

# Expert group joint opinion

Evaluation Procedure: Assessment of Study Field

Higher Education Institution: Latvijas Lauksaimniecības universitāte

Study field: Environmental Protection

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# **Summary of the Assessment of the Study Field and the Relevant Study Programmes**

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The study field “Environmental Protection” of Latvia University of Life and Technologies (LBTU) is relevant in the context of both the EU and Latvian environment. Study programmes complement each other. The content and administration of study direction and programmes correspond to legal requirements. LBTU has a well-functioning inner quality assurance system. Staff and students are provided with high quality resources. Staff of LBTU carries out active research work, involving also all level students. Different forms of collaboration with Latvian and foreign institutions are developed.

Main positive aspects of study direction are suitable research infrastructure, competent staff, and cooperation with industry at a high level.

Main negative aspects are too broad aim of study fields, low activity of students in management activities of study direction, the flow of students in the field is decreasing. Also there is a lack of foreign students in all programmes.

Professional undergraduate study programme “Environment and Water Management (42853) corresponds to study direction and legal requirements, it is well structured. Programme is student-centered. The qualification of teaching staff fully corresponds to the requirements. Main positive aspects are interconnection with the labour market, a multidisciplinary approach in teaching, and good facilities. Main negative aspects are low student mobility, low flow of the students. Also it is necessary to improve publicly available information on the study programme by harmonizing it, supplementing the academic staff database.

Master study programme Environmental, Water and Land Engineering (45529) complies with the State Academic Education Standard (Cabinet of Ministers No. 240). Compliance with the study programme with the State Education Standard is described in Annex No:5\_Compliance of the master's study programme ‘Environmental, Water and Land Engineering’ with the national education standard. It is important to note that this study programme does not comply with Law on Higher Education Institutions section 55 part 2 C - there is no C (free elective) part included. Therefore this criteria is partially compliant. The main positive aspects are the importance of the study field on national and international level, motivated and competent staff, interdisciplinarity of the programme. The main negative aspects orientation mainly to Latvian legislation and practices, low flow of students, the labour market does not recognise the programme as demanded, the ratio between number of students and the teaching staff is lower than the university average.

Doctor study programme “Environmental Engineering” (51529) corresponds to study direction and legal requirements, it is well planned to facilitate completion of promotion work. The content of the study is oriented toward the specific conditions in Latvia, especially on the assessment of the impact of agricultural activities and their connection with environmental protection. The uniqueness of the study programme relates to the assessment of global problems - potential climate change, water protection, agricultural runoff, the impact of changes in the qualitative composition of waters on marine ecosystems in general, and greenhouse gas emissions. Study program is offered in English, but no students until now. The infrastructure provided by LBTU is sufficient for the needs of the study programme. LBTU provides resources for work, studies, and research. The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme.

The main positive aspects are the practicality of the research, i.e. research directions, also defended thesis, are very close to practical and applied science, the teaching staff is very active in publication of the project results on national and international levels, the students are involved in national and international research projects. The main negative aspects are the small, number of students, no courses in English, cooperation with other scientific organizations and universities are rather weak and there is comparably low number of defended thesis. i.e. students are not finalizing their theses on time.

## **I - Assessment of the Study Field**

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#### **1.1 Management of the Study Field**

##### **Analysis**

1.1.1. The importance of the “Environmental Protection” study field (further in text - study field) is based on the tasks included in the Constitution of higher education, but uniqueness is defined and linked to the research directions included in the Development strategy ([https://www.llu.lv/sites/default/files/2023-01/LBTU\\_Attistibas\\_Strategija\\_2023-2027\\_gala.pdf](https://www.llu.lv/sites/default/files/2023-01/LBTU_Attistibas_Strategija_2023-2027_gala.pdf)) of Latvia University of Life Sciences and Technologies (LBTU). The field of Environmental protection studies and the programmes included therein are unique for the Latvian economic sector. Linking environmental processes specific to Latvia - agriculture, forestry, amelioration issues, greenhouse gas emissions studies in relation to agricultural activity are only provided in LBTU. The linking of study programmes in the field are determined by the aim and objectives of the course of study.

The aim of the study field “to prepare competitive specialists and scientists of various levels (engineers, masters and doctors) and to conduct research in the fields affecting the environment” (Self Assessment Report - SAR, p. 14 in Latvian) is ambitious and also very widely defined, linked to the competitive training of specialists in areas related to environmental impacts. But in general, it should be noted that specialists with a narrower specialization (hydrology, water management, amelioration) are prepared. Such a mismatch between the defined aim and the reality, education actually offered, including specialization, poses a risk leading to difficulty or impossibility to achieve declared aim. The SAR contains information about close cooperation with the Ministry of Agriculture and other professional institutions (SAR, p.15 in Latvian). In general, such cooperation has both positive and negative aspects. Positive aspects: financial support for research, involvement of students, researchers and teaching staff at all levels, increasing professional and scientific competence. As a negative aspect, there is no diversification, leading to strong financial dependency on these collaborative projects. The potential of the study field, not only in Latvia but also on the international level, is well characterized. At national level, the potential is described through the prism of employers and professional organizations, pointing to the lack of qualified specialists in this sector (SAR, p. 15 in Latvian). At international level, the potential for the study field is linked to global environmental change (e.g. climate change impacts), the need for research and integration into the regional and international research network (SAR, p. 16 in Latvian).

1.1.2. The SWOT analysis includes strengths, with a total of 16 different aspects as strengths being identified (e.g. uniqueness of the study field, experience in the implementation, diversity of programme content, qualified teaching staff, student-oriented studies, modern teaching methods, cooperation and extensive scientific activity et al., SAR, p. 16-20 in Latvian), in some cases only listed but not including strengthening the aspect, as is usually the case in this type of analysis. An analysis of the weaknesses in the analysis shows that mitigation is sometimes rather vague, such as extending the duration of doctoral studies to 4 years while leaving a 3-year programme in these

accreditation application documents (SAR, p. 21 and Study field direction plan, appendix - "01 pielikums\_Virziena\_attistibas\_plans\_LV.xlsx", in Latvian). In order to mitigate the weak aspects, activities included in the development plan (Study field direction plan, appendix - "01 pielikums\_Virziena\_attistibas\_plans\_LV.xlsx", in Latvian) for the course of study are planned to be carried out. Unfortunately, the activities included in this plan have not been quantified, which means that it will not be possible to assess progress.

1.1.3. Management of the field of study is implemented at various levels: level of management, administrative and support, strategic level of direction and level of particular study field. The relations and responsibilities of the individuals involved at each level are well defined (SAR, appendix "02 pielikums\_Virziena\_parvaldiibas\_limeni\_LV.docx", in Latvian). Development planning is in line with the strategic objectives of the University. Strategic planning and interlinking between the LBTU higher management personnel and those involved at the faculty level are the responsibility of the dean, while management and supervision of the implementation of the study field are obliged to the dean, head of study field and programme directors. In line with good system management practices, cooperation between programme directors, department directors, academic and technical staff is implemented (described in SAR, p. 27, in Latvian). The study field management structure appears to be optimal and efficient in its functioning, and topical issues are addressed in a collegial manner. The established management system is realistically operational, provides support for all kinds of personnel, for example, the implementation of the e-study system, the preparation of self-assessment reports, the promotion of cooperation with other departments, etc. (SAR, p. 28, in Latvian).

1.1.4. The admissions rules are (re)approved every year in October, they are only available on the LBTU home page in both Latvian (<https://www.llu.lv/lv/uznemsana>) and English (<https://www.llu.lv/en/how-to-apply>). The requirements are clearly defined as well as detailed rules for admission outside the competition. SAR (p. 29 in Latvian) contains information on the possibilities of starting studies at later stages of study, if appropriate knowledge has been acquired in advance. The procedures for recognising this knowledge (special commission) have been established, stressing that this option is used more frequently by students studying part-time studies. Providing information only on the LBTU home page can narrow the chances of learning information about studies.

In evaluating the information available on the home page of the LBTU, some old documents found on web page: Cabinet Regulation No. 49-23.01.2018. (The rules on Latvian science sectors and sub-sectors), are no longer in force, they have been replaced by others (MK. No 595-27.09.2022), available [here](https://www.llu.lv/sites/default/files/2022-06/nolikums_par_akademiskajiem_amatiem_2021.pdf) -

[https://www.llu.lv/sites/default/files/2022-06/nolikums\\_par\\_akademiskajiem\\_amatiem\\_2021.pdf](https://www.llu.lv/sites/default/files/2022-06/nolikums_par_akademiskajiem_amatiem_2021.pdf).

Information on study opportunities on the home page is sufficiently informative, and additional information can be obtained by contacting the contact person (email and phone number is provided). The procedures for the recognition of non-formal education and experience are carried out with a Centre for Lifelong Learning, which is logical. Also, positive, that, in addition, there is an option provided for learning courses as a listener (SAR, p. 30, in Latvian).

1.1.5. Student evaluations are carried out in accordance with the procedure laid down in the Study Regulations (<https://www.llu.lv/en/study-guide-documents>). This document is available on the University's internal network ([https://www.llu.lv/sites/default/files/2021-05/Study\\_regulation\\_2021\\_EN.pdf](https://www.llu.lv/sites/default/files/2021-05/Study_regulation_2021_EN.pdf)). The detailed criteria for the evaluation of courses are given in the course descriptions and are presented by the teacher of each course when the course starts. Methods and procedures for evaluation depend on the specifics of the study course. LBTU has a ten - point grading system, where 10 is the maximum and

4 is the passing grade. Very detailed explanation of the grading system and approximate comparison to ECTS grades are given on LBTU home page (<https://www.llu.lv/en/study-guide-documents>).

The final works of the studies shall be defended in front of the Commission. The Commission of Defense is approved by the rector, consisting of 7 people and at least 4 of them are professionals of the sector. The final examination commission regulation is given here: SAR, appendix "31\_Studiju\_nosleguma\_parbaudijumu\_nolikums.pdf", in Latvian.

The objectives of study programmes are achieved by achieving the objectives of each study course, the achievement of which is assessed by each academic personnel, feedback is provided in student surveys after finalization of study courses.

1.1.6. A system of principles of academic fairness and compliance mechanisms have been introduced on a multilateral basis. The code of ethics is available on the University home page (in English and Latvian; [https://www.llu.lv/sites/default/files/2022-04/LLU\\_Etic\\_kodec\\_2005\\_English.pdf](https://www.llu.lv/sites/default/files/2022-04/LLU_Etic_kodec_2005_English.pdf)), procedures have been developed and approved (by the Rector) for plagiarism testing and action, if plagiarism is observed, is explained and clear ([https://www.llu.lv/sites/default/files/2019-12/Akad\\_godigums\\_2019.pdf](https://www.llu.lv/sites/default/files/2019-12/Akad_godigums_2019.pdf)). Since 2014, a computerized plagiarism control system has been introduced for all works in bachelor's and master's studies, but with 2017/2018 also in doctoral studies (SAR, p. 31 in Latvian). Without controlling action, students are informed about the principles of academic fairness (the course Introduction to Environmental Engineering) when starting a studies (SAR, p. 31 in Latvian).

## **Conclusions on this set of criteria, by specifying strengths and weaknesses**

### Conclusions:

The study field and courses management system is established and functioning, responsibilities and duties are clearly defined at different levels. Strategic development of the study field is closely linked to the LBTU strategy, stated aim and objectives. SWOT analysis has identified both growth opportunities and potential risks and weaknesses. A perfectly integrated system of academic honesty and plagiarism control. Some risks have also been identified: (1) the aim of the study field is too broad, and it is difficult to achieve this when specialised study programmes are offered; (2) at the same time, it is positive but also risky to have such close cooperation with the Ministry of Agriculture; (3) SWOT analysis has been formally carried out.

### Strengths:

1. Good integration of plagiarism control system.
2. Unicity of study directions is very well described.

### Weaknesses.

1. The defined aim of the study field are too broad and general, linked to the training of specialists able to be competent at different levels and be specialists in environment fields. There are many areas affecting the environment: water pollution, waste problems, air pollution, noise and light pollution, etc. But in general, according to the analysis of study programmes, plans, course descriptions, so wide-ranging specialists are not prepared.
2. SWOT analysis is very formal. By the meaning SWOT analysis should give answers belonging to all main 4 segments - Strengths (e.g. what do customers see as strengths, this is not included; Weaknesses (e.g. what do competitors do better, and this is also not analyzed); Opportunities; Threats. In this SWOT analysis, main principles of this method are missing - Strengths must be strengthened, Opportunities to be used, Threats to be addressed, Weaknesses to be changed.

## 1.2. Efficiency of the Internal Quality Assurance System

### Analysis

1.2.1. In 2016, the University obtained proof of compliance with the 'Investors in Excellence' standard. In December 2020, the University was re-certified for the second time and its activities were accredited to this standard by December 2022, and during the site visit experts found out that the next accreditation meeting is ongoing. Information about the obtained standard is publicly available: <https://www.llu.lv/lv/sertifikats-investors-in-excellence>. This standard ensures the development and provision of a quality management system for the study field. A number of activities have been introduced during the standard implementation and maintenance process - at the management level (decision-making, control, strategy development, continuous provision of the management system, internal control), at the level of functionality (provision of the study process, scientific work and distance learning process, etc.), at the level of support (human resources, financial resources, document management, communication, communication, etc.). Quite detailed at the procedural level and related activities for internal quality assurance is given in SAR (p. 32-36, in Latvian). Also according to this standard implementation of the internal quality assurance of the study field should be implemented in cooperation with students, graduates, employees, employers, industry, other educational institutions et al. (SAR, p. 36-38, in Latvian).

As part of this initiative, the University has developed a document entitled "Description of the Quality Management System and Implementation Plan" (SAR, appendix "Documents in English-20220729.zip"). The objectives of the "Environmental Protection" study field, based on the objectives and action programmes set out in the Common Development Strategy, are focused on high-quality studies and further training opportunities, the integration of studies and research, the transfer of innovation into the economy, scientific continuity in the fields of environment and water management, and environmental engineering, ensuring the field of studies and inclusion in it the visibility and competitiveness of the programmes (SAR, p. 32 in Latvian). The effectiveness of the system is demonstrated by the effectiveness of cooperation with stakeholders: student satisfaction with studies, cooperation with other higher education institutions (RTU, LU), employers, etc.

1.2.2. The development of new study programmes in the LBTU takes place in accordance with the Senate approved by-law "Rules for the Development, Approval and Change of Study Programmes LLU" (SAR, appendix "12\_Studiju\_programmu\_izstradasanas\_noteikumi\_2019.pdf").

The existing study programmes are reviewed annually, the changes, if any, are reflected in the annual study field reports. The reports are available on the LBTU home page (<https://www.llu.lv/lv/studiju-virzientu-parskati-un-pasnovertejuma-zinojumi>). For the development of study programmes, the answers expressed in the surveys of employers, students and graduates are assessed. Participation in the polls is voluntary. Surveys of students and graduates are conducted every year, for employers - every second year (interview during the on-site visit). The results of the surveys are analyzed in order to make decisions on the development of the study process and study courses, while the ideas of the graduates are taken in order to get an opinion on the topics in the preparation of new specialists. Cooperation with employers is carried out at various events, workshops, and information generated in informal negotiations is also used to improve the study process (SAR, p. 40-41, in Latvian). In general, the procedures developed are effective, the views of stakeholders are taken into account, but feedback is only partly provided, for example, students do not receive information on the recommendations made (found during the site visit).

During the implementation of study programmes, regular communication with industry representatives, who participate in the study process as guest lecturers (e.g. course Hydrological modelling), provide places of practice (e.g. Jelgava municipality), host students in their undertakings

during training tours, and participate in final work commissions (e.g. 4 professionals in Commission of Defense). In addition, industry representatives, together with the teaching staff of the field of study, participate in different sectoral commissions and working groups (e.g. ERASMUS+, NUTRIFLOW).

Although SAR (p. 27) states that students are also involved, and standart "Investors of Excellence" postulates strong involvement of all stakeholders in management processes, during the site visit it was recognized that students had not heard about the preparation of accreditation documents and were not involved in it.

1.2.3. During studies, students have the possibility and the right to submit appeals for assessments, study process, study fees and exmatriculation (SAR, p. 39, in Latvian). Students can complain or make suggestions: (1) orally or in writing (if oral agreement cannot be reached) at the level of the faculty - the head of the responsible department, the director of the study programme or the dean of the faculty; (2) at the same way contacting directly to LBTU higher management; (3) anonymously by an alert mechanism of LBTU - <https://www.llu.lv/lv/trauksmes-celsana>.

The LBTU Studies Statute, which is available to all students lays down the procedures for submitting and examining complaints (appeals). Students are informed about the procedures for submitting complaints at the beginning of studies, this is the duty of the study programme director.

1.2.4. The mechanism for obtaining and providing feedback, including from students, graduates and employers, is effective and focused on the improvement of the study field. The results of the surveys are analyzed in order to make decisions on the development of the study process and study courses, while the ideas of the graduates are taken in order to get an opinion on the topics in the preparation of new specialists. Cooperation with employers is carried out at various events, workshops, and information generated in informal negotiations is also used to improve the study process (SAR, p. 40-41, in Latvian).

The LBTU compiles statistical data centrally, periodicity varies from once a month (number of students, filling of public funded study sites), academic year (number of graduates, admissions results), and to calendar year (trends in number of students in study programmes; filling in budget places), SAR (p. 40-41, in Latvian).

1.2.5. Information on the field of studies is available in Latvian and English on the LBTU website, National Educational Database ([www.niid.lv](http://www.niid.lv)), in the State Education Information System ([www.viis.gov.lv](http://www.viis.gov.lv), only in Latvian), AIKA platform (<https://eplatforma.aika.lv/index.php?r=site%2Fhei%2Flist>). A comparative analysis of the available information shows that: (1) general information on study programmes is the same everywhere; (2) the AIKA platform provides information that the bachelor's programme could be realized in full-time, part-time, remote-time study form, while the SAR report describes only 2-forms (full-time and part-time) presence); (3) the AIKA platform provides information that the master's programme is provided in the form of full-time and part-time presence, while the SAR refers only to full-time presence form. Considering that the methods of implementing the study programmes were clarified within the assessment procedure of the study field, after making a decision on the accreditation of the study field, LBTU must make sure that the information in these systems and on the university's website is updated and correct. An analysis of the information available in [www.niid.lv](http://www.niid.lv) system shows that not all academic staff can be found in the Academic personnel register, which should be according to Law of Higher Education (article 87). In addition to publicity, the use of Facebook and Instagram accounts also uses, and other resources - [www.prakse.lv](http://www.prakse.lv), publications and interviews with

journalists as well.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The higher quality policy introduced in LBTU in the form of "Investors in Excellence" standard is effective, the number of activities at three main levels (management, functional, supportive) were in force and ensures effective management. Also it's recognized that several feedback mechanisms were introduced and most intensive linkage existing between students and academic staff in the form of surveys. Comparative episodic cooperation is with employers, surveys are conducted every 2 years, but there are also informal conversations. However, it should be noted that the standard "Investors in Excellence" requires cooperation with students in the management of the study process and cooperation in the preparation of accreditation reports is also part of the management process. During the site visit in the LBTU, it was recognized that students had not heard about the preparation of accreditation documents and were not involved in the preparation of the SAR.

Strengths:

1. "Investors in Excellence" standard - implemented, maintained and functioning.
2. Cooperation with industry at a high level.

Weaknesses:

1. Statistics/feedback from employers has an episodic nature.
2. Not in all management activities students were involved.
3. It is necessary to improve publicly available information on the study programme by harmonizing it, supplementing the academic staff database.

### **Assessment of the requirement [1]**

- 1 R1 - Pursuant to Section 5, Paragraph 2.1 of the Law on Higher Education Institutions, the higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system:

**Assessment of compliance:** Partially compliant

In general successful development, integration and recertification of specific standard "Investors in Excellence" ensuring internal policy and quality procedures is set. Also, procedures for student evaluations are enough described in the LBTU web page, and more detailed criteria, conditions are given in the particular course descriptions. Growth supporting mechanisms for personnel is well established and functioning. Provided the study field development plan is qualitative, what means milestones were not measurable, so progress couldn't be evaluated in numbers.

Students are not involved in all study field development activities, as determined to the "Investors in Excellence" standard (SAR, p. 32-38, in Latvian). Also, case-by-case nonformal communication with employers, in order to get feedback, couldn be counted as a planned activity.

- 2 1.1 - The higher education institution/ college has established a policy and procedures for assuring the quality of higher education.

**Assessment of compliance:** Partially compliant

The policy and procedures to ensure the quality of higher education are implemented through the "Investors in Excellence" certification scheme introduced in 2016, which has already been



re-certified. Under this framework, a study field development plan has been developed, and indicators of the system's effectiveness have been set as sub-criterias e.g. describing cooperation, with employers, students, etc. In the SAR mentioned study field aim (SAR, p. 14) is very broad and hardly reached by offered study programmes due to specifics. Provided the study field development plan is qualitative ("01 pielikums\_Virziena\_attistibas\_plans\_LV.xlsx"), milestones were not measurable meaning that progress couldn't be evaluated.

- 3 1.2 - A mechanism for the development and internal approval of the study programmes of the higher education institution/ college, as well as the supervision of their performance and periodic inspection thereof has been developed.

