1. **Our Key Training Focus Industries:**

   At OSI we specialise in NQF certified training courses for industries like Mining, Energy, Water Services, Municipalities, State Departments, Construction, Environmental and Health and Safety. Our training courses are unit standard based which means that candidates successfully completing our courses will achieve nationally recognized credits which they may present towards achieving a whole qualification in water and wastewater treatment processes and operations or various other qualifications (see the index table on page 3 of this document). In acquiring these competencies, the qualifying delegate will lay a good foundation for future learning and action and better understand the broader context of his or her own work. Achieving these unit standards will enhance the employability of the qualifying delegate in the water, mining and other related sectors.

2. **Training courses:**

   We firmly believe in outcomes-based, onsite training where our clients can discuss their specific training problems and requirements with us and we, in return, design a tailor made action plan to address and focus on the identified problem areas. In this type of training we actually visit the premises of our client to provide the training in order to solve problems, improve skills and share information. Delegates are demonstrated how to apply what they have learnt within their organisation and this approach will result in reduced costs, improved productivity and overall profitability. Our highly skilled research team uses advanced research methodologies to identify training gaps in the market and sectors. We are then able to produce high level training programmes to provide the innovative solutions to close these problematic gaps.

   After successful completion of our training programmes, delegates will walk away with the necessary skills, knowledge and information which they can implement in their respective organisations. Again, this will lead to higher skilled employees, improved productivity and cost reduction as well as a long term improvement in profitability and efficiency. Delegates will receive a certificate certifying him/her as competent in the relevant NQF Unit Standard and reflecting the credits earned.

   Our training courses are highly interactive and workplace-based (we only provide onsite training), with more emphasis on hands-on learning and the theory component being addressed in the most practical manner and assessments conducted according to the OBE practices. On average, our single unit course duration varies between 1 -3 days of facilitation and 1-3 days of workplace based activities, observations and assessments – variable depending on the criteria (see paragraph 6.1). Leanship programmes will be conducted over a period of time and will be quoted for separately and on request.

3. **Workplace Assessments Consolidation of Portfolios of Evidence** normally takes place 2-3 days after the completion of the training course. Delegates are encouraged to practice what they have learned prior to commencement of these on-site assessments. Assessment and moderation of assessment will be overseen by the relevant ETQA according to the ETQA policies and guidelines for assessment and moderation. Moderation will include both internal and external moderation of assessments at exit points of the qualification, unless ETQA policies specify otherwise. Moderation will also encompass achievement of the competence described both in individual unit standards as well as the integrated competence described in the qualification.

4. **Benefits to the organisation:**
• Cost savings with more effective group training.
• Training times crafted around your schedule minimising the impact on your business.
• The ability to address specific employee training needs and tailoring course objectives to suit your specific requirements.
• No travel time and accommodation costs for delegates with on-site training.
• Convenience – training programs are delivered at a time and location that fit in with your business schedule.
• Having only your own delegates on the course will create focus and discussion on the issues that are important to your organisation.
• Hand-picked trainer/s that fit training needs.
• Printed Learner and Assessment Guides will be handed out which will provide delegates with future reference in their careers.
• SETA accreditation.
• Course fees reimbursed from SETA for members of the National Skills Fund in the form of a percentage paid to the skills fund or by means of ordinary or discretionary grant from SETA (please contact SETA for more information).
• SARS claims can be made for tax benefits of training costs.

5. Our presenter (specialising in training for Water and Wastewater Treatment Processes and Operations) is a certified NQF Level 5 Assessor, NQF Level 6 Moderator, NQF Level 7 Verifier and NQF Level 5 RPL Advisor. He has a BSC Honours Degree in Water Utilization and is currently in the process of acquiring his ETDP NQF Level 5 certification. He has practiced as Water treatment practitioner at Rand Water for 8 years and was involved in writing some of the unit standards currently used in the learnerships for Water and Waste Water Treatment. He has also delivered a paper on process controlling training at the ESETA and WISA conferences and served in the SGB for SETA.

6. The following Water and Wastewater Treatment Processes Courses are available as individual training modules or can form part of a learnership programme or national qualification (NQF Level 1 – 4). Please note that the duration of theses onsite courses and workplace-based assessments will depend on the amounts of NQF Unit Credits assigned to the module and delegates attending per session.

6.1. The following pertain to NQF Level 1 – 4 on average:

- **1-5 credits**: normally 1 day training session, 1 day workplace-based assessments (per class of 15 delegates).
- **6-9 credits**: normally 2 days training sessions, 2 days’ workplace-based assessments (per class of 15 delegates).
- **10+ credits**: normally 3 days training sessions, 3 days’ workplace-based assessments (per class of 15 delegates).

For example:

Course D260N: Demonstrate knowledge of activated sludge processes in wastewater treatment: 6 Credits: 30 delegates:

- **Training session 1**: 2 days training – 2 days’ workplace-based assessments – 15 delegates attending.
- **Training session 2**: 2 days training – 2 days’ workplace-based assessments – 15 delegates attending.

PLEASE SEE OUR CONTACT DETAILS ON THE LAST PAGE OF THIS DOCUMENT.
## COURSES associated with Water and Wastewater Reticulation, Systems, Treatments, Processes and Operations: NQF Level 1 - 4

