouse gas emissions: * relationship between water use and greenhouse gas emissions * ways of reducing greenhouse gas emissions through improving water efficiency * household internal and external water services * household water use: * trends in household water consumption and factors impacting on those trends * sustainable domestic water use * units of measurement * water bills * water consumption * water restrictions * water tariffs * impact of attitudes, behavior and preferences of household members on water use * options for improving efficiency of household water use: * behavior change * internal and external water services * leak detection * water efficient gardening practices * rainwater harvesting, greater technologies and other water conservation measures: * criteria for assessing feasibility * rebates and other forms of financial support * system risks * types and features of systems * sources of information on water measuring tools: * types * uses * sources of data on domestic water use and cost: * water bills * water meters * water efficiency and labeling standards (WELS) |
| Underpinning Skills | Demonstrates skills to:   * communication skills to interact with clients from diverse social, economic and cultural backgrounds * decision-making and problem-solving skills to make recommendations based on analysis of household water use * literacy skills to: * complete standard forms * generate business correspondence * interpret water accounts * prepare reports * read and interpret a variety of texts, including legislation, regulations, and codes of conduct and ethical standards * numeracy and data analysis skills to: * extract and interpret data from water accounts and interpret water plans and tariff structures * read, calculate and interpret water meter data * planning, organizing and scheduling skills to undertake work-related tasks, such as collecting data required for assessing household water use and costs * perform drinking water treatment at house hold level using different techniques * ratings of appliances * water consumption of appliances * use of rainwater harvesting, grey water technologies and other water conservation measures * technology skills to enter data and use the functions of water use calculators and general purpose software packages * time-management skills to complete assessment tasks in a time and cost efficient manner |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Estimate the quantity and cost of water construction work** |
| **Unit Code** | [EIS WSO3 11 0217](#EIS_WSO3_11_0217) |
| **Unit Descriptor** | This unit of competency specifies the outcomes required to estimate materials, labor and time requirements and establish costs for provision of services or products in basic construction work. It covers the gaining of information; the estimation of materials, labor and time; the calculation of costs; and the associated documentation. |

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| **Elements** | **Performance Criteria** |
| 1. Gather information. | 1.1. Details of requirements are obtained and understood through discussion with customer or from information supplied.  1.2. Plans and specifications are accessed and site is inspected to confirm full requirements.  1.3. Details of products and services to be provided are developed and checked for availability and as fit for purpose.  1.4. Delivery point and methods of transportation are determined where necessary.  1.5. Details are accurately recorded and checked in accordance with workplace procedures. |
| 2. Estimate volume of work, materials, labor, equipment and time. | 2.1. estimate the volume of works according to organizational requirement  2.2. Work, including preparatory tasks, is planned and sequenced to cover all necessary activity.  2.3. Types of materials, equipment and quantities required for product work are estimated based on availability, fitness for purpose and current costs.  2.4. Labor requirements to perform work are estimated to complete the work activity.  2.5. Time requirements to perform work are accurately estimated and checked with appropriate personnel. |
| 3. Calculate costs. | 3.1. Total materials, labor and overhead costs are calculated in accordance with workplace procedures and statutory requirements.  3.2. Total work cost is calculated, including overheads and mark-up percentages set by appropriate personnel.  3.3. Final cost for work is calculated and checked for accuracy. |
| 4. Document and verify details. | 4.1. Details of costs and charges are clearly and accurately documented in accordance with workplace procedures.  4.2. Costs, calculations or other details are verified in accordance with workplace procedures and current costing data.  4.3. Quotation/tender documentation is prepared and verified.  4.4. Costing documents are accurately completed for future reference in accordance with workplace procedures. |

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| **Variable** | **Range** |
| Plans and specifications | * May include: * sketches or drawings * statements of requirements, including environmental requirements relating to the acquisition, use and disposal of materials * materials lists and quantity schedules * building codes * Materials specifications, including specifications of material reuse and recycling. |
| Types of materials and equipments | * May include: * aluminum and steel framing and steel reinforcing * bricks, masonry blocks and pavers * cement, sand, aggregates and bonding agents * decorative finishing materials, such as wallpaper, laminates, gilding materials, lacquers and polishes * fixings, fastenings and adhesives * fuel and lubricants * paint, solvents and cleaning agents * tiles and glass * timber, plywood's, fiber board and composites * wall and ceiling lining materials, plaster and platters products and external claddings. * Mixer * Vibrator * Excavator * Spade * Tamper |
| Labour and overhead costs | * May include: * labor costs, such as: * personal protective equipment * site facilities * wages and on-costs * overhead costs, such as: * administration * Insurance * local government fees and charges * plant and equipment hire * transport * use of communication technology * Waste removal fees. |
| Costing documents | * job sheets * materials list and estimates * quotations and tenders * Work schedules. |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * locate, interpret and apply relevant information, standards and specifications to the estimation and costing of work * as a minimum, estimate and cost three varied jobs, including: * estimate quantities of material required * determine the types and amount of labor required to complete the work * estimate time required to complete the work * estimate overheads associated with the job * a written quotation/tender for each of the work requirements. |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * application of GST * construction terminology * environmental and sustainability requirements * estimating and calculating processes * impact of time on wages and other costs * international system of units (SI) system of measurements relevant to the construction industry * process of estimating and costing construction work * quality requirements of construction projects * relevant statutory and authority requirements related to estimating and costing work * estimating cost and volume of work * relevant tendering and contracting documentation * safe work method statements * sources of information and the processes for calculating material requirements * Standards applicable to the work to be undertaken, e.g. Australian standards and the Building Code of Australia. |
| Underpinning Skills | Demonstrates skills to:   * accessing current costing data * accurately calculating labour costs * accurately calculating material quantities and cost * producing accurate written costing information * Reading and interpreting drawings and material specifications. |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Monitor maintenance and control system of water and wastewater assets** |
| **Unit Code** | [EIS WSO3 12 0217](#EIS_WSO3_12_0217) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to inspect, identify faults, gather data, and assess asset maintenance and repairs to produce plans for maintenance and repair work completion. |