**Assessment of compliance:** Partially compliant

The internal quality system in the study field is efficient and functioning, mainly provided by the implemented, maintained and unresourced "Investors in Excellence" standard (<https://www.llu.lv/lv/sertifikats-investors-in-excellence>). Decision-making, implementation and enforcement control, strategy development and continuous updating, management and internal control process (SAR, p. 32-33 in Latvian). Ensuring the internal quality of the developed course of study involves the involvement of students in all management processes (SAR, p. 36, in Latvian), while during the visit, were found that students not to be involved in the formation of SAR.

The SAR report (p. 36, in Latvian) says students' opinions are gained in surveys to assess feedback. But the results of the surveys are debated and evaluated in the faculty council, Study council and Senate, where there are representatives of the study field. The quantitative measure of the functionality of the quality management system is also the annual self-assessment reports, including the accreditation application documents (SAR), which are approved by the faculty council (as stated in SAR p. 33). During the site visit, students were asked about the involvement in these debates, whether the reports prepared were seen, and there was a response that students were not informed about them.

- 4 1.3 - The criteria, conditions, and procedures for the evaluation of students' results, which enable reassurance of the achievement of the intended learning outcomes, have been developed and published.

**Assessment of compliance:** Fully compliant

General procedures for student evaluations are described in the Study Regulations ([https://www.llu.lv/sites/default/files/2021-05/Study\\_regulation\\_2021\\_EN.pdf](https://www.llu.lv/sites/default/files/2021-05/Study_regulation_2021_EN.pdf)), more detailed criterias, conditions are given in the particular course descriptions. Very detailed explanation of the grading system and approximate comparison to ECTS grades are given on LBTU home page (<https://www.llu.lv/en/study-guide-documents>).

- 5 1.4 - Internal procedures and mechanisms for assuring the qualifications of the academic staff and the work quality have been developed.

**Assessment of compliance:** Fully compliant

Introduced standart "Investors in Excellence" (<https://www.llu.lv/lv/sertifikats-investors-in-excellence>), in particular activity "Management and development of human resources" (SAR, p. 34) ensures internal procedures and mechanisms for continuous growth of personnel.

- 6 1.5 - The higher education institution/ college ensures the collection and analysis of the information on the study achievements of the students, employment of the graduates, satisfaction of the students with the study programme, efficiency of the work of the academic staff, the study funds available and the disbursements thereof, as well as the key performance indicators of the higher education institution/ college.

**Assessment of compliance:** Partially compliant

Data collection and analysis about students, alumni were collected (SAR, p.40-41), periodically described in the SAR. Cooperation with employers is the most rare, occasional (SAR, p. 41). The acquisition of information from students is scheduled to be frequent enough, but employer surveys aren't planned. SAR says, - feedback is obtained from meetings in non-formal events, which means it has a case-by-case event, usually with no written evidence after it (depending on person memory capacity). It's not a good management practice.

- 7 1.6 - The higher education institution/ college ensures continuous improvement, development, and efficient performance of the study field whilst implementing its quality assurance systems.

**Assessment of compliance:** Fully compliant

Continuous improvement is realized through specific activities under standard "Investors in Excellence" (<https://www.llu.lv/lv/sertifikats-investors-in-excellence>). Development and approval of annual reports in the faculty council, study council and Senate; analysis of improvements and weaknesses. Internal controls analyze student ratings, cooperation with teaching staff (SAR, p. 33 in Latvian).

**1.3. Resources and Provision of the Study Field****Analysis**

1.3.1. According to LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.1. Latvia University of Life Sciences and Technologies (LBTU) manages its finances by developing a budget plan every year. It is developed by the Working Group on Resource Use and Development, which consists of the Rector, Vice-Rectors, Chancellor, LBTU Director, Deans of all faculties, Head of Resource Accounting Center / Chief Accountant Head of the Planning Centre, key economists, key specialists in real estate and legal issues and is approved by the LBTU's Senate. The main income of the LBTU is from the state budget grant, its own revenues from tuition fees and scientific base funding granted to Faculty of Environment and Civil Engineering (VBF).

According to available information on different Latvian universities web pages, the cost of tuition fee in study programmes Professional bachelor's study programme "Environment and Water Management", Academic master's study programme "Environmental, Water and Land Engineering" and PhD study programme "Environmental Engineering" is on average level comparing to similar programmes in Latvia (e.g. University of Latvia "Environmental Science"; Riga Technical university "Environmental engineering"). There is a noticeable difference between international students' study fee and Latvian students' study fee in PhD study programme "Environmental Engineering", which is most likely related to expenses to organize studies in English. It's not considered as a risk, but indication. Most students study using the study place covered by the state budget grant.

Scientific research is mainly financed by state grants and projects, e.g. from the information found in LBTU web page, "Monitoring the quality of surface water and groundwater in particularly sensitive areas and agricultural lands in the agricultural runoff monitoring program" financed by Ministry of Agriculture of the Republic of Latvia, "Improvement of the accounting system for greenhouse gas (GHG) emissions and carbon dioxide (CO<sub>2</sub>) capture caused by the management of arable land and perennial grasslands and the development of appropriate methodological solutions" financed by state budget institutions etc. According to information acquired during LBTU visit and interviews with students, teaching staff and alumni, main focus of scientific research is focused to agricultural issues as historically LBTU was / is and will remain the only base for such research directions. It's considered as effective in terms of attracting financing, but in future shall be widened with other topics to cover whole study direction topics, e.g. drinking water, different wastewater characterizations, waste management. LBTU does not directly invest heavily into scientific activities

of the staff. As per information from LBTU web page, main LBTU financed scientific activities are related mainly on agricultural, food issues and doesn't focus on topics of this specific study field. This is leading to risks that LBTU is narrow focused on research topics which don't helps to grow environmental topics and staff responsible for teaching environmental topics. The amount of funding for the scientific base is calculated and allocated annually from the active research activities. According to LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.1. LBTU, the remaining funding from tuition fees and other paid income is used for the implementation of research activities, including publicity of research results in conferences and scientific journals, as well as for creative and other activities.

1.3.2. According to LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.2., the study and science infrastructure of the study direction "Environmental Protection" is improving by attracting funding from the Faculty of Environment and Civil Engineering's own earnings (tuition fees, etc.), ERDF projects "Strengthening the research and development infrastructure and institutional capacity of LBTU and the scientific institutions under its supervision" and "Modernization of STEM study programmes", as well as from various other projects implemented at the faculty. It is reasonable to mention that fundings for such activities are still available, will be available in future, and are rather simple to attract, which allows to save internal resources. This is considered as good approach. The infrastructure provided by LBTU is sufficient for the needs of the study field and the programmes "Environment and Water Management", "Environmental, Water and Land Engineering" and "Environmental Engineering". The teaching base is sufficient – the required materials are available in the library, and they are regularly updated, purchases of the requested books are regularly made. As per information acquired during LBTU, despite of technical equipment for the provision of learning processes is at a good level, without an increase in the flow of students, there is a risk that the equipment will amortize itself faster than wear and tear during intensive use. It would be useful to think about joint, mutually beneficial ways of use together with companies in the industry. To improve the learning process it is recommended to discuss with industries to use their infrastructure under supervision to get insight from theoretical to practical knowledge, by sharing the costs.

Access to databases e.g. CAB Abstracts, EBSCO, Science Direct Journal, Scopus and others mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.3., is sufficient and they are regularly used by the students. Active use of open-source materials by students is encouraged by the academic staff. To assure effective use of LBTU resources in general, LBTU organizes use of resources in centralized way as well, e.g., auditoriums, library. Every year, LBTU plans its available resources in buildings, facilities, libraries, planning their even utilization in all study directions so that there are economic benefits, without downtime. This is considered as good approach. The auditoriums are equipped with high-performance computer equipment, interactive displays and whiteboards, free internet access for students and teaching staff, guest lectures and conferences as mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.2.

Access to reading rooms, library and LBTU computers is very easy and student friendly. There are open-source options. Most of the softwares available on LBTU computers are accessible from home with student VPN accounts and the access granted outside working hours of LBTU. The library is always available during the working hours of LBTU with space available for work and studies as mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.3.

1.3.3. The study and scientific literature required for the implementation of the programmes of the study direction Environmental Protection is available in the Fundamental Library of LBTU and VBF Information Centre. Information about the available literature according to the subject of the

programs of the study direction is added to the VBF website <https://www.vbf.llu.lv/lv/informacijas-centrs>. As mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.3., The library collection is mainly compiled according to the recommendation of the academic staff. Library is available with sufficient literature / books to cover all programs courses in Latvian and English as well. Digital databases are available online for scientific articles, e.g. CAB Abstracts, EBSCO, Science Direct Journal. Scopus and others mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.3. Up to date these data bases are enough to ensure quality of studies. Notable, that the working hours of the library are adjusted to the needs of the main users of the library - students and academic staff, mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.3. and noted during visit of LBTU. The working hours of the library reading rooms and the Reference and Information Centre are extended until midnight during individual study and examination period. According to the requests of academic staff and other library users, LBTU purchases the requested publications. A "Collection Acquisition Policy" is developed for the Fundamental Library of LBTU mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.3., by determining main priority in the acquisition of the collection, that is given to the LBTU study programmes and research directions. In cooperation with the Cultural Information Systems Centre, LBTU offers its users to try out many databases available in the world. e.g. Lettonica, Elsewhere scientific literature, Taylor & Francis scientific literature. LBTU employees evaluate the statistics of the use of both subscribed and trial databases which is resulting into decision regarding which databases the library subscribes to.

1.3.4. The LBTU uses e-learning platform Moodle, which is used as a support system in the study process in web or mobile applications. According to information acquired during LBTU visit and interviews with students and teaching staff, Moodle was obligatory and monitored during the C-19 pandemic period, but after that usage of Moodle is voluntary. The Pandemic period was a chance to introduce a distance learning technique which is good implemented and is still possible to use from all aspects of communication as the study field takes place on-site or off-site, considering the specified number of contact classes in each study course. In this system teaching staff can and add study materials, record and store online courses for future use and review, leave the comments, organize polls, and get feedback from both sides, organize lists of courses and lectures, place announcements. Moodle e-learning platform is efficient and students, as well as teaching staff can work with this system with ease. It is recommended to continue this communication tool.

1.3.5. The process of attracting and employing the teaching staff of the LBTU (incl. announcing vacancies, hiring process, election procedure, etc.) is regulated by the regulations approved by the Senate of the LBTU - Regulations of the academic positions of the LBTU (<https://www.llu.lv/sites/default/files/2021-04/Nolikums%2014.04.2021.pdf>). Applicants for an academic position need a scientific or academic degree specified for the specific position. Requirements for applicants for academic positions are determined by the Law on Higher Education Institutions. If LBTU has a vacant academic position, the LBTU Senate may decide not to announce a competition upon the proposal of the faculty council. The rector may hire a visiting professor, associate visiting professor, visiting lecturer, guest lecturer or visiting assistant for a period of up to two years. The individual academic work of the academic staff members is planned in each study year in accordance with the LBTU academic work calculation regulations and the Rector's order On planning, accounting and control of the individual workload of the academic staff in the study year. This determines the academic staff work components, regulations, procedure for recording and controlling the work. As almost all universities in Latvia facing difficulties to attract new teaching staff, the process of attracting and employing the teaching staff is made in transparent way as mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field

subsection 2.3.5., by creating attractive academic position remuneration at LBTU which consists of 3 components: remuneration based on the regulations, bonus from the motivation system and bonus for scientific performance. Despite that, total remuneration of academic staff is still not sufficient comparing to other private equity industries in country, which can lead to problematic attraction of new the teaching staff. Despite of that, teaching staff is very self-motivated, passionate about what they do as the motivation of the staff is primarily not the salary for teaching.

1.3.6. The professional development of the teaching staff is related to the increase of the quality and efficiency of the study courses they implement. In order to motivate the teaching staff to improve regularly LBTU implemented motivation system by granting of a motivation bonus in accordance with the teaching staff evaluation (participating in seminars, local and international conferences, participating in exhibitions and popularizing the field of study, attracting students, conducting diploma theses, etc.) as mentioned in LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.6.

Though it must be noted that the staff of LBTU is competent and have valuable professional expertise in their respective fields. Providing feedback from students and graduates, which LBTU conducts in the form of surveys, is important. Also, lecturers perform annual self-evaluation and negotiate with the LBTU management about fulfilled and achievable goals as mentioned on LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.6.. Academic teaching methods, research methods, along with the growth of technology in the world, are rapidly changing, therefore it is vitally necessary for teachers and students to get closer to a common international understanding and competences, which can ensure international competitiveness in time.

LBTU provides a wide range of mobility for teaching staff which is actively used. From 2013 to 2021 inclusive, teaching staff have used the Erasmus+ mobility program 40 times, including 29 times for lecturing and 11 times for exchange of experience in higher education institutions of different countries, for example in Poland, Lithuania, Malta, Estonia, Finland, etc.

1.3.7. As mentioned in LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.7., 62 lecturers participate in the implementation of the study field. Despite the large number of teaching staff involved, most special subjects rely on a small number of teaching staff. It is considered that the workload of teaching staff is not evenly formed. There are mainly 4 teachers having the main teaching load on specific topics related to whole study field. In addition, there are obvious risks that with such workload distribution, the field of study may become endangered if one of the overworked teaching staff decides to terminate their legal relationship with LBTU. No replacement plan has been developed.

1.3.8. According to LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.8. and LBTU visit results, the study environment accessible to each student is ensured, the accessibility of the environment in the premises is also ensured. Students have the opportunity to attend classes and use study and scientific equipment, to use the study infrastructure also outside of classes. This is reflected in LBTU web site as well <https://www.vbf.llu.lv/lv/vides-pieejamiba-personam-ar-invaliditati>.

There is an opportunity for students to study full-time or part-time. There are clear, pre-defined criteria for assigning grades to study subjects, tests, in order to exclude the possibility of interpretation. This is reflected in Regulation of studies [https://www.llu.lv/sites/default/files/2021-05/Study\\_regulation\\_2021\\_EN.pdf](https://www.llu.lv/sites/default/files/2021-05/Study_regulation_2021_EN.pdf). Taking into account the small number of students in the groups, the teaching staff ensures their availability not only during the specified consultation times, but also outside of specified times at mutually beneficial times. According to interviews with teaching staff, the small student groups allow for regular assessment of

students' progress and special support to students who have difficulties with studies. Students are given the opportunity to provide an anonymous return link about the learning process, content and the teaching staff themselves, which is reviewed by the LBTU commission. This is reflected in Regulation of studies [https://www.llu.lv/sites/default/files/2021-05/Study\\_regulation\\_2021\\_EN.pdf](https://www.llu.lv/sites/default/files/2021-05/Study_regulation_2021_EN.pdf). Students are invited to seek help in conflicting issues from the directors of study programmes, the head of the study department, the vice dean and even higher officials.

Cooperation with industry companies and organizations is promoted in all study programmes of the Environmental Protection field of study. LBTU organizes study trips to companies, guest lectures with the participation of industry professionals and other activities that help find the most suitable specialization and direction to work after graduating from the study programme, e.g. municipal water companies, dairy factory, waste collection and recycling landfills etc.. In cooperation with companies, students are provided with internships where they can continue to work even after graduation, e.g. . municipal water companies, dairy factory, waste collection and recycling landfills, local governmental offices, designing and construction companies etc. According to interviews with alumni, some of them found work at private equity companies dealing with design and construction companies.

During the studies, financial support for students is provided in the form of scholarships and tuition fee discounts. Financial support for students during their studies is scholarships (<https://www.llu.lv/stipendijas>). As part of the competition, students can apply for a state scholarship, a one-time scholarship, a scholarship for obtaining a scientific degree, a social scholarship "Studēt gods" for students from large families and a scholarship from the LBTU Development Fund. LBTU offers tuition fee reductions (50-100%) for the following successful students LBTU employees who study in doctoral study programmes, for the children of LBTU employees, people with first and second degree disability, for orphans or surviving dependents and for student athletes.

LBTU provides support to students from abroad to provide with places in well-equipped student service hotels, technical support in obtaining / extending visas, residence permits, as well as helps resolving insurance issues. According to LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.8., survey of foreign students on the courses they have acquired is introduced every semester to understand their satisfaction with the quality of the courses.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The main income of LBTU is from the state budget grant, its own revenues from tuition fees and scientific base funding granted to VBF. It shall be overlooked critically by attracting more private sector for scientific base to increase confidence of further sustainability.

There is no clearly defined system for financing of the research of academic staff aside from state granted projects and other grants. The infrastructure provided by LBTU is sufficient for the needs of the study field. LBTU provides basic resources for work, studies, and research: the study rooms are well-equipped, study books are available for study fields and generally for all the specific courses. LBTU has developed procedures to attract teaching staff, but total remuneration is far less than other "industries" in country. Staff members go through self-evaluation taking into consideration feedback of the students, but it could benefit from further encouragement of the staff to keep up with modern teaching methodology, pedagogical skill set and keep up with the latest developments in education, especially in areas such as student-centered learning and problem-based learning. LBTU has an admirable student support system that focuses on student needs ensuring the necessary assistance. The students and graduates also acknowledged the accessibility and openness of the administration.

#### Strengths:

1. Well-equipped library and broad choice and granted access to scientific and professional databases.
2. There is a student-oriented support system, following the needs of students at any specific step of their studies and career development. The academic staff is very helpful and responsive.
3. The small student groups allow for regular assessment of students' progress and special support to students who have difficulties with studies.
4. Teaching staff is very self-motivated, passionate about what they do. The motivation of the staff is primarily not the salary for teaching.
5. There is a lot of mobility for teaching staff in the study field both in Latvia and abroad.

#### Weaknesses:

1. Without an increase in the flow of students, there is a risk that the technical provision will amortize itself faster than wear and tear during intensive use.
2. To improve the learning process it is recommended to discuss with industries to use their infrastructure under supervision to get insight from theoretical to practical knowledge, by sharing the costs.
3. The workload of teaching staff is not evenly formed. Many courses are reliant on specific lecturers that if they left, the course would be shut down. There is no plan "B" for substitution of teaching staff.

### 1.4. Scientific Research and Artistic Creation

#### Analysis

1.4.1. The field of scientific research in the study field is closely linked to the topics and trends in the field of environment in Latvia and abroad: (1) dynamics of the qualitative composition of agricultural runoff; (2) GHG emission reduction opportunities in agriculture; (3) environmentally friendly elements of drainage systems; (4) modelling of hydrological and hydrochemical processes. All the mentioned research directions are closely linked to the priority research areas identified in the LBTU Development Strategy

([https://www.llu.lv/sites/default/files/2023-01/LBTU\\_Attistibas\\_Strategija\\_2023-2027\\_gala.pdf](https://www.llu.lv/sites/default/files/2023-01/LBTU_Attistibas_Strategija_2023-2027_gala.pdf)).

Practically all research what is performed is very close linked to industry and application in real life, e.g. "to develop new and approbate the existing technologies for reducing climate change for the conditions of Latvia; to carry out research in the field of development of environmental technologies, paying special attention to technologies that reduce water pollution caused by agricultural activities" et al. (SAR, p. 61 in Latvian).

The academic staff involved in the study field have participated in the implementation of 86 projects in the period since 2013 (SAR, appendix "2\_dala\_11\_Istenoto\_projektu\_saraksts\_LV.docx", in Latvian).

The doctoral research programme Environmental engineering plays an important role in the development of research courses in the study field, since doctoral research topics are closely integrated into the research activities. Teaching staff often involve doctoral students in the teaching process. There is also an opportunity to apply to the internal grants of the LBTU, where PhD candidates work on their research topics under the leadership of supervisors. Totally 5 promotional works developed and defended during the reporting period.(SAR, p.62 in Latvian). All proposed and defended promotional thesis are closely related to the LBTU long-term and short-term objectives identified, e.g. by demonstrating excellence in research, the training of internationally competitive specialists, the integration of studies and research and internationalization.

1.4.2. Research through the study process is linked in a variety of ways: (1) integration of basic knowledge into the learning process; (2) inclusion of project guidelines in the study process; (3) development of international cooperation; (4) technical provision of infrastructure and materials; (5) involvement of students in research; (6) attracting new teaching staff (SAR, p. 62-63, in Latvian). The results of scientific work and participation in research projects also ensured funding for laboratory development and development, providing additional opportunities for scientific growth. For example, acquired knowledge and new laboratory equipment are used in the study course "The basics of scientific work", including the successful integration of the latest scientific knowledge into other study courses, or in study materials, such as the book "Phytoremediation. Possibilities of use in Latvia" (SAR, p. 63 in Latvian).

1.4.3. International cooperation in research is carried out in a variety of ways: research projects, joint scientific articles, the organization of international conferences and the review of scientific articles. Cooperation projects are carried out with Sweden, Lithuania, Finland, Estonia, Poland, Ukraine and Denmark. And cooperation also takes place with other study fields in LBTU (e.g. Architecture and Construction), as stated in SAR (p. 64-65, in Latvian).

Indicators for successful international cooperation are collaborative projects involving not only faculty personnel (teaching staff) but also students of bachelor's, masters and doctoral programmes. Around almost 25% of all projects carried out during the reporting period are international projects. This number is calculated according to data given in SAR, appendix "2\_dala\_11\_lstenoto\_projektu\_saraksts\_LV.docx".

1.4.4. The involvement of teaching staff in scientific research (projects, conferences, publications) is through an internal support system (SAR, Appendix "9\_Motivācija\_sistēma.pdf") where many of criteria are set essential for salary calculation such as - evaluation from students (survey data), development of teaching materials (textboxes, e-study learning materials), using of e-study system et al.

During the reporting period, the total number of articles produced and published by teaching staff is 721, including 195 scientific articles in SCOPUS/Web of Science databases. The dynamics of publications during the reporting period show that over the last three years, the number of publications in SCOPUS/Web of Science databases ranges from 26 to 33 publications per year, which has increased significantly (at least 3 times), information given in SAR (p. 67, in Latvian).

