

**POWER ENGINEERING COMPETENCY FRAMEWORK FOR POWER ENGINEERING PROFESSIONALS IN PUBLIC SERVICE
TECHNICAL SKILLS AND COMPETENCIES (TSC) REFERENCE DOCUMENT**

TSC Category	Electrical and Power Systems Management					
TSC Title	Substation Design Management					
TSC Description	Manage power engineering support for new substation design and oversee electrical works for upgrading of existing substations					
TSC Proficiency Description	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6
		<Insert TSC Code>	<Insert TSC Code>	<Insert TSC Code>	<Insert TSC Code>	
		Prepare electrical schematics, drawings and layouts for substations according to specifications and requirements	Oversee pre-engineering studies to review electrical designs and layouts for substations, and conduct quality checks	Provide solutions to optimise electrical designs for substations to enhance safety, reliability, compliance and maintainability	Evaluate and approve substation proposals and identify opportunities to adopt new technologies	
Knowledge		<ul style="list-style-type: none"> • Building Control Act and relevant regulations • Relevant safety legislative requirements and regulations • Handbook on Application of Electricity Connection • Principles of transmission and distribution networks • Engineering drawing and specification concepts • Schematic diagram and drawing concepts • Components of site layouts and blueprints • Fundamentals of building services technical requirements • Types of equipment used in the development of substation infrastructure • Computer Aided Design (CAD) drawing techniques • Supervisory Control and Data Acquisition (SCADA), metering and communication systems operational principles 	<ul style="list-style-type: none"> • Building Control Act and relevant regulations • Relevant safety legislative requirements and regulations • Pre-engineering study procedures • Quality assurance and quality control assessment and evaluation techniques • Substation earthing system design concepts • Building services technical requirements • Computer Aided Design (CAD) concepts • Technical requirements for the installation of Supervisory Control and Data Acquisition (SCADA), metering and communication systems • Methods for retrofitting and replacing of existing substation infrastructure 	<ul style="list-style-type: none"> • Building Control Act and relevant regulations • Relevant safety legislative requirements and regulations • Methods to evaluate cost effectiveness • Quality assurance and quality control assessment and evaluation techniques • Substation design and equipment factors that impact operations Workflow process development and optimisation • Energy efficiency optimisation techniques • Evaluation techniques of technical proposals and schematics of substation systems 	<ul style="list-style-type: none"> • Building Control Act and relevant regulations • Relevant safety legislative requirements and regulations • Agency strategies and directions on network developments • Quality assurance and quality control assessment and evaluation techniques • Substation design and equipment factors that impact operations • Industry developments, trends and best practices in substation development • Emerging technologies in substation design 	

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Abilities		<ul style="list-style-type: none"> • Verify drawings, technical specification requirements for substations • Check pre-engineering study report findings • Verify substation layouts and blueprints for new substations or upgrading works in existing substations • Verify Computer Aided Design (CAD) designs and drawings for new or upgraded substations • Verify adherence to technical specifications and project requirements • Check compliance with regulations, industry standards, and codes of practice 	<ul style="list-style-type: none"> • Witness on-site pre-engineering studies • Review Computer Aided Design (CAD) designs and drawings for new or upgraded substations • Conduct quality assurance and quality control assessment on preliminary substation design and recommend methods for improvement • Review substation modification requirements for upgrading of equipment or networks • Review compliance with regulations, industry standards, and codes of practice 	<ul style="list-style-type: none"> • Validate transmission substation drawings and distribution network portions of the substation design • Optimise substation requirements to ensure compliance with operational and maintenance needs • Enhance substation requirements to accommodate changes of equipment specifications, operational and maintenance needs • Review quality assurance and quality control assessment findings and make decisions on recommended methods for improvement • Advise on ways to optimise substation designs and drawings for cost effectiveness • Ensure compliance with regulations, industry standards, and codes of practice 	<ul style="list-style-type: none"> • Prescribe guidelines and policies for the design development of substations • Prescribe guidelines and policies to optimise substation design workflow processes • Provide acceptance for substation designs • Advise on process improvement methods based on quality assurance and quality control assessment outcomes • Promote industry best practices in substation design • Recommend solutions to adopt new technologies for substation design • Drive compliance with regulations, industry standards, and codes of practice 	
Range of Application		<p>Range of application includes, but is not limited to:</p> <ul style="list-style-type: none"> • Cable circuits • Transformer/Shunt reactor • Switchgear • Low voltage (LV) board • Low voltage (LV) over ground box • Substation • Building and civil works • Ducts • Optical fibre cable • Low tension, low tension current transformer, and whole current meters • Fire prevention and alarm systems • Heating Ventilation and Air Conditioning (HVAC) systems • Electrical and lighting systems 				