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| **Elements** | **Performance Criteria** |
| 1Analyze asset condition and determine remedial action**.** | 1.1 Schedule routine inspections of assets and monitor fault reporting according to organizational procedures.  1.2 Collect and analyze data on asset and infrastructure condition according to organizational procedures.  1.3 Determine and cost asset maintenance and repair methods.  1.4 Correctly select equipment and fit and use required safety equipment, including personal protective equipment. |
| 2Plan and prepare for asset repair**.** | 2.1 Schedule and plan work site investigations and repair activities according to organizational requirements.  2.2 Develop repair plans and procedures and communicate to all stakeholders.  2.3 Assess and record environmental and occupational health and safety risks according to enterprise requirements and specify appropriate preventative measures.  2.4 Select equipment, materials, prefabricated components and fittings and make available for use on site. |
| 3Monitor and report maintenance activities**.** | 3.1 Monitor repairs to ensure compliance with organizational and statutory requirements.  3.2 Monitor repair and maintenance progress and keep records according to organizational procedures.  3.3 Inspect, confirm and report completion of repair and maintenance according to organizational procedures. |
| 4Complete records and reports**.** | 4.1 Complete workplace records and reports according to organizational requirements.  4.2 Make recommendations which contribute to the continuous improvement and quality of the organization’s systems. |

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| **Variable** | **Range** |
| Assets | * May include: * infrastructure in urban or rural locations * pumping stations * filtration, treatment and related infrastructure * service reservoirs * channel and canal systems and related infrastructure * pipes, including: * polyvinyl chloride (PVC) * polyethylene * mild steel cement lined * ductile iron cement lined * cast iron * copper * glass reinforced plastic * vitrified clay * reinforced concrete * asbestos cement * structures, including: * meter pits * person access pits * regulators * erosion barriers * head walls * thrust blocks * drop structures * siphons * meter outlets * prefabricated sections, including: * drainage sections * drainage pits * culverts * under road crossovers * fittings, including: * jointing systems for pipe types e.g. gibault * tapping band * tension bands * solvent joins * compression ring joints * bolted flanges * malleable jointing materials * electro fusion * butt welding * cathodic protection * drainage systems |
| Organisational procedures | * May include: * organizational policies * standard operating procedures * environment protection * occupational health and safety * lifts and cranes * mines * road signage code * electrical * marine * chemicals * dangerous goods |
| Equipment | * May include: * hand and power tools * lifting and winching equipment * mechanical excavation equipment * levering equipment * hydraulic and/or vacuum set-ups * pneumatic and motorized equipment: * pneumatic spades and attachments * pipes and associated fittings * motorized cutting equipment * on- and off-road vehicles * portable pumps * compressors * chemical spraying apparatus * trenching systems * portable pumps * communication equipment * breathing apparatus * gas detection equipment * communication equipment * rescue equipment * appropriate personal protective equipment |

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| **Evidence Guide** | |
| Critical aspects of Competence | Assessment requires evidence that the candidate:   * conducting operational and maintenance inspections * monitoring fault reports * collecting and analyzing operational and mechanical data * identifying and assessing work methods effectiveness * planning investigations and repairs * developing repair procedures * assessing risks and specifying preventive methods * selecting equipment, materials, prefabricated components and fittings * monitoring repairs * inspecting completed repairs * completing workplace records |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * environmental aspects of water distribution systems and infrastructure * organizational occupational health and safety procedures * lock out procedures for mechanical and electrical installations * cleaning and protection of assets * policies and standard operating procedures for monitoring and maintenance of assets * relevant utilities and service bodies * communication systems * environment, landscape and ground structure of work area * risk factors and potential hazards involved with water pressures and flows * equipment operation, capacity and limitations * effects of weather and conditions on operation of supply infrastructure * system pipes and fittings * pumping and valving systems * system layout * system processes * system operation * gravity systems * control systems |
| Underpinning Skills | Demonstrates skills to:   * identify and correct operational problems * undertake maintenance planning activities * undertake calculations and determine work requirements * monitor system operations and processes * produce reports and logs * use safety equipment and personal protective equipment * interpret plans and instructions * interpret the organization's policies, standard operating procedures and standards for monitoring and maintenance of assets * communicate with employees and customers * use communication equipment * give and receive instructions * calculate water pressures and flows * identify and report control system faults |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Assessment Methods | Competence may be assessed through:   * Interview / Written Test / Oral Questioning * Observation / Demonstration |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Control water quality test in distribution systems** |
| **Unit Code** | [EIS WSO3 13 0217](#EIS_WSO3_13_0217) |
| **Unit Descriptor** | This unit of competency describes the outcomes required to monitor, identify and resolve water quality problems in water distribution systems. The ability to identify and investigate operational problems, collect samples and analyse technical information, communicate effectively with stakeholders and to interpret and apply incident management procedures are essential to performance. |

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| **Elements** | **Performance Criteria** |
| 1Identify and locate water quality problems**.** | 1.1 Conduct monitoring of water quality according to organizational and statutory requirements.  1.2 Investigate water quality problems and identify the cause according to organizational requirements.  1.3 Collect, analyze and report system data according to organizational requirements.  1.4 Collect, label and record samples according to organizational requirements.  1.5 Correctly select, fit and use required safety equipment, including personal protective equipment. |
| 2Respond to water quality problems**.** | 2.1 Analyze incidents and apply incident management procedures to resolve water quality problems.  2.2 Notify stakeholders of policies, procedures and plans.  2.3 Monitor the recovery of the system and measure recovery according to organizational requirements.  2.4 ***Investigate*** and review results and take action according to organizational requirements. |
| 3Complete documentation**.** | 3.1 Report process faults according to organizational requirements.  3.2 Compile reports from system data according to organizational requirements. |