According to interviews during the site visit this support system (Academic staff motivation system) is very stimulating and effective, and academic staff participate actively.

1.4.5. The involvement of students in scientific work is promoted in the following ways: (1) bachelors - study courses, cooperation with municipalities, private companies during practice, development of graduate projects; (2) Masters - research courses, cooperation with municipalities, industry, involvement in research projects, development of master works (3) PhD students - research activities at all study courses, PhD thesis, research projects, scientific conference (SAR, p. 68-70, in Latvian)..

The bachelor's study programme includes a special course on the basis of scientific work in which students, in cooperation with employers, work on research topics. Engineering issues are learned through the development of diploma projects. Research skills are also acquired and improved in other specific study courses, such as "Hydrotrometry and lymnology", "Mathematical Statistics", etc. (SAR, p. 68-69, in Latvian).

In the Master's study programme, students acquire research skills in a number of study courses (e.g.



Modelling of hydro-technical structures, Modelling of hydrological processes, etc.), while applied research is carried out in cooperation with industry, municipalities (e.g. Jurmala), stated in the SAR (p. 69, in Latvian).

In the PhD study programme, all study courses are related to the development of research and promotion work. Students are also involved in research projects carried out by LBTU (e.g. INTERREG, LIFE), SAR (p.69-70, in Latvian).

All students have the opportunity to speak with their research results at a student conference (<https://www.sws.llu.lv/>).

In general, it can be argued that students acquire research skills at each of the levels of study, have the possibility to engage in research, and to report their results to a scientific conference.

1.4.6. In the study field, IT solutions are actively used, new programmes are being learned, GIS technologies are being used more actively, and e-study tools (such as self-tests, online lectures and consultations) are increasing in usage (SAR, p. 71, in Latvian).

The focus is on organizational innovation: IT solutions in the study process, cooperation with schools, demonstration in nature, information days, research information. SAR (p. 71 in Latvian) states that above mentioned innovations claimed to have succeeded in attracting students to continue their studies and then signed up to academic careers by strengthening academic staff.

In order to increase the popularity of studies, various competitions are offered during the LBTU information days, the winners of which are guaranteed budget places, some of the candidates also use this option (SAR, p. 71, in Latvian)

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

In general scientific research showing positive tendency, growing number of scientific publications, active participation in research projects, well established internal supportive system and innovative attracting tools proves success of scientific research integration in study process, strong internationalization and scientific opportunities for all level students (it should be pointed, that all level students participate in research projects).

Strengths:

1. Growing scientific papers publishing tendency.
2. Involvement of all level students in scientific projects.

Weaknesses:

1. A sufficiently narrow range of research topics without covering all environmental areas.

### **Assessment of the requirement [2]**

- 1 R2 - Compliance of scientific research and artistic creation with the level of development of scientific research and artistic creation (if applicable)

**Assessment of compliance:** Fully compliant

All directions of scientific research (SAR, p.61 in Latvian) corresponds to LBTU priority research directions

([https://www.llu.lv/sites/default/files/2023-01/LBTU\\_Attistibas\\_Strategija\\_2023-2027\\_gala.pdf](https://www.llu.lv/sites/default/files/2023-01/LBTU_Attistibas_Strategija_2023-2027_gala.pdf)).

The research through the study process is realized in diverse ways - publications, international cooperation, involvement of all level students in research projects (SAR, p. 62-63 in Latvian).

Successful internationalization has been proven through international projects and collaboration with other faculties (e.g. Architecture and Construction), stated at SAR (P. 64-65 in Latvian). Academic staff motivation system is very sustainable and effective (SAR, p. 67 in Latvian; interviews during site visit).

## **1.5. Cooperation and Internationalisation**

### **Analysis**

1.5.1. After the analysis of the delivered documentation and interview it can be noticed: University proved that they have very good cooperation with a variety of institutions from Latvia. They have good cooperation with several universities and institutes in Latvia (Jelgava Technical College, Saldus Technical College, University of Liepaja, Riga Technical University). Cooperation with the industry is also significant, especially through the involvement of the students in real industry projects and student internships (82 companies). Regards state institutions and companies only three agreements are in force (Jelgava city municipal institution "Pilsētasimniecība", Rural Support Service of the Ministry of Agriculture of the Republic of Latvia, Riga municipal company "Rīgas ūdens"). Such a small number of agreements with the industry disable the development of projects related to the industry and real needs. (Annex – List of cooperation agreements including the agreements for providing internship 2\_dala\_13\_Sadarbiibas\_liigumi\_ENG.docx)

The criteria and the procedure for choosing the cooperation partners for the study field and study programs are not clarified. Although the main field of interest of the listed partners is in line with the study field and study program, they seem to be effective and the cooperation activities that are described contribute to the learning outcomes of the study field and relevant study programs. Therefore it is necessary to increase the number of agreements. An increasing number of agreements will contribute to the learning outcomes and overall goals of the study field and relevant study programs.

Additionally, it is strongly visible cooperation with the Ministry of agriculture, although cooperation with the umbrella organization of the study field is missing (the Ministry of the environment). Cooperation with the Ministry of Agriculture is shown through the whole Self-evaluation report, and through the interview at the meeting with the HEI management, the person responsible for QA and manager for foreign students. The study programs and the activities of the study field are mostly oriented toward the needs of the Ministry of agriculture (for example there is a Irrigation and drainage laboratory, Hydraulic Modelling Laboratory and other laboratories and related projects, and almost all final thesis are in the water supply system, waste water systems, irrigation and drainage, hydraulic modeling .. - annex 42853\_VUS\_2\_6\_2\_Diploma\_projects\_thematcal\_grups.docx) .

It seems that this state-level cooperation is not a stable long-lasting bond and depends on a political situation. Therefore, in the future, it is necessary to develop diversification of the activities in the study field. Part of the activities (scientific, expert and student activities) must be focused on other components of the environment such as waste management, noise and light pollution, decarbonisation processes.

1.5.2. LBTU has experience of cooperation with other foreign educational institutions through cooperation in the implementation of joint projects with other countries (Horizont 2020 projects, Life projects, Interreg projects) . From 2013-2021 LLU implemented 13 international projects and 8 other EU-funded projects (Annex: 2\_dala\_11\_Istenoto\_projektu\_saraksts\_ENG.docx). Also, ERASMUS + mobility for teaching staff is rather strong. Statistical data on the incoming and outgoing mobility of the teaching staff provided in annex 2\_dala\_16\_mācībspēku\_mobilitāte\_ENG.docx shows that the last

three years before Covid pandemic outgoing mobility was intensive, and in 2020/21 only one was performed. A total of 15 foreign guest lecturers have participated in the study direction with guest lectures during the reporting period (i Annex 14). The list of cooperation agreements in force of foreign educational institutions and organizations names only 5 agreements, from which two of them are suspended due to the situation in Ukraine (Samara State University of Economics – Russia, and Belarusian State University) (Annex 2\_dala\_13\_Sadarbiibas\_liigumi\_ENG.docx) . Therefore, it is necessary to establish cooperation with new foreign educational institutions and organizations within the framework of the study as soon as possible. The cooperation with new foreign educational institutions will increase the possibility of internationalization of the overall study program and therefore raise the quality of the study.

1.5.3. The web page of the LBTU shares sufficient information in English about mobility possibilities for students abroad and teaching staff. Continuous activities are ongoing to attract foreign students like e-marketing, and participation in international education fairs and agent forums. According to the presented information and data, the incoming and outgoing mobility of teaching staff, as well as students is satisfying. In 2020 outgoing mobility was weak, but probably due to Covid (Statistical data on the incoming and outgoing mobility of the teaching staff provided in annex 2\_dala\_16\_mācībspēku mobilitāte\_ENG.docx., Statistical data on the teaching staff and the students from abroad 2\_dala\_14\_piesaistītie ārvalstu mācībspēki\_ENG.docx,

Incoming mobility of students at LBTU is continuously in progress, but if the period of 2013 to 2021 is examined, then it can be noted that in the last three years there was no mobility for bachelor or master students completely for the whole study programme, but only for specific courses. These appearances can be justified with Covid (Annex Statistical data on the incoming and outgoing mobility of students 2\_dala\_15\_studejoso mobilitāte\_ENG.docx).

The LBTU is still not using ECTS points as the measure for the specific study course. This fact can be an obstacle for students because the volume of courses is not comparable to other EU courses.

The student's outgoing mobility is weak in the last two years, which can be justified again with Covid. In the interview for assessment visit with students (bachelor and master), almost all students stated that they don't plan to go anywhere because all of them are beyond study work as well.

## **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The LBTU developed good cooperation with higher education institutions and colleges from Latvia, as well as with other institutions (scientific institutes, and nongovernmental organizations) within the study field. The Ministry of Agriculture is a very significant and important partner of LBTU.

Cooperation with foreign institutions is widely spread through the number of international projects, but officially there are only 5 agreements, from which two of them are suspended due to the situation in Ukraine.

The incoming and outgoing mobility of teaching staff, in general, is satisfying. In 2020 outgoing mobility was a little weaker.

The student's outgoing mobility has been weak in the last two years. In the interview with students (bachelor and master), almost all students stated that they don't plan to go anywhere because all of them are beyond study work as well. The incoming mobility of students at the LBTU is continuously in progress.

The mobility in the last two years was decreased or not possible to perform at full scale due to a Covid pandemic.

Strengths:

1. Good cooperation with educational and scientific institutions from Latvia

2. Very good cooperation with specific state bodies
3. The international projects and EU-funded projects implementation experience
4. Teaching staff mobility is very good.

Weaknesses:

1. Lack of formal cooperation with foreign educational and scientific institutions
2. Scientific activities based on the needs of specific state bodies
3. Outgoing student mobility is hard to implement because almost all students work beyond study
4. Low number of agreements with foreign educational and scientific institutions

### **Assessment of the requirement [3]**

- 1 R3 - The cooperation implemented within the study field with various Latvian and foreign organizations ensures the achievement of the aims of the study field.

**Assessment of compliance:** Fully compliant

Although some weaknesses appeared during the analysis, they are not crucial in the evaluation. A few detected weaknesses can be attributed to Covid pandemic and current world crises. Therefore, it can be concluded that in cooperation and internalization, the study program Environmental engineering fully complies. All analysed elements such as cooperation with the institutions from Latvia, cooperation with the institutions from abroad, and systems and procedures for both outgoing and incoming mobility of teaching staff and students are satisfying and contribute to the quality of implementation of the study process and quality of studies.

### **1.6. Implementation of the Recommendations Received During the Previous Assessment Procedures**

#### **Analysis**

The previous evaluation of the whole study field happened in 2012. Since then there have been additional assessment procedures with additional recommendations. (SAR p.78)

Regarding previous evaluation in 2012 (SAR annex No.17: p.10-12):

1. It was recommended to enhance cooperation with other HEI and to develop research cooperation in use of premises and laboratories. This recommendation is partially implemented, because there is cooperation with Riga Technical University and University of Latvia doctoral councils and joint research is carried out in certain fields of environmental sciences, however, LBTU could concentrate more on cooperation with other HEI in water management fields.
2. It was recommended to increase cooperation with professional organizations and ministries in the field of water management. This recommendation has been implemented partially, because LBTU has developed a strong connection with ministry of agriculture, however cooperation with professional organizations and training specialists in this field could be better, which was concluded during the visit and interviews with graduates and employers.
3. It was recommended to develop international student exchange - during the visit, it was concluded that students are aware of such opportunities and are using them. Additionally, a doctoral study programme has been developed and implemented in Latvian and English language, but unfortunately at this moment there are no foreign students in the doctoral programme. This recommendation is fully implemented.

4. It was recommended to reduce the length of bachelor and master studies altogether. This recommendation is fully implemented, because bachelor study programme length was changed from 5 to 4 years.

5. It was recommended to increase the number of students in the master study programme, because it was not determined to be economically sustainable. LBTU combined 4 similar master study programmes into one, increasing the number of master students and reducing fragmentation. This recommendation is fully implemented.

6. It was recommended to develop a joint doctoral study programme together with foreign or another Latvian university, however, LBTU decided to combine two of their doctoral study programmes and create a new one, to further decrease fragmentation and improve usage of available resources. This recommendation is fully implemented.

7. It was recommended to increase more opportunities in scientific research for students. During the visit, it was concluded that the scientific component in studies is enough, because all involved parties admitted that there could be more practical components in studies. This recommendation is fully implemented.

8. It was recommended to develop teaching equipment, premises and library resources. Throughout the years there have been different funds such as ERDF projects and Faculties own earned funds. During the visit, it was clear that the library resources are well provided and up to date and students use them regularly. Teaching equipment is also in good condition as LBTU has different laboratory and field equipment. It would still be advised to think about basic infrastructure development (of the faculty) in the near future. This recommendation has been fully implemented.

9. It was recommended to attract external experts from the labor market to provide an objective study process (when assessing different works). This recommendation has been fully implemented and during the visit it was confirmed by graduates and employers.

10. It was recommended to involve new teaching staff in the study process and at the same time involve them in scientific work. This recommendation is fully implemented; doctoral students are involved in the study process as well as scientific work.

Since 2012, there has been licenced a new academic master study programme and doctoral study programme (SAR p80).

Recommendations given for academic masters study programme (SAR annex No.17 p.1-3):

1. To review A part study courses, ensuring greater compliance with the study direction. A part study courses are all important for further acquiring skills and competences for this study programme therefore are the first study courses introduced in the first semesters. This recommendation has been fully implemented.

2. To ensure the quality of study programme, to increase the amount of study courses with larger amount of CP to reduce the number of small study courses. This recommendation has been partially implemented (and confirmed by LBTU in the annex), because there are still a number of study courses worth 2 CP; which should be reviewed and perhaps combined (e.g. study courses VidZ5038 and VidZ5039, Ģeog5001 and Ģeog5007, VidZ5032 and VidZ5033).

3. It was recommended to allow students to freely choose B part study courses without setting a

mandatory choice. This recommendation has been fully implemented and was confirmed during the visit.

4. It was recommended to review terminology so that it would correspond with Latvian Council of Science recommendations. Since then the university has taken this recommendation into account and fully implemented changes and use corresponding terminology.

5. It was recommended to make a more detailed forecast of the employment of specialists in the field as well as the supply and demand of relevant specialists. This recommendation has been fully implemented, and it is clear what type of specialists are required now and what kind of direction the study programme should turn towards.

6. It was recommended to optimize the structure of the programme to ensure the quality of the study programme in the long term. University has made corresponding changes to the study programme and included various renewed and new study courses.

In 2020 and 2022 there were overviews of recommendations from licensing doctoral study programme.

Regarding these recommendations (SAR annex No.17 p. 4-9):

1. It was advised to develop cooperation with similar study programmes of a similar study profile in Latvia. The LBTU has developed cooperation with the Riga Technical University Environmental engineering field, however, it would be wise to develop more cooperation in the field of water and land management. This recommendation is partially implemented at this point.

2. It was recommended to establish doctoral school and develop generally applicable skills during studies. This recommendation is partially implemented, since the deadline has been set as year 2026.

3. It was recommended to improve the quality management system of the study process. This recommendation is being implemented constantly (e.g. asking students for feedback regularly) therefore its acknowledged. It must be noted that there could be a better contact with graduates and employers to further improve quality management system.

4. It was recommended to promote the involvement of doctoral students in the provision of study work and from year 2020/2021 all doctoral students have the opportunity to participate in the study process. This recommendation is fully implemented.

5. It was recommended to include study courses on civil protection, as well as environmental protection because of normative regulations. This regulation is fully implemented - Study courses Work and Civil protection (code Citi4016) in 2 CP (3 ECTS) form and Ecology and Environmental protection (code VidZ3006) in 2CP (3 ECTS) form. They are included in the study plan under obligatory A part study courses.

6. It was advised to speed up development of doctoral school at LBTU, and it's taken into account. The Doctoral School has been established but its development and expansion is planned in accordance with the activities of responsible state institutions, therefore it is implemented.

7. It was recommended to consider prolongation of the study programme to 4 years. Study programme director said that discussions are ongoing and during the visit it was confirmed by doctoral students that they wish the programme was prolonged to 4 years. Recommendation is

partially implemented.

8. It was recommended to improve communication strategy to reach a wider audience in order to increase the student number in study programmes and this is currently acknowledged by International Cooperations Centre of LBTU; however at this moment recommendation is partially implemented and is in progress.

9. The LBTU was recommended to develop a collaboration strategy for research staff and the students with the library to make requests for newly published literature orders. LBTU regularly informs structural units about availability of scientific publications on various databases. Every year, LBTU plans its available resources in buildings, facilities, libraries, planning their even utilization in all study directions so that there are economic benefits, without downtime. This is considered as good approach. Therefore this recommendation is fully implemented and work in this field is continuous.

10. It was recommended to intensify development of contacts with foreign researchers and maybe join efforts with RTU. This is a long term recommendation with no soon deadline, therefore its a work in progress. This recommendation is implemented.

In 2017 there was an evaluation of changes implemented in the bachelor study programme (SAR p.80, annex no. 17 p. 3-4).

11. It was recommended to supplement the list of periodicals indicated in newly established study courses. University has taken this recommendation into account and partially implemented it, updating study course descriptions and used literature, however, a large amount of study courses still have obligatory literature from the period 2000.-2010. and it could be considered a bit outdated.

12. It was recommended to continue to use the research infrastructure to promote cooperation with companies and foreign scientific institutions and to participate together in various scientific projects. This recommendation is constantly carried out with regular activities to maintain and develop cooperation. This recommendation is fully implemented.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The recommendations provided are partially implemented. The contribution of the LBTU to the analysis of recommendations and their application to the specifics of the study field and the corresponding study programmes is evident.

The LBTU has acknowledged previous recommendations and is implementing them to improve the study field and study programmes. There are some deficiencies (e.g. doctoral study programme extension to 4 years, improved international collaboration, increased cooperation in water management with professional organizations, employers and graduates), however all involved parties showed great commitment to resolving all issues found in evaluations.

Strengths:

1. Academic staff are highly motivated to improve their study courses therefore its easy to implement changes in teaching.
2. It is clear what kind of specialists are needed in labour market therefore there is a clear vision of study programme development. .

#### Weaknesses:

1. Lack of foreign cooperation in research and student exchange. Lack of foreign students in doctoral programme.
2. Doctoral programme is still only 3 years long.
3. LBTU cooperation with other HEI in water management field is lacking.
4. Cooperation with professional organizations, graduates and employers in water management field is not used to its full potential.
5. Master study programme has study courses which could be combined to reduce study programme fragmentation.

#### Assessment of the requirement [4]

- 1 R4 - Elimination of deficiencies and shortcomings identified in the previous assessment of the study field, if any, or implementation of the recommendations provided.

#### **Assessment of compliance:** Fully compliant

The LBTU has acknowledged previous recommendations and is implementing them to improve the study field and study programmes. There are some deficiencies, but the University has addressed them and is still improving. These deficiencies are not that important to evaluate this section as partially compliant.

#### 1.7. Recommendations for the Study Field

##### Short-term recommendations

The aim of the study field need to be reformulated so that it can be achieved in line with the objectives pursued by study programmes and individual courses.

To improve collaboration with all types of customers. As stated in internal quality policy, customers should be involved in all activities, not only in surveys, also in annual self-evaluation reports, accreditation reports and development plans.

To harmonize all publicly available information about study programmes, complete information about academic staff in public academic staff data base.

Improve cooperation with foreign educational and scientific institutions, increase number of cooperation agreements, common projects, research activities. This increased development should be in details included in development plan as measurable target.

Increase students mobility, including attraction of students in doctoral study program.

Create plan for substitution of teaching staff by having more specific teaching staff in specific fields to avoid situations if specific lecturers would leave for any reason, the course would not be shuttled down. An analysis of the workload of academic staff shows that it is not balanced, which poses risks to the existence of a study field. A large number of study courses (even 10 or 12 courses for one personell) pose a risk that the existence of a study field depends on some teachers.

To review Master study programme study courses and, in case of necessity, combine them.

##### Long-term recommendations



More accurate and detailed work on SWOT analysis is needed. For the moment SWOT analysis is closely linked with study direction development plan. Also this development plan should be revised, more concrete and measurable activities should be included.
To involve students in all study field management and improvement activities.
Discuss with industries to use their infrastructure under supervision to get insight from theoretical to practical knowledge, by sharing the costs. Make a survey / mapping of possible sites.
Revise the communication plan for attracting students according to the demand of the labor market
Revise supporting system for science development from LBTU funds.
Diversify scientific activities, not to belong to narrow research fields. At the moment, study courses and scientific research directions are fairly narrow-oriented. It would be useful to balance all areas of environmental engineering.
Balance the duration of the doctoral programme with practical implementation (extend it to 4 years).
To establish cooperation in research and studies with other HEI in water management field.
To improve cooperation with professional organizations, employers and graduates in water management field.

## II - "Environement and Water Management" ASSESSMENT

### II - "Environement and Water Management" ASSESSMENT

#### 2.1. Indicators Describing the Study Programme

##### Analysis

2.1.1. The content of the study courses on Environmental and Water management includes elements necessary for students to acquire basic and specific knowledge of Environmental and Water management. The ability to organize and perform tasks of designing environmentally protective and environmentally friendly technologies, perform environmental monitoring and control, and formulate, describe and analyse practical problems in the field of environmental engineering are the main elements of Environmental engineering.

