(Projects funded under the Call 2014 onwards must use this format)

LIFE Project Number

<LIFE14 CCM/LV/001103>

Final Report

Covering the project activities from 01/09/2015[1] to 30/08/2019

Reporting Date[2]

<30082019>

LIFE PROJECT NAME or Acronym

<LIFE REstore>

Data Project

Project location:	Latvia
Project start date:	<01/09/2015>
Project end date:	<30/08/2019> **Extension date:** <dd/mm/yyyy >
Total budget:	€ 1 828 318
EU contribution:	€ 1 096 990
(%) of eligible costs:	60%

Data Beneficiary

Name Beneficiary:	Nature Conservation Agency of Latvia
Contact person:	Ms Ieva Saleniece

[1] Project start date

[2] Include the reporting date as foreseen in part C2 of Annex II of the Grant Agreement

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Instructions:

Please refer to the General Conditions annexed to your grant agreement for the contractual requirements concerning a Mid-term/Final Report.

Both Mid-term and Final Reports shall report on progress from the project start-date. The Final Report must be submitted to the EASME no later than 3 months after the project end date.

Please follow the reporting instructions concerning your technical report, deliverables and financial report that are described in the document "Guidance on how to report on your LIFE 2014-2020 project", available on the LIFE website at: http://ec.europa.eu/environment/life/toolkit/pmtools/life2014_2020/documents/how_to_report_on_your_lifeproject.pdf. Please check if you have the latest version of the guidance as it is regularly updated. Additional guidance concerning deliverables, including the layman's report and after-LIFE plan, are given at the end of this reporting template.

Regarding the length of your report, try to adhere to the suggested number of pages while providing all the required information as described in the guidance per section within this template.

1. Table of contents

2. List of key-words and abbreviations

- AB – Associated Beneficiary
- Baltic Coasts – NGO Baltic Coasts, Associated Beneficiary of LIFE REstore project
- CB – Coordinating Beneficiary
- EC – European Commission
- LPA – NGO Latvian Peat association, Associated Beneficiary of LIFE REstore project
- NCA – Nature Conservation Agency of Latvia, Coordinating Beneficiary of LIFE REstore project
- Project – LIFE project "Sustainable and responsible management and re-use of degraded peatlands in Latvia" - LIFE REstore, LIFE14 CCM/LV/001103
- Silava – State Forest Research Institute "Silava", Associated Beneficiary of LIFE REstore project
- 1st Progress Report - LIFE REstore Progress Report, covering period from 01/09/2015 until 30/06/2016
- Midterm report – LIFE REstore Midterm Report, covering period from 30/06/2016 until 30/06/2017
- 2nd Progress report – LIFE Restore Progress Report, covering period from 01/07/2017 until 30/06/2018
- National Peat Strategy - National Strategy for Sustainable Use of Peat Resources – a long-term policy planning document, currently being elaborated by ministry
- UNFCCC -United Nations Framework Convention on Climate Change

3. Executive Summary (maximum 2 pages)

The project has been successfully implemented and deliverables have been provided in full scale and quality, as per the Grant Agreement.

The main objective of LIFE REstore project was to establish the decision support system for responsible and sustainable management of areas affected by peat extraction in Latvia.

The following tasks were set in order to achieve this objective:

- development of national emission factors and approbation of emission recording methodology based on analysis of GHG samples collected in field;
- vegetation inventory and geological survey in areas affected by peat extraction in Latvia;
- development of a decision-making tool for planning of a responsible use of areas affected by peat extraction;
- support to policy makers by providing information, recommendations and methods for the sustainable use of areas affected by peat extraction.

The key project results are the Optimisation model - decision-making support tool for planning of responsible use of degraded peatlands after peat extraction (Annex_C3), the developed national greenhouse gas emission factors for raised bog and transition mire peat soils and certain agricultural peat soils, and the method for measuring greenhouse gas emissions (Annex_A4), economic evaluation of ecosystem services in demo sites (Annex_C2), and inventory of degraded peatlands affected by peat extraction that has resulted in an open-access database (Annex_A5). The recommendations (Annex_C5_1)

prepared by the project team on reclamation will be an important component in the National Peat Strategy. Other contributions by the LIFE REstore project includes five reclamation measures implemented in four demo sites: reintroduction of Sphagnum mosses, establishment of highbush blueberry and large cranberry plantations, afforestation, and the peat dams on drainage ditches in Lauga mire to optimise the water runoff from the bog, thus ensuring recovery of raised bog ecosystem in an area of 309 ha (Annex_C4). Finally, a manual "Sustainable and Responsible After-Use of Peat Extraction Areas" (Annex_E5) presents the synopsis of all the project results and findings, and has already proven to be sought-after item for experts and Universities in the area.