<table>
<thead>
<tr>
<th>NQF UNIT STD ID</th>
<th>OSI COURSE CODE</th>
<th>COURSE TITLE</th>
<th>DESCRIPTION AND OUTCOMES</th>
<th>UNIT CREDIT ACCUMULATIONS</th>
</tr>
</thead>
</table>
| 254116          | D260N           | Demonstrate knowledge of activated sludge processes in wastewater treatment | This course is intended for delegates who are working with activated sludge in order to produce effluent in compliance with organisational standards. The delegate will understand the principles of the activated sludge process and be familiar with the layout of the plant. Delegates credited with this unit standard will be able to:  
- Describe the theory of activated sludge.  
- Describe the layout of the plant.  
- Make adjustments on the plant.  
- Monitor performance of the plant. | Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 3 with 6 credits) |
| 246440          | D270N           | Operate coagulation, flocculation and sedimentation processes | The delegate successfully completing this course and achieving this unit standard will be able to contribute towards optimal functioning of plant processes. The delegate will be provided with skills and knowledge relevant to the operation of the coagulation, flocculation and sedimentation processes within the relevant health, safety and legislative guidelines. This unit standard will contribute to the delivery of quality water to consumers. Delegates achieving this unit standard will demonstrate competence in:  
- Performing jar tests.  
- Evaluating the flash mixing and coagulation process.  
- Monitoring the flocculation process.  
- Operating the sedimentation process.  
- Operating sludge withdrawal process. | Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF 2 Level with 10 credits) |
| 246441          | D280N           | Maintain maturation and oxidation ponds | The delegate successfully completing this course and achieving this unit standard will be able to maintain maturation and oxidation ponds to ensure optimal functioning of the ponds. This competence will ensure that the water environment is economically sustained and protected in accordance with legislation and regulations. Delegates achieving this unit standard will demonstrate competence in:  
- Work policies and procedures.  
- Best operating procedures.  
- Irregularities: Septic conditions, odours and colour change.  
<table>
<thead>
<tr>
<th>Code</th>
<th>Unit Standard Description</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>246443</td>
<td><strong>Operate a sand filter</strong></td>
<td>C 1 4</td>
</tr>
</tbody>
</table>
|       | The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to assist in the operation of a sand filter. This competence will enable the delegate to explain rapid gravity and slow sand filters and operate one type of sand filter. This will contribute towards the water purification process and maintain the quality of potable water available to consumers. Delegates credited with this unit standard will be able to:  
  - Explain the filtration process.
  - Control water flow.
  - Explain the different types of filters.
  - Monitor filter performance.
  - Perform backwashing process of a rapid gravity sand filter.
  - Explain the unclogging of a slow sand filter.
  - Maintain a sand filter. |
|       | **Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 1 with 4 credits)** |
| 246445 | **Operate a biological trickling filter** | E 2 4 |
|       | The delegate completing this unit standard will be able to operate and maintain a biological trickling filter in accordance with work procedures to ensure a good quality effluent. This will contribute towards the effective and efficient operation of the wastewater works. Delegates credited with this unit standard will be able to:  
  - Explain the operation of a biological trickling filter process.
  - Monitor and control a biological trickling filter.
  - Apply methods to maintain a biological trickling filter.
  - Collate data for biological trickling filters. |
|       | **Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 4 credits)**  
**Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 6 credits).** |
| 246446 | **Operate a rapid gravity filtration process** | E 3 5 |
|       | The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to operate and maintain a rapid gravity filter. This competence will contribute towards the water and wastewater treatment process by ensuring that the filter is maintained in good working order at all times. This competence will also equip the delegate with an enhanced skills base, thereby improving the delegate’s motivation in the water sector. This will contribute to the quality of potable water to communities. Delegates credited with this unit standard will be able to:  
  - Operate the sludge withdrawal process.
  - Maintain the filter media.
  - Maintain the filter structure.
  - Conduct an inspection of compressors, blowers and backwash pumps.
  - Read and interpret flow indicators.
  - Collate data for the filtration process. |
|       | **Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 2 with 4 credits)**  
**Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 6 credits).** |
<table>
<thead>
<tr>
<th>Code</th>
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<th>Text</th>
</tr>
</thead>
</table>
| D330N | D330N | Operating a rotating biological contactor unit | The delegate successfully completing this course and achieving this unit standard will be able to operate and maintain a Rotating Biodisc Contactor (RBC) process in accordance with work procedures to ensure a good quality effluent. This will contribute towards the effective and efficient operation wastewater works. Delegates achieving this unit standard will demonstrate competence in:  
- Work operating procedures.  
- Flow: Influent, effluent, recycle.  
- Reports: Reports include but are not limited to fault reports, breakages, pump hours, repairs and/or maintenance.  
- Irregularities: Odours and/or colour change and ponding.  
- Major breakages: Pump break down, motor burn out, seized bearings, seized filter arm etc.  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 3 credits) |
| D340N | D340N | Demonstrate knowledge of the water treatment process | The delegate successfully completing this course and achieving this unit standard will be able to explain the elements of the water treatment process and the purpose of the works. This unit standard will provide delegates with skills and knowledge to operate the treatment process within the relevant health and safety and legislative guidelines. Delegates credited with this unit standard will be able to:  
- Explain the water treatment process.  
- Explain turbidity and the removal of suspended particles from water.  
- Explain acidity and alkalinity.  
- Explain the disinfection process.  
- Explain and interpret the distribution network.  
- Demonstrate knowledge of the water treatment monitoring process.  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 8 credits) |
| D360N | D360N | Apply personal safety practices in the water sector | The delegate successfully completing this course and achieving this unit standard will be able to follow defined occupational health and safety policies and procedures relating to the work being undertaken in order to ensure own safety and that of others in the workplace. The delegate, without supervisory responsibilities, will be able to recognise and report hazards to designated workplace personnel and accurately follow workplace procedures relevant to controlling risk in the workplace. The delegate will be able to identify and take into account internal and external (environmental) factors that influence safe working practices in any workplace in the water sector. Delegates credited with this unit standard will be able to:  
- Demonstrate knowledge of personal safety practices at the workplace.  
- Identify and explain the roles and responsibilities of a health and safety representative.  
- Explain the health and safety procedures relating to own job.  
- Apply emergency procedures in own work situation.  
- Maintain good housekeeping practices in a working environment.  
- Identify and explain occupational health and safety hazards in the water sector.  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 4 credits)  
Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 2 with 4 credits) |
<table>
<thead>
<tr>
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<th>Description</th>
<th>Credits</th>
<th>Accumulation</th>
</tr>
</thead>
</table>
| 246460 D370N | **Demonstrate basic knowledge of the wastewater treatment process** | The delegate successfully completing this course and achieving this unit standard will be able to explain the elements of wastewater treatment works as well as the purpose of the wastewater treatment. This competence will enable the delegate to understand the wastewater treatment process and his/her role in the process. This competence will enable the delegate to work effectively in both rural and urban wastewater treatment works. This will contribute towards the smooth running of the wastewater treatment works and the sustainability of the environment. Delegates credited with this unit will be able to:  
  - Explain the properties of water and water contaminants.  
  - Explain the different sources of wastewater.  
  - Identifying and describe the steps of the wastewater treatment process.  
  - Explain the different types of sanitation systems.  
  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 8 credits) |
| 246461 D380N | **Conduct water treatment process control tests** | This course (unit standard) is intended for delegates who are tasked with operating a water treatment plant. Delegates will be provided with the knowledge and skills to monitor and control the quality of the product leaving the plant. Delegates completing this unit standard will be able to demonstrate competence in:  
  - Calibrating test instruments.  
  - Performing physical determinant tests.  
  - Performing chemical determinant tests.  
  - Conduct settling tests.  
  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 4 credits) |
| 246463 D390N | **Demonstrate knowledge of water cycle, water and wastewater systems and processes** | The delegate successfully completing this course and achieving this unit standard will be able to explain the elements of the water cycle and water catchment management and gain a broad perspective of the water sector including relevant legislation. This will equip the delegate with the foundational knowledge and understanding of water which is required to function effectively within the water sector (as this knowledge is required in all areas). This competence will enable the delegate to value water as a scarce resource and share this knowledge to improve community understanding of the importance of conserving water resources. Delegates credited with this unit standard will be able to:  
  - Identify and explain the process of the natural water cycle.  
  - Explain the impact of land-use on water within a catchment.  
  - Discuss ground water as a water resource.  
  - Discuss surface water as a water resource.  
  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 5 credits)  
Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 2 with 5 credits) |
### Conduct sampling for water and wastewater treatment processes

This course (unit standard) is intended for delegates who are tasked with sampling and conducting field tests. The delegate will be provided with knowledge and skills to conduct field tests and sampling techniques for chemical and microbiological tests. Delegates will be able to take samples of water and wastewater and carry out associated field tests. The delegate will be able to interpret this data and document it accurately onto a collection list. This competence will equip the delegate with sampling skills, which underpin his/her ability to participate meaningfully in the testing process and prepare the delegate for horizontal articulation to a Sampler qualification at NQF Level 2.

Delegates credited with this unit standard will be able to:
- Identify and describe sampling points.
- Prepare for sampling.
- Perform chemical sampling.
- Perform microbiological sampling.
- Carry out associated field tests.
- Explain the collection of samples from auto-samplers.
- Prepare for handover of samples.

Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 4 credits)

### Operate water and wastewater chemical dosage systems

The delegate successfully completing this course and achieving this unit standard will be able to operate water chemical dosing systems on a water and wastewater treatment plant. Delegates will be provided with relevant competencies to be able to apply the required chemical dosages and monitor the use of relevant chemicals and to assist during emergency situations on the plant. Delegates will also be able to apply the relevant health, safety and legislative guidelines in the workplace. Delegates completing this unit standard will be able to contribute to cost effective chemical dosing thus providing consumers with affordable water services.

Chemicals used includes, but are not limited to, ammonia, bromine, lime, calcium carbonate, ferric chloride, ferrous chloride, ferric sulphate, flocculants and chlorine products.

Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 10 credits)

### Operate inlet works

The delegate successfully completing this course and achieving this unit standard will be able to operate inlet works to ensure optimal functioning of the works. In acquiring this competence the delegate will lay a good foundation for future learning and action, and better understand the broader context of own work.

Delegates credited with this unit will be competent in:
- Planning work according to inlet flow and the occurrence of rain and pollution.
- Removing and disposing screenings.
- Explaining the reasons for use of storm water and bypass weirs.
- Disposing grit from inlet works.
- Recording flow measurement in inlet works.
- Identifying and report equipment and structural defects.
- Monitoring influent to detect pollution.

Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 5 credits)
<table>
<thead>
<tr>
<th>Unit Code</th>
<th>Unit Standard Title</th>
<th>Description</th>
<th>Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level with credits)</th>
</tr>
</thead>
</table>
| 246469    | D430N Operate primary settling processes in wastewater treatment | Delegates completing this unit standard will be able to operate a settling process in accordance with work policies and procedures to ensure optimal functioning of the settling process. This competence will enable the delegate to operate the settling process at both large and small works. The delegate will understand his/her own role in contributing to sustainability and protection of the water environment. Delegates credited with this unit standard will be able to:  
  - Demonstrate knowledge of the different settling processes.  
  - De-sludge and de-scum in accordance with working procedures.  
  - Maintain settling tanks.  
  - Collate data for settling tanks. | E 2 5                                                                                                           |
| 246471    | D440N Demonstrate knowledge and understanding of plant equipment | The delegate successfully completing this course and achieving this unit standard will be able to understand the purpose and function of mechanical and electrical equipment and the dangers of using this equipment. This competence will enable the delegate to understand the use, care and basic maintenance of equipment used on water care works. This will ensure that breakages and stoppages are kept to a minimum and equipment is used in accordance with safe work practices. This competence will advance the delegate’s own expertise in both the water sector and other related jobs. Delegates credited with this unit standard will be able to:  
  - Identify and describe the different plant equipment on water and wastewater environment.  
  - Apply safety procedures during the operation of plant equipment.  
  - Demonstrate knowledge of plant instrumentation.  
  - Maintain plant instrumentation. | C 2 6                                                                                                           |
| 246472    | D450N Handle and dispose of water and wastewater sludge | The delegate successfully completing this course and achieving this unit standard will be able to handle and dispose of water and wastewater sludge in accordance with work policies, procedures and the sludge guidelines in terms of the National Water Act. The delegate will be able to recognise and report hazards to designated workplace personnel and accurately follow workplace procedures relevant to handling and disposing of water and wastewater sludge in the workplace. This competence will enable the delegate to reduce health risks and contribute towards maintaining the environment. Delegates credited with this unit standard will be competent in:  
  - Explaining health and environmental risks when handling and disposing of water and wastewater sludge.  
  - Explaining disposal options for water and wastewater sludge.  
  - Recording the disposing of water and wastewater sludge in accordance with work policies and procedures. | C 1 5                                                                                                           |
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Description</th>
<th>Credits</th>
<th>Level</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>246473</td>
<td>D460N  Demonstrate knowledge of elementary biology in the water wastewater environment</td>
<td>The delegate successfully completing this course and achieving this unit standard will have knowledge and understanding of fundamental biological concepts relating to water and wastewater treatment. This competence will equip the delegate with knowledge that contributes to the delegate’s personal development and progression in the water and wastewater industry. The application of this knowledge in the wastewater context will impact positively on the environment and the ecology. Delegates achieving this unit standard will be able to demonstrate knowledge of:  - Attached growth processes.  - Suspended growth processes.  - Aerobic processes.  - Anaerobic processes.  - Micro and macro organisms: Bacteria, fungi, algae, enzymes, protozoa and higher animals.  Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 3 credits)</td>
<td>C</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>246486</td>
<td>D470N  Operate water recovery unit</td>
<td>This course (unit standard) is intended for delegates who are tasked with the operation of a water recovery unit. This course will provide delegates with knowledge and skills to settle process water and both operate and maintain the recovery unit in accordance with work policies and legislation. This competence will assist in minimising water wastage, ensuring efficient water treatment processes, and will contribute to the availability of potable water to communities.  Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 4 credits)</td>
<td>E</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>246535</td>
<td>D480N  Operate the chlorine dosing process</td>
<td>This course (unit standard) is intended for delegates using chlorine gas and chlorine compounds for the treatment of water and wastewater. Delegates will be equipped with knowledge and skills to operate and maintain chlorine dosing equipment safely. Delegates credited with this unit standard will be able to:  - Demonstrate knowledge of the dangers of chlorine gas and chlorine compounds.  - Apply safety procedures in handling chlorine and products.  - Identify and describe a layout plan of the chlorine dosing installation.  - Operate chlorine dosing equipment.  - Measure the effectiveness of chlorine dosing.  - Measure chlorine residual.  Unit credits accumulation towards a National Certificate: Water and Wastewater Process Operations (NQF Level 2 with 5 credits)</td>
<td>C</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>
### D550N Operate mechanical, electrical, hydraulic and pneumatic tools and equipment

The delegate successfully completing this course and achieving this unit standard will be able to operate mechanical, electrical, hydraulic and pneumatic tools and equipment in a safe manner and in compliance with legislation. This knowledge and skill will enable the delegate to work in a competent manner, which will contribute towards overall efficiency. The attained competence will also enable the delegate to understand the use, care for and do the basic maintenance of this equipment. This will ensure that breakages and stoppages are kept to a minimum and equipment is used in accordance with safe work practices thus increasing the safety standards of the organisation. This competence will advance the delegate's own expertise and progression in both the water and wastewater sector and other related jobs.

Delegates achieving this unit standard will be able to demonstrate knowledge of:
- Mechanical tools and equipment: Compactors, water pumps, generators, pipe cutters, jetting machine and bucket machine.
- Electrical tools: Angle grinder, electric drill, and submersible water pump, electrical hoist and extension cords.
- Pneumatic tools: Compressor, jackhammer, angle grinders, spanners, drills and compactors.
- Hydraulic equipment: Hydraulic lifting and moving gear.
- Safety equipment: Gloves, goggles, overalls, safety boots, mask, earplugs, helmet, and reflector vest.

Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 2 with 4 credits)

### D570N Demonstrate knowledge of water reticulation systems and the cleaning and disinfection thereof

The delegate successfully completing this course and achieving this unit standard will be able to contribute to the socio-economic development of the water and waste water services industry by displaying competence in the following specific outcomes:
- Describe the purpose and components of water supply systems.
- Describe the hydraulics of a water reticulation system.
- Describe the consequences of not cleaning water mains and reservoirs.
- Describe the techniques used for cleaning and disinfecting water mains.
- Describe the planning, and techniques used for cleaning water reservoirs.
- Describe the use of chlorine compounds for disinfection.

Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 2 with 12 credits)

### D590N Measure and interpret chlorine dosage

The delegate achieving certification on this course (unit standard) will be able to interpret and make adjustments to maintain the correct chemical dosage system for quality water.