According to the presented facts, delivered data, and performed interviews the content of the study program follows the study field. The content of the study courses allows students to acquire basic knowledge in environmental, water management, land reclamation, wastewater treatment problems, as well as waste management, environmental protection, and sustainable use of natural resources. The study organization and approach enable students to achieve basic and specific knowledge of environmental engineering skills (Annexes: Mapping of the study courses/ modules for the achievement of the learning outcomes of the study programme 42853\_VUS\_2\_2\_1\_Maping.xlsx; The curriculum of the study programme (for each type and form of the implementation of the study programme 42583\_VUS\_2\_1\_4\_Full\_time\_study\_plan.xlsx; Descriptions of the study courses/ modules Profesionaalaa\_bakalaura\_studiju\_kursu\_programmas\_ENG.rar

2.1.2. The professional bachelor study programme "Environement and Water Management"

corresponds for code 42853 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, <https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitiba-klasifikaciju>), corresponds to the following codification: meaning of the first two digits `42` notes that this study programme is professional bachelor study programme and the last three digits `853` indicate that this study programme is related to the educational group of "Environment and water management"

After students finish this study programme they acquire degree: Professional bachelor's degree in environmental management and environmental Engineering and obtained qualification is an Environmental engineer. In the future, it should be considered to harmonize the qualification with the level of achieved qualification, because, currently the main focus of the study is water management related to the environmental engineering, then environmental engineering in general. The goal of the study programme state is focused on the construction of environmental engineering structures (which is a very wide term and include waste management, noise pollution, light pollution, air pollution..), and then it is named specifically: hydro technical structures, melioration systems, water supply, and sewer systems at the engineering level. This approach in the future will decrease the credibility of the study. It is recommended that in the future these activities and these fields should be more represented in the final thesis.

Environmental engineering covers different topics that should be in the future included in the goals and results (outcomes) of the study programme. From the description of the courses, it is obvious that the study programme covers necessary environmental engineering issues, but they are not specified in the overall goals (air, soil, waste management.)(Annex: Descriptions of the study courses/ modules 11\_Praksu\_nolikums\_ENG.pdf).

The study duration is:

Full time studies, 4 years (160 CP or 240 ECTS), the teaching language is Latvian.

Part time extramural studies, 5 years (160 CP or 240 ECTS, the teaching language is Latvian.

The content of the study programme is well-established and logical. The students get basic knowledge in the first year and then upgrade knowledge with specific environmental and engineering topics. The study programme is organized through the theoretical and practical acquisition of knowledge (laboratory and field work), skills, and competences. Additionally, in the fourth year of study students acquire practical skills during internship which are recognized and appreciated by the employers (according to the results of the interview).

Overall course curriculums contain Latvia legislation, but EU legislation is weak or missing. If the goal is internationalization then more EU legislation should be implemented in the course curriculums.

The system of the diploma project is well established and clearly described. The students are led from the diploma topic selection, preparation and defence of the diploma project.

2.1.3. Several corrections are made to the study programm's parameters within the assessment of the study field. After the study programme was analyzed, some study courses were excluded because some overlapping was noticed with previous education levels (etc: Philosophy and Forest and Wetland, Hydrology and Limnology practices) .

Additionally, the volume of some courses has been reduced, and the volume of developing and defending the diploma project. The reduction was focused on courses related to scientific work and mathematical statistics, as well as professional English knowledge.

Topics such as Bioengineering, Hydrotechnical Structures, Environmental Engineering, and GIS were increased.

Also, according to the recommendations of the expert, some additional courses were added such as Reclamation Association, The Management of Environmental Projects study course , The Land Reclamation Project Management, The Indicator Species of Environmental Quality, The

2.1.4. The employment indicators of the graduates of the study programme were not presented, but according to the results of performed interviews with former students, and employers there is a significant number of former students that work in the field. Additionally, in the analysis, it is a proven need for experts – environmental engineers, especially in the field of hydro ameliorative constructions of reclamation systems, and in the sector of water supply and sewerage sector in Latvia (Chapter 3.1.3.).

There was no analysis of needs in the waste management sector, and the general need for experts in EU due to the Green deal implementation. These fields are probably neglected because there are no experts who deal with these topics within the study. Determination of these needs is highly dependent on the available experts within the university. These field are very perspective, and in the future there will be need for the experts who will be able to cover it.

An analysis of the number of students in the study was performed (Annex 42853\_VUS\_1\_4\_1\_The\_Dynamics\_of\_Students). In the past years, it was noticed that the number of students, despite the market and labour needs continuously decreasing. It was noticed that a large role in the decrease in the number of students played by student dropouts, and has tendency to increase. But since the study year of 2017/2018 the number of graduates has stabilized. From 2021/2022 the number of students increased by 8% (Annex 42853\_VUS\_1\_4\_1\_The\_Dynamics\_of\_Students).

All these oscillations in the number of students can be justified partially by Covid issues.

It is necessary to continue and increase different activities to promote the study programme with available University infrastructure.

#### 2.1.5. NA

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The content of the study programme after implementation of the changes follows the study field. The content of the study program is well-established and logical. Overall course curriculums contain Latvia legislation, but EU legislation is weak or missing. If the goal is internationalization, then more EU legislation should be implemented in the course curriculums. All indicators (economical, social, and other) giving good justification of the study programme, the need for such a study programme is proven.

#### Strengths

1. Well established study programme with clear aim and well defined learning outcomes
2. The quality of the study programme is recognized on the labour market it can start to work very soon after finishing the study

#### Weaknesses

1. It is necessary to continue and increase different activities to promote the study programme with available University infrastructure.
2. EU legislation is weak or missing. If the goal is internationalization then more EU legislation should

be implemented in the course curriculums.

3. Currently, the aim and the tasks of the study programs couldn't be achieved, it is not possible to do so when narrow specialisation courses are learned or not all fields in Environment Protection are covered. It would therefore be necessary to harmonise the courses proposed with the aim and tasks of the study programme.

## 2.2. The Content of Studies and Implementation Thereof

### Analysis

2.2.1. In the professional bachelor's study programme "Environment and Water Management", in full-time studies (4 years, 160 CP) and part-time studies (5 years, 160 CP), study courses to be studied are divided as compulsory (A part), restricted elective (B part) and free choice courses (C part). In accordance with the Rules of Cabinet of Ministers' No 512 - 26.08.2014. "Regulations Regarding the State Standard of Vocational Higher Education of the Second Level", this division is true. But, in fact, in the case of this study program, all part (compulsory and restricted elective) courses are obligatory and there is no possibility to choose. Similar situation is with free choice study courses (C part), all 4 offered courses covering 24 CP should be taken (SAR, Annex: 42853\_VUS\_2\_1\_4\_Pilna\_laika\_studiju\_plans.xlsx). Compliance with the State education standard is very well described in Annex: 42853\_VUS\_1\_2\_1\_Atbalstiba\_MK\_Noteikumiem.docx.

Rules of Cabinet of Ministers No 512 - 26.08.2014. "Regulations Regarding the State Standard of Vocational Higher Education of the Second Level", stated:

- in the Article 13, that courses, praxis and obtained CP belong to professional standard, but in this case full compliance with standard "Environmental Engineer" (<https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0329.pdf>) not provided;
- in the article 14, that during the studies at least 3 study projects have been developed, is fulfilled (Annex: 42853\_VUS\_2\_1\_4\_Pilna\_laika\_studiju\_plans.xlsx);
- in the article 15, that specific requirement for praxis are established, is fulfilled (Annex:11\_Praksu\_nolikums\_LV.pdf);
- in the article 18, that graduates can continue studies in an appropriate master's degree program, is fulfilled (Annex: Prof\_Bakalaura\_diploms\_pielikums\_Vide\_LV.7z).

According to professional standard "Environmental Engineer" (<https://registri.visc.gov.lv/profizglitiba/dokumenti/standarti/ps0329.pdf>), all perception, understanding and application were selected within all environmental engineering fields (specific table is given). And mainly in all environmental fields Environmental engineers should have skills at application level. Comparative analysis of needs, according to standard, and given skills according to SAR data (Annexes: Annexes: 42853\_VUS\_2\_1\_4\_Pilna\_laika\_studiju\_plans.xlsx; Profesionaalaa\_bakalaura\_studiju\_kursu\_programmas\_LV.rar) shown sustainable differences, as this study program mainly focuses on the field of water management. For example, according to the professional standard, the Environmental Engineer should have knowledge at the level of understanding in chemistry and biochemistry, in the physics cycle sciences, that the documents provided (Annex No 42853\_VUS\_1\_2\_Atbalstiba\_standartam) are not included. Or, according to the standard, the Environmental Engineer should have knowledge of "mathematics, mathematical modeling techniques and the use of information technologies in environmental engineering" at the level of use, but the compliance assessment refers to the subject "Mathematics", unfortunately none of the course descriptions (Mate1036; Mate2039) are included in the course content (Annex: Profesionaalaa\_bakalaura\_studiju\_kursu\_programmas\_LV.rar).

In general, study courses are well distributed, obtained knowledge, and skills to be acquired are

logical. The relevance of study programmes and study courses to labour market requirements is assessed on the basis of recommendations from industry-leading organizations, labour market demand and student self-government proposals (SAR, p. 88, in Latvian).

#### 2.2.2. Not applicable

2.2.3. Both forms of the study programmes (full-time studies - 4 years length and part-time extramural studies - 5 years length) are offered in Latvian language.

The study programme is implemented sequentially, learning theoretical knowledge and skills, acquiring competences; pursuing the cumulative principle: each course of the next studies complements the previous one. The organization of study courses in full-time studies takes place in a combined form - lectures, practical works, laboratory works, course work. The capabilities of Moodle e-studies have also been introduced. The reinforcement of theoretical knowledge is done by supplementing studies with lectures on the part of employers (SAR, p. 95, in Latvian).

The study programme is implemented using a number of student-centered methods: (1) individual approaches and small groups; (2) ensuring the learning environment; (3) wide access of teaching staff beyond consultation times; (4) support for teaching in the performance of studies; (5) promoting student mobility and supporting returns from it; (6) participation of students in the processes. These student-centred methods are successfully implemented and used to achieve aims of the study courses and in general aims of the study programs that's proven stable number of graduates (Annex:42853\_VUS\_1\_4\_1\_Studejoso\_skaita\_dinamika.docx ).

2.2.4. The study programme includes four practices. Three teaching practices Surveying 2 CP, Geology and Soil Science 1 CP and Hydrometry and Limnology 1 CP, which are implemented in the study programme to strengthen theoretical knowledge. Professional practices outside the educational establishment, which should be settled for all students at 20 CP. In practice, the student shall submit a report and defend the practice in the presence of the faculty and the director of the study programme (SAR, p. 97-98, in Latvian). The LBTU supports the achievement of the tasks set out in the study practice, by offering places of practice in major partner companies (VSIA Meliorproject, LTd Riga Water, etc.), as well as by allowing students to choose places of practice themselves, in line with the professional activity and the practice programme (SAR, p. 98, in Latvian).

#### 2.2.5. Not applicable

2.2.6. During the reporting period, 121 students defended their final thesis, their topics closely related to labor market requirements, e.g., "Water Management Development Project in a new Building Area "Mežpūces" Ikskile" (2022); "The Project of a Construction Waste Sorting Area "Noriņas" in Ineši Parish, Cēsu Municipality" (2022); "The Project of Drainage System Pumping Station in Garkalne Municipality, Suži Village" (2022). The most popular topics relate to amelioration systems, water supplies and sewers. A small proportion of the closing work is related to environmental recovery, pollution reduction and waste management (SAR, Appendix:42853\_VUS\_2\_6\_1\_Diplomprojektu\_temas.docx ). For most final thesis, the score is above 7 points (good). However, it should be noted that during a visit to the site, a large part of the projects issued for inspection shows very little use of scientific literature, which should nevertheless be done in the preparation of a study of literature, which is a compulsory part of scientific work.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

Conclusion:

It has been found that there are very limited study course choice, all courses by nature are compulsory. Non-compliance with the “Environmental engineer” professional standard, defining very extensive and comprehensive knowledge to be learned when studying environmental engineering, which is not equivalent to the study programme. The study-centered methods used are appropriate to achieve the objectives of study courses and also the objectives of the programme, the final work is very practical and linked to labour market requirements.

Strengths:

1. Impressive part of practical works.

Weaknesses:

1. All study courses are compulsory, there is no option to make a choice.
2. Not all fields maintained by standard of the profession “Environmental Engineer” are covered.
3. Insufficient amount of scientific literature analyzed in the final thesis.

### **Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)**

- 1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

**Assessment of compliance:** Not relevant

Not applicable

### **2.3. Resources and Provision of the Study Programme**

#### **Analysis**

2.3.1. According to self-assessment of Study Program "Environement and Water Management" (42853) clause 3.3. Resources and Provision of the Study Programme subsection 3.3.1., study programme resources consist of three groups - study and science equipment, software, and literature. Industry publications for studies and research work are available in the LBTU Fundamental Library Subscription, Educational Literature Subscription and Reading Room. Bibliographic information on various issues related to environmental protection, land reclamation, water management and other sectors can be obtained in the bibliographic information department. A number of subscribed databases are available: CAB Abstracts; CRC Press e-books; EBSCO databases; EBSCO eBook Academic Collection; ScienceDirect journals; Scopus; Web of Science and other databases. The faculty and students are informed about the databases to which access is granted temporarily. Databases of lecturers' publications and doctoral theses have also been created. The staff of the library provides consultations on current events, as well as advises students on searching for scientific information. Students at the Faculty of Environment and Civil Engineering can use the Faculty of Environment and Civil Engineering Information Centre, which provides free access to the database of the LBTU Fundamental Library, available specific industry literature - books, standards, scientific and industry practical journals; it is possible to print large-format prints, such as the study projects. The study and science infrastructure of the area of environmental engineering is improved, attracting funding from the Faculty of Environment and Civil Engineering's own earnings (tuition fees, etc.), ERDF projects “Strengthening the research and development infrastructure and institutional capacity of LBTU and the scientific institutions under its supervision” and “Modernisation of STEM study programmes” as well as from various other projects implemented at the faculty. It is reasonable to mention that international fundings for such activities are still available, will be available in future, and are rather simple to attract, which allows to save internal

resources. High-performance computer equipment is in place that supports the development of digital skills, including BIM; equipment, tools and room equipment. All the auditoriums required for the study work are equipped with the necessary technical means - multimedia equipment, computer equipment, appropriate software and internet access - for conducting the lessons. Several study and scientific laboratories are involved in the implementation of the study process of the programme - irrigation and drainage laboratory, which is equipped with computerised drainage and filtration visualisation study equipment, sediment flow measuring equipment, hydrological process study equipment for laboratory and practical work, student research, demonstrations. Laboratory of Pumps and the Laboratory of Hydraulic Modelling where work is carried out in the study courses Hydraulics, Hydrostructures, Pumps and Pumping Stations. In the water supply and sewage laboratory, various visual aids are available for study work. Building materials training laboratory is equipped according to the study of the composition and properties of building materials. GIS Competence Centre, where 12 workstations are equipped with ArcGIS Pro software. A large-format scanner for scanning cartographic images, as well as a plotter and a 3D printer are located in the GIS Competence Centre, which students can use in the process of developing scientific and diploma projects. Forest and Water Scientific Laboratory. Equipped with a greenhouse gas (GHG) emission measuring device, hydroacoustic flow meters, field multi-meters for determining water quality parameters, a set of equipment for measuring nitrogen oxide isotopes and concentrations, etc., equipment and facilities for scientific research. Two computer classrooms with 49 (24 workstations in room 803, 25 workstations in room 702) high-performance computers equipped with the latest versions of BIM support software, Autodesk computer programs AutoCAD are available for those studying at the Faculty of Environment and Civil Engineering, which are used in the design of drainage systems and hydrotechnical structures, modelling elements in a 3D environment. Geospatial modelling computer classroom with 20 workstations equipped with MicroStation, ArcMap and ArcGIS Pro software for creating maps, Mathcad for performing various mathematical calculations. The auditoriums are equipped with interactive displays and whiteboards. The infrastructure provided by LBTU is sufficient for the needs of the study programme "Environment and Water Management". The teaching base is sufficient.

#### 2.3.2. N/A

2.3.3. According to Study Program "Environment and Water Management" (42853) clause 3.3. Resources and Provision of the Study Programme subsection 3.3.3., the amount of state-funded study places is coordinated in a tripartite agreement between the Ministry of Education and Science (MoES), the Ministry of Agriculture (MoA) and Latvia University of Life Sciences and Technologies (LBTU). The cost per student in the professional bachelor's programme "Environment and Water Management" is EUR 3,328.80. The tuition fee in the programme per semester for full-time studies is EUR 980 or EUR 1,960 per year, and for part-time studies EUR 700 or EUR 1,400 per year. Every year, the LBTU Senate approves the distribution of revenues and expenses of the LBTU general budget structure, prepared in accordance with the Saeima annual Law on the State Budget and the annual LBTU Rector's Order "On LBTU General Budget Planning". Control and audit of the general budget is performed by an independent sworn auditor, whose opinion and report are reviewed and approved by the Senate of LBTU. The distribution of income and expenses approved by the LLU Senate determines that 80% of the funding allocated from the state consists of compensation costs, and 20% other costs. 60% of the paid study funding consists of reimbursement costs, and 40% other costs, of which 20% is directly at the disposal of the faculty that implements the respective study programme. The overall distribution of the total LLU budget is formed by the estimates of structural units/faculties, where the costs are estimated by type of expenditure. In 2022, the share of costs of the bachelor's study programme "Environment and Water Management" consists of: remuneration - 71%; scholarships - 7%; goods and services - 19%, incl. utility services - 8%; share capital formation

- 3%. Additional financial support opportunities are available for those studying in the programme. State scholarships are awarded to an average of 13 students in a professional bachelor's study programme in one study year.

In order to ensure the cost-effectiveness of the study programme, the minimum number of students in full-time and part-time studies shall be five students.

According to the results of the interviews with employers, the study program is in demand in the labor market, especially in the field of design and work management, because upon obtaining a bachelor's degree, you can also apply for design and construction practice certificates in the regulated fields. The required number of specialists per year is on average 5 to 10 and there are no problems to ensure enough students yearly.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The study base, scientific base, informative base, material-technical base and financial base meet the specifics of the study program, implementation conditions, as well as create prerequisites for achieving study results and indicate the possibility of ensuring a high-quality study process in the future. The main income of the LBTU is from the state budget grant, its own revenues from tuition fees. Study programme is demanded in labor market.

Strengths:

1. Well-equipped laboratories and library and broad choice and granted access to scientific and professional databases.
2. Study programme is demanded in labor market and there are no problems to ensure sufficient number of students yearly.
3. Financial base is sufficient to continue study programme.

Weaknesses:

1. Many courses are reliant on specific lecturers that if they left, the course would be shut down. There is no plan "B" for substitution of teaching staff.

### **Assessment of the requirement [6]**

- 1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

**Assessment of compliance:** Fully compliant

The study program is in demand on the labor market, LBTU has no problem providing the minimum number of students per year. The current funding model is sufficient for the further successful implementation of the study program. The material and technical support is sufficient, significant improvements have been made in the classrooms, quality access to scientific literature in both printed and digital form in various databases has been ensured.

## **2.4. Teaching Staff**

### **Analysis**

2.4.1. Evaluation of University teaching staff qualifications is based on the information provided in the self-assessment description, Annexes and interview during the visit to University . The qualifications of the teaching staff involved in the programme fully meet the conditions of the implementation of the study programme and the requirements of the laws and regulations.



University has approved mechanism for the qualification and quality assurance of teaching staff, therefore a regular improvement of the qualifications of teaching staff is ensured (SAR part 3.4.1). The SAR and the management answers during the visit show, that the staff at least once every six years attends the professional development programme for higher education teachers. During the reporting period, 10 teaching staff members completed the teacher professional development programme and obtained a certificate. Special attention was paid to the development of English language skills – both at the university, and abroad during ERASMUS exchange or visits to other research institutions (SAR part 3.4.1).

The professional competences were also improved by participation in the international and national projects, conferences, professional development courses (SAR part 3.4.1). The main topics of courses and seminars are related to the latest regulatory framework, innovations and technical solutions, environmentally friendly elements of reclamation systems, and increase of digital skills.

Therefore it can be stated that the qualifications of the teaching staff meet the conditions for the implementation of the study programme and the requirements of the laws and regulations..

2.4.2. During the reporting period, the total number of lecturers involved in the Professional Bachelor's study programme "Environment and Water Management" has changed to a minimum extent. The total number of teaching staff is 48. The analysis of the information provided shows that 39% of teaching staff members elected to academic or scientific positions. 27 teaching staff members have been elected to academic and scientific positions as lecturers and research assistants, associate professors and professors; 12 teaching staff members have been promoted. 5 teaching staff members have terminated their employment either due to choosing another job, retiring, or passing away. 8 new teaching staff members have started new work relations and have become part of the teaching staff. As a positive aspect from the professional and practical perspective is the fact that some of the teaching staff members are industry representatives, therefore the programme students receive up-to-date practical information. Also this widens opportunities to choose real topics both for course projects and final theses (SAR Annexes 42583\_VUS\_4\_2\_1, 42853\_VUS\_2\_4\_1).

Another positive aspect in the programme is involvement of PhD students – 6 of them are teaching staff. Therefore an efforts to attract new staff members were performed.

To ensure international experience sharing to the programme students the foreign guest lectures were invited. As it was confirmed during the meeting with University and the programme management, mainly this activity was financed via ERASMUS exchange, i.e. for short term visits. The added value to the programme would long term agreements with international lecturers, which will ensure stable competence development reducing the risks related to the change of potential lecturers.

