SECTION A:	QUALIFICATION DETAILS																	
QUALIFICATION DEVELOPER (S)	Botswana International University of Science and Technology																	
TITLE	Certificate V in Geological Engineering													**NCQF LEVEL**	5			
STRANDS (where applicable)	1. N/A 2. 3. 4.																	
FIELD	Manufacturing, Engineering and Technology		**SUB-FIELD**	Engineering and Engineering Trades									**CREDIT VALUE**	148				
New Qualification		√	*Legacy 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:

Botswana is a mining-intensive country with many large-scale operating mines like Orapa Mine, Letlhakane Mine, Damtshaa Mine, Jwaneng Mine, Karowe Diamond Mine, Khoemacau Copper Mine etc. Various mines within the Botswana mining industry including Jwaneng, Morupule, Khoemacau, Lucara, Mupane and Orapa mines have indicated the need for skills training and demanded to upgrade the knowledge, and abilities of their employees. This is could be achieved by allowing them to pursue different qualifications such as certificate

programs, diploma programs etc., either locally or abroad. This is to facilitate better understanding and assimilation of the written instructions and information and improve work practices and quicker adaptability to the ever-changing mining and related technologies. This, in turn, will make them eligible to pursue higher studies like Bachelor's degree and become Geological Engineers.

This has resulted in the development of the proposed qualification Certificate V (Geological Engineering). The qualification is specially designed to develop broad technical knowledge, skills and competences in geological engineering among personnel to meet the critical needs within Botswana and the SADC region related to geological engineering. The qualification thus produces competent geological engineering personnel and prepares them to take up jobs in the mines and other allied sectors.

The qualification is developed in line with Human Resource Development Council (HRDC) report of 2016 where it has indicated that the occupations that are in high demand are in the Mining, Minerals, Energy, Water Resources, and Manufacturing sectors. It also highlighted the need for continuous engagement with industry to develop graduates that are ready to address the ever-changing needs of the industry (HRDC, 2016). Thus, the qualification is designed considering the exploration of construction materials and exploitation of mineral resources in Botswana and the SADC region.

The Certificate V in Geological Engineering is aimed at providing a solid foundation in concepts of geological engineering and related fields. The main objective is to upgrade the knowledge and skills of the employees in the Botswana mining and allied industries. In addition, it is to improve the skills of the personnel working in mines and other related sectors, and to provide basic understanding of the geological engineering related problems and prepare them to pursue higher degree programs in geological engineering, if they chose to.

PURPOSE: (itemise exit level outcomes)

The purpose of this qualification is to produce graduates with broad technical knowledge, skills and competences to:

- participate in the design of safe and efficient mines, build and maintain roads, railways, airports, transmission lines and pipelines in challenging terrains.
- conduct geotechnical site investigation for a variety of projects.
- Design foundations of structures and investigate rock and soil slope stability.
- Investigate and mitigate natural and man-made hazards;.

- Collaborate on the mitigation of problems related to land reclamation, water and air pollution, and sustainability.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

Certificate IV, NCQF level 4 (General Education or TVET) with at least one year industry experience.

There shall be provision for access through Recognition of Prior Learning in line with applicable policies.

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SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Solve geological engineering problems related to mining and geotechnical activities.	1.1. Identify geological engineering problems. 1.2. explain the core concepts of geological engineering. 1.3. Apply the core concepts and principles of geological engineering to solve practical problems encountered in mines and other related works.
2. Apply basic principles of engineering and broad technical knowledge in identifying and assessing geological engineering problems in mining and geotechnical site investigations.	2.1. Apply basic concepts of mathematics, physics and chemistry related to geological engineering. 2.2. Explain basic principles of engineering design. 2.3. Conduct engineering works as per the design requirements.
3. Generate different geological engineering data using field and laboratory investigations.	3.1. Apply basic knowledge to retrieve geological engineering information from library, online source, and other data storage facilities. 3.2. Conduct standard lab tests. 3.3. Retrieve field investigation data. 3.4. Analyse data using appropriate techniques. 3.5. Explain geological engineering issues in the mineral and construction industries.
4. Effectively use standard geological engineering applications, and Information and Communication Technology (ICT) skills.	4.1. Use and apply basic ICT (computer literacy) skills. 4.2. Use geological engineering software.

