

Training Package	Rural Production (RTE03)	HSC Requirements and Advice
Title	Lay irrigation and/or drainage pipes	
Unit code RTE2603A	<p>This competency standard covers the process of setting out and excavating trenches using manual equipment and a machine operator, laying bedding materials, and positioning irrigation and/or drainage of varying types and sizes under routine supervision. Laying pipes requires the ability to read and interpret scale drawings, measure trench width, depth, grade and location, use power tools and hand tools, and work safely to instructions. This unit requires knowledge of irrigation and/or drainage pipes, types and sizes, hand and power tools and equipment, bedding and backfill materials and handling methods, hand signals for communication, and relevant OHS issues and procedures.</p> <p>NB: This unit does not include operating excavation machinery such as trench diggers or ditch witches, but does include the use of mechanical equipment for lowering irrigation and/or drainage pipes.</p>	HSC Indicative Hours 15

Evidence Guide

What evidence is required to demonstrate competence for this standard as a whole?

Competence in laying irrigation and/or drainage pipes requires evidence that a person can set out and excavate trenches, check trench depth and grade, lay bedding materials, and position pipes to job specifications and supervisor instructions. The skills and knowledge required to lay pipes must be **transferable** to a different work environment. For example, this could include different pipes types and sizes, soil types and enterprises.

What specific knowledge is needed to achieve the performance criteria?	What specific skills are needed to achieve the performance criteria?	Are there other competency standards that could be assessed with this one?	Assessment guide	HSC Requirements and Advice
<p>Knowledge and understanding are essential to apply this standard in the workplace, to transfer the skills to other contexts, and to deal with unplanned events. The knowledge requirements for this competency standard are listed below:</p> <ul style="list-style-type: none"> workplace and equipment safety requirements for excavating, filling trenches and laying pipes, including relevant legislation regulations and codes irrigation and/or drainage pipes, types and sizes hand and power tools and equipment bedding and backfill materials and handling methods 	<p>To achieve the performance criteria, appropriate literacy and numeracy levels as well as some complimentary skills are required. These include the ability to:</p> <ul style="list-style-type: none"> read and interpret scale drawings and specifications use hand signals for communicating with machine operator measure trench width, depth, grade and location level cover with existing ground use power tools and hand tools handle materials safely work safely to instructions. 	<p>This competency standard <u>could</u> be assessed on its own or in combination with other competencies relevant to the job function.</p>	<p>There is essential information about assessing this competency standard for consistent performance and where and how it may be assessed, in the Assessment Guidelines for this Training Package. All users of these competency standards must have access to the Assessment Guidelines. Further advice may also be sought from the relevant Sector Booklet.</p>	<p>Key Terms and Concepts</p> <ul style="list-style-type: none"> backfill materials bedding materials communication environmental considerations job drawings manual support occupational health and safety (OHS) personal protective equipment (PPE) pipe joints and fittings plan and drawing interpretation quality assurance sediment control measures setting out trenches soil stability trench depth

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<ul style="list-style-type: none"> • scale drawings for laying irrigation and/or drainage pipes • hand signals for communication • OHS issues and procedures related to trenching and pipe laying • Quality Assurance procedures for excavating, filling trenches and laying pipes. 				<ul style="list-style-type: none"> • trench gradient (grade) • trench location • types of drainage pipe • types of irrigation pipe • use, maintenance and storage of tools, equipment and machinery required for pipe installation.

Element	Performance Criteria	Range of Variables	HSC Requirements and Advice
1 Plan and prepare job	1.1 Materials required for the job are transported to the location and stacked in a safe position.	<p>The Range of Variables explains the contexts within which the performance and knowledge requirements of this standard may be assessed. The scope of variables chosen in training and assessment requirements may depend on the work situations available.</p> <p>For more information on contexts, environment and variables for training and assessment refer to the Sector Booklet.</p>	<p>Learning experiences for the HSC must address:</p> <p>Onsite site storage of materials in accordance with the following objectives:</p> <ul style="list-style-type: none"> • conveniently located to facilitate pipe installation • sufficient space to enable machinery access • located or barricaded to prevent trip injuries • secured to prevent theft.
	1.2 Tools, equipment and machinery are selected consistent with the requirements of the job	<p>What tools, equipment and machinery might be relevant to this competency standard?</p> <p>These may include string lines, hammers, measuring tapes, automatic or manual levels, staves, optical squares, rakes, shovels, spades, rollers, trench digger, backhoe, polythene pipe layer, and fitting and welding tools.</p> <p>What type of irrigation and/or drainage pipes might be used?</p> <p>These may include concrete, metal, polythene or polyvinylchloride (PVC). The type and size of pipe will vary with the terrain, soil type and traffic load.</p>	<p>Learning experiences for the HSC must address:</p> <p>Types of irrigation pipe including:</p> <ul style="list-style-type: none"> • polythene • PVC. <p>Types of drainage pipe including:</p> <ul style="list-style-type: none"> • agricultural drainage pipe • slotted PVC. <p>Knowledge of tools required for underground irrigation and drainage pipe installation and their function including:</p> <ul style="list-style-type: none"> • spirit level • water level • string lines • shovels • spades • rakes • picks • pegs • hacksaw. <p>The function of other equipment including:</p> <ul style="list-style-type: none"> • automatic level • laser level • trencher • polythene pipe layer • roller • vibrating plate.