Delegates credited with this unit standard will be able to:
- Explain the process of chlorination to disinfect water.
- Operate on-site chlorine processes.
- Connect and disconnect chlorine cylinders.
- Calculate the average chlorine dosages.

Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 6 credits).
Demonstrate knowledge of SI measurement units used in water and wastewater treatment

This course (unit standard) is intended for delegates who are expected to measure volumes and flow rates on a water and wastewater treatment plant. Delegates credited with this unit standard will be able to measure physical quantities using SI (Standard International) units. Delegates will be provided with knowledge of different measuring equipment and methods applicable in the water industry.

Delegates credited with this unit standard will be able to:
- Identify and describe the units used in the standard international (SI) metric system.
- Perform calculations using the SI system of measurement.
- Use formulae to solve unknown variables.
- Take measurements and use them in calculations to solve problems.
- Describe dilute solution strengths.
- Solve problems involving calculation of time.

Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 7 credits).

Demonstrate knowledge of sampling procedures for water and wastewater treatment tests

Delegates successfully completing this course (unit standard) will be able to identify and explain sampling procedures in the context of the methods and equipment used for sampling purposes. Delegates will be able to eliminate contamination and ensure sample integrity by:
- Taking basic precautions.
- Use the knowledge and skills acquired to ensure representative samples.
- Take, preserve and transport representative samples and thereby contribute to accurate test results.

Delegates credited with this unit standard will be able to:
- Explain the methods of taking samples.
- Describe the requirements of sampling plan.
- Describe the requirements for storage.
- Record data collected in a water and wastewater plant.

Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 6 credits).

Demonstrate knowledge of the principles and application of potable water science

The delegates successfully completing this course and achieving this unit standard will be able to explain water related chemistry and its application in the water treatment process. This competence will provide the delegate with knowledge and understanding of the composition of untreated water, its chemical and physical characteristics, water biology and the application of chemical processes in water treatment. It will also provide the delegate with a scientific understanding of the industry in which she/he operates and will provide a basis for learning in other related sectors.

Delegates credited with this unit standard will be able to demonstrate knowledge in:
- Dissolved substances - Carbonate, bicarbonate, sulphate, nitrates, chloride, sodium, fluoride, calcium, magnesium, iron, manganese, total dissolved solids (TDS) and Phosphate.
- Colloidal/suspended particles or material - Silt, clay, micro-organisms, oil, algae and plant material and naturally occurring colour forming compounds e.g. humic acids.
- Relevant laboratory analysis - pH, turbidity, total dissolved solids (TDS), conductivity, alkalinity, hardness, temperature, suspended solids analysis.
- Physical properties - Temperature, taste, odour, colour, conductivity and turbidity, density, specific gravity (SG), viscosity, suspended solids and colloidal matter.
- Origin of taste, odour and colour - Algae, plant life, animal life, bacteria, industrial effluent, organic and inorganic substances.
- Water borne and water related diseases - Cholera, dysentery, cryptosporidiosis and giardiasis, gastric enteritis, bilharzia, malaria and trachoma.
- Infestations of filter media - Insect larvae, algae and worms (e.g. blood worms).
- Microbiological tests - Plate counts, total coliforms and faecal coliforms.
- Stabilisation process - pHs, Langelier index, precipitation potential.

Unit credits accumulation towards a Further Education and Training Certificate: Water and Wastewater Treatment Process Control Supervision (NQF Level 4 with 8 credits)
<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Description</th>
<th>Credits</th>
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</thead>
</table>
| 12048  | **D750N** Operate rotating biodisc contactor       | The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to operate a Rotating Biodisc Contactor (RBC) process in accordance with legislation and work policies and procedures to ensure a good quality effluent. This competence will equip the delegate with an enhanced skills base thereby improving the delegate’s motivation, employability in the water sector and contribute towards the smooth running of the wastewater works. This competence will contribute towards the sustainability of the water system for all communities. Delegates achieving this unit standard will be able to demonstrate knowledge of:  
  - Work policies and procedures: Best operating procedures.  
  - Reports: Include fault reports, breakages, pump hours, repairs, and/or maintenance.  
  - Irregularities: Odours and/or colour change.  
  - Major breakages: Pump break down, motor burn out, seized bearings etc.  
  - Information: Minor breakages, temporary repairs.  
  
  **Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 2 with 4 credits)** | E 2 4  |
| 12340  | **D760N** Operate and Maintain Water Reticulation System | The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to undertake specific maintenance, water loss control and operational tasks on a water reticulation system. This competence will enable the delegate to identify safety risks, implement safety procedures, identify the cause and scope of the breakdown in the water reticulation system and carry out repairs and preventative maintenance tasks. This competence will contribute towards the effective operation of water supply services to communities. Achieving this unit standard will enhance the efficiency of the delegate and advance his / her own expertise and employability in water and other related sectors. Delegates achieving this unit standard will be able to demonstrate knowledge of:  
  - Personal safety clothing: As laid down in work procedures.  
  - Safety equipment: As laid down in work procedures.  
  - Breakdowns: Damage to all types, classes and sizes of pipes, associated fittings, valves and meters.  
  - Preventative maintenance: Clean/check chambers and boxes, check legibility procedures of markings, check pipeline components for vandalism, tampering and corrosion and check for evidence of leaks.  
  - Tools and equipment: Tools and equipment associated with the tasks.  
  - Legislation: OHS Act  
  - Records and reports: Job cards, sundry records, incident reports, accident reports and meter reading records  
  
  **Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 2 credits)** | E 3 12 |
| 115907 | **D840N** Operate and maintain a wastewater reticulation system | The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to undertake specific maintenance and operational tasks on a wastewater reticulation system. This competence will enable the delegate to identify safety risks, implement appropriate safety procedures, identify the cause and scope of the breakdown in the wastewater reticulation system, communicate with customers, repair the problem and carry out preventative maintenance tasks. This competence will contribute towards the effective operation of wastewater services. Achieving this unit standard will enhance the efficiency of the delegate and advance his / her own expertise and employability in water and other related sectors. Delegates achieving this unit standard will be able to demonstrate knowledge of:  
  - Safety risks - Confined spaces, gases, ladder and step safety, road works safety, high pressure water, lifting heavy items, rotating turning bars and engulfment.  
  - Preventative maintenance procedures - Clean, check and maintain chambers and manholes, check legibility of markings, check pipeline components for vandalism, tampering and corrosion, check for evidence of blockages and surcharging, inspect and clean pipes and repair pipes.  
  
  **Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 15 credits) (60155)** | E 3 15 |
**Operate, maintain and provide technical support for on-site sanitation systems**

The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to identify and explain the working principles of various on-site sanitation systems (conservancy tank, septic tank, ventilated improvements pit latrine (VIP), chemical toilet, pit latrine, bucket system) and their application. The delegate will also be able to provide on-site sanitation maintenance services and technical support to customers. This competence will enable the delegate to advise customers on the most appropriate sanitation system based on site conditions, cost, operation and maintenance requirements. This will contribute towards the sustainability of on-site sanitation systems.

- On-site sanitation systems - Conservancy tank, septic tanks, ventilated improved pit latrine (VIP), chemical toilet, pit latrine and bucket system
- Site conditions - Soil type, slope, size of available area, accessibility, access to water borne sewerage, water table, service levels of potable water supply, volume and nature of effluent.
- Problems - Collapsed tank, ingress of water, inappropriate water service level, use of incorrect chemicals, soak-pit failure, foreign objects, water table and soil conditions.

**Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 8 credits)**

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**Demonstrate understanding of sections of the occupational health and safety act (act 85 of 1993) applicable to the water sector**

The delegate successfully completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to create an awareness of the requirements of the Occupational Health and Safety Act and all the relevant regulations applicable to the water sector. The delegate will be able to explain the responsibilities of management in the water industry in terms of the Act and identify instances of non-compliance. The delegate achieving this unit standard will be able to apply the Occupational Health and Safety Act (Act 85 of 1993) as amended, in combination with context expertise, to ensure compliance in the workplace with the Act. This knowledge will contribute towards the protection of the delegates in the workplace in accordance with legislation and regulations.

Delegates achieving this unit standard will be able to demonstrate knowledge of:

- The following sections of the Occupational Health and Safety Act:
  - Section 8: General duties of employers to their employees.
    - All clauses.
  - Section 9: General duties of employers and self-employed persons to persons other than their employees.
    - All clauses.
  - Section 13: The duty to inform.
    - Clause 13. (a) to (c).
  - Section 14: General duties of employees at work.
    - All clauses.
  - Section 15: Duty not to interfere, damage or misuse things.
    - All clauses.
  - Section 16: Chief executive officer charged with certain duties.
    - All clauses.
  - Section 19: Health and safety committees.
    - Clause 19(1) to (7).
  - Section 20: Functions of health and safety committees.
    - Clause 20.1(1) to (4).
  - Section 37: Acts or omissions by employees or mandatories.
    - All clauses.
  - Environmental regulations for work places.
  - Definitions and regulations 2 to 12.
  - Facilities regulations.
  - Definitions and regulations 2 to 12.
  - General administration regulations.
  - Definitions and regulations 2 to 17.
  - Hazardous chemical substances.
  - Regulations 2 to 15.
  - Electrical machinery Regulations.
    - Regulations 2 to 10.
  - General machinery regulations.
    - Definitions and regulations 2 to 6.
  - General safety regulations.
    - Definitions and regulations 2 to 12.
  - Major hazard installation regulations.
    - Definitions and clauses 2 to 8.
  - Vessels under pressure regulations.
    - Definitions and clauses 2 to 16.
  - Noise induced hearing loss regulations.
    - Regulations 2 to 5.
  - Construction regulations.
    - Regulations 2 to 28.
  - General Administrative Regulation.
    - Regulations 4 to 9.

**Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision (New Level Assignment Pending, 6 credits)**
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</table>
| D990N  | **Enter, work in, and exit a confined space in the water industry**         | The delegate achieving certification for this course (unit standard) will be able to follow defined occupational health and safety policies and procedures relating to entering confined spaces and ensure own safety and that of others in the workplace. The delegate, without supervisory responsibilities, will be able to:  
  - Identify the location, and work procedure to be carried out.  
  - Examine an entry plan for completeness, and enter, complete work and withdraw from a confined space.  

Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 3 credits) | C 3 3 |
| D1010N | **Operate a reticulation pump station**                                     | The delegate achieving certification for this course (unit standard) will be able to explain the working principles of pumps and operate and maintain a pump station in the wastewater sector. This competence will enable the delegate to operate and maintain pumps, diagnose faults and work with moving machinery in accordance with work and safety procedures. Delegates credited with this unit standard will be able to demonstrate knowledge of:  
  - Pumps: Centrifugal (submersible, immersible and dry well) reciprocating, ejector and screw.  
  - Components of pumps: Impeller, casing, filter, packing, nipples, shafts, universal joints/couplings, bleed-off points, gaskets, gauges, bearings and suction and delivery pipe work.  
  - Hazards: Harmful gases, slippery conditions, electrical equipment, moving mechanical equipment, vertical drops and falls and biological contact.  
  - Maintenance of pumps: Cleaning inlets filters, packing glands and lubrication.  
  - Valves: Non return, isolating, regulating, sluice-gate venting and resilience seal valves.  
  - Drive-units for pumps: Water, hand, wind, electric and internal combustion.  
  - Indications of malfunctions: Excessive vibration, excessive noise, gland water (too much or too little) water leaks, high temperature, odour, low delivery of water, non-delivery of water and high/low current.  

Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 10 credits) | C 3 10 |
| D1030N | **Demonstrate knowledge of the operation and maintenance of mechanical and electrical equipment** | This competence will enable the delegate to understand the maintenance of equipment used in a wastewater works, which will assist with minimizing breakages and stoppages. The unit standard will expand the skills base of the delegate and make the person more effective in his/her tasks. The delegate successfully completing this course and achieving this unit standard will be able to demonstrate the following competence:  
  - Explain basic mechanical principles.  
  - Operate mechanical equipment at own works.  
  - Explain maintenance of mechanical equipment.  
  - Explain principles of electricity.  
  - Demonstrate practices and procedures for managing electrical fires.  

Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 10 credits) | C 3 10 |
| D1070N | **Demonstrate knowledge of pressure zones and backflow prevention in water reticulation** | This course (unit standard) is designed for delegates who wish to enter or further their career in this sub field of learning or whom is currently employed in the industry and wishes to receive formal recognition of credits against current competence. Delegates credited with this unit standard will be able to:  
  - Demonstrate knowledge of pressure zones in water reticulation.  
  - Demonstrate knowledge of backflow prevention in water reticulation.  

Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 4 credits) | E 3 4 |
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<th>Competency</th>
<th>Unit Credits</th>
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<tr>
<td>254074</td>
<td><strong>D1080N Investigate problems in a wastewater reticulation system</strong></td>
<td>The delegate completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to explain the elementary hydraulics of a wastewater system that will assist in the investigation of abnormal sewer flows. This competence will enable the delegate to identify, investigate, locate, rectify and report problems on a wastewater reticulation system.</td>
<td>E 3 10</td>
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<td><strong>Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 10 credits)</strong></td>
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<tr>
<td>254077</td>
<td><strong>D1110N Provide water services support for rural communities</strong></td>
<td>The delegate completing this course and achieving this unit standard will be able to provide a broad-based support service and advice to communities operating community water systems including levels of service and the implications for operation and maintenance. This competency will assist communities in ensuring sustainable water services. In acquiring this competence the delegate will lay a good foundation for future learning and action, and better understand the broader context of own work.</td>
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<td><strong>Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 10 credits)</strong></td>
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<tr>
<td>254094</td>
<td><strong>D1120N Manage water resources</strong></td>
<td>This course will enable the delegate to work in the water conservation and resources environment. The knowledge and skills outlined by this unit standard is meant to give credit to delegates who have gained experience in the sub field of learning and wishes to gain formal credits towards the outcomes described. Competence gained will benefit the industry by the efficient operation and maintenance of resources. The delegate achieving this unit standard will be able to: • Demonstrate basic knowledge of hydrology. • Demonstrate knowledge of the National Water Act of 1998 (NWA). • Read maps and satellite images. • Determine volumetric quantities. • Comply with dam safety regulations. • Monitor pollution control.</td>
<td>E 4 12</td>
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<td><strong>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Reticulation Services (NQF Level 4 with 12 credits)</strong></td>
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<tr>
<td>254095</td>
<td><strong>D1130N Maintain water quality in water supply reticulation systems</strong></td>
<td>This course (unit standard) is ideal for delegates who supervise maintenance and operations in water reticulation and for delegates who work in specialist water reticulation activities. Delegates credited with this unit standard will be able to: • Identify and isolate water quality problems. • Implement responses and report findings. • Implement hygienic measures to prevent contamination during maintenance and construction. • Identify further action required, and carry out water supply sampling.</td>
<td>E 4 5</td>
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<td><strong>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Reticulation Services (NQF Level 4 with 5 credits)</strong></td>
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<td>Course Code</td>
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<td>Credits Accumulation</td>
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| D1170N     | Demonstrate knowledge of wastewater composition, odours, and odour control  | This course (unit standard) is intended for delegates who supervise maintenance and operations in specialist water and wastewater reticulation activities. Delegates credited with this unit standard will be able to demonstrate knowledge of:  
  - Wastewater and wastewater composition.  
  - Wastewater source control.  
  - The causes of odours and techniques for minimizing odours in sewers.  
  Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Reticulation Services (NQF Level 4 with 6 credits) |
| D1180N     | Demonstrate knowledge of oxidation pond and maturation ponds processes in wastewater treatment | This course (unit standard) is intended for delegates who are responsible for the operation of oxidation and maturation ponds. Delegates accessing this unit standard will be able to monitor and maintain maturation and oxidation ponds. This competence will enable the delegate to manage ponds in both a rural and an urban context to ensure optimal functioning of the ponds. This competence will contribute towards the sustainability of the water environment in accordance with legislation and regulations. Delegates credited with this unit standard will be able to:  
  - Explain the purpose of oxidation and maturation ponds in wastewater treatment processes.  
  - Explain the purpose of maturation ponds in wastewater treatment processes.  
  - Identify the process options for oxidation and maturation pond wastewater treatment.  
  - Identify tests and performance measures of oxidation and maturation pond treatment operations.  
  - Monitor the maintenance of the maturation and oxidation ponds.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 7 credits) |
| D1190N     | Demonstrate basic knowledge of different types of trenchless technologies in water and wastewater environments | The delegate successfully completing this course and achieving this unit standard will be able to explain the purpose of trenchless technologies, the different types and the advantages and disadvantages of each type. This will enable the delegate to make recommendations when trenchless technologies would be appropriate based on calculations, evaluations and analysis of data and monitor contractors more effectively thus ensuring minimal disruptions to customers. Achieving this unit standard will form the foundation for specialising in trenchless technologies.  
  Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Reticulation Services (NQF Level 4 with 6 credits) |
| D1200N     | Demonstrate knowledge of different methods of achieving disinfection in a water and wastewater effluent environment | This course (unit standard) is intended for delegates who are responsible for disinfecting water or effluent on water and wastewater effluent treatment works. Delegates will be provided with knowledge of the different methods that can be used for disinfection and an understanding of the advantages and disadvantages of the preferred methods of disinfection. Delegates credited with this unit standard will be able to:  
  - Discuss the presence and role of micro-organisms in an environment.  
  - Identify the different methods of disinfection.  
  - Determine dosages of disinfection.  
  - Identify the methods used to measure the effectiveness of the disinfection process.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 2 credits) |
<table>
<thead>
<tr>
<th>Code</th>
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<th>Description</th>
<th>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Reticulation Services (NQF Level 4 with 7 credits)</th>
<th>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 7 credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1230N</td>
<td>Demonstrate sound environmental practices in wastewater operations</td>
<td>The delegate completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to explain sound environmental practices associated with wastewater operations and demonstrate contamination prevention methods and remedial techniques for spillages. This competence will enable the delegate to demonstrate sound environmental practices in compliance with relevant legislation and contribute towards the protection of the environment. In acquiring this competence the delegate will lay a good foundation for future learning and action, and better understand the broader context of own work.</td>
<td>E 4 7</td>
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</tbody>
</table>
| D1240N   | Demonstrate knowledge of activated sludge processes in wastewater treatment | This course (unit standard) is intended for delegates who are working with activated sludge in order to produce effluent in compliance with organisational standards. The delegate will understand the principles of the activated sludge process and be familiar with the layout of the plant. Delegates credited with this unit standard will be able to:  
- Describe the theory of activated sludge.  
- Describe the layout of the plant.  
- Make adjustments on the plant.  
- Monitor performance of the plant.  | E 3 6                                                                                | Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 6 credits)                                                                                   |
| D1250N   | Operate a membrane process                                           | This course (unit standard) is intended for delegates who operate a membrane plant for the treatment of water or wastewater. Delegates credited with this unit standard will be able to measure physical quantities using SI units. Delegates will be provided with knowledge of different measuring equipment and methods applicable in the water industry. Delegates credited with this unit standard will be able to:  
- Demonstrate knowledge of the principals of membrane processes.  
- Prepare membrane plant for service.  
- Start-up and monitor the membrane plant.  
- Stabilise out of normal conditions.  
- Shutdown and isolate out of service plant.  
- Clean the membrane plant according to organizations standard procedures.  | C 3 8                                                                                | Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 8 credits)                                                                                   |
| D1290N   | Demonstrate knowledge of the characteristics of water flow           | The delegate completing this course and achieving this unit standard will be able to explain the flow characteristics of water in a water reticulation system. This competency will enable the delegate to describe negative influences affecting water flow in pipelines, explain pressure and flow measuring devices and calculate water flows accurately. Delegates credited with this unit standard will be able to demonstrate knowledge of:  
- Water flow including water and wastewater flow in pipes and channels.  
- Characteristics of water flow: Volume, pressure/vacuum, flow rate and gravity/head.  
- Measuring devices: Water meters (standard), magnetic flow meters, ultra-sonic flow meters, pitot tubes, rotameters, positive displacement pumps and pressure gauges.  | C 4 10                                                                               | Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Reticulation Services (NQF Level 4 with 10 credits) Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 10 credits |
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</table>
| D1320N | **Control composting process**                                                    | The delegate completing this course and achieving this unit standard will be able to produce compost from dewatered sludge. This competence will enable the delegate to:  
• Control the composting process to ensure safe disposal of sludge in accordance with legislation and sludge guidelines.  
• Contribute towards optimal functioning of the works and the economic sustainability of the environment. In addition the delegate will gain enhanced skills, thereby improving the delegate's motivation and basic work experience.  
Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 4 with 4 credits) | 4 4 |
| D1350N | **Supervise the various disinfection and oxidation processes**                    | This course (unit standard) is aimed at delegates who have the responsibility to supervise the disinfection of water supplies and also carry out advanced water treatment processes involving the oxidation of contaminants. Delegates will be able to explain the principles and use of oxidants for disinfection, removal of iron manganese and organic compounds and control of micro-biological growth. Delegates will also be equipped with knowledge and skills to apply the oxidation processes to produce quality potable water and effluent. Delegates credited with this unit standard will be able to:  
• Demonstrate knowledge of principles of oxidation and disinfection for water and wastewater treatment purposes.  
• Demonstrate knowledge of the operation and maintenance of the various disinfection and oxidation processes.  
• Monitor and control oxidant dosing.  
• Monitor and control oxidant storage and handling.  
Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Reticulation Services (New Level Assignment Pending, 6 credits) | C † 6 |
| D1360N | **Supervise and optimise the operation of separation processes**                 | The delegate completing this course and achieving this unit standard will be able to supervise the operation of the separation unit processes and make decisions related to optimising the water and wastewater treatment process as a whole. This competence will enable the delegate to explain the principles of separation processes, calculate load factors, evaluate the design and functioning of different processes and removes different contaminants. This will contribute to the cost effectiveness and efficiency of a water treatment plant and the sustainable provision of potable water and effluent. Delegates credited with this unit standard will be able to:  
• Explain the purpose and principles of separation processes.  
• Explain and evaluate the performance of different separation processes.  
• Assess the operation of separation processes in use.  
Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 8 credits) | C 4 8 |
<table>
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<tbody>
<tr>
<td>255978</td>
<td><strong>Take non-routine investigative samples for monitoring process in water and wastewater works</strong>&lt;br&gt;The delegate completing this course and achieving this unit standard will be able to take chemical, bacteriological and micro-biological samples for process monitoring and investigative purposes. Delegates will be able to interpret data collected at various locations in order to determine the status of the different parts of the process and understand the meaning of data to optimize the process. The unit standard will expand the skills base of the delegate and make the person more effective in his/her tasks. This competence will also enable the delegate to undertake water and wastewater quality sampling in various water environments. This will ensure that the water resources are accurately monitored in terms of water and wastewater quality.&lt;br&gt;Delegates credited with this unit standard will be able to:&lt;br&gt;• Plan the collection of investigative samples.&lt;br&gt;• Undertake gas sampling.&lt;br&gt;• Undertake solid sampling.&lt;br&gt;• Undertake depth sampling.&lt;br&gt;• Maintain sample logs.&lt;br&gt;• Interpret results received from laboratory.</td>