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| **Variables** | **Range** |
| Monitoring | * May include: * visual and electronic inspection * the implementation of incident management plans and reporting procedures * the implementation of by-laws, organizational policies, standard operating procedures and statutory requirements |
| Water quality | * May include: * parameters and standards as set by: * the World Health Organisation * the National Health and Medical Research Council (NHMRC) * Australian Drinking Water Guidelines |
| Organisational and statutory requirements | * May include: * Australian Drinking Water Guidelines * National Water Quality Management Strategy * World Health Organization guidelines * local authority by-laws * organizational policies and standard operating procedures * environment protection * equal employment opportunity * occupational health and safety, including the use of personal protective equipment * plumbing and drainage standards * Water Acts * electrical and mechanical procedures * hazardous substances and dangerous goods |
| Water quality problems | * May include: * loss of disinfection * E. coli * cross contamination * levels of heavy metals, such as manganese and iron * turbidity (nephelometric turbidity units -NTU) * colour (Hazen units - HU) * odour and presence of trihalomethanes (THMs) |
| System data | * May include: * sampling and testing records * infrastructure failures * customer complaints |
| Incident management procedures | * May include: * categorization of the incident * implementation of the incident management control plan * customer notification * notification to relevant state or territory government departments |
| Stakeholders | * May include: * consumers * employee groups * community groups * government departments |
| Investigation | * May include: * the identification of possible contamination in areas including: * catchment areas * bulk water assets * water transfer assets * water distribution assets * sampling procedures * interaction and communication with other employees, other authorities and the general public |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge in:   * perform each task outlined in the elements consistently and in a representative range of contexts * meet the performance criteria associated with each element by employing the techniques, procedures, information and resources available in the workplace from those listed in the range statement * demonstrate an understanding of the underpinning knowledge and the application of skills as described under knowledge and skills * The candidate should demonstrate the ability to: * monitor characteristics of water quality * investigate water quality problems * collect samples * collect and record water quality data * analyze and resolve water quality incidents * inform stakeholders regarding water quality procedures and incident management plans * complete incident reports and other relevant documentation |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * relevant legislative requirements and responsibilities * established environmental management procedures * control procedures for environmental risks and incidents * environmental impact assessment * primary agencies involved in drinking water quality management * water quality standards and issues * causes of water quality deterioration * system hydraulics * incident management processes * system layout * system processes * systems operation * isolation procedures * sampling and testing procedures * water quality specifications * environmental aspects of water systems and infrastructure * safety procedures * lock out procedures for mechanical and electrical installations * policies, standard operating procedures and legislation * relevant utilities and service bodies * communication systems * environment, landscape and ground structure of work area * risk management principles * risk factors and potential hazards involved in water systems * equipment operation, capacity and limitations * effects of weather and conditions on operation of infrastructure * pipes and fittings * pumping and valuing systems * control systems |
| Underpinning Skills | Demonstrate skills to:   * identify and correct operational problems * identify and investigate water quality problems * access, interpret and apply relevant organizational and legislative requirements * identifies environmental policies, plans and procedures * undertake sampling and testing procedures * produce reports, logs, etc. * use safety equipment and personal protective equipment * investigate type of contamination * interpret plans, service diagrams, topographic plans, charts and specifications * interpret policies, standard operating procedures * communicate with employees and customers * manage system operations and processes * use communication systems * give and receive instructions * monitor inflows * identify control system faults |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Use Computer Aided Drafting Systems To Produce Basic Engineering Drawings** |
| **Unit Code** | [EIS WSO3 14 0217](#EIS_WSO3_14_0217) |
| **Unit Descriptor** | This unit covers producing basic engineering drawings using a CAD system, under the direction of a supervisor.  This unit applies to the production of drawings according to defined parameters and predetermined specifications that include materials, tolerances, codes and other specifications. All work is conducted under supervision.  Standard CAD software would be used including inbuilt file management, macros and reports. |

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| **Elements** | **Performance Criteria** |
| 1. Prepare the CAD environment | 1.1. All relevant manuals, instructions and operating procedures for the CAD software are obtained in accordance with workplace procedures.  1.2. The CAD package is booted up in accordance with workplace procedures.  1.3. Screen display areas and ***basic parameters*** are set in accordance with instructions. |
| 2. Produce a basic drawing/ Modify existing CAD drawings | 2.1. ***Basic CAD drawings*** are created and guidance is sought as required.  2.2. ***Drawings*** are prepared in accordance with AS 1100 or equivalent or in accordance with standard operating procedures.  2.3. As required, CAD drawings are reviewed with supervisor and/or other designated staff in accordance with company procedures.  2.4. Existing CAD drawings are located and modified by adding, deleting or changing drawing elements within that drawing. |
| 3. Produce output | 3.1. Drawing files are saved in the appropriate format in accordance with standard operating procedures.  3.2. Drawing files are printed out using plotter or ***equivalent devices***.  3.1. Programs and computer are shut down in accordance with workplace procedures. |

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| **Variable** | **Range** |
| Basic parameters | May include:   * layer or level, line type, line width, colour and text format etc. |
| Basic CAD drawings | May include:   * Include the following characteristics: lines, arcs, circles, polygons, ellipses, hatching or filling of areas, text, dimensions and tangents |
| Drawings | May include:   * include plans, diagrams, charts, circuits, systems or schematics. |
| Equivalent devices | May include:   * ink jet printers or the like |

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| **Evidence Guide** | |
| Critical aspects of Competence | Demonstrate knowledge and skills of:   * Assessment must confirm appropriate knowledge and skills that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts. |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * CAD program capabilities and processes |
| Underpinning Skills | Demonstrate skills in:   * reading and interpreting engineering specifications * organising information * using computer and peripherals * using CAD program * preparing simple drawings in plane orthogonal, isometric projection or equivalent |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Implement and monitor environmentally sustainable work practices** |
| **Unit Code** | [EIS WSO3 15 0217](#EIS_WSO3_14_0217) |
| **Unit Descriptor** | This unit describes the performance outcomes, skills and knowledge required to effectively analyse the workplace in relation to environmentally sustainable work practices and to implement improvements and monitor their effectiveness.  This unit requires the ability to access industry information, applicable legislative and occupational health and safety (OHS) guidelines. |