Regarding the final third of project implementation, an essential advancement towards meeting project goals has been ensured. Substantial LIFE REstore activities, i.e. A4, C3, C4, C5, E5 were finalised in the above stated period. The project key deliverables and outputs were produced: the developed national GHG emission factors, the approbated method for measuring GHG emissions (Action A4), decision-making tool for planning of responsible use of degraded peatlands (Action C3) and the reclamation recommendations (Action C5). Within Action E5 the project book "Sustainable and responsible after-use of peat extraction areas" has been published in Latvian and English languages. The book summarizes information on management of peat extraction affected peatlands in Latvia, after-use types of peatlands, reclamation measures most appropriate for Latvia, ecosystem services of peatlands and their economic value and the information of inventory of degraded peatlands in Latvia. As a result, the remaining 17 LIFE Restore activities have been completed during the final third of project implementation ensuring finalisation of all 24 planned activities.

The international conference of LIFE Restore project "Sustainable Management of Degraded Peatlands and Climate Change Mitigation" was held in Riga, the Academic Center for Natural Sciences of the University of Latvia on 13-14 of June. The field trip to LIFE Restore afforestation and highbush blueberry demo site and demonstration of GHG emission measurements was organized on 2nd day of conference. The goal of the conference was to raise awareness of peatlands' role in climate change mitigation. Please find attached the conference agenda, book of abstracts, presentations and etc. in Annex_E5.

An overview indicating each completed action is provided in the table below. Actions listed in bold have been completed in the final Reporting period of LIFE Restore project.

Action	**Status**
A.1: Stakeholder mapping and current situation analysis	Completed
A.2: Elaboration of Project Communication Strategy	Completed
A.3: Criteria for classification of degraded peatlands and optimal management approach definition	Completed
A.4: Approbation of the methodology for GHG emission accounting	**Completed**
A.5: Inventory of degraded peatland areas and development of database	Completed
A.6: Elaboration of the Management Plan, Detail and Technical Design	Completed
C.1: Development of peatland re-use optimisation model – Stage I – Assessment of key processes in demo-sites	Completed

C.2: Development of peatland re-use optimisation model – Stage II – Economic assessment of ecosystem services in demo-sites	Completed
C.3: Development of peatland re-use optimisation model – Stage III – Assessment of the land use scenarios for demo-sites	**Completed**
C.4: Testing of the peatland re-use optimisation model – implementation of the land use scenarios in demo-sites	**Completed**
C.5: LIFE Recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands	**Completed**
D.1: Monitoring of the impact of project actions	**Completed**
D.2: Monitoring of the socio-economic impact of project	**Completed**
E.1: Project website	**Completed**
E.2: Public information and educational materials	**Completed**
E.3: Public information and educational events	**Completed**
E.4: Networking with other LIFE and non-LIFE projects	**Completed**
E.5: Manual "Methodology for degraded peatland re-use in Latvia"	**Completed**
E.6: International Conference for the degraded peatland management and re-use	**Completed**
E.7: Layman's report	**Completed**
F.1: Project management by NCA	**Completed**
F.2: Audit	**Completed**
F.3: Compilation of information for indicator tables	**Completed**
F.4: After-LIFE Plan	**Completed**

Importantly, the project results have allowed to contribute to the policy planning and implementation documents. In particular, the project contribution to the Climate Change Policy should be emphasized, as the elaborated national GHG emission factors and measurement methodology for peat soils, are really topical elements in the light of recently adopted LULUCF Regulation3 in 2018. Latvia is the first EU Member State, having considerable peat resources, which will be able from now onwards to use national GHG emission factors in the annual inventory. In addition, LIFE REstore elaborated national GHG emission factors for managed peatlands in Latvia have been presented at European Commission DG JRC LULUCF Workshop in May 2019.

[3] Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework.

Second, the contribution of the project to the draft national Peat Strategy (being elaborated) has to be emphasized. The developed recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands have been submitted to the Ministry of Environmental Protection and Regional Development. Recommendations have been also presented to major international and European organisations: the International Peatlands Society (IPS) and the Growing Media Europe.

Difficulties encountered during the project implementation are linked with the delays of start of certain activities (e.g. A5, C1, C2) Despite these delays in start compared to the original timetable, the work was intensified in the final third of the project, and the outputs are of good quality, and have not in principle delayed the implementation of the other subsequent activities (notably Activity C3).

The other difficulty regarding the implementation of works in the demonstration sites is the limited interest of constructors to carry out small-scale works in mires (e.g. 3 dams), which can be also explained with the limited experience in the sector. On the other hand, the works in the mire Lauga have been successfully implemented and have enlarged experience of building peat dams in raised bogs.

Finally, the unpredictable weather conditions have to be listed as difficulty in the planning and implementation of works in nature sector. Indeed, while summer 2017 has been wet and precipitation rich, summer 2018 was extremely dry period. This aspect complicated to the certain extent both the GHG measurements (Activity A4) and reintroduction of spfagnum moss in Ķemeri site. On the other hand, the experiences and measures applied to mitigate above-stated difficulties, will be useful to the other projects and activities to better plan and prepare for weather-related issues as far as possible. In view of that, the project manual (Annex E-5) ‘’Sustainable and responsible after-use of peat extraction areas’’ will be useful material.