<td>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 8 credits)</td>
<td>C 4 8</td>
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<tr>
<td>255979</td>
<td><strong>Thicken and dewater sludge</strong>&lt;br&gt;The delegate completing this course and achieving this unit standard will be able to thicken and dewater sludge. This competence will enable the delegate to operate and maintain sludge thickeners and dewatering processes and dispose of sludge in accordance with legislative requirements and sludge guidelines. In addition this competence will contribute to the economic sustainability of the environment and equip the delegate with enhanced skills, thereby improving the delegate’s motivation and basic work experience.&lt;br&gt;Delegates credited with this unit standard will be able to show competence in:&lt;br&gt;• Work policies and procedures - Best operating procedures.&lt;br&gt;• Thickening processes - Diffused air flotation, gravity thickening and centrifuging.&lt;br&gt;• Dewatering process includes refers to - Drying bed, screw press, centrifuge and belt press.&lt;br&gt;• Reports - Maintenance, faults, breakdowns.</td>
<td>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 6 credits)</td>
<td>C 4 6</td>
</tr>
<tr>
<td>255982</td>
<td><strong>Control water abstraction structures</strong>&lt;br&gt;This unit standard is intended for delegates who have the responsibility to operate the abstraction of water from water sources. The delegate successfully completing this course and achieving this unit standard will be able to ensure the care and optimal functioning of abstraction structures for untreated water. This competence will enable the delegate to monitor adverse activities in a catchment area, operate and maintain the abstraction works and monitor the quality and flow of untreated water required for treatment purposes. This competence will contribute towards the protection of the water environment and ensure a safe water environment for public utilisation. Achieving this unit standard will enhance the efficiency of the delegate and provide foundational learning that will advance his/her own expertise in the water and other related sectors.&lt;br&gt;Delegates credited with this unit standard will be able to show competence in:&lt;br&gt;• Abstraction Works: Boreholes, weirs and inlet towers.&lt;br&gt;• Mechanical Equipment: Valves, screens, penstocks, booms, gates and fish traps and metering equipment and surge vessels.&lt;br&gt;• Structural Problems: Stability, seepage and spalding concrete.&lt;br&gt;• Civil Works: Reservoirs, dams, weirs, canals, chambers and intake towers.&lt;br&gt;• Water levels in bore holes.&lt;br&gt;• Pumping level, recovery time and resting level.</td>
<td>Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 8 credits)</td>
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<tr>
<td>255983</td>
<td>D1420N Supervise the operation of mechanical, electrical, pneumatic and hydraulic control systems</td>
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</table>
|       | The delegate successfully completing this course and achieving this unit standard will be able to explain the need, broad working principles and uses of electrical mechanicals, hydraulic and pneumatic control systems. This competence will enable the delegate to supervise the operation of hydraulic/pneumatic, mechanical and electrical control systems in accordance with safe work practices and recognize when they have failed. This will contribute towards keeping the works functioning in an efficient manner to ensure continuous service to the community. In acquiring this competence the delegate will lay a good foundation for future learning and better understand the broader context of the functioning of the plant. Delegates credited with this unit standard will be able to show competence in:  
  - Liquids: Water and oil.  
  - Control systems: Mechanical, electrical, pneumatic and hydraulic control systems.  
  - Hydraulic and pneumatic control valves: Single action directional flow, double action directional flow, dump valves and orifice valves.  
  - Hydraulic and pneumatic actuators: Double acting, single acting and single acting spring return. |
|       | Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 10 credits |
| 255984 | D1430N Operate and control activated sludge process                                      | 12      | 12                        |
|       | This unit standard is intended for delegates operating and controlling an activated sludge process. Delegates will be able to treat wastewater by removing dissolved and suspended organic material to ensure a good quality effluent. This competence will enable the delegate to operate the activated sludge process at various wastewater works. This knowledge will contribute towards the protection of the water environment in accordance with legislation and regulations. Delegates credited with this unit standard will be able to:  
  - Identify and explain the different types of activated sludge systems.  
  - Control activated sludge systems.  
  - Assess activated sludge plant performance.  
  - Operate nitrogen removal activated sludge plants.  
  - Operate biological phosphate removal activated sludge plants.  
  - Operate chemical phosphate removal activated sludge plants.  
  - Control sludge carry-over.  
  - Identify and discuss health risks and dangers associated with activated sludge process. |
|       | Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 12 credits |
| 255985 | D1440N Operate an anaerobic wastewater sludge digester                                    | 7       | 7                         |
|       | This unit standard is suitable for delegates who have the responsibility for operating anaerobic digestion processes in a wastewater environment. Delegates achieving this unit standard will be able to operate an anaerobic digester in accordance with legislation, guidelines and procedures. Delegates will be able to convert the raw sludge from material of smelly potable nature to a substance that is relatively odour free. This competence will enable the delegate to monitor and maintain the anaerobic digester and interpret laboratory analytical results related to the functioning of the digester. Achieving this unit standard will enhance the efficiency of the delegate as part of a wastewater team and advance his/her own expertise in wastewater treatment. Delegates credited with this unit standard will be able to:  
  - Describe the anaerobic digestion process.  
  - Stabilise sludge in compliance with standard working procedures.  
  - Identify hazardous material in a wastewater treatment environment.  
  - Monitor anaerobic digestion process.  
  - Maintain anaerobic digester and its components in accordance with work policies and procedures. |
<p>|       | Unit credits accumulation towards a Further Education &amp; Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 3 with 7 credits |</p>
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<tbody>
<tr>
<td>D1450N</td>
<td>Demonstrate knowledge of advanced treatment of wastewater process</td>
<td>E 4 8</td>
</tr>
</tbody>
</table>
|       | The delegate successfully completing this course and achieving this unit standard will have a broader understanding of advanced treatment of wastewater processes including biological nutrient removal, coagulation and flocculation, tertiary treatment, advanced sludge treatment and package plants. This knowledge will contribute towards the delegate’s broader understanding of legislation and compliance issues. This unit standard will expand the skills base of the delegate and make the person more effective in his/her tasks and open up job opportunities in related fields. This competence will contribute towards the improved quality of final wastewater products which will impact positively on the environment and ecology. Delegates credited with this unit standard will be able to:  
  - Explain the biological nutrient removal (BNR) process.  
  - Explain the chemical nutrient removal processes.  
  - Explain the importance of de-nitrification.  
  - Explain advanced sludge treatment. |                                                                                       |
| D820N  | Understand fundamentals of electricity                                                                                                        | C 2 8                     |
|       | This course (unit standard) is intended for delegates in the Electrical Engineering, Generation, Distribution, Transmission, Construction and Renewable Energy Sector s. A delegate credited with this unit standard will be able to:  
  - Explain the electron theory.  
  - Explain magnetic theory.  
  - Explain the basic fundamentals of power generation and distribution.  
  - Apply OHM’s law to solve problems.  
  - Configure series, parallel and series-parallel resistive circuits.  
  This unit standard will contribute to the full development of the delegate within the electrical engineering and construction environment by providing recognition, further mobility and transportability within the field of Physical Planning and Construction. The skills, knowledge and understanding demonstrated within this unit standard are essential for social and economic transformation and upliftment within the electrical engineering and construction environment. |                                                                                       |
| D1000N | Operate and maintain dams                                                                                                                     | E 3 4                     |
|       | This course (unit standard) is designed for delegates wishing to enter or further their career in this sub field of learning or who find themselves currently employed in the industry and wishes to receive formal recognition of credits against current competence. Delegates credited with this unit standard will be able to:  
  - Demonstrate knowledge of dams.  
  - Operate dams.  
  - Maintain dams. |                                                                                       |
| D1020N | Connect a customer to a water reticulation system                                                                                              | E 3 4                     |
|       | In acquiring this certification, the delegate will lay a good foundation for future learning and assist with maintaining good customer relations. The delegate successfully completing this course and achieving this unit standard will be able to demonstrate the following knowledge and skills:  
  - Plan work tasks for water connection.  
  - Connect a water supply (range: under pressure for pipe sizes less than 54mm).  
  - Connect a water supply (range: under pressure for pipe sizes more than 54mm).  
  - Complete water connection tasks. |                                                                                       |
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3)</th>
</tr>
</thead>
</table>
| 254071 | D1050N Operate and maintain canals                                            | This course (unit standard) is designed for delegates wishing to enter this sub field of learning or who find themselves currently employed in the industry and wishes to receive formal recognition of credits against current competence. Delegates credited with this unit standard will be able to:  
  • Demonstrate knowledge of water measurement.  
  • Demonstrate knowledge of water distribution.  
  • Maintain canals.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 10 credits) | E 3 10                                                                                                                                         |
| 254072 | D1060N Connect a customer drainage system to a public wastewater system      | The delegate completing this course and achieving this unit standard in combination with context expertise standard(s) will be able to plan and connect a customer sewerage system to a public wastewater system.  
  This competence will enable the delegate to establish levels, select route of connection, excavate and install as well as check connections installed by other service providers. In acquiring this competence the delegate will lay a good foundation for future learning and assist with maintaining good customer relations.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 5 credits) | E 3 5                                                                                                                                         |
| 254075 | D1090N Read and interpret maps and engineering drawings of water and wastewater reticulation systems | The delegate successfully completing this course and achieving this unit standard will be able to:  
  • Identify, use and explain different maps.  
  • Locate work sites from a map.  
  • Interpret and explain engineering drawings and diagrams.  
  • Prepare materials list based on engineering drawing.  
  This competence will ensure that this water related tasks are completed by the delegate efficiently and effectively. In acquiring this competence the delegate will lay a good foundation for future learning and better understand the broader context of own work.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 5 credits) | C 3 5                                                                                                                                         |
| 254076 | D1100N Demonstrate knowledge of hydraulics and flow measurement in water and wastewater systems | This course (unit standard) is ideal for delegates who supervise maintenance and operations in water reticulation and for delegates who work in specialist water reticulation activities. Delegates completing this course and who are credited with this unit standard will be able to demonstrate knowledge of external factors affecting wastewater flows and flow measurement techniques for wastewater.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Reticulation Services (NQF Level 3 with 12 credits) | C 3 12                                                                                                                                         |
| 254114 | D1220N Demonstrate knowledge of quality and its management in water and wastewater context | Delegates credited with this unit standard will be able to:  
  • Explain the fundamentals of quality and its management.  
  • Explain the role of supply chain influences in terms of quality and its management in the water industry.  
  • Explain the roles and responsibilities for ensuring quality in the water and wastewater industry.  
  • Describe quality management systems.  
  • Identify approaches to quality improvement.  
  Unit credits accumulation towards a National Certificate: Water and Wastewater Process Control (NQF Level 3 with 4 credits) | C 3 4                                                                                                                                         |
Apply water loss control principles