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| **Elements** | **Performance Criteria** |
| 1. Investigate current practices in relation to resource usage | 1.1. Identify environmental regulations applying to the enterprise  1.2. Analyze procedures for assessing compliance with environmental/sustainability regulations  1.3. Collect information on environmental and resource efficiency systems and procedures, and provide to the work group where appropriate  1.4. Collect, analyze and organize information from a range of sources to provide information/advice and tools/resources for improvement opportunities  1.5. Measure and document current resource usage of members of the work group  1.6. Analyze and document current purchasing strategies  1.7. Analyze current work processes to access information and data to assist in identifying areas for improvement |
| 2. Set targets for improvements | 2.1. Seek input from stakeholders, key personnel and specialists  2.2. Access external sources of information and data as required  2.3. Evaluate alternative solutions to workplace environmental issues  2.4. Set efficiency targets |
| 3. Implement performance improvement strategies | 3.1. Source and use appropriate techniques and tools to assist in achieving efficiency targets  3.2. Apply continuous improvement strategies to own work area of responsibility, including ideas and possible solutions to communicate to the work group and management  3.3. Implement and integrate environmental and resource efficiency improvement plans for own work group with other operational activities  3.4. Supervise and support team members to identify possible areas for improved practices and resource efficiency in work area  3.5. Seek suggestions and ideas about environmental and resource efficiency management from stakeholders and act upon where appropriate  3.6. Implement costing strategies to fully value environmental assets |
| 4. Monitor performance | 4.1. Use and/or develop evaluation and monitoring, tools and technology  4.2. Document and communicate outcomes to report on efficiency targets to key personnel and stakeholders  4.3. Evaluate strategies and improvement plans  4.4. Set new efficiency targets, and investigate and apply new tools and strategies  4.5. Promote successful strategies and reward participants where possible |

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| **Variables** | **Range** |
| Compliance | * May include: * meeting relevant laws, by-laws and regulations or best practice or codes of practice to support compliance in environmental performance and sustainability at each level as required (such as Environmental Protection or Biodiversity Conservation Act): * international * commonwealth * state/territory * industry * organization. |
| Sources | * May include: * organization specifications * regulatory sources * relevant stakeholders * resource use. |
| Purchasing strategies | * May include: * influencing suppliers to take up environmental sustainability approaches * researching and participating in programs such as a supply chain program to purchase sustainable products. |
| Stakeholders***,*** key personnel and specialists | * May include: * individuals and groups both inside and outside the organization who have direct or indirect interest in the organization's conduct, actions, products and services, including: * customers * employees at all levels of the organization * government * investors * local community * other organizations * suppliers * key personnel within the organization, and specialists outside the organization who may have particular technical expertise. |
| Techniques and tools | * May include: * examination of invoices from suppliers * examination of relevant information and data * measurements made under different conditions * others as appropriate to the specific industry context. |
| Environmental and resource efficiency improvement plans | * May include: * addressing environmental and resource sustainability initiatives such as environmental management systems, action plans, green office programs, surveys and audits * applying the waste management hierarchy in the workplace * determining organization's most appropriate waste treatment including waste to landfill, recycling, re-use, recoverable resources and wastewater treatment * initiating and/or maintaining appropriate organizational procedures for operational energy consumption, including stationary energy and non-stationary (transport) * preventing and minimizing risks, and maximizing opportunities such as: * improving resource/energy efficiency * reducing emissions of greenhouse gases * reducing use of non-renewable resources * referencing standards, guidelines and approaches such as: * ecological foot printing * Energy Efficiency Opportunities Bill 2005 * Global Reporting Initiative * green office program - a cultural change program * green purchasing * Greenhouse Challenge Plus (Australian government initiative) * ISO 14001:1996 Environmental management systems life cycle analyses * product stewardship * supply chain management * sustainability covenants/compacts * triple bottom line reporting. |
| Suggestions | * May include: * prevent and minimize risks and maximize opportunities such as: * usage of solar or renewable energies where appropriate * reducing emissions of greenhouse gases * reducing use of non-renewable resources * making more efficient use of resources, energy and water * maximizing opportunities to re-use, recycle and reclaim materials * identifying strategies to offset or mitigate environmental impacts: * purchasing carbon credits * energy conservation * reducing chemical use * reducing material consumption * expressing purchasing power through the selection of suppliers with improved environmental performance e.g. purchasing renewable energy * eliminating the use of hazardous and toxic materials. |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge in:   * knowledge of relevant compliance requirements within work area * developing plans to make improvements * planning and organising work group activities in relation to measuring current use and devising strategies to improve usage * monitoring resource use and improvements for environmental performance relative to work area and supervision * ensuring appropriate action is taken within work area in relation to environmental/sustainability compliance and potential hazards * implementing new approaches to work area in an effort to resolve and improve environmental and resource efficiency issues and reporting as required |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * best practice approaches relevant to own area of responsibility and industry * compliance requirements within work area for all relevant environmental/sustainability legislation, regulations and codes of practice including resource hazards/risks associated with work area, job specifications and procedures * environmental and energy efficiency issues, systems and procedures specific to industry practice * external benchmarks and support for particular benchmarks to be used within organization, including approaches to improving resource use for work area and expected outcomes * OHS issues and requirements * organizational structure and reporting channels and procedures * quality assurance systems relevant to own work area * strategies to maximize opportunities and to minimize impact relevant to own work area * supply chain procedures * terms and conditions of employment including policies and procedures, such as daily tasks, work area responsibilities, employee, supervisor and employer rights, equal opportunity |
| Underpinning Skills | Demonstrate skills to:   * analytical skills to analyze problems, to devise solutions and to reflect on approaches taken * change management skills * communication skills to answer questions, clarify and acknowledge suggestions relating to work requirements and efficiency * communication/consultation skills to support information flow from stakeholders to the work group * innovation skills to identify improvements, to apply knowledge about resource use to organizational activities and to develop tools * literacy skills to comprehend documentation, to interpret environmental and energy efficiency requirements, to create tools to measure and monitor improvements and to report outcomes * numeracy skills to analyze data on organizational resource consumption and waste product volumes * planning and organizing skills to implement environmental and energy efficiency management polices and procedures relevant to own work area * problem-solving skills to devise approaches to improved environmental sustainability and to develop alternative approaches as required * technology skills to operate and shut down equipment; where relevant, to use software systems for recording and filing documentation to measure current usage; and to use word processing and other basic software for interpreting charts, flowcharts, graphs and other visual data and information * supervisory skills to work effectively with a team |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Monitor Implementation of Work Plan/Activities** |
| **Unit Code** | [EIS WSO3 16 0217](#EIS_WSO3_16_1116) |
| **Unit Descriptor** | This unit covers competence required to oversee and monitor the quality of work operations within an enterprise. This unit may be carried out by team leaders or supervisors. |