4. Introduction (maximum 2 pages)

Organic soils are one of the largest key sources of greenhouse gas (GHG) emissions in boreal and temperate climate regions in Europe. However, scientifically based accounting methods for GHG emissions have been developed and activity data are available mainly for organic soils in boreal climate region. For instance, the default emission factors (EFs) in the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands for forest land on drained nutrient-rich organic soils and similar number of studies for nutrient-poor organic soils in the boreal zone are based on data from 62 sites, while for temperate zone there are data from only 8 sites and both nutrient-rich and poor soils are lumped together. Such a situation creates the risk of the inconsistency of the greenhouse (GHG) inventories and makes the complicated planning of the mitigation measures in national and EU climate policies. Therefore the development of country-specific Tier 2 or Tier 3 compatible GHG accounting methods and activity data are urgently needed for temperate climate zone, together with boreal climate zone representing the majority of organic soils in EU.

Land use represents the most significant climate mitigation potential in many countries in EU. Only the land-based carbon sequestration efforts currently offer the possibility of large-scale removal of GHG from the atmosphere, through photosynthesis and carbon sequestration in soils and biomass of perennial plants. Changes in management practices and land use may also moderate local and regional climate. Moreover, within agriculture, many adaptation measures have significant mitigation co-benefits. For example, increasing soil organic matter improves

adaptive capacity by increasing soil water retention rate and soil fertility, while sequestering carbon at the same time.

Land use, land use change and forestry (LULUCF) sector has a particular potential to make an important contribution to climate change mitigation (CCM), which is not yet fully explored. A key challenge for this sector still is gathering data on GHG emissions and CO2 removals in soils, and development of transparent, management, climate and nutritional regime sensitive GHG EFs or models that can be applied at local, EU and global scale in short-term and long-term prospective. Decision No 529/2013 and LULUCF regulation (2018/841) foresees that the Member States will prepare information on actions, which would set out measures to limit or reduce emissions and to maintain or increase removals and the monitoring and reporting methods to be taken to adopt common accounting rules, to which the efforts of LIFE REstore project are contributing.

To date, the LULUCF sector has been largely limited to the regulation, monitoring, and reporting of land-use change. By themselves, the CCM measures are unlikely to fully deliver on the significant potential of the sector for offsetting GHG emissions, which has been recognised in the recent re-framing of EU and United Nations Framework Convention on Climate Change (UNFCCC) policy contexts. The framework for climate-smart land management of spatial interaction between agriculture, forestry or peat production and the full spectrum of ecosystem services (e.g., water quality, carbon sequestration, biodiversity, nutrient cycling) provides the next step toward implementation of proactive management principles in LULUCF sector, with a view to broadening and diversifying the menu of options for the mitigation of climate change.

Climate-smart land management does not necessarily require radically new policy initiatives. Customisation and targeting of existing governance instruments are transferable to other regions, allowing LULUCF sector to fulfil its potential in contribution to the GHG reduction targets in non-ETS (Emission Trading System) sector in the emerging policy environment.
The LIFE REstore project addresses the Climate Change Mitigation priority area, particularly on the reduction of GHG emissions in the managed wetlands as primary targets. The project stresses the importance of using spatially-explicit data to identify land use and land use change, by using existing national and EU level dataset, like National forest inventories, high-resolution LiDAR and Sentinel II, Land Parcel Information System (LPIS) spatial data for site characterisation and modelling of the emissions from organic soils. It is also built on the existing EU-wide LULUCF accounting rules laid down in Decision No 529/2013/EU and Regulation of the European Parliament and of the Council on the inclusion of GHG emissions and removals from LULUCF into the 2030 climate and energy framework (2018/841/EU) on a mechanism for monitoring and reporting GHG emissions and other information relevant to climate change.

The contribution of the LIFE REstore project to the CCM targets can be summarized as:

- Improved the knowledge base for the quantitative assessment, monitoring, projections and implementation of the CCM measures in the management of organic soils informer peat extraction sites and enhanced capacity of national authorities to apply obtained knowledge in practice in planning of management of organic soils. The practical use of the project results already during the implementation stage of the project is ensured by experienced consortium consisting from organisations participating in development and implementation of climate policies;
- facilitated development and implementation of integrated and cross-sectoral approaches in LULUCF sector for management of organic soils through the CCM measures integrated into

the national strategies, i.e. the National Energy and Climate Plan of Latvia 2021–2030 (draft for submission to the EC) more detail in section 6.4.7);

- verified and demonstrated innovative CCM methods in wetland management like production of berries and afforestation and instruments that are suitable for monitoring of implemented measures;
- strengthened capacity of national GHG inventory team and developed regional networking channels on the GHG accounting and mitigation actions; as well as strengthening of capacity of the researchers by implementation of new and efficient methods for GHG measurements;
- tools and guidelines for implementation of the CCM measures in degraded peatlands, as well as biodiversity and socio-economic impact analysis of the proposed actions. Nutritional regime and temperature sensitive EFs, tools for generation of activity data for GHG accounting and integration of the emission projections from wetlands into the national projections are of special importance in long-term perspective, considering that management of soil for CO2 sequestration requires long-term implementation period and effectiveness of different measures might change during the time.

