SECTION A:	QUALIFICATION DETAILS												
QUALIFICATION DEVELOPER (S)	Department of Teacher Training and Technical Education												
TITLE	Diploma in Geomatics									NCQF LEVEL		6	
STRANDS (where applicable)	N/A												
FIELD	Natural, Mathematical and Life Sciences		SUB-FIELD		Life Sciences					CREDIT VALUE		360	
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:

Geomatics has been identified as one of the occupations in high demand in Botswana and beyond .The occupations or the skills are needed by the lands, environment, energy, water, mining, tourism, power, agriculture, construction, education (TVET), and most of the sectors. This is based on the Labour Market Analysis conducted by the HRDC.

The qualification Diploma in Geomatics is developed as a response to the need established by Human Resource Development Council Report (HRDC 2023/2024): Forecast for Botswana's of Top Occupations in Demand, which identified Geomatics Technicians as one of the occupations in high demand in Botswana

The skills of a Geomatics Technician are required to align the national land management efforts with African Union Agenda 2063 as well as United Nations Sustainable Development goal number 11 (sustainable cities and communities)

NDP 11(pg11) encourages access to Technical Vocational Education & Training (TVET) Programmes hence increasing enrollment in TVET institutions and the same time bridging skills gap in the industry. It also calls for review of programmes curriculum from content based curriculum to outcome based curriculum. Furthermore NDP 11(pg11) states that the emphasis will be more on technology, business and vocational skills that are essential for the socio-economic development of the nation.

Geomatics Technician though not on HRDC priority skills and employment trends, is one of the skills needed in the country by most economic sectors. The geomatics profession has been declared a scarce skill by the government and as such it is essential that the required manpower is supplied to the industry (Retention Policy, 2008).

According to NDP 11 (4.43) access to land and its other associated inputs have a significant bearing on investment decisions, thus justifying the need to produce the required and relevant graduates at technician level. This will contribute to the economy by taking the country to greater heights by skills such as demarcation of the international boundaries, densification of the national control framework, land information management and mapping.

In the development of this qualification, the industry was involved as supported by the NDP 11 (5.10) which states that in order to address the current limited research capacity, the country matches technical training with industry. The strategy for NDP 11 will be to increase investment in quality research activities and to direct those research activities towards meeting the needs of the economy and industry. The development of this qualification with the involvement of the private sector will address the issues of mismatch between the demand and supply of skills as well as weak collaboration between industry and training institutions as stated in the NDP 11,6.109 (Pg 108)..

A pivotal step towards fortifying the foundation of the TVET sector's positive image and enhancing its overarching image. Beyond its intrinsic value, the qualification acts as a dynamic catalyst, propelling a surge in enrollment rates while seamlessly harmonizing the diverse array of TVET programs. This strategic augmentation resonates harmoniously with the aspirations outlined in the Education Training Strategic & Sector Plan (ETSSP) on page 98, whereby institutions fervently cultivate a burgeoning demand for adept, resourceful, and proficient human capital. This broader perspective serves as an influential conduit, not only invigorating the educational landscape but also adroitly addressing the evolving demands of industries and economies in a harmonious symbiosis.

As per Botswana land Policy(2019), section 51(iv) of Policy Goals and objectives, Geomatics technicians play an important role in promoting up-to-date, efficient, and accessible land information by leveraging advanced technologies, spatial analysis techniques and data management strategies. This leads to better land management, informed decision making and sustainable development.

The skills acquired by Geomatics technicians will help to transform Botswana from Resource based economy to Research Based economy (vision 2036) by use of science, technology and innovation to propel the socio-economy to high levels of efficiency.

PURPOSE: (itemise exit level outcomes)

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

1. Assess and evaluate geographical areas for urban development and sustainable environmental planning.
2. Utilize field surveying tools to gather, analyse and manage geospatial data.
3. Perform various tasks using technical equipment including installation, calibration and trouble shooting and be able to maintain them.
4. Perform spatial analysis and generate maps based on different projections.
5. Create visual representations of collected information such as maps, diagrams, infographic and charts.
6. Collect data on natural and manmade structures including surface and underground features.