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| **Elements** | **Performance Criteria** |
| 1. Monitor and improve workplace operations | * 1. Efficiency and service levels are monitored on an ongoing basis.   2. Operations in the workplace support overall enterprise goals and quality assurance initiatives.   3. Quality ***problems*** and issues are promptly identified and adjustments are made accordingly.   4. Procedures and systems are changed in consultation with colleagues to improve efficiency and effectiveness.   5. Colleagues are consulted about ways to improve efficiency and service levels. |
| 1. Plan and organise workflow | * 1. Current workload of colleagues is accurately assessed.   2. Work is scheduled in a manner which enhances efficiency and customer service quality.   3. Work is delegated to appropriate people in accordance with principles of delegation.   4. Workflow is assessed against agreed objectives and timelines and colleagues are assisted in prioritisation of workload.   5. Input is provided to appropriate management regarding staffing needs. |
| 1. Maintain workplace records | * 1. ***Workplace records*** are accurately completed and submitted within required timeframes.   2. Where appropriate completion of records is delegated and monitored prior to submission. |
| 1. Solve problems and make decisions | * 1. Workplace problems are promptly identified and considered from an operational and customer service perspective.   2. Short term action is initiated to resolve the immediate problem where appropriate.   3. Problems are analysed for any long term impact and potential solutions are assessed and actioned in consultation with relevant colleagues.   4. Where problem is raised by a team member, they are encouraged to participate in solving the problem.   5. Follow up action is taken to monitor the effectiveness of solutions in the workplace. |

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| **Variables** | **Range** |
| Problems | May include but not limited to:   * difficult customer service situations * equipment breakdown/technical failure * delays and time difficulties * competence |
| Workplace records | May include but is not limited to:   * staff records and regular performance reports |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge in:   * ability to effectively monitor and respond to a range of common operational and service issues in the workplace * understanding of the role of staff involved in workplace monitoring * knowledge of quality assurance, principles of workflow planning, delegation and problem solving |
| Underpinning Knowledge and Attitudes | Demonstrate knowledge of:   * roles and responsibilities in monitoring work operations * overview of leadership and management responsibilities * principles of work planning and principles of delegation * typical work organization methods appropriate to the sector * quality assurance principles and time management * problem solving and decision making processes * industrial and/or legislative issues which affect short term work organization as appropriate to industry sector |
| Underpinning Skills | Demonstrate skills to:   * monitor and improve workplace operations * plan and organize workflow * maintain workplace records |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Apply Quality Control** |
| **Unit Code** | [EIS WSO3 17 0217](#EIS_WSO3_17_1116) |
| **Unit Descriptor** | This unit covers the knowledge, attitudes and skills required in applying quality control in the workplace. |

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| **Elements** | **Performance Criteria** |
| 1. Implement quality standards | 1. Agreed quality standard and procedures are acquired and confirmed. 2. Standard procedures are introduced to organizational staff/personnel. 3. Quality standard and procedures documents are provided to employees in accordance with the organization policy. 4. Standard procedures are revised / updated when necessary. |
| 1. Assess quality of service delivered | 1. Services delivered are ***quality checked*** against organization ***quality standards*** and specifications. 2. Service delivered are evaluated using the appropriate evaluation ***quality*** ***parameters*** and in accordance with organization standards. 3. Causes of any identified faults are identified and corrective actions are taken in accordance with organization policies and procedures. |
| 1. Record information | 1. Basic information on the quality performance is recorded in accordance with organization procedures. 2. Records of work quality are maintained according to the requirements of the organization. |
| 1. Study causes of quality deviations | 1. Causes of deviations from final outputs or services are investigated and reported in accordance with organization procedures. 2. Suitable preventive action is recommended based on organization quality standards and identified causes of deviation from specified quality standards of final service or output. |
| 1. Complete documentation | 1. Information on quality and other indicators of service performance is recorded. 2. All service processes and outcomes are recorded. |

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| **Variable** | **Range** |
| Quality check | May include but not limited to:   * Check against design / specifications * Visual inspection and Physical inspection |
| Quality standards | May include but not limited to:   * Materials * Components * Process * Procedures |
| Quality parameters | May include but not limited to:   * Standard Design / Specifications * Material Specification |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge in:   * Checked completed work continuously against organization standard * Identified and isolated faulty or poor service * Checked service delivered against organization standards * Identified and applied corrective actions on the causes of identified faults or error * Recorded basic information regarding quality performance * Investigated causes of deviations of services against standard * Recommended suitable preventive actions |
| Underpinning Knowledge | Demonstrates knowledge of:   * Relevant quality standards, policies and procedures * Characteristics of services * Safety environment aspects of service processes * Evaluation techniques and quality checking procedures * Workplace procedures and reporting procedures |
| Underpinning Skills | Demonstrates skills to:   * interpret work instructions, specifications and standards appropriate to the required work or service * carry out relevant performance evaluation * maintain accurate work records * meet work specifications and requirements * communicate effectively within defined workplace procedures |
| Resource Implications | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Lead Workplace Communication** |
| **Unit Code** | [EIS WSO3 18 0217](#EIS_WSO3_18_1116) |
| **Unit Descriptor** | This unit covers the knowledge, attitudes and skills needed to lead in the dissemination and discussion of information and issues in the workplace. |

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| **Elements** | **Performance Criteria** |
| 1. Communicate information about workplace processes | * 1. Appropriate ***communication method*** is selected   2. Multiple operations involving several topics areas are communicated accordingly   3. Questions are used to gain extra information   4. Correct sources of information are identified   5. Information is selected and organized correctly   6. Verbal and written reporting is undertaken when required   7. Communication skills are maintained in all situations |
| 2. Lead workplace discussion | 1. Response to workplace issues are sought 2. Response to workplace issues are provided immediately 3. Constructive contributions are made to workplace discussions on such issues as production, quality and safety 4. Goals/objectives and action plan undertaken in the workplace are communicated. |
| 3. Identify and communicate issues arising in the workplace | 1. Issues and problems are identified as they arise 2. Information regarding problems and issues are organized coherently to ensure clear and effective communication 3. Dialogue is initiated with appropriate staff/personnel 4. Communication problems and issues are raised as they arise |