The project has considerable transferability and replication potential in Nordic and Baltic region (5 mill. ha of organic soils) and in the whole temperate climate region in Europe by adaptation of CCM measures implemented in the demo sites of the LIFE REstore project and further development of EFs covering different climatic and management conditions to retain or increase the economic and biological value of managed peatlands thus ensuring sustainability and resilience of the national CCM strategies.

5. Administrative part (maximum 1 page)

5.1. Project management

During the project implementation, the Project management structure has not been changed. Please find the organogramme below.

In order to ensure successful implementation of the Project, all three essential groups:

1. Project Management team,
2. Monitoring group (inter-institutional Steering group and internal Monitoring group organised by NCA),
3. the Thematic Workgroups were operational.

During the project implementation period there have been 37 project management meetings and five Inter-institutional Steering group meetings. There have been three thematic groups during the whole project implementation period. Also five internal Monitoring group meetings by Nature Conservation Agency have been organized.

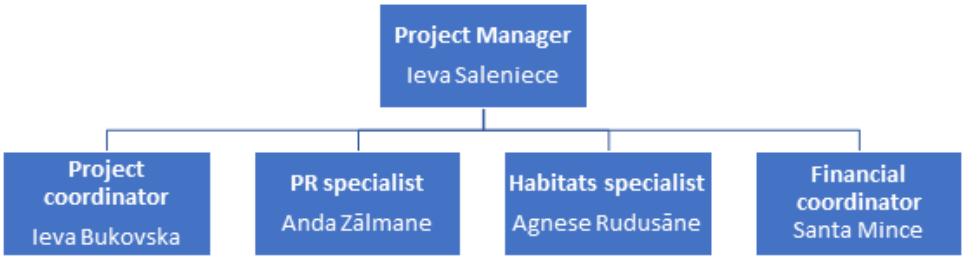
Project Management team was aiming to meet once a month. In the final third of the project there have been 14 meetings. In addition to the regular meetings, contacts email and phone contacts provide for effective organisation of work. According to the Partnership agreements, associated beneficiaries have submitted Quarterly reports.

In the final third of the project , Inter-institutional Steering group meetings were organised on 13th November 2018 (please find minutes of the meeting, presentations and participant list in the Annex_5.1) and on 30 May 2019 (please find minutes of the meeting, presentations and participant list in the Annex_5.1.-1). In those meetings the progress of project activities implementation and project results and outcomes were presented. The following deliverables were presented at the meeting of the Steering Group: database Application on areas affected by peat extraction (https://restore.daba.gov.lv/public/lat/datu_baze1/), optimisation model and also it's interactive online tool (https://karte.ozols.gov.lv/optimizacijas.modelis/), the reclamation recommendations and the developed national greenhouse gas emission factors for raised bog and transition mire peat soils and agricultural peat soils, as well as the approved method for measuring greenhouse gas emissions. In addition, there have been one internal Monitoring group in NCA in the final third of project.

The meetings of Thematic Working groups were organised on the needs basis. Within the final third of the project, the final version of Optimisation model (action C3) was presented in Thematic group on 9th January 2019. The deliverable Optimisation model is attached in the Annex_C3 and the participant list from the final Thematic group in the Annex_5.1.-2.

5.2. Project management by NCA

Within the final third of the project, the personnel of the project management team have not been changed. Please find the organogramme with names below.



There has been agreed changes in the Partnership Agreement between NCA and BC. Amendment Nr 1 to Partnership Agreement between NCA and BC was reported with the 2nd Progress report (Annex_5_2_A). Amendment Nr 2 to Partnership Agreement between NCA and BC to formalise the activities under the responsibility of each project partner is to be found in Annex 5_2_B. The updated scheme of Partners' responsibilities per different activities is below:

The LIFE Restore management team have been regularly communicating with EASME and external monitoring team during the project implementation. The communication always has been effective, facilitating understanding how to solve challenges that project team may face. Yearly visits by the monitoring experts and/or the Commission`s representatives have been constructive and useful.

Amendment request regarding the administrative modification of the change of the name of an associated beneficiary "Latvian Peat Association" has been submitted to EASME on 2 May 2019 (Annex_5.2.-1). EASME confirmation letter dated 11 July 2019 constitutes the letter Amendment No. 4 to Grant Agreement (Annex_5.2.-2).