MINIMUM ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement for this qualification is as follows:

- Certificate IV, NCQF Level 4(General Education or TVET Intermediate Certificate)
- Applicants who do not meet minimum entry will be absorbed through RPL and CAT according to the ETP's policies aligned to BQA RPL and CAT policies

(Note: Please use Arial 11 font for completing the template)

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1 Collect and manipulate survey data using various field work survey methods	1.1 Use survey equipment to collect various types of geographic data according to the manufacture's specification 1.2 Manipulate and process data using survey hardware and software 1.3 Trouble shoot common errors during field work and data manipulation with survey equipment and apply solutions

2 Apply cartographic technical skills to produce maps	2.1 Operate various cartographic software adhering to established standards 2.2 Produce maps using cartographic skills 2.3 Interpret and analyse forms of geo spatial data to make decisions in map design and production
3 interpret and utilize land management statutes and policies to ensure compliance with land management regulations	3.1 Comply with Land Management acts and policies when producing various geomatics deliverables 3.2 Adhere to land management acts when executing land administration duties 3.3 Implement land management statutes, policies according to the set standards
4 Perform cadastral surveying to define legal land boundaries.	4.1 Conduct historical data searches in preparation for survey(Site Reconnaissance) 4.2 Carry out datum transformations to ensure accurate positioning of property boundaries 4.3 Perform pre-calculations for setting out layout plans 4.4 Produce survey records such as diagrams, general plans and working plans as per standards and statutes 4.5 Demarcate land parcels as per standards and statutes
5 Conduct Topographical surveying to determine relative and absolute positions of landscape features	5.1 Conduct historical data search to aid in preparation for fieldwork and elaborate on the methods of extending control. 5.2 Illustrate the skill to use survey instruments for field work in a safe manner. 5.3 Perform datum transformations to integrate data from various sources and ensure compatibility with existing geospatial data 5.4 Perform pre-calculations for topographical survey

	5.5 Utilize survey software for data manipulation, analysis and production of topographical survey deliverables 5.6 Produce Topographical maps and reports as per standards and statutes
6 Perform engineering survey, structural deformation and monitoring to mitigate risks and structural safety	6.1 Conduct historical data search to aid in preparation for fieldwork 6.2 Carry out datum transformations for setting grades, volume calculations, setting grades and levels, setting out curves and construction monitoring and quality control 6.3 Conduct pre-calculations for engineering survey 6.4 Illustrate the skill to use survey instruments for field work in a safe manner. 6.5 Use survey software for data manipulation, analysis and production of deliverables 6.6 Produce survey reports as per standards and statutes
7 Carry out Geodetic surveying to determine shape, size and gravity of the earth surface	7.1 Conduct datum transformations to establish a unified national and global geodetic reference frame 7.2 Perform historical data search for baseline establishment and datum determination, and cultural and heritage preservation 7.3 Establish survey control network with 3 Dimensions as per standards and statutes 7.4 Produce survey records as per standards and statutes 7.5 Perform geodetic surveying calculations and computations to determine precise p[positions, elevations and earth shape characteristics 7.6 Conduct geodetic surveying to accurately measure precise locations of features on the earth surface taking into account the size and the shape of the earth

8 Apply photogrammetry and remote sensing skills to extract and analyse geospatial data	8.1 Produce and use metadata to describe and manage imagery for accurate data extraction and analysis 8.2 Establish and use ground control points to accurately georeferenced 8.3 Produce georeferenced orthophoto maps as per standards and statutes 8.4 Acquire, process and analyse orthophotos to generate maps and extract detailed geospatial information 8.5 Employ remote sensing techniques to address contemporary issues
9 Apply Geographic Information Systems (GIS) applications and programming in mapping.	9.1 Use GIS software for data modelling, manipulation, analysis and product deliverables 9.2 Perform computer programming for Geomatics 9.3 Create, store, manage and query databases for GIS and Land management systems. 9.4 Map real world features and visualize relationships to solve different spatial problems
10. Execute professional (generic/soft) skills applicable in geomatics field	10.1 Employ ICT skills in geomatics discipline to execute the assigned tasks 10.2 Communicate effectively and efficiently in geomatics field (oral and written) 10.3 Apply entrepreneurship practical skills in a business set up 10.4 Perform administrative & management duties in geomatics industry. 10.5 Employ professional skill to carryout research in geomatics discipline 10.6 Apply code of ethics for geomatics practitioners in work environment