	4.3. assess the validity of ICT solutions for problems related to geological engineering.
5. Communicate geological engineering and related information both verbally and in writing, using visual, symbolic, and/or other forms of representation.	5.1. Present geological engineering and related information verbally to appropriate audiences. 5.2. Use non-verbal forms of representation correctly and appropriately. 5.3. Apply broad technical knowledge correctly to produce clear written documents.
6. Use broad technical knowledge in geological engineering to address environmental sustainability and other societal issues.	6.1. Display the ability to use ethically geological engineering knowledge to address societal issues. 6.2. Evaluate public information related to industrial and environmental issues. 6.3. Appraise the ethical implication of geological engineering-based activities on society.
7. Work effectively as a member of a team in geological engineering related tasks and understand basic professional ethics in engineering.	7.1. Display the evidence of successful and effective contributions in teamwork skills. 7.2. Conduct effective participation in teamwork in a range of situations tenable in geological engineering issues, including but not limited to the mining sector. 7.3. Understand the need of professionalism in daily conduct of duties. 7.4. Apply professional ethics in engineering practices.
8. Conduct basic geological engineering investigations.	8.1. Apply geological engineering knowledge to execute investigation plans. 8.2. Use geological engineering knowledge to conduct supervised geological engineering projects. 8.3. Produce basic reports of results of a geological engineering evaluation.
9. Understand basic principles of engineering management and workplace practices in engineering establishments.	9.1. Use engineering management principles in engineering practice. 9.2. Apply appropriate workplace practice to solve engineering practice. 9.3. Apply the principles of supervision in addressing geological engineering tasks.

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SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits*** (Per Subject/Course/ Module/Units)
		Level [4]	***Level [5]***	***Level [6]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Bridging Course (Mathematics, Physical Science and Basic Engineering)	8			8
	Mathematics	8			8
	Computer awareness		8		8
	Communications skills & study skills		8		8
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Introduction to geology		8		8
	Introduction to geological engineering practices		8		8
	Introduction to economic geology and mineral exploration		8		8
	Geological mapping and GIS techniques		8		8
	Introduction to mining geology		8		8
	Field Identification and evaluation of geological structures		8		8
	Introduction to geomechanics		4		4
	Introduction to geotechnical testing methods		4		4

	Geological hazards evaluation in mining sites		8		8
	Rock excavation techniques		8		8
	Mine supervision and management		8		8
	Botswana mining laws		4		4
	Project Report		8		8
	Field trip to mines in SADC region		8		8
STRANDS/ SPECIALIZATION	*Subjects/ Courses/ Modules/Units*	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [ ]***	***Level [ ]***	
1.					
	NOT APPLICABLE				
2.					
Electives	**Elective 1** I. Introduction to construction management II. Mine waste management III. Introduction to mine surveying		8 8 8		8
	Elective 2		8		8

	I. Geological structural data interpretation II. Introduction to drilling and mineral resource estimation III. Introduction to Botswana productive mines		8 8		
				Total	***148***

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	***Credit Value***
Level 4	***16***
Level 5	***132***
TOTAL CREDITS	**148**

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

The Certificate V qualification in Geological Engineering constitutes a minimum total number of **148 credits** and takes one year to complete. Students need to choose one each from Elective 1 and Elective 2 (**two electives)** from the list given under Elective component. The credit combination for the qualification is **32 of the fundamental components, 100 core components** and **16 elective components**.

Distribution of credits is as follows (based on the above Qualification Structure) with respect to NCQF levels:

	As per BQA, min. number of credits	Certificate V Program	Remarks
Total	***132***	***148***	Number is within the allowed allowance.
Maximum credits at NCQF Level 4	20	16	Number of credits is within the allowed maximum requirement.
Minimum credits at NCQF Level 5 or above	90	132	Number of credits meets the minimum requirement.

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ASSESSMENT ARRANGEMENTS

All assessments, formative and summative, leading/contributing to the award of credits or a qualification should be based on learning outcomes and/or sub-outcomes.

Formative assessment

Formative assessment or continuous assessment contributing towards the award of credits should be based on course outcomes. This includes tests, assignments, and projects as well as simulated and real work settings. The contribution of formative assessment for each course to the final grade shall be 40%.