6. Technical part (maximum 25 pages)

6.1. Technical progress, per Action

A.1: Stakeholder mapping and current situation analysis

Reported and finalised by the 1st Progress report

Status:	Foreseen start date:	01/09/2015	Actual start date:	01/09/2015
Completed	Foreseen end date:	31/12/2015	End date:	30/06/2016
Deliverable name		Deadline		Status
Stakeholder analysis		12/2015 (Modified to 06/2016)		Completed by the 1st Progress Report
QA/QC programme and Work Plan		11/2015 (Modified to 06/2016)		Completed by the 1st Progress Report
Milestone name		**Deadline**		**Status**
Stakeholder mapping and current situation analysis performed		12/2015 (Modified to 06/2016)		Completed by the 1st Progress Report

Self-assessment

Self-assessment has been carried out at the beginning of the project, forming an integral part of the Project implementation. It is a part of Project Quality Assurance guidelines (Annex No. A1-01).

Work plan

Work plan has been elaborated at the beginning of the project, and updated during the implementation period. Although there have been several extensions of the deadlines for the implementation of certain activities these have not had a significant impact on the overall project progress. Work plan is a part of Project Quality Assurance guidelines (Annex No. A1-01).

Task 3. Stakeholder mapping

The database of stakeholders has been developed at the beginning of the project and is a part of Project Quality Assurance guidelines submitted with the first Progress Report (Annex No. A1-01).

The project communication activities were focused on raising awareness on the importance of peatland ecosystem services and their monetary value; on the potential of peatlands for the climate change mitigation; on the integration of this knowledge into planning and decision-making for degraded peatlands. Awareness and improved knowledge among stakeholders have facilitated the successful implementation of the project results. The project team prepared various informative materials: publications in

media, scientific papers, e-newsletters on topics and activities of the project, such as after-use scenarios of cutaway peatlands, GHG measurements, development of national GHG emission factors, and inventory of cutaway peatlands in Latvia.

Ten documentary short films about the most significant project results were created. An important part of the communication activities were educational and informative events – seminars, meetings with target groups, presentation of the project results in annual events which are important for peat industry, such as Baltic Peat Producers Forums, and guest lectures at universities.

Guidelines for project impact monitoring

The task had a focus on Project management monitoring rather than on Project impact monitoring, which is carried out within Action D1. Project management is part of Project Quality Assurance guidelines (Annex No. A1-01) for the following project management processes:

- Project management and organization;
- Document and risk management;
- Public procurement;
- Accounting;
- Human resources;
- Trips and travelling;
- Quality assurance and control of GHG emissions accounting.

Current situation analysis

Current situation analysis, including analysis of national regulations and management practices, has been carried out in the beginning of the project and submitted by the 1st Progress Report.

A.2: Elaboration of Project Communication Strategy

Reported and finalised by the 1st Progress report

Status:	Foreseen start date:	01/09/2015	Actual start date:	01/10/2015
completed	Foreseen end date:	31/12/2015	Actual end date:	30/06/2016

Deliverable name	**Deadline**	**Status**
Project Communication Strategy (submitted with PR1, Annex A2-01)	12/2015 (Modified to 06/2016)	completed
Milestone name	**Deadline**	**Status**
Project Communication Strategy Elaborated	12/2015 (Modified to 06/2016)	completed

Communication Strategy of the Project has been elaborated by PR specialist, and agreed by the Project management team. Communication Strategy addresses issues of goals and tasks of communication, communication risks and crisis communication management, communication messages and channels. Communication strategy includes Project communication activities plan. Strategy was submitted with Progress Report 1 and is annexed as Annex No. A2-01.

According to Communication strategy, it's implementation is supervised by Project Communication team, which consists of Project management team and PR specialist. The implementation was evaluated every 6 months and communication activity plans were updated if necessary. Evaluation of Communication strategy is done within Project socio-economic impact assessment plan (action D.2).

A quote of Ilona Mendziņa, Ministry of Environment Protection and Regional Development, Deputy Director of Department of Nature Protection, at the LIFE REstore' international closing conference allows to summarize the effects of the successfully and professionally elaborated project Communication strategy – "As LIFE REstore strength project's public relations component must be highlighted".

LIFE REstore was also nominated as the Most publicly active project at the LIFE Programme Awards 2018 organized by capacity building project in Latvia of the LIFE program – CAPLIFELAT on November, 2018.

Effective and professional media relations by LIFE REstore resulted in extensive media coverage of the project – in total 182 publications/ broadcasts on local and national media – newspapers, internet media, radio and TV, with more than 3 129 326 reached audience – data according to National News Agency LETA media monitoring. During the project lifetime in total 52 information and education events have been organized and held engaging in total more than 2138 participants - accordingly +100% and + 328% more than planned in the project proposal. In addition, 1 international closing conference was organized with 159 participants. Detailed information in actions E2, E3 and E6.