The industrial guest lectures were invited from Latvian companies (approx. 10-15 per study year).

2.4.3. N/A

2.4.4. An analysis of the practical and scientific performance of teaching staff shows that of the 46 teachers involved in the study process, the majority have (61%) scientific publications over the last 6 years. The number of publications per person varies a lot, from 1 to 82 scientific publications (SAR, Annex: 42583\_VUS\_4\_2\_1\_Teaching\_Stuff.xlsx). The other teaching staff involved in the study process as guest lecturers have required work experience (SAR, Annex: 2\_dala\_08 CV\_ENG.rar). The analysis of the presented documents revealed that not all CV of the teaching staff have been presented. Also design of the CVs is extremely different, (e.g. Europass with or without photos, with or without tabular forms, free designed forms, etc.), different job statements (e.g. visiting lecturer and guest lecturer is used for the same position).

2.4.5. The teaching staff of the programme closely cooperates seeking the goal to ensure systematic competences of the graduating students, i.e. the topics in the study courses are planned to be cross-cutting, each study course is based on the knowledge and skills acquired in the previous courses. This cooperation starts from the first study year and continues until the final thesis (SAR part 3.4.5).

As a positive aspect should be highlighted the cooperation not only study but also research activities, g staff of the programme are highly rated professionals, which are experts of the Latvian Science Council, full and honorary members of the Latvian Academy of Agricultural and Forestry Sciences, and have been experts in the evaluation and accreditation of the study programmes organised by the Ministry of Education and Science and the "Academic Information Centre" foundation.

Also the teaching staff work in commissions at the Promotion Council of Riga Technical University, are members of editorial boards and scientific committees of scientific journals, as well as committees of various international conferences. Cooperation also takes place within the framework of various professional industry organizations, for example, SIA "Melioprojekts ", SIA "Grow Energy", SIA "Ventspils nafta termināls" and others (SAR part 3.4.5, Annex 42853\_VUS\_2\_4\_1).

### **Conclusions on this set of criteria, by indicating strengths and weaknesses**

The qualification of teaching staff involved in the implementation of the study programme overall corresponds to the conditions of implementation of the study programme and the requirements of regulatory enactments, as well as ensures the achievement of aims and learning outcomes of the study programme and respective study courses.

The academic staff members of the study program, both at the national and international level, are engaged in scientific research in the field of quality management and conformity assessment, and the acquired information and experience are integrated into the study process. Unfortunately not for all teaching staff CV`s were added, also technical design is a medium.

#### **Strengths**

1. Close cooperation with industry, which ensure actual competences for the graduates;
2. Continuous competences improvement of teaching staff on national and international level.
3. Involvement of PhD students in the teaching process.

#### **Weaknesses**

1. There is no long term agreements with international lecturers

### **Assessment of the requirement [7]**

- 1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

#### **Assessment of compliance:** Fully compliant

The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme and the requirements of regulatory enactments, as well as ensures the achievement of aims and learning outcomes of the study programme and respective study courses. (SAR annexes):

1. Confirmation that the academic staff of the academic study programme complies with the

## 2.5. Assessment of the Compliance

### Requirements

- 1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard

**Assessment of compliance:** Fully compliant

The study programme "Environment and water management" volume is 160 CP of which 22 CP are compulsory part covering the overall educational field, Theoretical basic courses of the field - 36 CP; Vocational specialization courses - 60 CP, 6CP for the free elective part, 24CP for internships and 12CP for Bachelor's thesis (Diploma project). The study programme includes study courses corresponding to requirements set in Civil protection and Disaster Management Law and Environmental Protection Law. While technically study programme consists of all necessary parts and complies with professional education standard, in reality, there is limited study course choice in B part and all courses by nature are compulsory. It would be useful for LBTU to invest in preparing additional B part study courses, so there would be more freedom of choosing. Study programme compliance with the State Education Standard is described in Annex No 42853\_VUS\_1\_2\_1\_Correspondance to regulations.

The study programme includes study courses corresponding to requirements set in Civil protection and Disaster Management Law and Environmental Protection Law.

Study programme compliance with the study programme with the State Education Standard is described in Annex No 42853\_VUS\_1\_2\_1\_Correspondance to regulations.

- 2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

**Assessment of compliance:** Partially compliant

The study programme is meeting the criteria set in "Regulations of the Cabinet of Ministers on the Classifier of Professions, Basic Tasks Corresponding to the Profession and Basic Qualification Requirements No. 264 and Professional Higher Education Standard.

The study programme partially complies with a professional standard PS-0329; while this study programme is heavily oriented on water management, the old (currently active) profession standard demands more detailed level of knowledge in other environmental engineering aspects such as chemistry and biochemistry, etc. See Annex No. 42853\_VUS\_2\_1\_2\_Standard\_compliance.docx.

It must be noted that currently the study programme complies with the old professional standard which was accepted in 2005, therefore there could be risks if it has different requirements for skills and knowledge than needed in the current work environment. That being said, there is a new professional standard being developed, but it's underway.

- 3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561 , Paragraph two and Section 562 , Paragraph two of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

Study course descriptions and study materials are prepared in Latvian language, and they satisfy requirements set in Law on Higher Education Institutions. However, Faculty (and study programme) management must make sure that lecturers update study course descriptions with literature up to date regularly (at least once per year or once every two years). It should be noted that some of the A and B part study course descriptions have compulsory literature dating from 2000.-2010. (and earlier) year period and they could be considered a bit outdated (e.g. study courses MežZ2039, Mate2037, HidZP009, HidZ3035, HidZ3033, HidZ3030, BūvZ3129 and more).

- 4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

**Assessment of compliance:** Fully compliant

The diploma issued complies with the state legislature and "Procedures by which documents certifying higher Education recognised by the State shall be issued" (Cabinet of Ministers No. 202). See Annex No. Prof\_Bakalaura\_diploms\_pielikums\_Vide\_EN.7z.

- 5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

**Assessment of compliance:** Not relevant

- 6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

**Assessment of compliance:** Not relevant

- 7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

**Assessment of compliance:** Not relevant

- 8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

**Assessment of compliance:** Fully compliant

The academic staff has sufficient Latvian language knowledge for implementing study courses, see annexes: Basic information about the teaching staff involved in the implementation of the study field No.2\_dala\_07 macibspeku\_saraksts\_ENG.xlsx and LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

- 9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

**Assessment of compliance:** Not relevant

- 10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

**Assessment of compliance:** Fully compliant

Study agreements include all necessary parts set in legislation. It must be noted, that the University has included information about 11. and 12. criteria in the study agreement, therefore making it easier to give this information to the students.

See the annex: 2\_dala\_05\_Study\_Agreement\_2021\_LV\_ENG.pdf

- 11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

**Assessment of compliance:** Fully compliant

University has a rector order as confirmation that in case the implementation of this study programme is terminated students will be able to continue studies in RTU academic bachelor study programme "Environmental Engineering". See annex: 2\_dala\_03\_Vienošānās\_LLU and RTU\_Vides aizsardzība\_ENG.docx

It should be noted that in this case, students will not get a professional qualification, but only an academic degree. It is advised to sign additional agreements with HEI to provide opportunities to study water management and get a professional qualification in this regard. (see weakness below)

- 12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme's license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

**Assessment of compliance:** Fully compliant

University has a rector's order that confirms it will compensate losses to students if the study programme is not accredited or loses its license and the student does not wish to continue studies in another study programme.

This information is also in the study agreement.

See annex: LLU\_apliecinājumi\_Vides\_aizsardzība\_EN.docx

- 13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

**Assessment of compliance:** Not relevant

- 14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

**Assessment of compliance:** Not relevant

**Assessment of the requirement [8]**

- 1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

**Assessment of compliance:** Partially compliant

Due to having an old professional standard (which is currently in the process of renewal), this study programme partially complies with some regulatory enactments due to inefficiencies of covering all environmental engineering areas effectively. It is expected that some contents might change after the renewal of the professional standard.

### **General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme**

This study programme has logical content and is well-established for this study field. Study course curriculums contain legislation for Latvia, but it lacks EU legislation and that is decreasing the abilities to produce experts knowledgeable for international markets. All indicators (economic, social, and other) giving good justification of the study programme, the need for such a study programme is proven. Study programme is well-regarded among the labour market and employers. The teaching staff of the programme closely cooperates seeking the goal to ensure systematic competences of the graduating students, i.e. the topics in the study courses are planned to be cross-cutting, each study course is based on the knowledge and skills acquired in the previous courses. This cooperation starts from the first study year and continues until the final thesis. It must be noted that close cooperation with Ministry of Agriculture allows for unique possibilities in research and scientific projects.

Despite identified risks and shortcomings largely arising from outdated legislation (e.g. the professional standard is more than 20 years old, but its review is now ongoing), in the country of economic status (leading to an overload of academic staff), the study program could be evaluated as excellent.

#### **Strengths:**

1. Well established study programme with clear aim and well defined learning outcomes.
2. The quality of the study programme is recognized on the labour market it can start to work very soon after finishing the study.
3. Well-equipped laboratories and library and broad choice and granted access to scientific and professional databases.
4. Study programme is demanded in labor market and there are no problems to ensure sufficient number of students yearly. Close cooperation with industry, which ensure actual competences for the graduates.
5. Financial base is sufficient to continue study programme.
6. Continuous competences improvement of teaching staff on national and international level.
7. Involvement of PhD students in the teaching process.

#### **Weaknesses**

1. It is necessary to continue and increase different activities to promote the study programme with available University infrastructure.
2. EU legislation is weak or missing. If the goal is internationalization then more EU legislation should be implemented in the course curriculums.
3. The goals of the study programme should be harmonised with the study programme and specific curriculum (air, soil, waste management).
4. All study courses are obligatory, there is no possibility to make a choice.
5. Many courses are reliant on specific lecturers that if they left, the course would be shut down. There is no plan "B" for substitution of teaching staff.
6. Not all fields maintained by standard of the profession "Environmental Engineer" are covered.
7. There is no long term agreements with international lecturers.

8. Study course descriptions have mandatory/obligatory literature from years 2000.-2010. and could be considered a bit outdated. Insufficient amount of scientific literature analyzed in the final thesis.

### **Evaluation of the study programme "Environement and Water Management"**

Evaluation of the study programme:

Good

### **2.6. Recommendations for the Study Programme "Environement and Water Management"**

#### **Short-term recommendations**

Review and restructure the compulsory and free choice study courses included in the study programme in order to ensure possibility to choose.

Increase EU legislation aspects in teaching processes, review study course descriptions.

Create plan for substitution of teaching staff by having more specific teaching staff in specific fields to avoid situations if specific lecturers would leave for any reason, the course would not be shuttled down.

To update study course description mandatory literature with relevant sources of literature. During this review it should be taken account, that amount of scientific literature should sufficiently enlarged during final thesis preparation.

Sign long term agreements with international lecturers, which will ensure stable competence development reducing the risks related to the change of potential lecturers.

#### **Long-term recommendations**

Review the structure of the study programme to ensure the acquisition of skills according to the "Environmental Engineer" professional standard.

Continue to work on infrastructure improvements.

To sign additional agreement with HEI in water management field to provide more precise opportunities to students with similar content to current study programme.

The aim, and tasks of the study prorammm should be harmonized with achievements reached within study courses.

## **II - "Environmental, Water and Land Engineering" ASSESSMENT**

### **II - "Environmental, Water and Land Engineering" ASSESSMENT**

#### **2.1. Indicators Describing the Study Programme**

##### **Analysis**

2.1.1. The study program is an interdisciplinary program which covers environmental themes and engineering and scientific approach. The environmental part of the study program covers aspects of air, water, land, biological diversity, sustainable resource and waste management, as well as climate

change. Therefore the study programme is in compliance with the study field.

The study consists of mandatory theoretical courses, and then, according to the student's individual interests and abilities the students further continue to study specialized topics: Environmental engineering, Hydrotechnics and Water, Land Management, or Geodesy. All specialized topics except Geodesy are in line with the study field topics. In general, geodesy in some cases represents the basis for environmental engineering projects construction, but it is not part of environmental engineering. So, it is recommended to remove specialized topic - Geodesy in the future.

2.1.2. The academic master study programme "Environmental, Water and Land Engineering" corresponds for code 45529 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, <https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitiba-klasifikaciju>), corresponds to the following codification: meaning of the first two digits `45` notes that this study programme is academic master study programme and the last three digits `529` indicate that this study programme is related to the educational group of "Environmental engineering"

After finishing the master's study programme, students acquire a Master's degree in Engineering in Environmental Engineering.

The study duration is:

Full time studies, 2 years (80 CP or 120 ECTS), the teaching language is Latvian.

The study programme is designed to gradually introduce the student to the selected topic, learn about scientifically significant issues, acquire theoretical knowledge and practical skills (laboratory), as well as develop scientific research to solve current problems. The learning outcomes are in line with the goals of the study programme (Chapter 3.1.2. of the Self-evaluation report.

Although this master's study programme is academic level, scientific research topics are overstressed and should be decreased in the future. On the other side, within this study, the practice (outside the faculty) is missing. It was the main objective of employers.

Overall course curriculums contain Latvia legislation, but EU legislation is weak or missing. If the goal is internationalization then more EU legislation should be implemented in the course curriculums.

2.1.3. The Environmental, Water and Land Engineering master study is a newly established study programme (2016) as the result of previous analysis. Recently (2022), minor changes were made, such as an increase of master thesis CP, theoretical courses have been reduced from 60 to 56 ECTS, and contact hours for learning theoretical courses have been reduced as well.

2.1.4. In the Self assessment report (Chapter 3.1.3.) the need for master Environmental engineer is not clearly justified, but the information provided in the description of the bachelor's study program is applicable to the master's study programme, therefore it can be concluded that there is need for such graduates of the Environmental engineer master master study program. The graduate survey was performed (Chapter 3.1.3.). The most significant result of graduate surveys showed that only 7% of students end up in pedagogical and scientific activities. On the other side, 71% of students end up in the industry or in the fields related to the industry. One of the results of the survey indicated that Employers want study programs orientated toward the Latvian economy. The same stated employers at the interview.

From this short survey (SAR, Chapter 3.1.3.), it is obvious that the master's programme in the future should adjust the study program to the line of presented results. That means decreasing the number and/or volume of courses that contain scientific topics and increasing practice. Also, it should be considered to introduce topics related to industrial pollution.



### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

All specialized topics of the study program, except Geodesy, are in line with the study field topics. The study program is designed to gradually introduce students to the selected topic. The scientific research topics are overstressed, and the practice is missing. More than 70% of students work in industry or industry-related fields, while only 7% end up in pedagogical and scientific activities.

#### **Strengths**

1. Study program is actual and needed in the future

#### **Weaknesses**

1. The specialized topic - Geodesy is not in the line with study program and study field
2. Overloaded scientific and research courses within the program
3. Although the academic programme does not require the acquisition of praxis, the topics of this study programme are very closely linked to practical life, thus the practice is therefore very desirable.
4. The study program is oriented toward Latvian legislation, and EU legislation is missing

## **2.2. The Content of Studies and Implementation Thereof**

### **Analysis**

2.2.1. The focus of the academic study programme is on the need for qualified specialists who could be involved in evaluating environmental conditions and areas, forecasting changes, planning of land developments and low use patterns for transformation, addressing land planning and property issues, engineering and design work, modern, innovative and sustainable the development and design of sustainable engineering water management solutions, the integration of environmentally friendly technologies and the provision of land-use conditions. The aim of the academic Master's study programme "Environmental, Water and Land Engineering" is to prepare high-skilled professionals for scientific, pedagogical and professional and management work, which are well versed in scientific research and competent to address scientific and practical challenges related to the environment, water management, land management and geodesy (SAR, p.109-110, in Latvian).

Results to be achieved in the study programme: (1) in-depth knowledge and understanding of the current development phase of environmental, water and land engineering, development trends and potential future challenges (knowledge); (2) skills to present ideas and work outcomes and engage in constructive discussions; organizing a structured interdisciplinary research process, addressing and debating engineering the challenges of engineering; the ability to organize effective individual and group work and to address interdisciplinary engineering; (3) the competence to analyse constructively and critically the existing environmental and natural resource management model, the methods and solutions applied, their strengths and weaknesses; the competence to develop sustainable and innovative solutions for the development of local and regional areas and the use of natural resources (SAR, p. 118-119, in Latvian). All these goals are achieved through obtaining knowledge and skills in study courses, specialization ensures specific knowledge in the selected field. In every specific study course specific goals and requirements were set, and after fulfillment of them part of study program goals were reached. Overall picture is well described in the mapping of study courses (Annex:8\_studiju kursu kartejums.xlsx, in Latvian).

The study programme consists of compulsory study courses of 32 CP and restricted elective of 80 CP, depending on the field of specialization, in the final work of 24 CP. Content of compulsory courses covers GIS, spatial planning and development, and principles for the development of

research work et al. According to specialization “Environmental Engineering”, “Hydrotechnics and Water Management”, “Land Management”, “Geodesy” restricted elective courses are offered, but in fact there is no possibility to make a choice, and all courses are compulsory. This is non-compliance with requirements written in Law of Higher Education (Article 55, part 2 (c)), that study programmes should contain compulsory, restricted elective courses and free choice study courses. In this case, free choice study courses are not offered at all (SAR, Annex: 9\_VUZI\_programmas\_plans\_2022\_2023\_LV\_EN.xlsx).

The relevance of the study programme to labor market trends is indicated by the request for comments from qualified specialists and professional organizations in this sector (SAR, p. 119; Latvian)

The academic study programme provides learning of knowledge and skills in sufficient areas, but students also obtain practical things. Although the academic programme does not require the acquisition of internship, the topics of this study programme are very closely linked to practical life, thus the practice is therefore very desirable.

2.2.2. At the beginning of the studies, students are only enrolled in compulsory general courses, and then start learning courses related to the selected specialization. In the second year of study, the focus is on addressing challenges in the sector and developing creative capabilities, innovation, with a strong focus on data processing and visualization methods. In the last semester, however, studies are devoted only to the development of an ongoing scientific study in the specialization of a master's work and a related student. The development process is coordinated by the master's thesis supervisor and associated consultants. Additional support is available from the Defense Commission on the pre-evaluation stage during the semester (SAR, p.119-121; Annex: 9\_VUZI\_programmas\_plans\_2022\_2023\_LV\_EN.xlsx, in Latvian).

In defending the final thesis, students demonstrate the achievements of the relevant field of specialization, the results of research. When drawing up their final thesis, students must use the current scientific information, work must be in line with an appropriate structure (the structure of an analogue scientific article), and students should be able to defend their opinions in front of the commission. (SAR, p. 119; Annex: Magistra\_studiju\_kursu\_programmas\_LV.rar, in Latvian )

2.2.3. The study process is organized in accordance with the principles of student-centred education (e.g. diversification of methods, individual growth, collaboration et al.). The individual interests and abilities of the student are developed in specializations included in the Master's degree programme, as well as in individual works and master's work. Depending on the specific topic the work is organized in optimal student groups of different sizes. Student engagement and discussions are being promoted between the teacher and students, and between students. Availability of infrastructure during and outside contact hours. Teaching staff is available for advice outside contact hours, both on-site and through online tools, e-mails, e-study environment. In order to extend experience and develop individual interests and capabilities, students have access to international mobility (SAR, p. 122-125, in Latvian).

The content of study courses and training materials are available to students in an e-study environment. The acquired knowledge, skills and competences in study courses shall be controlled and evaluated in accordance with the rules and criteria reflected in the study course programmes. In the course of study, workshops are organized, discussions are encouraged and regular testing of laboratories, practical and independent works is organized. The acquired knowledge is evaluated on a 10-point scale or pass/fail according to the approved criteria (SAR, p. 121-123, in Latvian).

2.2.4. N/A

#### 2.2.5. N/A

2.2.6. The topics of Master's thesis are devoted to the development of both urbanized and rural areas. The issues addressed in the developed Masters work assess the current situation, the factors affecting the situation, as well as forecasting potential future changes and evaluating possible ways of addressing existing and future challenges in a sustainable manner. Some topics of defended final thesis: (1) improving the effectiveness of wastewater treatment; (2) evaluation of the effectiveness of measures improving water quality; (3) analysis of waste management and biogas production processes; (4) flood risk assessment and forecasts (SAR, p. 124-125, in Latvian).

The division of final thesis developed into specializations is close to similar, during the period under assessment, 14 Master's works are defended in the specialization of "Environmental Engineering", 14 works in the specialization "HydroEngineering and Water Management", 13 thesis in the specialization of "Geodesy", but the least 5 thesis in the specialization of "Land Management" (SAR, p. 124, in Latvian).

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

#### Conclusion:

Study programmes are successfully achieved through the implementation of study courses; compliance with the Law of Higher Education is partial because limited and free courses are not offered, as required by Section 55 (2c) of the Law on Higher Education. The study process uses student-centered learning techniques, and the acquisition of a master's degree is based on research and scientific achievements. The themes defended are closely linked to practical challenges and the needs of the labour market.

#### Strengths:

1. Good level of hydro engineering studies with sufficient support from teaching staff
2. Logical planning of study courses, in general, - understandable and good.

#### Weaknesses:

1. Partially compliance with Law Higher Education (Section 55, 2c).

### **Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)**

- 1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

#### **Assessment of compliance:** Fully compliant

A Master's degree in environmental engineering-based knowledge and skills-related research, to be obtained during the successful acquisition of the study programme, is closely linked to it. The final thesis to be developed during the studies shall include both the relevant analysis of scientific knowledge, the practical and experimental parts, the processing and interpretation of results, public discussion and the defence of work at the Commission.