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	1.3 Quality Assurance requirements are recognised and adhered to.		<p>Learning experiences for the HSC must address:</p> <p>Quality assurance requirements/procedures for:</p> <ul style="list-style-type: none"> • excavating • filling trenches • laying pipes.
	1.4 Personal protective equipment is selected, correctly fitted and used.		<p>Learning experiences for the HSC must address:</p> <p>Selection, use, maintenance and storage of personal protective equipment (PPE) appropriate to work task.</p> <p>A range of PPE including:</p> <ul style="list-style-type: none"> • footwear • head protection – hard hat, sun hat and helmet • gloves • overalls • apron • respirator • face mask • hearing protection • eye protection – goggles, safety glasses and face guard • sunscreen • waterproof clothing. <p>Importance of correct fitting PPE.</p> <p>Maintenance of PPE according to manufacturer’s instructions and enterprise Standard Operating Procedures (SOP):</p> <ul style="list-style-type: none"> • cleaning and decontamination • correct storage • regular checks for damage • repair/replacement of worn, malfunctioning or damaged equipment/parts • disposal of single-use equipment.
	1.5 OHS requirements are adhered to.	<p>What OHS requirements might be relevant to this standard?</p> <p>OHS requirements include safe systems and procedures for the operation of machinery such</p>	<p>Learning experiences for the HSC must address:</p> <p>Occupational health and safety (OHS) considerations including:</p> <ul style="list-style-type: none"> • physical distance from excavation machinery

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		<p>as trench diggers and backhoes and other equipment, manual handling, selection and use of hand tools, selection and use of relevant personal protective clothing and equipment, and for working outdoors including protection from solar radiation, dust and noise.</p>	<ul style="list-style-type: none"> • manual handling of heavy loads • repetitive strains from use of hand tools • personal hygiene at meal times • reporting OHS hazards • the importance of following instructions • issues associated with working in unshored trenches that are more than 1.5metres deep • safety barriers around exposed trenches • location of underground gas and electricity services.
<p>2 Set out and excavate trenches</p>	<p>2.1 Location and depths of trenches is determined from job drawings.</p>	<p>What factors might affect trench location and trench depth?</p> <p>Factors affecting the location and depth of trenching may include existing services such as power, water, and telephone, depth of cultivation for pasture improvement, existing plant and facilities such as roads and tracks, the susceptibility of soil to erosion or slipping during excavation or construction, and relevant legislation and/or regulations.</p>	<p>Learning experiences for the HSC must address:</p> <p>Interpretation of drawings and plans including:</p> <ul style="list-style-type: none"> • determination of scale and units used in the plan • orientation of the plan to the site • using measuring tapes and pegs to mark out the site • location of power, water, gas, telephone lines • existing plant facilities.
	<p>2.2 Trench location is set out with pegs and string line and clearly marked with appropriate marking material.</p>		<p>Learning experiences for the HSC must address:</p> <p>Equipment for trench location and marking including:</p> <ul style="list-style-type: none"> • measuring tapes • pegs • string lines • spirit levels. <p>Factors to consider when setting out trenches:</p> <ul style="list-style-type: none"> • location of underground services • access by machinery and equipment • stability of soils to be excavated • susceptibility of the site to erosion • sediment control measures.
	<p>2.3 Manual support is provided to machine operator with excavation of trenches, shoring or battering in accordance with OHS requirements</p>		<p>Learning experiences for the HSC must address:</p> <p>Manual support including:</p> <ul style="list-style-type: none"> • cleaning out trenches where material subsides • digging around structures • battering where soil type is loose or unstable.