11 Execute health and safety measures to ensure a health and safety complaint environment	11.1 Adhere to health and safety regulations in the workplace to minimize risks and accidents 11.2 Apply and monitor occupational, health and safety regulations, codes and practices in the work place to ensure best safety practices 11.3 Report injuries and accidents in the work place to comply with health and safety reporting
12 Apply engineering mathematics skills to analyse systems in geomatics discipline	12.1 Perform calculations in order to solve problems within geomatics field 12.2 Apply mathematical concepts and principles in field of geomatics 12.3 Perform calculations on geomatics engineering systems

Note: Please use Arial 11 font for completing the template

SECTION C	***QUALIFICATION STRUCTURE***				
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***			***Total Credits***
		Level [ ]	***Level [5]***	***Level [6]***	
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Introduction to Computing		8		**8**
	Occupational Health and Safety		6		**6**
	Communication Skills		8		**8**
	Introduction to Research Methods			8	**8**
	Entrepreneurship		8		**8**

	Project Management Essentials			10	**10**
	Engineering Ethics			8	**8**
CORE COMPONENT *Subjects/Courses/ Modules/Units*	Cadastral surveying		14		**14**
	Introduction to GIS and cartography		10		**10**
	Introduction to Geomatics		10		**10**
	Land Management Law		8		**8**
	CAD for Geomatics		12		**12**
	Engineering Mathematics		18	18	**36**
	Survey Camp		18	18	**36**
	Geodesy			26	**26**
	Engineering & Topographical surveying			15	**15**
	GIS applications and programming			13	**13**
	Remote Sensing and Photogrammetry			12	**12**
	Survey Computation & Adjustment			7	**7**
	Mine Surveying			15	**15**
	Integrated Project			30	**30**
	Work placement			60	**60**
	Subjects/ Courses/ Modules/Units	***Credits Per Relevant NCQF Level***			***Total Credits***

STRANDS/ SPECIALIZATION		***Level [ ]***	***Level [ ]***	***Level [ ]***	
1.	***N/A***				
2.	***N/A***				
Electives	***N/A***				

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL	
TOTAL CREDITS PER NCQF LEVEL	
NCQF Level	*Credit Value*
Level 5	*120*
Level 6	*240*
TOTAL CREDITS	*360*

Rules of Combination:

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

Fundamentals NCQF 5= 30
Fundamental NCQF 6 = 26

Core NCQF 5 = 90
Core NCQF 6=214

Total Credits 360

The candidate has to pass all core modules and fundamentals modules.

N.B. There are no electives for this qualification

(Note: Please use Arial 11 font for completing the template)

ASSESSMENT ARRANGEMENTS
Documentation All necessary documents including qualification document, alignment matrices, assessment instruments and Assessment criteria/rubrics should be available. **Formative Assessment (60%)** The contribution of formative assessment to the final grading shall be 60% **Summative Assessment (40%)** The contribution of summative assessment to the final grade shall be 40% Assessment shall be carried out by BQA registered and accredited Assessors
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. The moderators should be holders of bachelor's degree in Geomatics, Bachelor's Degree in Surveying and Mapping sciences, Bachelor's Degree in Geo-informatics and Surveying Engineering **or** relevant/similar qualifications and industrial experience will be an added advantage
RECOGNITION OF PRIOR LEARNING
Recognition of Prior Learning (RPL) will be considered for the award of the credits according to applicable RPL policies
CREDIT ACCUMULATION AND TRANSFER
Credit Accumulation and Transfer will be considered for the award of credits according to applicable RPL policies
PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)
LEARNING PATHWAYS Horizontal Articulation(related qualifications of similar level that graduates may consider) ● Diploma in Land Surveying ● Diploma in Geographic Information Systems ● Diploma in Photogrammetry and Remote sensing ● Diploma in Cartography