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| **Variable** | **Range** |
| Methods of communication | May include but not limited to:   * Non-verbal gestures * Verbal * Face to face * Two-way radio * Speaking to groups * Using telephone * Written * Using Internet * Cell phone |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge in:   * Dealt with a range of communication/information at one time * Made constructive contributions in workplace issues * Sought workplace issues effectively * Responded to workplace issues promptly * Presented information clearly and effectively written form * Used appropriate sources of information * Asked appropriate questions * Provided accurate information |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * Organization requirements for written and electronic communication methods * Effective verbal communication methods |
| Underpinning Skills | Demonstrates skills to:   * Organize information * Understand and convey intended meaning * Participate in variety of workplace discussions * Comply with organization requirements for the use of written and electronic communication methods |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Lead Small Teams** |
| **Unit Code** | [EIS WSO3 20 0217](#EIS_WSO3_19_1116) |
| **Unit Descriptor** | This unit covers the skills, knowledge and attitudes required to determine individual and team development needs and facilitate the development of the work group. |

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| **Elements** | **Performance Criteria** |
| 1. Provide team leadership | 1. ***Learning and development needs*** are systematically identified and implemented in line with ***organizational requirements*** 2. Learning plan to meet individual and group training and developmental needs is collaboratively developed and implemented 3. Individuals are encouraged to self-evaluate performance and identify areas for improvement 4. ***Feedback on performance*** of team members is collected from relevant sources and compared with established team learning process |
| 1. Foster individual and organizational growth | 1. Learning and development program goals and objectives are identified to match the specific knowledge and skills requirements of Competence standards 2. ***Learning delivery methods*** are appropriate to the learning goals, the learning style of participants and availability of equipment and resources 3. Workplace learning opportunities and coaching/ mentoring assistance are provided to facilitate individual and team achievement of competencies 4. Resources and timelines required for learning activities are identified and approved in accordance with organizational requirements |
| 1. Monitor and evaluate workplace learning | * 1. Feedback from individuals or teams is used to identify and implement improvements in future learning arrangements   2. Outcomes and performance of individuals/teams are assessed and recorded to determine the effectiveness of development programs and the extent of additional support   3. Modifications to learning plans are negotiated to improve the efficiency and effectiveness of learning   4. Records and reports of Competence are maintained within organizational requirement |
| 1. Develop team commitment and cooperation | * 1. Open communication processes to obtain and share information is used by team   2. Decisions are reached by the team in accordance with its agreed roles and responsibilities   3. Mutual concern and camaraderie are developed in the team |
| 1. Facilitate accomplishment of organizational goals | * 1. Team members actively participated in team activities and communication processes   2. Teams members developed individual and joint responsibility for their actions   3. Collaborative efforts are sustained to attain organizational goals |

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| **Variable** | **Range** |
| Learning and development needs | May include but not limited to:   * Coaching, mentoring and/or supervision * Formal/informal learning program * Internal/external training provision * Work experience/exchange/opportunities * Personal study * Career planning/development * Performance appraisals * Workplace skills assessment * Recognition of prior learning |
| Organizational requirements | May include but not limited to:   * Quality assurance and/or procedures manuals * Goals, objectives, plans, systems and processes * Legal and organizational policy/guidelines and requirements * Safety policies, procedures and programs * Confidentiality and security requirements * Business and performance plans * Ethical standards * Quality and continuous improvement processes and standards |
| Feedback on performance | May include but not limited to:   * Formal/informal performance appraisals * Obtaining feedback from supervisors and colleagues * Obtaining feedback from clients * Personal and reflective behavior strategies * Routine and organizational methods for monitoring service delivery |
| Learning delivery methods | May include but not limited to:   * On the job coaching or mentoring * Problem solving * Presentation/demonstration * Formal course participation * Work experience and Involvement in professional networks * Conference/seminar attendance and induction |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge in:   * identified and implemented learning opportunities for others * gave and received feedback constructively * facilitated participation of individuals in the work of the team * negotiated learning plans to improve the effectiveness of learning * prepared learning plans to match skill needs * accessed and designated learning opportunities |
| Underpinning Knowledge and Attitude | Demonstrates knowledge of:   * coaching and mentoring principles * understanding how to work effectively with team members who have diverse work styles, aspirations, cultures and perspective * understanding how to facilitate team development and improvement * understanding methods and techniques for eliciting and interpreting feedback * understanding methods for identifying and prioritizing personal development opportunities and options * knowledge of career paths and competence standards in the industry |
| Underpinning Skills | Demonstrates skills to:   * read and understand a variety of texts, prepare general information and documents according to target audience; spell with accuracy; use grammar and punctuation effective relationships and conflict management * receive feedback and report, maintain effective relationships and conflict management * organize information; assess information for relevance and accuracy; identify and elaborate on learning outcomes * facilitation skills to conduct small group training sessions * relate to people from a range of social, cultural, physical and mental backgrounds |
| Resource Implications | Access to relevant workplace or appropriately simulated environment where assessment can take place |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written exam * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the workplace or in a simulated workplace setting |

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| **Occupational Standard: Water Supply and Sanitation Operation Level III** | |
| **Unit Title** | **Improve Business Practice** |
| **Unit Code** | [EIS WSO3 21 0217](#EIS_WSO3_20_1116) |
| **Unit Descriptor** | This unit covers the knowledge, skills and attitudes required in promoting, improving and growing business operations. |