## **2.3. Resources and Provision of the Study Programme**

### **Analysis**

2.3.1. As per information acquired during LBTU visit, study programme resources, similar to Study Program "Environment and Water Management" (42853), consist of three groups - study and science equipment, software, and literature. Industry publications for studies and research work are

available in the LBTU Fundamental Library Subscription, Educational Literature Subscription and Reading Room. Bibliographic information on various issues related to environmental protection, land reclamation, water management and other sectors can be obtained in the bibliographic information department. A number of subscribed databases are available: CAB Abstracts; CRC Press e-books; EBSCO databases; EBSCO eBook Academic Collection; ScienceDirect journals; Scopus; Web of Science and other databases. The faculty and students are informed about the databases to which access is granted temporarily. Databases of lecturers' publications and doctoral theses have also been created. As per information acquired during LBTU visit, the staff of the library provides consultations on current events, as well as advises students on searching for scientific information. Students at the Faculty of Environment and Civil Engineering can use the Faculty of Environment and Civil Engineering Information Centre, which provides free access to the database of the LBTU Fundamental Library, available specific industry literature - books, standards, scientific and industry practical journals; it is possible to print large-format prints, such as the study projects. The study and science infrastructure of the area of environmental engineering is improved, attracting funding from the Faculty of Environment and Civil Engineering's own earnings (tuition fees, etc.), ERDF projects "Strengthening the research and development infrastructure and institutional capacity of LBTU and the scientific institutions under its supervision" and "Modernisation of STEM study programmes" as well as from various other projects implemented at the faculty as mentioned in self-assessment of Study Program "Environmental, Water and Land Engineering" (45529) and according to the information acquired during LBTU visit. It is reasonable to mention that international fundings for such activities are still available, will be available in future, and are rather simple to attract, which allows to save internal resources. High-performance computer equipment is in place that supports the development of digital skills, including BIM; equipment, tools and room equipment. All the auditoriums required for the study work are equipped with the necessary technical means - multimedia equipment, computer equipment, appropriate software and internet access - for conducting the lessons. The existing and used measuring devices in the infrastructure, their application and application possibilities are explained in the study courses. When needed, measurements are performed, and the results are used to develop master's theses. The infrastructure of other LBTU structural units and the resources of the LBTU Fundamental library are also involved in the study process. For research purposes, the infrastructure of other LBTU structural units (<https://www.llu.lv/lv/zinatniska-inventara-datubaze>) is available after prior agreement. The available equipment can be used for research related to study specialisations. The equipment of the Irrigation and Drainage, as well as the Hydraulic Modelling Laboratory in the VBF enables computerised control, simulation and visually perceptible demonstration of the hydrological and hydraulic processes characteristic of surface watercourses and groundwater flows and the migration of substances affected by them. Laboratory equipment provides experimental work, measurements characterising hydrological, hydraulic and hydrochemical processes, and collection of water samples. The infrastructure of the Forest and Water Scientific Laboratory ([http://www.murzl.llu.lv/?page\\_id=25](http://www.murzl.llu.lv/?page_id=25)) includes measuring devices that measure the physical and chemical parameters of water, air and soil. There are available portable measuring devices equipped with sensors for oxygen dissolved in water, total dissolved substances, pH, conductivity, ammonium chloride, fluoride, nitrate calcium, multi-parameter probes for high-resolution measurements of dynamic changes in the chemical quality of surface and groundwaters, fluorometers for turbidity measurements in surface and groundwaters, and filtration devices with equipment for measuring the concentration of suspended solids in water as mentioned in self-assessment of Study Program "Environmental, Water and Land Engineering" (45529) and according to the information acquired during LBTU visit. In laboratory indicators of the chemical quality of water and the chemical composition of the soil-water solution can be measured using a spectrophotometer. Long-term measurements can be carried out at agricultural runoff and groundwater monitoring stations and sites in order to determine parameters characterising flow and water quality and their influencing

factors during changes, to evaluate the effectiveness of water quality improvement measures, to provide initial data for the calibration and validation of mathematical models and to develop recommendations for the implementation of water quality improvement measures. Monitoring stations are equipped with equipment for flow parameters, and water chemical quality measurements, including data loggers-controllers, pressure and conductivity sensors, and equipment for automatic collection of composite samples. Greenhouse gas (GHG) processes and their influencing factors can be studied using optical spectroscopy equipment.

In the LBTU Fundamental Library students and teaching staff have free access to educational literature necessary for implementing study courses, with the possibility of receiving it temporarily for personal use. The library's infrastructure includes a reading room, where students and teaching staff have access to workstations and are provided with opportunities to study the necessary printed and online literature and implement other learning process activities. Subscription and trial databases, e-journals and e-books, as well as publications of LBTU teaching staff and researchers and master's and doctoral theses defended by students, are available for students and teaching staff in the unified virtual network. LBTU Fundamental Library provides access to the electronic catalogues of other Latvian universities, the Latvian National Library, the information centres and information offices located in the faculties of LBTU.

As mentioned in LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field subsection 2.3.7., 62 lecturers participate in the implementation of the study field, from them 15, according to LBTU self-assessment report clause 2.3 Resources and Provision of the Study Field II - Description of the Study Field - 2.3. Resources and Provision of the Study Field annex 2\_dala\_07\_Macibspeku\_saraksts\_ENG.XLSX, are involved in teaching in Study Program "Environmental, Water and Land Engineering" (45529). Despite the large number of teaching staff involved, most special subjects rely on a small number of teaching staff. It is considered that the workload of teaching staff is not evenly formed. There are mainly 4 teachers having the main teaching load on specific topics related to particular study programme. In addition, there are obvious risks that with such workload distribution, the field of study may become endangered if one of the overworked teaching staff decides to terminate their legal relationship with LBTU. No replacement plan has been developed.

#### 2.3.2. N/A

2.3.3. According to self-assessment of Study Program "Environmental, Water and Land Engineering" (45529) clause 3.3. Resources and Provision of the Study Programme subsection 3.3.3 the amount of state-funded study places is agreed upon in a tripartite agreement between the Ministry of Education and Science (IZM), the Ministry of Agriculture (ZM) and the Latvia University of Life Sciences and Technologies (LBTU). Every year, the LBTU Senate approves the distribution of revenues and expenses of the LBTU joint budget structure, prepared following the law "On the state budget" adopted annually by the Saeima and the annual order of the LBTU rector "On LBTU joint budget planning". The control and audit of the joint budget are carried out by an independent sworn auditor, whose opinion and review report are reviewed and approved by the Senate. The distribution of revenues and expenses approved by the Senate of LBTU determines that 80% of the funding allocated by the state consists of compensation costs and 20% of other costs. Of the paid study funding, 60% consists of compensation costs and 40% of other costs, of which 20% is directly at the disposal of the faculty that implements the relevant study programme. The amount of science base funding is annually calculated and allocated from scientific activities. 50% of the science base funding is at the direct disposal of the faculty, and 50% is for covering centralized costs. Science funding is made up of funding for the implementation of projects. State budget funding in 2022 for one budget place financed by the state in the amount of 100% is EUR 5013.38 (including social

security costs of the study place EUR 265.50). The required number of students to cover all costs – is 10. Funding for covering study costs in the study year with this number of students will be 50133.80 EUR, which covers the necessary costs (for teachers' salaries, scholarships and others). When the number of students is 10, the cost of teaching staff salaries for conducting lectures and practical work will not increase because such a number of students forms one academic and group of laboratory work, and therefore the classes will be able to take place together. Only the salary for additional contact hours, correction of study papers, etc., will increase. The costs for maintaining the common infrastructure will also not increase, as they do not directly depend on the number of students.

As per information acquired during LBTU visit, scientific research is mainly financed by state grants and projects. LBTU does not directly invest heavily into scientific activities of the staff. The amount of funding for the scientific base is calculated and allocated annually from the active research activities. By investing directly in staff research, LBTU must recognize that it engages in research as part of its mission of learning and discovery. This would directly contribute to the primary mission of teaching. LBTU provides higher education, where students develop breadth and depth of knowledge in basic and advanced subjects, improve knowledge acquisition and understanding skills. Part of this training and preparation comes from exposure to staff engaged in leading research and scholarly work in their fields. In this way, staff and scholars can combine their teaching and research efforts for mutual benefit in a way that excites and engages students. The amount of funding for the scientific base is calculated and allocated annually from the active research activities.

According to the results of the interviews with employers and alumni, study programme is not well demanded in labor market as employers focus mainly on the first available level of education, which allows obtaining certificates in the regulated field. The exception is state and municipal administration employees who have the opportunity to gain additional financial benefits / promote career growth. The self-evaluation report and the evaluation visit did not provide clear assurance that in future it is possible to provide the minimum number of students for this study program each year. In order to promote the development of the program, it is necessary to review the target markets of specialists, possibly outside the country's borders or ensuring successful succession in doctoral studies. According to the information acquired from LBTU visit, despite of technical equipment for the provision of learning processes is at a good level, without an increase in the flow of students, there is a risk that the equipment will amortize itself faster than wear and tear during intensive use.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The study base, scientific base, informative base, material-technical base and financial base meet the specifics of the study program can ensure a high-quality study process in the future. The main income of the LBTU is from the state budget grant, its own revenues from tuition fees. Study programme is not well demanded in labor market as employers focus mainly on the first available level of education, which allows obtaining certificates in the regulated field. There is no clear assurance that in future it is possible to provide the minimum number of students for this study program each year. LBTU does not directly invest heavily into scientific activities of the staff. The amount of funding for the scientific base is calculated and allocated annually from the active research activities. Most special subjects rely on a small number of teaching staff. There are obvious risks that with such workload distribution, the field of study may become endangered if one of the overworked teaching staff decides to terminate their legal relationship with LBTU. No replacement plan has been developed for this particular issue.

#### Strengths:

1. Well-equipped library and broad choice and granted access to scientific and professional databases.
2. Despite the low labor market demand, LBTU up to date is able to complete groups with the minimum number of students.
3. Financial base is sufficient to continue study programme.

#### Weaknesses:

1. Many courses are reliant on specific lecturers that if they left, the course would be shut down. There is no plan "B" for substitution of teaching staff.
2. Without an increase in the flow of students, there is a risk that the equipment will amortise itself faster than wear and tear during intensive use.
3. LBTU does not directly invest heavily into scientific activities of the staff. The amount of funding for the scientific base is calculated and allocated annually from the active research activities.
4. Study programme is not well demanded in labor market.

### Assessment of the requirement [6]

- 1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

#### **Assessment of compliance:** Fully compliant

Despite the fact that weaknesses have been identified in this study program, they can be considered as potential threats, the occurrence of which cannot be predicted immediately and can be prevented in the short term by making strategic decisions. The current model is functional and ensures the viability of the study program.

## 2.4. Teaching Staff

### Analysis

2.4.1. The Teaching staff of the programme possesses diverse knowledge, experience and competencies, which according the provided information and interviews, are continuously renewed or additionally gained. The above-mentioned enables to apply modern teaching tools (software, equipment, field experiments) in the study and related research processes.

Also the competencies of the staff ensures continuous improvement the study programme: its structure, the contents, to develop new study courses corresponding to actual needs and scientific developments. The staff actively publish their scientific achievements in national and international journals in Scopus and Clarivate Analytics databases. As additional values can be highlighted the involvement of the students in the publication development (SAR part 3.4.1.) .

2.4.2. According the provided information currently 27 lecturers from six University faculties and centres are involved in the implementation of the study courses included in the implementation of the study programme. 22 or 82%, of the lecturers that conduct the study courses represent the departments of VBF, mainly the Department of Environmental Engineering and Water Management and the Department of Land Management and Geodesy. 73% are elected academic staff, and 50% have obtained a doctoral degree (SAR Annex LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx) .

During the reporting period the changes in the composition of the lecturers are reported. The process had slight influence to the proportion of the lecturers with doctoral degrees has slightly decreased. The reasons of the change are not declared. As a positive aspect should be highlighted

involvement of two lecturers with doctoral degrees who studied in the USA, and one of the specialists has done her scientific activities in France (SAR part 3.4.1). Therefore, the involvement of international experiences was ensured.

Another positive aspect, which was stressed during the meeting with programme management, is involvement of the University PhD students in the teaching process. Four of the lecturers who have been involved in the study process plan to defend their PhD thesis in about one year, and another six lecturers are expected to defend their dissertations in the next few years. Accordingly, it is predicted that the proportion of lecturers with doctoral degrees implementing the study programme could exceed 80% in the next few years.

More than 90% of the lecturers involved in the study programme implementation have more than ten years of experience at University, and these lecturers have gained extensive experience in the implementation of the study process (SAR Annex 2\_dala\_08\_macibspeku CV\_ENG.rar) . The lecturers who have participated in the implementation of the study process for a relatively shorter time have extensive experience and knowledge in the industry and related scientific fields. Currently, the study programme is characterised by a generational change, when younger colleagues replace retiring lecturers. Approximately 69% of the lecturers involved in the study programme are in age less than 55. Several younger specialists have been successfully attracted already during the bachelor's level study period, implementing scientific activities. During the implementation of the study programme, the attraction of lecturers and the realisation of scientific projects, master's and doctoral theses have promoted the interdisciplinarity of the studies and related research. The gender structure of the involved teaching staff is similar with a slightly higher proportion of women, where 53% of the total number of teaching staff are women SAR Annex 2\_dala\_07\_Macibspeku\_saraksts\_ENG.XLSX).

The quality of the studies is positively influenced by the specialization of young teaching staff, which is facilitated by their active involvement in scientific projects and solving practical tasks. Also, the teaching staff regularly attends seminars and conferences of a scientific and practical orientation, which allows the inclusion of the most current scientific research results, tools and methods in study course programmes and lecture materials (SAR part 3.4.2, 3.4.5). The teaching staff offers the students real time and actual topics. There is an active transfer of knowledge between colleagues of the younger and older generations. Likewise, knowledge transfer also takes place at regular meetings of department colleagues.

Part of the teaching staff is involved in solving not only scientific, but also practical tasks, performing the design and construction of engineering structures, the practical application of diverse materials in reclamation structures, solving land development and territorial planning measures, performing geodetic surveying of various scale structures and territories. Interaction between teaching staff performing practical tasks and scientific tasks promotes mutual transfer and improvement of knowledge, development of the industry and further transfer of knowledge to students.

#### 2.4.3. N/A

2.4.4. The teaching staff of the programme actively participates in their research publication process. In total during the evaluation period they published 227 scientific publications in Scopus, Web of Science and other recognized data basis. Information provided in Annexes 42583\_VUS\_4\_2\_1\_Teaching\_Stuff and 2\_dala\_12\_Macibspeku\_publikaciju\_saraksts\_LV\_ENG.

An analysis of the practical and scientific performance of teaching staff shows that of the 27 teachers involved in the study process, the majority have (93%) scientific publications over the last 6 years. The number of publications per person varies a lot (from 1 to 34 or more scientific publications (SAR, Annex: 42583\_VUS\_4\_2\_1\_Teaching\_Stuff.xlsx). The qualifications of the other teaching staff involved in the study process as guest lecturers, are proved by practical experience (SAR, Annex: 2\_dala\_08 CV\_ENG.rar). The analysis of the presented documents revealed that not all CV of the teaching staff have been presented. Also design of the CVs is extremely different, (e.g.



Europass with or without photos, with or without tabular forms, free designed forms, etc.), different job statements (e.g. visiting lecturer and guest lecturer is used for the same position).

2.4.5. The programme has academic staff with extensive scientific, professional and practical experiences. This ensures interdisciplinarity of the programme and fosters the cooperation among the Departments. Which results in high quality of the studies and research activities at the university, national and international levels (SAR Annex 2\_dala\_07\_Macibspeku\_saraksts\_ENG.XLSX).

As it was confirmed during the meeting with the programme management, the study process is centrally coordinated through the cooperation of the director of the study programme with the academic staff of the Departments of Environmental Engineering and Water Management, as well as Land Management and Geodesy. Likewise, the director of the study programme resolves issues arising during the study process in direct contact with all participating teaching staff and departments.

Professional experience, scientific activities, seminars and courses for teaching staff to improve qualifications have contributed to acquiring a relatively wide range of specialised knowledge, skills and competencies, as it was mentioned above the staff gained different certificates and applied their new competences in the study modules, formulation of final thesis topics, etc. The in-depth specialised knowledge of the teaching staff ensured the improvement of the study programme and the development of new study courses and allowed to attract the most competent specialists to teach specific topics. As a result of inter-departmental cooperation, the improved study programme plan, the courses contents were developed. Also the interdisciplinary composition of teaching staff and shared knowledge, skills and competencies are ensured (SAR Annex 2\_dala\_07\_Macibspeku\_saraksts\_ENG.XLSX).

The content and sequence of the compulsory study courses contribute to the learning of the content and are the basis for further learning the content of the study courses included in the specialisations and developing the master's thesis. The development of the master's thesis takes place in the mutual interaction between the master's student, the supervisor of the master's thesis and the teaching staff of several study courses. The content of the compulsory study courses included in the 3rd semester of studies can be realised in tripartite cooperation between the teaching staff conducting the study course, the master's student and the master's thesis supervisor, according to the topic of each master's thesis and the student's scientific interests. Accordingly, the content of the mandatory study courses includes the collection, analysis and visualisation of measurements necessary for individual master's theses and data obtained in other studies, as well as the structuring and improvement of the master's thesis or scientific publication. A group of teaching staff is involved in the regular pre-defence of master's theses, ensuring the improvement of the quality of the master's thesis, the improvement of the student's knowledge and skills, and mutual interaction, and communication and discussions between teaching staff. Cooperation between teaching staff also takes place in the realisation of other individual courses.

In the learning process, in 62% of all study courses covering unique topics, individual course training is implemented by one lecturer. Accordingly, 48% of study courses are taught by several lecturers who specialise in a specific field of science (SAR Annex 2\_dala\_07\_Macibspeku\_saraksts\_ENG.XLSX).

In the study programme, the ratio of the average number of students to the full time equivalent of the workload of teaching staff is 10.3. In the considered period, the ratio has been lower than the average at University (13:1). The ratio tends to increase by an average of 5.9% per year, reaching 11.4. (SAR part 3.4.5)

### **Conclusions on this set of criteria, by indicating strengths and weaknesses**

The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme and the requirements of

regulatory enactments, as well as ensures the achievement of aims and learning outcomes of the study programme and respective study courses.

The academic staff members of the study program, both at the national and international level, are engaged in scientific research in the field of quality management and conformity assessment, and the acquired information and experience are integrated into the study process.

#### Strengths

1. Due to collaboration between different departments interdisciplinarity of the study programme is ensured;
2. High scientific and practical competences of the teaching staff
3. Rational and motivated plan for staff increase (especially with doctoral degree) is implemented.

#### Weaknesses:

1. The ratio between number of students and the teaching staff is lower than the university average.

### Assessment of the requirement [7]

- 1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

#### **Assessment of compliance:** Fully compliant

The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme and the requirements of regulatory enactments, as well as ensures the achievement of aims and learning outcomes of the study programme and respective study courses. (SAR annex):

Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions - LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

### 2.5. Assessment of the Compliance

#### Requirements

- 1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard

#### **Assessment of compliance:** Partially compliant

Study programme Environmental, Water and Land Engineering sciences complies with the State Academic Education Standard (Cabinet of Ministers No. 240).

The study programme volume is 80CP of which 32 CP are for the compulsory part, 24 CP are for the elective compulsory part and 24 CP for the Master thesis.

Compliance with the study programme with the State Education Standard is described in Annex No:5\_Compliance of the master's study programme 'Environmental, Water and Land Engineering' with the national education standard

It is important to note that this study programme does not comply with Law on Higher Education Institutions section 55 part 2 C - there is no C (free elective) part included. Therefore this criteria is partially compliant.

- 2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

**Assessment of compliance:** Not relevant

- 3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561 , Paragraph two and Section 562 , Paragraph two of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

Study course descriptions and study materials are prepared in Latvian language, and they satisfy requirements set in Law on Higher Education Institutions. However, Faculty (and study programme) management must make sure that lecturers update study course descriptions with literature up to date regularly (at least once per year or once every two years). It should be noted that some of the A and B part study course descriptions have compulsory literature dating from 2000.-2010. (and earlier) year period and they could be considered a bit outdated.

See annex: Magistra\_studiju\_kursu\_programmas\_ENG.rar

- 4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

**Assessment of compliance:** Fully compliant

The diploma issued complies with the state legislature and "Procedures by which documents certifying higher Education recognised by the State shall be issued" (Cabinet of Ministers No. 202). See Annex No. Diploms\_pielikums\_mag\_programma\_EN.pdf.

- 5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

There are at least 5 asoc. professors or professors involved in the study programme implementation together. See annex: LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

- 6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

This criterion is met and AIP has approved the implementation of the study programme. The main argument for approval was to decrease fragmentation of study programmes and to increase student count, merging similar master study programmes. See annex: mag\_stud\_prog\_Vides\_udens\_un\_zemes\_inzenierzinatne\_AIP\_atzinaums\_EN.pdf.

- 7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

**Assessment of compliance:** Not relevant

- 8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

**Assessment of compliance:** Fully compliant

The academic staff has sufficient Latvian language knowledge for implementing study courses, see annexes: Basic information about the teaching staff involved in the implementation of the study field No.2\_dala\_07\_macibspeku\_saraksts\_ENG.xlsx and LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

- 9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

**Assessment of compliance:** Not relevant

- 10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

**Assessment of compliance:** Fully compliant

Study agreements include all necessary parts set in legislation. It must be noted, that the University has included information about 11. and 12. criteria in the study agreement, therefore making it easier to give this information to the students.