Problems/delays/changes

Clarification of Expected results (establishment of communication working group was asked to be deleted as the Project management team was supervising the implementation of the communication strategy) and modification of deadlines of Deliverable and Milestone to actual end dates of action A.2 were proposed within Progress report 1.

A.3: Criteria for classification of degraded peatlands and optimal management approach definition

Reported and finalised by the 1st Progress report

Status:	Foreseen start date:	01/10/2015	Actual start date:	01/10/2015
Completed	Foreseen end date:	31/12/2015	End date:	30/06/2016
Deliverable name		Deadline		Status
List of Criteria for the classification of degraded peatland areas		12/2015 (Modified to 06/2016)		Completed by the 1st Progress Report
List of Criteria for the definition of the optimal management approaches		12/2015 (Modified to 06/2016)		Completed by the 1st Progress Report
Milestone name		**Deadline**		**Status**
Criteria for classification of peatland areas and definition of management approaches elaborated		12/2015 (Modified to 06/2016)		Completed by the 1st Progress Report

Both deliverables: List of criteria for the definition of the optimal management approaches (Annex_A3_01) and list of criteria for the classification of degraded peatland areas (Annex_A3_02) were developed in the beginning of the project, and submitted with the Progress report Nr 1.

As the classification of the degraded peatlands was carried out in line with the Intergovernmental Panel on Climate Change (IPCC) requirements for accounting of GHG emissions from wetlands and organic soils in cropland, forest land and grassland, the changes the IPCC 2013 introduced into the National GHG inventory, were addressed by essential changes also into the workplan: like new land use categories and vegetation types (these were not considered at the project application stage because then the previous IPCC requirements were in place).

Nevertheless, the objective of the action was achieved, and the developed system of criteria was later used in the elaboration the inventory of the degraded peatlands within action A5, as well as in the development of peatland re-use optimisation model (actions C1-C5). The same criteria were also used in elaboration of GHG emission factors and in the development of the model for comparison of the potential impact of the implemented measures.

In spite that most of the indicators can be evaluated using existing or approaching data sources, e.g. Sentinel 1, 2 and 3 and LiDAR data, there are several crucial indicators, which requires field measurement like peat depth and nutritional conditions in different peat layers. The project team also, however, was not able to develop DTW maps for the whole country because of lack of high-resolution terrain data. The peat layer was evaluated in the selected set of peatlands, as well as in the National forest inventory (NFI) plots located in the degraded peatlands. The chosen approach was sufficient to ensure the required result, however, it is recommended to carry out the country-wise evaluation of above-listed indicators within the scope of further studies.

A.4: Approbation of the methodology for the GHG emission accounting

Status:	Foreseen start date:	01/10/2015	Actual start date:	01/10/2015
Completed	Foreseen end date:	(30/06/2016) 12/2018	End date:	31/05/2019
Deliverable name		Deadline		Status
Methodology for GHG emissions accounting (Modified to "Approbated methodology for GHG emissions accounting")		07/2016 (Modified to 12/2018; confirmed with EASME letter on 1st Progress Report Ref. Ares (2016)7098225 - 21/12/2016) technical issue Point No.7		Finalised
Milestone name		**Deadline**		**Status**
GHG measurements in degraded peatland areas carried out, methodology elaborated and verified		07/2016 (Modified to 12/2018)		Finalised
Draft methodology for GHG emissions accounting		12/2016		Finalised as the final methodology was approved.

Significant contributions of LIFE Restore project are within Action A4 developed national greenhouse gas emission factors for raised bog and transition mire peat soils and for agricultural peat soils, as well as the approved method for measuring greenhouse gas emissions which will form an important component in climate policy in Latvia.

To ensure that result, a considerable research work has been carried out for improving GHG emission factors from managed organic soils, in order to replace the emission factors offered by Guidelines for GHG Inventories of Intergovernmental Panel on Climate Change (IPCC), with scientifically tested nationally applicable emission factors and activity data. The GHG emission accounting methods were adopted, based on two years of GHG emission measurements in lands with various land use types, in 41 sites in Latvia. National emission

factors were developed for managed wetlands, as well as for a part of organic soils in agricultural and forest areas. For the introducing the developed national factors, they will be published in scientific literature, and presented during the International Auditing of National Inventory of GHG emissions. GHG emission factors for forest lands and peat fields, including abandoned peat deposits, are planned to be published in Baltic Forestry journal in 2020. GHG emission factors for agricultural land are planned to be published in Agronomy research journal in 2020, integrating soil emission data with biomass equations developed by Silava in cooperation with Latvia University of Life Sciences and Technologies.

Latvia is the first among the Baltic countries where the abovementioned national GHG emission factors have been developed.

