SECTION A:	***QUALIFICATION DETAILS***																	
QUALIFICATION DEVELOPER (S)	Botswana University of Agriculture and Natural Resources (BUAN)																	
TITLE	Bachelor of Science in Soil and Water Conservation Engineering														***NCQF LEVEL***	7		
FIELD	Agriculture and Nature Conservation			***SUB-FIELD***	Soil and Water Conservation engineering										***CREDIT VALUE***	480		
New Qualification							√	*Review of Existing Qualification*										
SUB-FRAMEWORK	*General Education*							*TVET*						*Higher Education*		√		
QUALIFICATION TYPE	*Certificate*	*I*		*II*		*III*		*IV*		*V*		*Diploma*		*Bachelor*		√		
	Bachelor Honours				*Post Graduate Certificate*							*Post Graduate Diploma*						
	Masters							*Doctorate/ PhD*										

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

The Government of Botswana has implemented various projects, policies and programmes aimed at improving arable and pastoral farming, for the country to achieve food security. These initiatives include various irrigation horticulture schemes, National Master Plan for Arable Agriculture and Dairy Development (NAMPAADD), National Policy on Agricultural Development, 2006, the Integrated Support Programme for Arable Agricultural Development (ISPAAD) and Agricultural Service Support Project (ASSP). Since agriculture is dependent on natural resources, production systems should embrace the concept of sustainable development by integrating environmental, technical, and economic considerations.

Botswana has ratified the Framework Convention on Climate Change (UNFCCC) in 1994, Convention on Biological Diversity (UNCBD) in 1995 and United Nations Convention to Combat Desertification (UNCCD) in 1996, subsequently putting together National Action Programmes (NAPs) to ensure compliance with the conventions. These conventions call for the promotion of conservation and sustainable utilization of soil, water and other natural resources for agricultural and other uses. Soil and water management has also been identified in National Development Plans as an essential area/field for improving crop production.

A qualification needs assessment survey was conducted in 2018 through a questionnaire sent to government, non-governmental, private institutions and companies involved in agricultural engineering related professions. A total of 164 respondents partook in the survey. According to the survey, 72 % of the respondents recommended the Soil and Water Conservation Engineering qualification as per attached needs assessment survey report.

The HRDC Agriculture Sector HRD Plan (2015) provides information on the manpower requirements in the agricultural sector.

PURPOSE:

To achieve sustainable development, the country needs graduates who can provide adequate guidance in issues that include appropriate irrigation technologies; selection, operation and maintenance of agricultural equipment and machinery; as well as implementation of environment-friendly production systems as alluded to by HRDC priority list for Agricultural development. Sustainable agricultural production should be complimented by appropriate design and construction of farm structures, use of renewable energy, and information technologies for appropriate decision-making.

The purpose of this qualification is to produce graduates with the knowledge, skills and competence to:

1. Demonstrate scientific knowledge to advance agricultural production through sustainable land and water management.
2. Apply in-depth knowledge of irrigation, ground and surface water resources planning, design, layout, and management processes, for environmentally sustainable production systems and to influence policy formulation.
3. Demonstrate understanding of soil conservation planning, design, layout, and management processes and land use planning, for environmentally sustainable production systems and to influence policy formulation.
4. Employ advanced use of ICT skills in the implementation of government policies related to agricultural mechanization and environment protection.
5. Demonstrate ability to conduct scientific research experiments in Soil and Water Engineering
6. Practice entrepreneurship skills.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement for this qualification is a:

Certificate IV, (NCQF level 4) with credits in Mathematics, Physics and Chemistry.

Recognition of Prior Learning (RPL):

There will be access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) in accordance with the RPL and CAT National Policies.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Demonstrate scientific and engineering knowledge to advance agricultural production through appropriate land and water management strategies.	1.1 Explain mathematical / biometry / numerical engineering concepts to different stakeholders. 1.2 Explain physics related engineering concepts to different stakeholders. 1.3 Explain chemistry related engineering concepts to different stakeholders. 1.4 Explain biological systems and bio-diversity concepts to different stakeholders. 1.5 Explain Soil/Plant/Water relations engineering concepts to different stakeholders. 1.6 Explain the effects of farm structures load on soils.
2. Apply in-depth knowledge of irrigation, ground and surface water resources planning, design, layout, management processes, for environmentally sustainable production systems and to influence policy formulation.	2.1 Explain planning pathways of irrigation, ground and surface water management processes to different stakeholders. 2.2 Produce irrigation schemes, ground and surface water resources project designs, layouts, and monitoring and evaluation plans. 2.3 Produce project management reports that demonstrate environmental sustainability. 2.4 Make subject matter presentations to stakeholders.
3. Demonstrate understanding of soil conservation planning, design, layout and management processes and land use planning, for environmentally sustainable production systems and to influence policy formulation.	3.1 Explain the planning pathway of soil and water conservation engineering projects. 3.2 Design soil and water environment protection systems 3.3 Explain pathways of land use planning. 3.4 Produce project management reports that demonstrate environmental sustainability.