See the annex: 2\_dala\_05\_Study\_Agreement\_2021\_LV\_ENG.pdf

- 11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

**Assessment of compliance:** Fully compliant

University has a rector order as confirmation that in case the implementation of this study programme is terminated students will be able to continue studies in RTU academic master study programme "Environmental Engineering". See annex: 2\_dala\_03\_Vienošānās\_LLU and RTU\_Vides\_aizsardziba\_ENG.docx

- 12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme's license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

**Assessment of compliance:** Fully compliant

University has a rector's order that confirms it will compensate losses to students if the study programme is not accredited or loses its license and the student does not wish to continue studies in another study programme.

This information is also in the study agreement.

See annex: LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

- 13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

**Assessment of compliance:** Not relevant

- 14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

**Assessment of compliance:** Not relevant

### **Assessment of the requirement [8]**

- 1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

**Assessment of compliance:** Partially compliant

The requirements set in other regulatory enactments are fulfilled, however this study programme doesn't have free elective (C Part) therefore it does not comply with requirements set in Law on Higher Education Institutions section 55. part 2 C.

### **General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme**

There are no legislative requirements that should be eliminated during short-time, except for adding C part in the study programme. Scientific research is mainly financed by state grants and projects. Study programme is not well demanded in labor market as employers focus mainly on the first available level of education, which allows obtaining certificates in the regulated field. The exception is state and municipal administration employees who have the opportunity to gain additional financial benefits / promote career growth.

#### **Strengths**

1. Study program is actual and needed in the future.
2. Good level of hydro engineering studies with sufficient support from teaching staff
3. Logical planning of study courses, in general, - understandable and good.
4. Well-equipped library and broad choice and granted access to scientific and professional databases.
5. Despite the low labor market demand, LBTU up to date is able to complete groups with the minimum number of students.
6. Financial base is sufficient to continue study programme.
7. Due to collaboration between different departments interdisciplinarity of the study programme is ensured;
8. High scientific and practical competences of the teaching staff
9. Rational and motivated plan for staff increase (especially with doctoral degree) is implemented.

#### **Weaknesses**

1. The specialized topic - Geodesy is not in the line with study program and study field
2. Overloaded scientific and research courses within the program
3. The academic study programme provides learning of knowledge and skills in sufficient areas, but students also obtain practical things. Although the academic programme does not require the acquisition of praxis, the topics of this study programme are very closely linked to practical life, thus the practice is therefore very desirable.
4. The study program is oriented toward Latvian legislation, and EU legislation is missing.
5. Partially compliance with Law Higher Education (Section 55, 2c).

6. Many courses are reliant on specific lecturers that if they left, the course would be shut down. There is no plan "B" for substitution of teaching staff.
7. Without an increase in the flow of students, there is a risk that the equipment will amortise itself faster than wear and tear during intensive use.
8. LBTU does not directly invest heavily into scientific activities of the staff. The amount of funding for the scientific base is calculated and allocated annually from the active research activities.
9. Study programme is not well demanded in labor market.
10. The ratio between number of students and the teaching staff is lower than the university average.

## **Evaluation of the study programme "Environmental, Water and Land Engineering"**

Evaluation of the study programme:

Good

## **2.6. Recommendations for the Study Programme "Environmental, Water and Land Engineering"**

### **Short-term recommendations**

Create plan for substitution of teaching staff by having more specific teaching staff in specific fields to avoid situations if specific lecturers would leave for any reason, the course would not be shut down.

Conduct broader assessments of labor market demand and the need for specific skills/knowledge for graduates that employers need, which can be implemented in study programme.

Review LBTU's strategy on LBTU's contribution to the scientific activity of staff in the way, the staff do not overwork time for seeking funding resources outside LBTU for their scientific work and not lose their interest in scientific research because of lack of financing. The management of LBTU should strategically attract additional long-term partners for fundamental, academic and practical research, which are relevant for market stakeholders in the industry to ensure at least 50% from the financing needed for scientific activities of staff.

Draw up a plan for renting or sharing existing study equipment if the intensity of its use is lower than 60%.

Review study plan and prepare it according to Law of Higher Education (Article 55, 2c).

Review study courses, tend to be broad according to study program specifics, balance scientific and research courses, including practical activities, covering topics of EU legislation as well, not only site specific - Latvian.

### **Long-term recommendations**

Balance number of students and the academic staff, for the moment number of students are very low comparing to number of teaching staff.

Review study courses according to specialization. All specialized topics except Geodesy are in line with the study field topics. In general, geodesy in some cases represents the basis for environmental engineering projects construction, but it is not part of environmental engineering. So, it is recommended to remove specialized topic Geodesy in the future.

To adjust study program according to industry needs, as main part of graduates stays in industry. That means decreasing the number and/or volume of courses that contain scientific topics and increasing practice. Also, it should be considered to introduce topics related to industrial pollution.

## **II - " Environmental Engineering" ASSESSMENT**

### **II - " Environmental Engineering" ASSESSMENT**

#### **2.1. Indicators Describing the Study Programme**

##### **Analysis**

2.1.1. The doctoral study program Environmental Engineering is a rather new study (2020) raised up from the doctoral study Environmental engineering science and Hydroinegenering science.

The content of the study is oriented toward the specific conditions in Latvia, especially on the assessment of the impact of agricultural activities and its connection with environmental protection including the research on water quantity and quality, implementation of environmentally friendly drainage systems for water quality improvements, emission of greenhouse gasses and measures to reduce emissions, the importance of drainage and hydrotechnical structures in mitigation flood risks (Annex Description of the study courses: 10\_appendix\_Doktora\_studiju\_kursu\_programmas\_ENG.rar) The study program is in compliance with the study field, but there is a place to improve it through the introduction of additional aspects of Environmental engineering besides named connected to the air, waste management, noise, circular economy).

2.1.2. The doctoral study programme "Environmental Engineering" corresponds for code 51529 (which according to Latvian Education Classification (Latvian Cabinet of Ministers Regulations (Cab, Reg.) No. 322, <https://likumi.lv/ta/id/291524-noteikumi-par-latvijas-izglitiba-klasifikaciju>), corresponds to the following codification: meaning of the first two digits `51` notes that this study programme is doctoral study programme and the last three digits `529` indicate that this study programme is related to the educational group of "Environmental engineering"

After finishing the Doctoral study programme in Environmental engineering, students acquire a Doctoral degree Doctor of Science (Ph.D) in Engineering Science and Technology which is reasonable and justified according to the skills and learning outcomes of the study.

The study duration is full time studies, 3 years (120 CP or 180 ECTS), the teaching language is Latvian and English,

The duration of doctoral study is three years, but it is stated that it should be prolonged. (Annex: Statistics on the students in the reporting period 4\_appendix\_Statistical\_data\_on\_the\_students\_doctoral\_programme\_Environme....docx)

The number of students that finished their studies is not sufficient to make such a conclusion. According to the EU practice, three years should be sufficient to finish the study. In the doctoral study, acts should consider possibilities of prolongation, but the formal duration should be 3 years.

The aim and objectives of the study (Mapping of the study courses/ modules for the achievement of

the learning outcomes of the study programme 8\_appendix\_Mapping\_of\_the\_study\_courses\_EN.XLSX) are well defined and clarified. The curriculum of the study program is consistent and follows the aims and objectives through each study course Descriptions of the study courses/ modules 10\_appendix\_Doktora\_studiju\_kursu\_programmas\_ENG.rar. The study courses provide learning outcomes that are interrelated and harmonized. (Annex: The curriculum of the study programme (for each type and form of the implementation of the study programme) 9\_appendix\_Study\_plan\_doctoral\_programme\_Environmental\_Engineering\_51529....docx

2.1.3. The doctoral study programme Environmental Engineering is a rather new study (2020) raised up from the doctoral study Environmental engineering science and Hydroinegenering science. So, the corrections that have been made (joining two doctoral studies in one) are justified and well-clarified. The doctoral study programme Evironmental Engineering was created on the basis of the accredited and existing study programmes “Environmental Engineering Science” and “Hydroengineering Science”. The experience accumulated during the implementation period of the previous doctoral study programmes was taken over and critically evaluated as new doctoral study programme was established. (Chapter 3.1.1. of SAR Environmental engineering) The initiated research directions were continued, developed and expanded, The transition toward Environmental engineering is reasonable and represents the answer to current EU trends.

2.1.4. Currently, labor market has demant for the Environmental engineering topics. Six finished PhD Evnironmental engineers (from the Evnirnomenta Engineering Science doctoral program) work already at the higher education institutions in Latvia. The current situation shows a rather small interest of students in this study programme. There are several reasons that are named to justify the situation. The study recently started, and the last two years Covid pandemic contributed to the study dynamic and interest of the students. In the 2020/2021 doctoral students were not enrolled in the 1st year of studies. It is assumed that potential doctoral students were not enrolled because it is difficult to start and continue research remotely. Additionally, it has been recognised in the SAR that the prescribed duration of doctoral study (3 years) is too short a period for doctoral students to be able to conduct research specific for engineering disciplines, which in most cases includes experimental studies in field conditions. As it is clarified previously, the period of study performace is too short (two years) and it can't be representative to make final conclusions. The lack of financial support for the study resulted in additional efforts of LBTU to support programs as it is stated in the interview, and described in chapter 3.1.4. of Self evaluation report (SAR, p. 154). The results of these activities need time to appear.

2.1.5. NA

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The content of the study is oriented toward the specific conditions in Latvia, especially on the assessment of the impact of agricultural activities and their connection with environmental protection. The study program is in compliance with the study field, but there is a place to improve it through the introduction of additional aspects of Environmental engineering besides named. After finishing the Doctoral study program in Environmental engineering, students acquire a Doctoral degree Doctor of Science (Ph.D) in Engineering Science and Technology which is reasonable and



justified according to the skills and learning outcomes of the study. The current situation shows a rather small interest of students in this study program, but Covid pandemic and rather the recent establishment of the study should be taken into consideration.

#### Strengths

1. Study programme is actual and needed in the future
2. The study programme is well developed in the field on the assessment of the impact of agricultural activities and their connection with environmental protection.

#### Weaknesses

1. Small number of students
2. The lack of financial support for the study
3. Additional aspects of Environmental engineering (beside named previously) are missing (such as waste management, noise pollution, circular economy).
4. The duration of the studies is unbalanced with the activities planned during the studies (e.g. research takes more time than planned) which makes it difficult to complete the studies within the planned time.

## 2.2. The Content of Studies and Implementation Thereof

### Analysis

2.2.1. The duration of the study programme (full time in Latvian or English, both 120 CP) is 3 years. Studies consist of theoretical study courses (approximately 25% of the total amount of study) and scientific work. Most theoretical courses are planned at the beginning of studies to provide knowledge of the study methodology, presentation of data-processing techniques, writing scientific articles and supplementing knowledge of foreign languages with scientific terminology. In the specialised sub-sector of the environmental engineering and energy science sector, the student shall choose according to the selected sub-sector of science at the beginning of studies - Environmental Engineering or Water Management, while the special course of the study directions - according to the direction of studies from the courses offered in the study programme. Special courses may vary depending on the content of student studies and their feasibility. Each doctoral candidate of the programme shall acquire the relevant study courses and shall set out three promotion examinations: 1) a foreign language special course; 2) theoretical studies in the science sub-sector; 3) a special course in the direction of the study (SAR, p. 137, 145-146, in Latvian).

There is no national standard and requirements for doctoral studies, but their eligibility in this programme can be assessed from the point of view of the objectives set out in the LBTU "Development Strategy 2023-2027" ([https://www.llu.lv/sites/default/files/2023-01/LBTU\\_Attistibas\\_Strategija\\_2023-2027\\_gala.pdf](https://www.llu.lv/sites/default/files/2023-01/LBTU_Attistibas_Strategija_2023-2027_gala.pdf)).

Environmental engineering is mentioned in the specialisation industries and sub-sectors of the LBTU, while priority research directions "Climate change reduction and environmental technologies, hydrology and agricultural runoff studies", with key research objectives: developing new and burying existing climate change-reducing technologies for Latvian conditions; conducting research on environmental technology development, paying particular attention to water pollution-reducing technologies from agricultural activities; undertaking fundamental research in the field of hydrology and hydro-chemical; carrying out studies on the composition and variability of agricultural praxis at different agricultural intensity from point and diffuse sources of pollution, and making recommendations for pollution reduction.

2.2.2. The uniqueness of the study programme relates to the assessment of potential climate

change, water protection, agricultural runoff, the impact of changes in the qualitative composition of waters on marine ecosystems in general, greenhouse gas emissions. In addition, the content of the Latvian Rural Development Programme (2014-2020), where special hydrological conditions of Latvia and the risk of water pollution are highlighted, determines the need for a doctoral study programme. It should be noted that this doctoral study programme is the only one in Latvia with an in-depth orientation in water management, hydrology, hydrotechnical amelioration (SAR, p. 146-148, in Latvian).

The acquisition of a PhD degree in the study programme is closely linked to scientific research in Latvia, at regional and also global level. The specific nature of research directions (green technologies, waste collection and disposal, etc.) governs continued follow-up to the latest scientific trends (SAR, p. 146-148, in Latvian).

2.2.3. The most important section of doctoral studies is the implementation of research activities resulting from the development of promotion work. The scientific laboratories of the LBTU, specific computer programs, the sources of scientific information of the Fundamental Library, as well as the research resources of other scientific institutions of Latvia, if necessary, shall be used for the performance thereof. The PhD students shall present each year in seminars and conferences where the results of the study and research are presented, followed by the preparation of scientific publications, the content of which is gradually being integrated into the promotion work (SAR, p. 148, in Latvian).

The following principles are used to ensure student-centered education: (1) respect the individual needs of students (e.g. resources available to students outside working hours); (2) students are available for communication not only during face-to-face teaching, but also during consultation, and within e-mail communication; (3) students traveling within exchange mobility have the opportunity to learn study courses on remote regime; (4) effective models and algorithms for student and faculty cooperation, such as complaints, academic ethics; (5) openness - clear evaluation criteria for students to be explained before studies (SAR, p. 149-150, in Latvian).

The study programme is also offered in English, with interest expressed by several potential students from India, Pakistan, etc., but real action (the preparing and submission of documents has not followed), SAR (p. 149-150, in Latvian).

2.2.4. N/A

2.2.5. In order to make information on the incentive arrangements readily accessible to doctoral students and applicants for a scientific degree, an appropriate section on the LBTU home page (<https://www.ltu.lv/lv/promocijas-kartiba>) has been created. This section of the home page summarizes the most important information about the implementation of the promotion process in the LBTU (SAR, p. 150, in Latvian).

The applicant for a scientific degree shall submit the finished promotion work to the Administrative Centre of the LBTU for registration. After registration, the Administrative Centre shall send the promotion work to the Promotion Board in the science sector "Environmental engineering and energy". The Promotion Board under the chairmanship of the Chairperson shall follow the promotion procedure in accordance with the Regulation No 1001 of 27 December 2005 (Procedures and Criteria for the Granting of a Scientific Degree of Doctors). After successful defending the promotion during the period up to 2019, the applicant was granted an engineering doctorate (Dr.sc. ing) in the field of environmental science (in the environmental engineering sub-sector), but degree to be obtained from 1 January 2020, - a science doctor (Ph.D) in environmental engineering and energy.

2.2.6. Topics of doctoral thesis developed by students of the doctoral study programme include addressing topical environmental problems, such as (1) Identification of sources of NO<sub>2</sub> in the soil

using isotopic measurements; (2) Development of methodologies for the exploration of morphometry and hydrological regime of water bodies; (3) Integrated flood and rainfall collection and drainage systems cities of Latvia; (4) Analysis of the selection and installation sites of elements of environmentally friendly amelioration systems; (5) Assessment of the risk of air pollution with heavy metals using spatial modeling; (6) Assessment of measures to reduce ammonia emissions in the crop sector. (SAR, p. 151, in Latvian).

Overall topics of the final thesis closely correspond to the study programme aim and tasks covering knowledgeable, skilled and competent specialists in the environmental engineering field. But it should be noted that during the evaluation period a comparatively low number of thesis were defended (SAR, p. 151, in Latvian).

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

Conclusion:

The uniqueness of the study programme relates to the assessment of global problems - potential climate change, water protection, agricultural runoff, the impact of changes in the qualitative composition of waters on marine ecosystems in general, and greenhouse gas emissions. Study program is offered in English, but no students until now.

Strengths:

1. All research directions, also defended thesis, are very close to practical and applied science.

Weaknesses:

1. Comparably low number of defended thesis.
2. There are no foreign students in the study programme, although it is possible to carry out this programme in English. Either review the student recruitment plan, which has not been effective until now, or consider the potential for offering the program in English.

### **Assessment of the requirement [5] (applicable only to master's or doctoral study programmes)**

- 1 R5 - The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or field of artistic creation.

**Assessment of compliance:** Fully compliant

The content of the study programme is topical, the study courses are interlinked and ensure that the objectives are achieved. The most up-to-date scientific knowledge and methods are used for the development of thesis. The study methods used are appropriate and supportive for students. The long time needed to develop final thesis makes it difficult to complete studies within 3 years, which is also evidenced by the small number of thesis defended.

It should be concluded, that research topics were very close related to content of the studies, but there is potential for broader research topics.

## **2.3. Resources and Provision of the Study Programme**

### **Analysis**

2.3.1. According to self-assessment of Study Program "Environmental Engineering" (51529) clause 3.3. Resources and Provision of the Study Programme subsection 3.3.1, the material and technical provision has been purposefully developed according to financial possibilities on the basis of the

main research directions of the Faculty of Environment and Civil Engineering (VBF) since the 1990s with extensively expanded and developed network of agricultural runoff monitoring in Latvia, which is one of a kind and consists of buildings, hydrotechnical structures, equipment that allows to carry out long-term field observations, the results of which can be further used in research, modelling of hydrological and hydrochemical processes. Equipment and facilities for conducting research in hydrology, which includes computers with appropriate software for modelling of hydrological processes, equipment for water quality research, equipment for measurements of greenhouse gases (GHG) emission is available as well. Last one is unique as it is the only one in the Baltic states and corresponds to EU "Green Deal" direction fulfilment. The material and technical provision used for the implementation of the study programme "Environmental Engineering" is rather wide, but mainly located in 8 different monitoring stations. Although the self-evaluation report indicates that the material and technical base created is directly related to the research areas to be implemented, which are defined in the doctoral study program and indicates differences from other doctoral study programs implemented in Latvia in the field of environmental engineering, it must be recognized that its basic application is related to agriculture related studies. According to self-assessment of Study Program "Environmental Engineering" (51529) clause 3.3. Resources and Provision of the Study Programme subsection 3.3.1, every year, computer programs (Microstation, SketchUp, ArcGIS) are maintained and subscribed to, which are necessary for work in the study areas implemented at the Faculty of Environmental and Building Sciences. The Faculty also has the AutoCAD program offered by the Academic Network. In the scientific laboratory of Forest and Water Resources of LBTU, rooms have been rebuilt for the work of master's and doctoral students, as well as 8 computer sets have been purchased for research work.

As per information acquired during LBTU visit, scientific research is mainly financed by state grants and projects related mainly to agriculture and land reclamation issues, affecting areas under the supervision of the relevant ministry. LBTU does not make direct large investments in the scientific activity of its staff, expecting that the staff realizes its scientific activity through projects financed by various funds and grants, so that LBTU's resources can be redistributed to other needs. The amount of scientific base funding is calculated and allocated annually from active research activity. The remaining funding from tuition fees and other paid income is used for the implementation of research activities, including the publication of research results in conferences and scientific journals, as well as creative and other activities.

2.3.2. The Fundamental Library of LBTU provides opportunities to obtain scientific literature. The library collection includes a large number of publications in natural sciences, engineering, technology and social sciences. In addition, it is possible to use services of interlibrary subscription. Industry publications for studies and research work are available in Subscription, Educational Literature Subscription, Reading Room, Food and Agriculture Organization of the United Nations Depository Library. Factual and bibliographic information on various issues related to agriculture and other sectors can be obtained from the Bibliographic Information Department. The search engine LBTU Primo Discovery, online databases BIS Aleph500, online databases created in the LBTU Fundamental Library (8 databases of different meanings) are available to search for scientific literature. A number of subscribed databases are available: CAB Abstracts; CRC Press e-books; EBSCO databases; EBSCO eBook Academic Collection; ScienceDirect journals; Scopus; Web of Science and other databases.

Yearly there are orders placed from Ministry of Agriculture of Latvia for research purposes. There are several on-site research sites created, but mainly for agriculture and water directions. Cooperation with other scientific organizations and universities are rather weak. International cooperation mainly

relates to agricultural issues. It is reasonable to rise discussions with private sector for practical research works which are solving specific issues. Despite this, programme have a good potential, as the content of studies historically are unique only for LBTU.

2.3.3. Considering the fact that the doctoral study program "Environmental engineering" was created on the basis of two study programs "Environmental engineering" and "Hydroengineering" implemented until 2020, it is considered new. During the implementation of the previous study programs, the material, technical and financial base has been created, taking into account that LBTU receives state funding for 11 study places, which are directed to the implementation of the new study program "Environmental Engineering". It is believed that the number of 11 study places is optimal to ensure a high-quality study process. Funding sources for the study program come from the state budget and study fees, totaling 134'773,76 EUR.