Among the reclamation measures for extracted peatlands examined within LIFE REstore project, the lowest net GHG emissions were found in large cranberry plantations and Scots pine plantations. The transformation of harvested peatlands into agricultural lands was considered as inappropriate after-use type, because it results in multifold increase of emissions from the soil. The studies done by LIFE REstore project team will be an essential component of planning and implementation of climate policy in Latvia, including achieving of EU-LULUCF Regulation objectives. This Regulation includes managed wetlands in the GHG reduction objectives from 2026 onwards.

A detailed information on the process and methodology of Action A.4, its importance in the international UNFCCC framework and the national climate change policy is to be found also in REstore manual ‘’Sustainable and responsible after-use of peat extraction areas’’ (Annex E_5), in section 3 ‘LIFE Restore ’Contribution to the GHG emission accounts in Latvia’’, (page21-55). The deliverable ‘’Methodology for GHG emissions accounting’’ is to be found in Annex_A4. The table 8 of the deliverable for activity A4 lists seven different reports within framework of the climate change legislation which will use the results of the elaborated methodology and GHG emissions factors.

Within A4 activity GHG measurements were carried out to establish national GHG emission factors, measurement of GHG in demo-sites falls within scope of D1 activity, and is described in relevant section. GHG analyses for the period of 24 months from November 2016 to November 2018 were done by the Severitas OÜ (subcontracted by the NCA).

There were several reasons why the originally planned measurements twice a month (as per project application) were optimised for once a month measurement. Indeed, sampling intensity twice per month is recommended to characterize only N_2O emissions, for CH_4 and CO_2 measurements once per month measurement is sufficient. Quite often measurement are done quarterly or once per year at certain period of time. The sampling procedure was optimised due to the fact that actual distance to study sites were about twice long as initially planned to ensure comparable soil characteristics, e.g. farmlands and abandoned peatlands. The implemented approach allowed to avoid the increase of subcontracting costs but at the same time provided an opportunity to do additional measurements, e.g. photosynthesis by LSFRI Silava. The risk of underestimation of N_2O emissions was considered negligible because the

project target area is nutrient poor soils, where N_2O emissions are not a key source in Latvia or are accounted in agriculture sector (cropland and grassland), respectively elaboration of higher tier methodology in LULUCF sector is voluntary. From the other side, even monthly data should be sufficient to elaborate emission factors for minor source of emissions.

The Severitas OÜ in cooperation with LSFRI Silava implemented initial QA procedures (Severitas for gas analyses and Silava for photosynthesis , other soil, water and physical environment related parameters).

The elaborated methodology within Restore project will contribute to seven separate reports prepared in the framework of national Inventory for GHG. Please find a list of reports and specified Restore contribution in table below (in Latvian):

Ziņojums	**Normatīvais akts**	**LIFE REstore ieguldījums**
Ziņojums, kurā aprakstīts zemes izmantošanas, zemes izmantošanas maiņas un mežsaimniecības darbību īstenošanā panāktais progress saskaņā ar ES Lēmumu 529/2013 10.p.	EIROPAS PARLAMENTA UN PADOMES LĒMUMS Nr. 529/2013/ES 10.pants	Emisiju faktori organiskajām augsnēm, emisiju mazināšanas pasākumu (zemes izmantošanas veida maiņa) ietekmes aprēķini
Ziņošana par emisijām un piesaisti, ko rada aramzemes apsaimniekošana un ganību apsaimniekošana (Lēmuma Nr. 529/2013/ES izpildei)	EK Īstenošanas Regulas 749/2014 40.pants; UNFCCC COP 6/CMP.9; 2/CMP.8	
Ieviestās Ziņošanas prasības attiecībā uz aramzemes apsaimniekošanas un ganību apsaimniekošanas nacionālām sistēmām (Lēmuma Nr. 529/2013/ES izpildei)	EK Īstenošanas Regulas 749/2014 39.pants; UNFCCC COP 19/CMP.1; 24/CP.19	Pilnveidota SEG emisiju aprēķinu un prognožu metodika organiskajām augsnēm aramzemēs un zālājos
Valstu nacionālie ziņojumi UNFCCC un KP ietvaros (jāsagatavo ik pēc 4. gadiem)	EK Īstenošanas Regulas 749/2014 18.pants; UNFCCC COP 2/CP.17; UNFCCC 12.p. Konvencijas 12. pants Lēmums 4/CP.5 Lēmums 15/CMP.1 Lēmums 9/CP.16 Lēmums 2/CP.17	SEG emisiju prognožu pārrēķins atbilstoši pētījumā iegūtajiem darbības datiem un emisiju faktoriem
Divgadu pārskati UNFCCC ietvaros	EK Īstenošanas Regulas 749/2014 18.pants; UNFCCC COP 2/CP.17; UNFCCC 12.p. Lēmums 1/CP.16 Lēmums 2/CP.17 Lēmums 19/CP.18	
Ziņojums par politikām, pasākumiem un SEG prognozēm	Monitoringa mehānisma regulas 525/2013 13., 14. pants.	
Ikgadējā SEG inventarizācija	EP un Padomes Regulas 525/2013 7.pants; EK Īstenošanas Regulas 749/2014 7.pants - 18.pants; UNFCCC Līgumslēdžeju pušu konferences Lēmumi 6/CMP.9; 24/CP.19; Lēmums 15/CMP.1; 2/CMP.8; 3/CMP.11	SEG emisiju un CO_2 piesaistes pārrēķini barības vielā nabadzīgās organiskās augsnēs mitrājos un meža zemēs, kā arī barības vielām bagātās augsnēs aramzemēs un zālājos