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			Communication including: <ul style="list-style-type: none"> • verbal • non-verbal signals.
	2.4 Trenches are cleaned out by hand and corners left square.		
	2.5 Trench depths and grades are checked for conformity to job requirements.	How might the grade be designed? This may include manual and laser equipment.	Learning experiences for the HSC must address: Techniques for checking trench depths and grades including: <ul style="list-style-type: none"> • string lines, pegs and tape measures • water levels • automatic levels • laser levels. Importance of consistent grade in trenches for drainage pipes.
3 Install bedding materials	3.1 Bedding materials are laid and consolidated to specified depths and grades.		Learning experiences for the HSC must address: Bedding materials including: <ul style="list-style-type: none"> • crusher dust • coarse sand. Tools for levelling and consolidating bedding material including: <ul style="list-style-type: none"> • hand tools • screed • rollers • vibrating plates.
4 Lower and position pipes	4.1 Pipes are installed/lowered into position with appropriate mechanical equipment according to specifications.	What type of irrigation and/or drainage pipes might be used? These may include concrete, metal, polythene or polyvinylchloride (PVC). The type and size of pipe will vary with the terrain, soil type and traffic load.	

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	4.2 Pipe joints and fittings are installed to job specification.	What fittings may be relevant to this standard? Fittings may include valves, outlets, thrust blocks and connecting surfaces such as O-rings.	Learning experiences for the HSC must address: Knowledge of the range of fittings that can be installed including: <ul style="list-style-type: none"> • couplings • unions • tees • gate valves • saddles • reducers • elbows • caps • flow meters • remotely controlled valves • low voltage electrical cable. Fitting types including: <ul style="list-style-type: none"> • O-ring coupling • screw thread • glued joint.
	4.3 Pipes are back filled to specifications and cover left level with surrounding ground.		Learning experiences for the HSC must address: Materials for backfilling of drainage pipes including: <ul style="list-style-type: none"> • coarse aggregate to facilitate drainage • geo-textile material to prevent silt and clay from blocking the drainage pipes. Risks when backfilling pipes including: <ul style="list-style-type: none"> • coarse materials and stones puncturing the pipe wall • crushing pipe walls when machinery drives over non-compacted trenches • trench wall collapse if backfilling machinery is not operated at a right angle to the trench.
5 Clean up	5.1 Site is cleared and excess soil, debris and unwanted materials removed in accordance with organisational procedures and environmental requirements .	What environmental requirements might there be in the clean up phase of laying pipes? Environmental requirements may include recycling or environmentally safe disposal of excess soil, debris and unwanted materials.	Learning experiences for the HSC must address: Environmental considerations for rehabilitating the trench site including: <ul style="list-style-type: none"> • use of excess material in a manner that does not spread weeds onto other sites or results in sediment entering water ways

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			<ul style="list-style-type: none"> replacing disturbed vegetation preventing erosion of the trench site using sediment control measures removing rubbish to approved solid waste dumping facilities recycling.
	5.2 Tools and equipment are cleaned, maintained and stored.	<p>What tools, equipment and machinery might be relevant to this competency standard?</p> <p>These may include string lines, hammers, measuring tapes, automatic or manual levels, staves, optical squares, rakes, shovels, spades, rollers, trench digger, backhoe, polythene pipe layer, and fitting and welding tools.</p>	<p>Learning experiences for the HSC must address:</p> <p>Equipment cleaning and storage procedures as appropriate including:</p> <ul style="list-style-type: none"> washing mud and soil from tools rust prevention treatments lubrication repairing damaged handles on hand tools sharpening edges storing tools in designated locations filling out registers to record return of tools.

What processes should be applied to this competency standard?

There are a number of processes that are learnt throughout work and life, which are required in all jobs. They are fundamental processes and generally transferable to other work functions. Some of these are covered by the **key competencies**, although others may be added. The questions below highlight how these processes are applied in this competency standard. Following each question a number in brackets indicates the level to which the key competency needs to be demonstrated where

0 = not required 1 = perform the process 2 = perform and administer the process 3 = perform, administer and design the process

1. How can communication of ideas and information (1) be applied?	Using hand signals to machine operator.
2. How can information be collected, analysed and organised (1) ?	Checking depth and grade of trenches and meeting design specifications.
3. How are activities planned and organised (1) ?	Selecting equipment, tools, materials and personal protective equipment.
4. How can team work (1) be applied?	Providing manual support to machine operator.
5. How can the use of mathematical ideas and techniques (1) be applied?	Pegging out trench locations.
6. How can problem-solving skills (1) be applied?	Lowering and positioning pipes.
7. How can the use of technology (1) be applied?	Using laser equipment to design grades.