Scientific research is mainly financed by state grants and projects. LBTU does not directly invest heavily into scientific activities of the staff. The amount of funding for the scientific base is calculated and allocated annually from the active research activities.

According to LBTU statistical data (Appendix No. 4 to the self-assessment report - Statistical data on students in the doctoral study program "Environmental Engineering" (51529)) on students in the doctoral study program "Environmental Engineering", no students have been admitted in the last academic year. LBTU cannot currently financially justify the income from the optimally planned number of 11 students, therefore there is no proves that this study program is viable in future.. This can be ensured in the event that students' succession after master's studies from LBTU itself or other universities in Latvia and outside Latvia is promoted.

Study programme is demanded mainly for agricultural and surface water studies. Total number of current students is very low and is critical to continue the programme. Despite of technical equipment for the provision of learning processes is at a good level, without an increase in the flow of students, there is a risk that the equipment will amortize itself faster than wear and tear during intensive use.

### **Conclusions on this set of criteria, by specifying strengths and weaknesses**

The infrastructure provided by LBTU is sufficient for the needs of the study programme. LBTU provides resources for work, studies, and research.: the study rooms are equipped with 8 new computer stations, study materials are available in printed and digital form for study programme. The technical equipment for the provision of learning processes is at a good level. Cooperation with other scientific organizations and universities are rather weak. International cooperation mainly relates to agricultural issues. Scientific research is mainly financed by state grants and projects. LBTU does not directly invest heavily into scientific activities of the staff. The amount of funding for the scientific base is calculated and allocated annually from the active research activities. Study programme is demanded mainly for agricultural and surface water studies. Number of students are very low and is critical to continue the programme. Without an increase in the flow of students, there is a risk that the equipment will amortise itself faster than wear and tear during intensive use.

Strengths:

1. Well-equipped library and broad choice and granted access to scientific and professional databases.
2. There are several good on-site research sites created.
3. Programme have a good potential, as the content of studies historically are unique only for LBTU.

#### Weaknesses:

1. LBTU does not directly invest heavily into scientific activities of the staff.
2. Without an increase in the flow of students, there is a risk that the equipment will amortise itself faster than wear and tear during intensive use.
3. Cooperation with other scientific organizations and universities are rather weak.
4. Low number of students.
5. Financial base is not sufficient to continue study programme in long-term.
6. Cooperation with other scientific organizations and universities are rather weak, the research topics of the study program are too narrow for its name, they are mostly related to agriculture as well as international cooperation.

### Assessment of the requirement [6]

- 1 R6 - Compliance of the study provision, science provision (if applicable), informative provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and ensuring the achievement of learning outcomes

#### **Assessment of compliance:** Partially compliant

For the implementation of the study program, extensive information provision, library resources with a wide printed and digital literature base corresponding to the study program are available. The material and technical provision fully corresponds to the content of the study program; however, it is not fully used because the research topics of the study program are too narrow for its name, they mostly relate to agriculture. It's visible, that research topics obviously were very closely related to the content of the studies, but there is potential for broader research topics and fields. Also, this broadening activity is very difficult to obtain, due to a critically low number of students, also cooperation with other universities and scientific institutions is low. However, the program has its own unique advantages related to agricultural issues, which no other university in Latvia has. Financial provision is sufficient and up to date, but there can be risks to cut the financing if amount of students will not increase, All the above facts and circumstances is a source of the significant risk to the sustainability of the programme.

## 2.4. Teaching Staff

### Analysis

2.4.1. In the implementation of the doctoral study programme the following teaching staff is involved: 5 professors; 2 associate professors; 3 assistant professors. All academic staff elected in academic positions in University and have a doctoral degree. This ensures the provision of the high quality theoretical study process and scientific work. The competences and qualifications of the teaching staff fulfills and even exceeds requirements of article 55 of the Law on Higher Education Institutions.

The field of environmental engineering is thematically very diverse and interdisciplinary competences are needed to ensure high quality and actual research and study processes. Therefore, the study programme involves academic staff, who know the widest possible range of issues addressed by environmental engineering. It expands the field of knowledge and competencies acquired in the study programme in the fields of communication with other fields of science.

The competences of the staff were also improved by participation in the international and national projects, conferences, ERASMUS exchanges (SAR part 3.4.1).

It can be concluded that the teaching staff qualification complies with the requirements for the implementation of the study programme and the requirements set forth in the regulatory enactments.

2.4.2. Since the establishment of the new doctoral study programme “Environmental Engineering” in the study year of 2020/2021, there have been two changes in the composition and qualifications of the academic staff: one due to partial retirement, (one professor was replaced with associate professor); new associate professor was admitted to the programme teaching staff after gaining PhD degree (SAR part 3.4.2).

The changes have no negative impact of the programme study and research quality, *vis versa* – new competences were involved enabling wider research fields and interdisciplinarity of doctoral dissertations.

2.4.3. During the reporting period, academic staff involved in the implementation of the study programme have written 133 scientific publications, 99 of which are indexed in the Scopus or Web of Science databases (SAR Annex - . The topics and content of the publications in the most cases are related to the research interests of the academic staff and doctoral students in the relevant field of science. At the same time, it should be highlighted that the publications are elaborated in accordance with the content of the research projects implemented, which are not always directly related to the research interests of academic staff and doctoral students.

Six persons involved in the implementation of the study programme as academic staff are experts of the Latvian Council of Science (SAR Annex - LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx; LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx) . The academic staff have acquired the rights of expertise not only in the thematically directly related field of science such as Environmental Engineering and Energy (4 persons), but also in the field of science Animal and Dairy Science (1 person) and Electrical Engineering, Electronics, Information and Communication Technologies, which contributes to the interdisciplinarity of the study process implemented.

2.4.4. The doctoral study programme “Environmental Engineering” is designed for a long-term implementation, which is determined by the already started research directions and research development trends in the field of environmental engineering in Latvia, Europe and the world.

An analysis of the practical and scientific performance of the teaching staff shows that all teachers involved in the study process have scientific publications over the last 6 years (SAR, Annex: 42583\_VUS\_4\_2\_1\_Teaching\_Stuff.xlsx, SAR, Annex: 2\_dala\_08 CV\_ENG.rar).

The academic staff of the study programme have accumulated a long-term experience in implementation of research projects as evidenced by their involvement in a large number of research projects (SAR Annex - 51529\_Environmental\_Engineering\_3\_4\_4\_List\_of\_projects\_implemented\_ENG.docx). In recent years, there have been increasing opportunities to involve master, doctoral students and candidates of the doctoral degree in research projects offering the necessary conditions for research activities.

The academic staff of the doctoral study programme participated in the implementation of 9 international projects, 5 other EU-funded projects, 37 projects funded by the state, state institutions (ministries), 3 contract studies un 1 internal grant of LBTU.

2.4.5. The cooperation of the academic staff takes place by working on the improvements of the study programme, as well as by cooperating in research and in supervising and consulting doctoral students about the topics of doctoral thesis. As it was stated in the meeting with the programme management, the improvements of the programme and exact topics of doctoral thesis are discussed in the department’s meetings and/or by communicating in the e-environment on a regular basis. Cooperation between the academic staff within the study programme is mainly subordinated to the research topic of the doctoral student. The academic staff of the theoretical courses of the programme communicate with the supervisors of the doctoral thesis in order to specify the individual tasks in accordance with the topic of the doctoral thesis. Cooperation between the academic staff of the programme also takes place within the framework of various study courses

involving more than one member of academic staff.

All academic staff involved in the implementation of the study program are elected, which ensures academic staff stability and eliminates regular changes. According to the information provided during the visit to LBTU and discussion with the programme management the ratio between the number of students and academic staff is currently 6 (2 in study process and 4 in academic leave) to 10, which is related to the specifics in the study programme implementation with a small number of students, which provides the opportunity to apply an individual approach to each student.

### **Conclusions on this set of criteria, by indicating strengths and weaknesses**

The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme and the requirements of regulatory enactments, as well as ensures the achievement of aims and learning outcomes of the study programme and respective study courses.

The academic staff members of the study program, both at the national and international level, are engaged in scientific research in the field of quality management and conformity assessment, and the acquired information and experience are integrated into the study process.

#### **Strengths**

1. The teaching staff is very active in publication of the project results on national and international levels.
2. The students are involved in national and international research projects

#### **Weaknesses:**

1. Students are not finalizing their theses on time.

### **Assessment of the requirement [7]**

- 1 R7 - Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements set out in the respective regulatory enactments.

#### **Assessment of compliance:** Fully compliant

The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme and the requirements of regulatory enactments, as well as ensures the achievement of aims and learning outcomes of the study programme and respective study courses. (SAR annexes):

Confirmation that the academic staff of the doctoral study programme includes not less than five doctors, of which at least three are experts approved by the Latvian Council of Science in the branch or sub-branch of science in which the study programme intends to award a scientific degree - LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

Confirmation that the academic staff of the academic study programme complies with the requirements specified in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions - LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

## **2.5. Assessment of the Compliance**

### **Requirements**

- 1 1 - The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard



**Assessment of compliance:** Not relevant

- 2 2 - The study programme complies with a valid professional standard or the requirements for the professional qualification (if there is no professional standard required for the relevant occupation) provided if the completion of the study programme leads to a professional qualification (if applicable)

**Assessment of compliance:** Not relevant

- 3 3 - The descriptions of the study courses and the study materials have been prepared in all languages in which the study programme is implemented, and they comply with the requirements set forth in Section 561, Paragraph two and Section 562, Paragraph two of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

Study course descriptions and study materials are prepared in Latvian and English languages, and they satisfy requirements set in Law on Higher Education Institutions. However, Faculty (and study programme) management must make sure that lecturers update study course descriptions with literature up to date regularly (at least once per year or once every two years). It should be noted that some study course descriptions have compulsory literature dating from 2000.-2010. year period and they could be considered a bit outdated.

- 4 4 - The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure according to which state recognised documents of higher education are issued.

**Assessment of compliance:** Fully compliant

The diploma issued complies with the state legislation and "Procedures by which documents certifying higher Education recognised by the State shall be issued" (Cabinet of Ministers No. 202). See annex: [Doktora\\_diploms\\_Vide\\_EN.pdf](#)

- 5 5 - The academic staff of the academic study programme complies with the requirements set forth in Section 55, Paragraph one, Clause 3 of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

There are at least 5 asoc. professors or professors involved in the study programme implementation together. See annex: [LLU\\_apliecinajumi\\_Vides\\_aizsardziba\\_EN.docx](#)

- 6 6 - Academic study programmes provided for less than 250 full-time students may be implemented and less than five professors and associated professors of the higher education institution may be involved in the implementation of the mandatory and limited elective part of these study programmes provided that the relevant opinion of the Council for Higher Education has been received in accordance with Section 55, Paragraph two of the Law on Higher Education Institutions.

**Assessment of compliance:** Fully compliant

This criterion is met and AIP has approved the implementation of the study programme. See annex: [dokt\\_stu\\_prog\\_Vides\\_inzenierija\\_AIP\\_atzinums\\_EN.pdf](#).

- 7 7 - At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).

**Assessment of compliance:** Fully compliant

This criterion is fulfilled completely, three academic staff with doctoral degrees are approved by Latvian Science Council as experts in respective field of science.

See annex: LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

- 8 8 - The teaching staff members involved in the implementation of the study programme are proficient in the official language in accordance with the regulations on the level of the official language knowledge and the procedures for testing official language proficiency for performing professional duties and office duties.

**Assessment of compliance:** Fully compliant

The academic staff has sufficient Latvian and English language knowledge for implementing study courses, see annex: Basic information about the teaching staff involved in the implementation of the study field No.2\_dala\_07 macibspeku\_saraksts\_ENG.xlsx

- 9 9 - The teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, if the study programme or any part thereof is to be implemented in a foreign language (if applicable).

**Assessment of compliance:** Fully compliant

The academic staff has sufficient foreign language knowledge for implementing study courses, see annex: 2\_dala\_07 macibspeku\_saraksts\_ENG.xlsx and annex: 2\_dala\_08 macibspeku CV\_ENG.rar

- 10 10 - The sample of the study agreement complies with the mandatory provisions to be included in the study agreement.

**Assessment of compliance:** Fully compliant

Study agreements include all necessary parts set in legislation. It must be noted, that the University has included information about 11. and 12. criteria in the study agreement, therefore making it easier to give this information to the students.

See the annex: 2\_dala\_05\_Study\_Agreement\_2021\_LV\_ENG.pdf

- 11 11 - The higher education institution / college has provided confirmation that students will be provided with opportunities to continue their education in another study programme or another higher education institution or college (agreement with another accredited higher education institution or college) if the implementation of the study programme is terminated.

**Assessment of compliance:** Fully compliant

University has a rector order as confirmation that in case the implementation of this study programme is terminated students will be able to continue studies in RTU academic doctoral study programme "Environmental Engineering". See annex: 2\_dala\_03\_Vienošānās\_LLU and RTU\_Vides aizsardzība\_ENG.docx

- 12 12 - The higher education institution / college has provided confirmation that students are guaranteed compensation for losses if the study programme is not accredited or the study programme's license is revoked due to the actions (actions or omissions) of the higher education institution or college and the student does not wish to continue studies in another study programme.

**Assessment of compliance:** Fully compliant

LBTU has a rector's order that confirms it will compensate losses to students if the study programme is not accredited or loses its license and the student does not wish to continue studies in another study programme.

This information is also in the study agreement.

See annex: LLU\_apliecinajumi\_Vides\_aizsardziba\_EN.docx

- 13 13 - The joint study programmes comply with the requirements prescribed in Section 55.(1), Paragraphs one, two, and seven of the Law on Higher Education Institutions (if applicable)

**Assessment of compliance:** Not relevant

- 14 14 - Compliance with the requirements specified in other regulatory enactments that apply to the study programme being assessed (if applicable)

**Assessment of compliance:** Not relevant

### **Assessment of the requirement [8]**

- 1 R8 - Compliance of the study programme with the requirements set forth in the Law on Higher Education Institutions and other regulatory enactments.

**Assessment of compliance:** Fully compliant

The requirement has been met and fulfilled, and all requirements set in different regulatory enactments are satisfied.

### **General conclusions about the study programme, indicating the most important strengths and weaknesses of the study programme**

The content of the study is oriented toward the specific conditions in Latvia, especially on the assessment of the impact of agricultural activities and their connection with environmental protection. The uniqueness of the study programme relates to the assessment of global problems - potential climate change, water protection, agricultural runoff, the impact of changes in the qualitative composition of waters on marine ecosystems in general, and greenhouse gas emissions. Study program is offered in English, but no students until now. The infrastructure provided by LBTU is sufficient for the needs of the study programme. LBTU provides resources for work, studies, and research. The qualification of teaching staff involved in the implementation of the study programme fully corresponds to the conditions of implementation of the study programme.

#### **Strengths**

1. Study programme is actual and needed in the future
2. The study programme is well developed in the field on the assessment of the impact of agricultural activities and their connection with environmental protection.
3. All research directions, also defended thesis, are very close to practical and applied science
4. Well-equipped library and broad choice and granted access to scientific and professional databases.
5. There are several good on-site research sites created.
6. Programme have a good potential, as the content of studies historically are unique only for LBTU.
7. The teaching staff is very active in publication of the project results on national and international levels.
8. The students are involved in national and international research projects

#### **Weaknesses:**

1. The number of the admitted students is low and comparably low number of defended thesis.
2. The lack of financial support for the study
3. Additional aspects of Environmental engineering (beside named previously) are missing (such as air pollution, waste management, noise pollution, circular economy).
4. The duration of the studies is unbalanced with the activities planned during the studies (e.g.

research takes more time than planned) which makes it difficult to complete the studies within the planned time.

5. There are no foreign students in the study programme, although it is possible to carry out this programme in English. Either review the student recruitment plan, which has not been effective until now, or consider the potential for offering the program in English.

6. LBTU does not directly invest heavily into scientific activities of the staff.

7. Without an increase in the flow of students, there is a risk that the equipment will amortise itself faster than wear and tear during intensive use.

8. Cooperation with other scientific organizations and universities are rather weak, the research topics of the study program are too narrow for its name, they are mostly related to agriculture as well as international cooperation.

9. Financial base is not sufficient to continue study programme in long-term.

## **Evaluation of the study programme " Environmental Engineering"**

Evaluation of the study programme:

Good

## **2.6. Recommendations for the Study Programme " Environmental Engineering"**

### **Short-term recommendations**

Review LBTU's strategy on LBTU's contribution to the scientific activity of staff in the way, the staff do not overwork time for seeking funding resources outside LBTU for their scientific work and not lose their interest in scientific research because of lack of financing. The management of LBTU should strategically attract additional long-term partners for fundamental, academic and practical research, which are relevant for market stakeholders in the industry to ensure at least 50% from the financing needed for scientific activities of staff. Conduct broader assessments of labor market demand and the need for specific skills/knowledge for graduates that employers need, which can be implemented in study programme.

Conduct a broader labor market assessment of the demand for graduates of the study program.

Create a cooperation plan with other scientific organizations and universities for the implementation of joint curricula to ensure enough students in study programme.

Evaluate the availability of the budget for the continuation of the study program for the next 2 years.

Draw up a plan for renting or sharing existing study equipment if the intensity of its use is lower than 60%.

### **Long-term recommendations**

Develop and implement a recruitment plan for local and foreign students.

In view of the relatively high time needed to develop a practical part, the study programme should be extended to 4 years.

In general, revision of study program is needed, - additional aspects of Environmental engineering are missing (such as air pollution, waste management, noise pollution, circular economy); also the duration of the studies is unbalanced with the activities planned during the studies (e.g. research takes more time than planned) which makes it difficult to complete the studies within the planned time.

### III - Assessment of the Requirements for the Study Field and the Relevant Study Programmes

#### III - Assessment of the Requirements for the Study Field and the Relevant Study Programmes

##### Assessment of the Requirements for the Study Field

Requirements	Requirement Evaluation		Comment
R1 - Pursuant to Section 5, Paragraph 2.1 of the Law on Higher Education Institutions, the higher education institution/ college shall ensure continuous improvement, development, and efficient performance of the study field whilst implementing its internal quality assurance system:		Partially compliant	<p>In general successful development, integration and recertification of specific standard "Investors in Excellence" ensuring internal policy and quality procedures is set. Also, procedures for student evaluations are enough described in the LBTU web page, and more detailed criteria, conditions are given in the particular course descriptions. Growth supporting mechanisms for personnel is well established and functioning. Provided the study field development plan is qualitative, what means milestones were not measurable, so progress couldn't be evaluated in numbers.</p> <p>Students are not involved in all study field development activities, as determined to the "Investors in Excellence" standard (SAR, p. 32-38, in Latvian). Also, case-by-case nonformal communication with employers, in order to get feedback, couldn't be counted as a planned activity.</p>
R2 - Compliance of scientific research and artistic creation with the level of development of scientific research and artistic creation (if applicable)	Fully compliant		<p>All directions of scientific research (SAR, p.61 in Latvian) corresponds to LBTU priority research directions (<a href="https://www.llu.lv/sites/default/files/2023-01/LBTU_Attistibas_Strategija_2023-2027_gala.pdf">https://www.llu.lv/sites/default/files/2023-01/LBTU_Attistibas_Strategija_2023-2027_gala.pdf</a>). The research through the study process is realized in diverse ways - publications, international cooperation, involvement of all level students in research projects (SAR, p. 62-63 in Latvian). Successful internationalization has been proven through international projects and collaboration with other faculties (e.g. Architecture and Construction), stated at SAR (P. 64-65 in Latvian). Academic staff motivation system is very sustainable and effective (SAR, p. 67 in Latvian; interviews during site visit).</p>
R3 - The cooperation implemented within the study field with various Latvian and foreign organizations ensures the achievement of the aims of the study field.	Fully compliant		<p>Although some weaknesses appeared during the analysis, they are not crucial in the evaluation. A few detected weaknesses can be attributed to Covid pandemic and current world crises. Therefore, it can be concluded that in cooperation and internalization, the study program Environmental engineering fully complies. All analysed elements such as cooperation with the institutions from Latvia, cooperation with the institutions from abroad, and systems and procedures for both outgoing and incoming mobility of teaching staff and students are satisfying and contribute to the quality of implementation of the study process and quality of studies.</p>

Requirements	Requirement Evaluation			Comment
R4 - Elimination of deficiencies and shortcomings identified in the previous assessment of the study field, if any, or implementation of the recommendations provided.	Fully compliant			The LBTU has acknowledged previous recommendations and is implementing them to improve the study field and study programmes. There are some deficiencies, but the University has addressed them and is still improving. These deficiencies are not that important to evaluate this section as partially compliant.

### Assessment of the Requirements for the Relevant Study Programmes of the Study Field

No.	Study programme	R5	R6	R7	R8	Evaluation of the study programme (excellent, good, average, poor)
1	Environement and Water Management (42853)	Not relevant	Fully compliant	Fully compliant	Partially compliant	Good
2	Environmental, Water and Land Engineering (45529)	Fully compliant	Fully compliant	Fully compliant	Partially compliant	Good
3	Environmental Engineering (51529)	Fully compliant	Partially compliant	Fully compliant	Fully compliant	Good

### The Dissenting Opinions of the Experts

It should be noted that, although according to some indicators describing compliance to current documents (e.g. non-compliance with the professional standard), the Environment and Water Management (42853) professional bachelor study programme should be assessed as “good”, the programme is, in fact, excellent. Very good specialists are being prepared for the labour market, and not only students, graduates, but also employers' feedback is excellent. In particular, it should be reminded that the professional standard is outdated and is currently being revised.