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| **Elements** | **Performance Criteria** |
| 1. Diagnose the business | * 1. ***Sources data*** is identified; ***data required*** for diagnosis is determined and acquired based on the business diagnosis toolkit.   2. Value chain analysis is conducted.   3. ***SWOT analysis*** of the data is undertaken.   4. ***Competitive advantage*** of the business is determined from the data. |
| 1. Benchmark the business | 1. Product or service to be benchmarked is identified and selected. 2. Sources of relevant benchmarking data are identified. 3. ***Key indicators*** are selected for benchmarking in consultation with key stakeholders. 4. Key indicators of own practice are compared with benchmark indicators. 5. Areas of improvements are identified. |
| 1. Develop plans to improve business performance | 1. A consolidated list of required improvements is developed. 2. Cost-benefit analysis is determined for required improvements. 3. Work flow changes resulting from proposed improvements are determined. 4. Proposed improvements are ranked according to agreed criteria. 5. An action plan is developed and agreed to implement the top ranked improvements. 6. ***Organizational structures*** are checked to ensure they are suitable. |
| 1. Develop marketing plans | 1. The practice vision statement is reviewed. 2. Practice ***objectives*** are developed/ reviewed. 3. Market research is conducted and result is obtained. 4. Target markets are identified/ refined. 5. ***Market position*** is developed/ reviewed. 6. ***Practice*** ***brand*** is developed. 7. ***Benefits*** of products or services are identified. 8. ***Promotion tools*** are selected and developed. |
| 1. Develop business growth plans | 1. Plans are developed to increase profitability 2. Proposed plans are ***ranked*** according to agreed criteria. 3. An action plan is developed and agreed to implement the top ranked plans. 4. Business work practices are reviewed to ensure they support growth plans. |
| 1. Implement and monitor plans | 1. Implementation plan is developed in consultation with all ***relevant stakeholders***. 2. Success indicators of the plan are agreed. 3. Implementation is monitored against agreed indicators. 4. Implementation is adjusted as required. |

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| **Variable** | **Range** |
| Data sources | May include but not limited to:   * Primary data sources * Secondary sources |
| Data required | May include but not limited to:   * Organization capability * Appropriate business structure * Level of client service which can be provided * Internal policies, procedures and practices * Staff levels, capabilities and structure * Market and market definition * Market changes/market segmentation * Market consolidation/fragmentation * Revenue * Level of commercial activity * Expected revenue levels, short and long term * Revenue growth rate * Break even data * Pricing policy * Revenue assumptions * Business environment * Economic conditions * Social factors * Demographic factors * Technological impacts * Political/legislative/regulative impacts * Competitors, competitor pricing and response to pricing * Competitor marketing/branding * Competitor products |
| SWOT analysis | May include but not limited to:   * Internal strengths such as staff capability, recognized quality * Internal weaknesses such as poor morale, under-capitalization, poor technology * External opportunities such as changing market and economic conditions * External threats such as industry fee structures, strategic alliances, competitor marketing |
| Competitive advantage | May include but not limited to:   * Quality * Pricing * Cost * Location * Technology * Delivery * Timeframe * Promotion * Niche marketing * Support from government |
| Key indicators | May include but not limited to:   * Staffing * Cost and expenses * Personnel productivity (particularly of principals) * Goodwill * Profitability * Price structure * Customers base * Productivity * Quality * System |
| Organizational  structures | May include but not limited to:   * Lines of authority and reporting relationship |
| Objectives | May include but not limited to:   * Market share growth * Revenue growth * Profitability * Productivity * Innovation |
| Market position | May include but not limited to:   * The goods or service provided * Product mix * The core product - what is bought * The tangible product - what is perceived * The augmented product - total package of consumer * Features/benefits * Product differentiation from competitive products * New/changed products * Price and pricing strategies (cost plus, supply/demand, ability to pay, etc.) * Pricing objectives (profit, market penetration, etc.) * Cost components * Market position * Distribution strategies * Marketing channels * Promotion * Target audience * Communication |
| Practice brand | May include but not limited to:   * Practice image * Practice logo/letterhead/signage * Phone answering protocol * Facility decor * Slogans * Templates for communication/invoicing * Style guide * Writing style * AIDA (Attention, Interest, Desire, Action) |
| Benefits | May include but not limited to:   * Features as perceived by the client * Benefits as perceived by the client |
| Promotion tools | May include but not limited to:   * Networking and referrals * Seminars * Sales promotion * Advertising * Personal selling * Press releases * Publicity and sponsorship * Brochures * Newsletters (print and/or electronic) * Websites * Direct mail * Telemarketing/cold calling |
| Ranking | May include but not limited to:   * Importance * Urgency * Technology * Resource availability |
| Relevant stockholders | May include but not limited to:   * Micro and Small Enterprises development * Non-Government Organizations (NGOs) * Finance institutions * Capital goods leasing enterprise |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge of:   * Identifying the key indicators of business performance * Identifying the key market data for the business * A wide range of available information sources * Acquiring information not readily available within a business * Analyzing data and determine areas of improvement * Negotiating required improvements to ensure implementation * Evaluating systems against practice requirements * Forming recommendations and/or make recommendations * Assessing the accuracy and relevance of information |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * Data gathering and analysis * Value chain analysis * SWOT analysis * Competitive advantage * Cost benefit analysis * Target market * Marketing principles * Organizational structure * Marketing mix * Promotion mix * Market position * Branding * ProfitabilityDemonstrates knowledge of: * Data gathering and analysis * Value chain analysis * SWOT analysis * Competitive advantage * Cost benefit analysis * Target market * Marketing principles * Organizational structure * Marketing mix * Promotion mix * Market position * Branding * Profitability |
| Underpinning Skills | Demonstrates skill in:   * Benchmarking skills * Communication skills * Computers kills to manipulate data and present information * Negotiation skills * Preparing action plan * Conducting market research * Identifying target market * Identifying suitable marketing mix * Preparing promotional tools * Problem solving * Planning skills * Monitoring and evaluation * Ability to acquire and interpret relevant data * Use of market intelligence * Development and implementation strategies of promotion and growth plans * Ability to acquire and interpret required data, current practice systems and structures and sources of relevant benchmarking data * Applying methods of selecting relevant key benchmarking indicators * Communication skills * Working and consulting with others when developing plans for the business * Negotiation skills * Using computers to manipulate, present and distribute information |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |

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| **Occupational Standard: Water Supply and Sanitation Operation LEVEL III** | |
| **Unit Title** | **Prevent and Eliminate MUDA** |
| **Unit Code** | [EIS WSO3 19 0217](#EIS_WSO3_21_1116) |
| **Unit Descriptor** | This unit of competence covers the knowledge, skills and attitude required by a worker to prevent and eliminate MUDA/wastes in his/her their workplace. It covers responsibility for the day-to-day operation of the work and ensures Kaizen elements are continuously improved and institutionalized. |