4. Employ advanced use of ICT skills in the implementation of government policies related to agricultural mechanization and environment protection.	4.1 Use modelling techniques for logical quantitative decision-making scenario analysis. 4.2 Use programming ICT skills in the development of soil and water management schemes. 4.3 Apply engineering computing software for decision making and project management.
5. Demonstrate ability to conduct scientific research experiments in Soil and Water Engineering	5.1 Develop a sound scientific proposal. 5.2 Conduct a scientific experiment. 5.3 Analyse and interpret experimental data. 5.4 Use Soil and Water Engineering judgement to draw conclusions.
6. Practice entrepreneurship skills	6.1 Produce fundable agricultural project proposals 6.2 Initiate profitable agricultural enterprises 6.3 Produce project management reports which 6.4 Demonstrate profitable agricultural enterprises 6.5 Monitor and evaluate agricultural enterprises

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SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total (Per** Subject/ Course/ Module/ Units)*
		Level [5]	*Level [6]*	*Level [7]*	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Mathematics	24			24
	Computing Skills and Fundamentals	16			16
	Physics	24			24
	Biometry	16			16
	Communication and Academic Literacy Skills	16			16
				Total	**96**
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Biodiversity		12		12
	General and Inorganic Chemistry		16		16
	Biology of Cells		12		12
	Introduction to General economics		8		8
	Soil Mechanics and Foundation			12	12
	Land Surveying and Evaluation		12		12
	Physical and Organic Chemistry		16		16
	Soil-Plant-Water Relations			12	12
	Fluid Mechanics			12	12
	Irrigation Technology		12		12
	Field Practical Training (Farm)			12	12
	Soil and Water conservation			12	12
	Design of irrigation systems			12	12
	Irrigation Water Supply and Conveyance			12	12

	Irrigation and Water Quality			12	12
	Field Practical Training (Office)			12	12
	Research Project Proposal			8	8
	Hydrology and Climatology			12	12
	Land Drainage			12	12
	Current Issues in Agriculture Engineering			4	4
	Research Project Implementation			8	8
	Watershed management			12	12
	Ground water Hydrology			12	12
	Farm Business management			8	8
	Project Appraisal and Evaluation			8	8
				Total	**280**
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses/ Modules/Units*	**(Set 1, Select 1)** **Crop Production** Principles of Crop production Vegetable production Crop physiology		12		12
	(Set 2, Select 1) **Computing** Computer Application in Engineering Problem solving with Spread sheet			12	12
	(Set 3, Select 1) **Structural Design** Statics Engineering design		12		12
	(Set 4, Select 1) **Controlled Environment** Farm Structures			12	12

	Electrical Power				
	(Set 5, Select 1) **Geoinformatics** Environmental Impact Assessment Remote Sensing Geographical Information Systems			12	12
	(Set 6, Select 1) **Environmental Protection** Agricultural processing Wind Erosion			12	12
	(Set 7, Select 1) **Soil Management** Soil Science Soil Fertility			12	12
	(Set 8, Select 1) **Mathematics** Numerical Analysis Differential Equations			12	12
	(Set 9, Select 1) **Climate Change Management** Climate Smart Agriculture Agro-Meteorology		8		8
				Total	**104**

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SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
5	80
6	136
7	264
TOTAL CREDITS	**480**

Rules of Combination:

A student shall be awarded a Bachelor of Science in Soil and Water Conservation Engineering qualification after completing a minimum of 480 credits. At least 280 credits must come from core courses, 96 from fundamental courses and 104 from electives of the total credits prescribed in the qualification.

The credit distribution is shown in the table below

(Please Indicate combinations for the different constituent components of the qualification)

NCQF LEVEL 7	**CREDIT VALUE**
Fundamental	**96 credits**
Core	**280 credits**
Elective	**104 credits**
TOTAL CREDITS	**480 credits**

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ASSESSMENT ARRANGEMENTS

Formative Assessment (50%)

The contribution of formative assessment to the final grade shall be **50%**

Summative Assessment (50%)

The contribution of summative assessment to the final grade shall be **50%**

MODERATION ARRANGEMENTS

Moderation Arrangements

Internal and external moderators to be engaged will be BQA accredited subject specialists in relevant fields with relevant industry experience and academic qualifications.

Both internal and external moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING

There will be provision for learners to be awarded the qualification through RPL.

CREDIT ACCUMULATION AND TRANSFER

Candidates may submit evidence of credits accumulated in related qualification in order to be credited for the qualification they are applying for.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Once registered for this qualification, learners can progress as follows:

Horizontal Progression

- Bachelor of Science in Agricultural Mechanization
- Bachelor of Science in Food Science and Technology
- Bachelor of Science in Agriculture

Vertical Progression

- Master of Science in Irrigation Engineering
- Master of Science in Hydrology

- Master of Science in Soil and water Conservation Engineering

Diagonal progression

- Master's Degree in Business Administration
- Master's Degree in Risk Management
- Master's Degree in Project Management

QUALIFICATION AWARD AND CERTIFICATION

For a Candidate to achieve this qualification they must have acquired a minimum of **480** credits. The Candidate should pass all the Fundamental, Core, and 9 Electives modules.

Certification

A **Bachelor of Science in Soil and Water Conservation Engineering** Certificate will be awarded to a Candidate upon completion of the qualification in accordance with applicable policies. A certificate and transcript will be issued at award.

REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification was compared with similar or equivalent qualifications from several institutions, both regionally and internationally. The qualifications have been registered according to their respective frameworks. The structure of the proposed qualification is identical across ETPs, comprising of Fundamental, Core and Elective courses. The structure of the BTech qualification is identical to the proposed BSc qualification.

In summary, the BSc (Soil and Water Conservation Engineering) qualification compares favourably with regional and international qualifications in terms of exit outcomes, structure, and credit loading.

REVIEW PERIOD

The qualification will be reviewed every five **(5) years**.

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