Vertical Articulation(qualifications to which the holder may progress to)

- Bachelor of Geomatics
- Bachelor of Geographic Information Systems
- Bachelor of Surveying and Mapping Science

Employment Pathways

- On successful completion of this qualification the holder may be absorbed in the job market as:

- Geomatics technician
- GIS technician
- Mine survey technician
- Land survey technician
- Survey equipment and software sales representative
- Security personnel
- Agricultural land use personnel
- Cartography technician

QUALIFICATION AWARD AND CERTIFICATION

Qualification Award

- Learners are required to have a minimum of 360 credits to be awarded Diploma in Geomatics in accordance with the qualification composition rules and applicable policies.

Certification

- There will be certification upon awarding of Diploma in Geomatics qualification.

SUMMARY OF REGIONAL AND INTERNATIONAL COMPARABILITY

Title of Qualifications
The proposed, Cape Peninsula University of Technology (UCT) and Universiti Geomatika Malaysia share same qualification tittle named Diploma in Geomatics and duration is 3 Years for the three.

Duration and Level
The Cape Peninsula University of Technology, Universiti Geomatika Malaysia and the proposed qualification duration is three (3) years. The proposed qualification has two entry levels which are at year 1(NCQF Level 4) and at year 2(NCQF Level 5). Cape Peninsula University of Technology and

Universiti Geomatika Malaysia entry level is for High School Leavers. The content and the depth for both the proposed and benchmarked qualifications is the same.

Main Exit outcomes

The benchmarked qualifications and the proposed qualification have similar competencies such as capturing of data, working with spatial information, data manipulation, collect, manage and analyse data, create and produce maps and carrying out survey.

Modules

The proposed and the benchmarked qualification share some similar modules as shown on the table below:

The Proposed(DTT&TE)	Cape Peninsula University of Technology	Universiti Geomatika Malaysia
Introduction to Computing	Computer skills	
Engineering Mathematics	Mathematics	Advanced Mathematics
Introduction to GIS and cartography		Cartography
Cadastral Surveying		Cadastral Survey
Land Management Law	Land Law Management	Land Law and Land Management
CAD for Geomatics	Computer Aided Drafting(CAD)	CAD Drawing
Survey Camp	Surveying : Theory Surveying : Practical	Geospatial Survey Camp
Survey Computation & Adjustment	Adjustments of Errors	Survey Adjustment
Engineering & Topographical Surveying		Engineering Survey
GIS applications and Programming	Geographical Information Systems	Fundamental of GIS
Remote Sensing and Photogrammetry	Photogrammetry Remote Sensing	Fundamental of Remote Sensing Digital Photogrammetry
Work-placement		Industrial Training
Project Management Essentials		Project Management
Integrated Research Project	GIS Industrial Project	

Assessment strategies and Weightings

The proposed qualification and benchmarked qualifications do have formative and summative assessments

Qualification rules and minimum Standards for the award of the qualification

The proposed qualification and the benchmarked qualification have stated that the candidate has to satisfy all the set minimum standards (such as all the modules should be passed) of the qualification in order to be awarded a diploma.

Differences

Naming

The minor difference is the naming of modules and Universiti Geomatika Malaysia does not have soft skills or generic skills

See attachment A

REVIEW PERIOD

The qualification will be reviewed every five (5) years or as and when required depending on the changing needs of the market**.**

(Note: Please use Arial 11 font for completing the template)

For Official Use Only:

CODE (ID)			
REGISTRATION STATUS	**BQA DECISION NO.**	**REGISTRATION START DATE**	**REGISTRATION END DATE**
LAST DATE FOR ENROLMENT		**LAST DATE FOR ACHIEVEMENT**	
REVISION DATE:		**NAME OF PROFESSIONAL BODIES/REGULATORY**	