Summative assessment

Candidates may undergo work integrated assessment including written and practical projects in mining, geological and geotechnical investigation sites. In addition, the project module involves project formulation, data collection, data processing and presentation of results. The final examination for each course contributes 60% of the final mark for that course.

MODERATION ARRANGEMENTS

Pre-assessment moderation will be carried out before administering assessments that contribute towards the award of credits in this qualification and post-assessment moderation will be carried out after the assessment tasks have been marked.

Internal Moderation

All assessment instruments shall be subjected to internal moderation by BQA accredited Assessors and Moderators before administering to ensure fairness, validity, reliability, and consistency of assessments.

External Moderation

All assessment instruments shall be moderated by an External Moderator to ensure fairness, validity, reliability, and consistency of assessments.

RECOGNITION OF PRIOR LEARNING

Candidates may submit evidence of prior learning and current competence and/or undergo appropriate forms of RPL assessment for the award of up to 40 credits towards the qualification in accordance with applicable RPL institutional policies and national policies and legislative framework.

CREDIT ACCUMULATION AND TRANSFER

There shall be access and award of credits of the qualification using Institutional Credit Accumulation and Transfer (CAT) Policy in line with the National CAT Policy.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Learning Pathways

This qualification is intended to provide learners with both horizontal and vertical articulation pathways:

Horizontal articulation:

Students may articulate horizontally to:

- Certificate V in Mining Engineering,
- Certificate V in Civil Engineering,
- Certificate V in Environment Engineering.

Vertical articulation:

Completion of a Certificate V in Geological Engineering meets the requirement for admission to a Diploma in Geological Engineering (NCQF level 6).

EMPLOYMENT PATHWAYS

The graduates of this qualification can be employed as:

Assistant Geological Engineers, Assistant Engineering Geologists, Assistant Geologists, Assistant Environmental Engineers, Assistant Field Regiment Engineers (Military), Assistant Materials Engineers.

QUALIFICATION AWARD AND CERTIFICATION

Qualification award:

A candidate is required to achieve a minimum of 148 credits, inclusive of the fundamental, core and elective components. Candidates meeting prescribed requirements will be awarded the qualification of ***Certificate V in Geological Engineering*** in accordance with standards prescribed for the award of the qualification and applicable policies.

Certification:

A certificate and transcript of the award of the degree of ***Certificate V (Geological Engineering)*** will be given upon successful completion of the qualification.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification is similar to the certificate V qualification offered by Kland International College, Johannesburg (South Africa) and Johannesburg City College, Johannesburg (South Africa). Duration of the proposed qualification which is one year (full time) is similar to the qualification offered by the University of Witwatersrand, South Africa. However, it being an integrated qualification (NQF levels 5 & 6) the duration is two years. Eligibility criterion is similar in all cases, that is, National Senior Certificate, or equivalent (NQF level 4) in the relevant field of study. The assessment criteria are also more or less similar between the proposed and the qualification offered by the University of Witwatersrand, South Africa.

The proposed qualification differs from that of the benchmarked ones in terms of credit hours where the proposed qualification has 148 credits while the qualification offered by the University of Witwatersrand has 360 (it is an integrated qualification), Kland International College has 120 and Johannesburg City College has 120 credits. Duration of the proposed qualification is one year; it differs from the qualification offered by Kland International College and Johannesburg City College where it is six months. The proposed qualification and the qualification offered by the University of Witwatersrand have project report in addition to the coursework, while it is only coursework in the case of Kland International College, and Johannesburg City College. The title of the qualification differs significantly between the proposed qualification and the benchmarked ones. The assessment criteria of the proposed qualification differ with the Kland International College, and Johannesburg City College as they offer only coursework. All the benchmarked qualifications also differ with the proposed qualification in terms of mine visit module.

The NQF level of the proposed and the benchmarked qualifications are the same (NQF level 5). All the qualifications are aligned to the Washington accord. The proposed qualification is accredited by Botswana Qualification Authority (BQA). The qualification offered by the Kland International College, Johannesburg City College and the University of Witwatersrand are approved by the Higher Education of Quality Council, and Council on Higher Education (CHE) and aligned to ECSA and SAQA.

REVIEW PERIOD

The review period of qualification is five years. The review can also be considered as per the need that can arise due to technology changes, employment processes changes, or program delivery adjustments.

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