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| **Elements** | **Performance Criteria** |
| * 1. Prepare for work. | 1. Work instructions are used to determine job requirements, including method, material and equipment. 2. Job specifications are read and interpreted following working manual. 3. ***OHS requirements***, including dust and fume collection, breathing apparatus and eye and ear personal protection needs are observed throughout the work. 4. Appropriate material is selected for work. 5. ***Safety equipment and tools*** are identified and checked for safe and effective operation. |
| 1. Identify MUDA. | 1. Plan of MUDA identification is prepared and implemented. 2. Causes and effects of MUDA are discussed. 3. ***Tools and techniques*** are used to draw and analyze current situation of the work place. 4. Wastes/MUDA are identified and measured based on ***relevant procedures***. 5. Identified and measured wastes are reported to relevant personnel. |
| 1. Eliminate wastes/MUDA. | 1. Plan of MUDA elimination is prepared and implemented. 2. Necessary attitude and ***the ten basic principles for improvement*** are adopted to eliminate waste/MUDA. 3. Tools and techniques are used to eliminate wastes*/*MUDA based on the procedures and OHS. 4. Wastes/MUDA are reduced and eliminated in accordance with OHS and organizational requirements. 5. Improvements gained by elimination of waste/MUDA are reported to relevant bodies. |
| 1. Prevent occurrence of wastes/MUDA. | 1. Plan of MUDA prevention is prepared and implemented. 2. Standards required for machines, operations, definingnormal and abnormal conditions, clerical procedures and procurement are discussed and prepared. 3. Occurrences of wastes/MUDA are prevented by using ***visual and auditory control methods***. 4. Waste-free workplace is created using ***5W and 1H***sheet. 5. The completion of required operation is done in accordance with standard procedures and practices. 6. The updating of standard procedures and practices is facilitated. 7. The capability of the work team that aligns with the requirements of the procedure is ensured. |

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| **Variable** | **Range** |
| OHS requirements | May include but not limited to:   * Are to be in accordance with legislation/ regulations/codes of practice and enterprise safety policies and procedures. This may include protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances. * Personal protective equipment is to include that prescribed under legislation/regulations/codes of practice and workplace policies and practices. * Safe operating procedures are to include, but are not limited to the conduct of operational risk assessment and treatments associated with workplace organization. * Emergency procedures related to this unit are to include but may not be limited to emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation. |
| Safety equipment and tools | May include but not limited to:   * dust masks / goggles * glove * working cloth * first aid * safety shoes |
| Tools and techniques | May include but not limited to:   * Plant Layout * Process flow * Other Analysis tools * Do time study by work element * Measure Travel distance * Take a photo of workplace * Measure Total steps * Make list of items/products, who produces them and who uses them & those in warehouses, storages etc. * Focal points to Check and find out existing problems * 5S * Layout improvement * Brainstorming * Andon * U-line * In-lining * Unification * Multi-process handling & Multi-skilled operators * A.B. control (Two point control) * Cell production line * TPM (Total Productive Maintenance) |
| Relevant procedures | May include but not limited to:   * Make waste visible * Be conscious of the waste * Be accountable for the waste. * Measure the waste. |
| The ten basic principles for improvement | May include but not limited to:   * Throw out all of your fixed ideas about how to do things. * Think of how the new method will work- not how it won. * Don’t accept excuses. Totally deny the status quo. * Don’t seek perfection. A 5o percent implementation rate is fine as long as it’s done on the spot. * Correct mistakes the moment they are found. * Don’t spend a lot of money on improvements. * Problems give you a chance to use your brain. * Ask “why?” at least five times until you find the ultimate cause. * Ten people’s ideas are better than one person’s. * Improvement knows no limits. |
| Visual and auditory control methods | May include but not limited to:   * Red Tagging * Sign boards * Outlining * Andons * Kanban, etc. |
| 5W and 1H | May include but not limited to:   * Who * What * Where * When * Why * How |

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| **Evidence Guide** | |
| Critical Aspects of Competence | Demonstrates skills and knowledge to:   * discuss why wastes occur in the workplace * discuss causes and effects of wastes/MUDA in the workplace * analyze the current situation of the workplace by using appropriate tools and techniques * identify, measure, eliminate and prevent occurrence of wastes by using appropriate tools and techniques * use 5W and 1H sheet to prevent |
| Underpinning Knowledge and Attitudes | Demonstrates knowledge of:   * Targets of customers and manufacturer/service provider * Traditional and kaizen thinking of price setting * Kaizen thinking in relation to targets of manufacturer/service provider and customer * value * The three categories of operations * the 3“MU” * waste/MUDA * wastes occur in the workplace * The 7 types of MUDA * The Benefits of identifying and eliminating waste * Causes and effects of 7 MUDA * Procedures to identify MUDA * Necessary attitude and the ten basic principles for improvement * Procedures to eliminate MUDA * Prevention of wastes * Methods of waste prevention * Definition and purpose of standardization * Standards required for machines, operations, defining normal and abnormal conditions, clerical procedures and procurement * Methods of visual and auditory control * TPM concept and its pillars. * Relevant Occupational Health and Safety (OHS) and environment requirements * Plan and report * Method of communication |
| Underpinning Skills | Demonstrates skills to:   * draw & analyze current situation of the work place * use measurement apparatus (stop watch, tape, etc.) * calculate volume and area * use and follow checklists to identify, measure and eliminate wastes/MUDA * identify and measure wastes/MUDA in accordance with OHS and procedures * use tools and techniques to eliminate wastes/MUDA in accordance with OHS procedure * apply 5W and 1H sheet * update and use standard procedures for completion of required operation * work with others * read and interpret documents * observe situations * solve problems * communicate * gather evidence by using different means * report activities and results using report formats |
| Resources Implication | Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices. |
| Methods of Assessment | Competence may be assessed through:   * Interview / Written Test * Observation / Demonstration with Oral Questioning |
| Context of Assessment | Competence may be assessed in the work place or in a simulated work place setting. |