This competence will enable the delegate to provide accurate data for analysis and suggest appropriate remedial action, which will result in the conserving of water and the overall reduction of the cost of water to the organisation.

The delegate completing this course and achieving this unit standard will be able to explain:

- The principles of water demand management.
- Sequence meters.
- Collect and record meter readings and flow data.
- Detect water leaks.
- Detect illegal connections on a water reticulation system.

Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision (New Level Assignment Pending, 8 credits)

Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Reticulation Services (New Level Assignment Pending, 8 credits)

Operate electronic equipment for water and wastewater process control

The delegate completing this course and achieving this unit standard will be able to read and interpret data from a range of electronic equipment to measure, relay and record information relating to quality and quantity of water and wastewater. Delegates will be able to monitor the status of the water and wastewater treatment process by looking at information on computer screens including warning messages and data logger. This unit standard will benefit delegates in that it creates portability to enable the delegate to use the skills obtained in the chemical manufacturing and production fields. This will ensure that the work is economically operated and maintained according to work specifications.

Delegates credited with this unit standard will be able to show competence in:

- Work policies and procedures - best operating procedures.
- Scientific instrumentation - pH meter, DO meter, temperature meter, laboratory information, management system (LIMS) and residual chlorine meter.
- Electronic equipment - flow meter, DO meter, temperature probes and CCTV.
- Telemetric equipment - reservoir level monitoring, valve status, valve control and flow measurement.
- Data loggers - chart recorders, electronic data logger.
- Reports - faults, irregularities and maintenance requests.

Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 6 credits)

Demonstrate knowledge of the principles of water hydraulics

This unit standard is suitable for delegates who are involved in the operation or maintenance of water or wastewater treatment systems or those who desire a further knowledge of water hydraulics. Water and wastewater process controllers are expected to use of pumps and valves, reading flow measuring devices and maintain proper solid levels in unit processes. This unit standard will therefore equip delegates with the principles applicable to flows in water and wastewater collection and treatment in a simple and straightforward manner. Delegates will be able to explain the principles of hydraulics and know how to measure flow and protect pumps and pipelines on a works from water hammer and cavitation. This competence will enable the delegate to contribute towards keeping the works functioning in an efficient manner to ensure continuous service to the community.

Delegates credited with this unit standard will be able to:

- Explain the general principles of water hydraulics.
- Explain measurement of flow.
- Explain flow characteristics in pressurised lines.
- Discuss flow measuring devices and their application on the plant.

Unit credits accumulation towards a Further Education & Training Certificate: Water and Wastewater Treatment Process Control Supervision NQF Level 4 with 6 credits)