The elaborated GHG flux measurement methodology is approved by the scientific community in Latvia and Estonia. Activity data are published as follows: (Butlers, A., & Ivanovs, J. (2018). Improved activity data for accounting greenhouse gas emissions due to management of wetlands. *Annual 24th International Scientific Conference Research for Rural Development*

2018, 1, 27–33. https://doi.org/10.22616/rrd.24.2018.004; Pētersons, J., & Lazdiņš, A. (2019). Inventory of territories affected by peat extraction and its results. *Sustainable and responsible management and re-use of degraded peatlands in Latvia*, Rīga: Academic Center for Natural Sciences of the University of Latvia). In addition, there are planned publications in Baltic Forestry journal and in Agronomy research journal in 2020.

The GHG flux measurement methodology is already transferred to several research and development projects including LIFE Peat Restore and LIFE OrgBalt projects dealing with demonstration of the CCM measures in degraded peatlands and nutrient-rich organic soils, accordingly.

The improved methodology for National GHG inventory in LULUCF sector is demonstrated in national and international events, including presentation of the elaborated methodology in EC JRC meeting in May 2019. The Ministry of Environment and Regional Development has appreciated project results (see letter in Annex_6_3) and has stated that the results are of importance not only in Latvia, but also to the other countries in hemiboreal region as up to now the LIFE REstore project provides the most comprehensive data set for development of GHG emission factors for North-Eastern part of the temperate climate region. The most important result of the task is approval of the initial hypothesis that the default EFs proposed in the IPCC guidelines for temperate climate zone considerably overestimates CO_2 and N_2O emissions and underestimates CH_4 emissions. The net GHG emissions from most of the land use categories are about twice smaller than the current estimates.

The elaborated GHG emission factors and activity data will be/are published in the peer reviewed scientific journals and then integrated into the National GHG inventory (see information on concrete publications earlier in the section, page 19). Up to now the LIFE REstore provides the most comprehensive data set for development of GHG EFs for hemi-boreal climate region, representing North-Eastern part of the temperate climate region (please find the graph on temperate cool and moist climate zone in Annex A_4). Due to harmonized methodologies these data can be integrated with recent research results in Estonia and Finland, thus covering the whole boreal and hem-boreal climate region.

Even though, E actions presents detailed information on dissemination of GHG measurement methodology, it is appropriate in this section to underline presentation of the elaborated methodology in EC JRC meeting in May 2019 prior to the REstore Closing Conference. The carried out work and the deliverable of the Activity A4 has been praised also by the Climate Change department of the Ministry of ….. (please refer to the film on the importance of GHG measurement methodology in managed peatlands and national GHG emission factors, interview with the Director of Climate Change Department min 5-6 in the project film:

https://www.youtube.com/watch?v=4SuPAO2Arms&feature=youtu.be)

A.5: Inventory of degraded peatland areas and development of database

Reported and finalised by the 2nd Progress Report.

Status:	Foreseen start date:	**01/04/2016**	Actual start date:	**01/11/2015**
Completed	Foreseen end date:	30/06/2017	End date:	31/08/2018
Deliverable name		Deadline		Status
Database supplemented by multi-layer maps and inventory report developed		08/2018		Completed by the 2nd Progress Report. Annex_A5-1; Annex_A5-2.
Milestone name		**Deadline**		**Status**
Inventory of degraded peatlands performed		07/2018		Completed
Database of degraded peatlands created		12/2017		Completed

Within the LIFE REstore project, identification of peatlands affected by peat extraction was carried out. In total, ca. 50 thousand hectares of areas affected by peat extraction were identified. Out of them, ca. 15 thousand hectares (30%) are active peat extraction areas; ca. 17 thousand hectares (34%) are areas where reclamation measures have been or are currently being implemented; ca. 18 thousand hectares (36%) are abandoned cutaway peatlands where reclamation should be carried out. However, since in many of them there are unused peat resources left, at first these areas could be used for peat extraction and after peat extraction the national regulations would come into force to reclaim territories. Thus, these abandoned peat extraction areas will be reclaimed.

Data on peatland areas show the situation on January 1, 2016. About 18 thousand hectares of cutaway peatlands identified within the project are areas where peat extraction has been ceased or completed, but no reclamation has been carried out and no license for the use of peat resources is valid any longer. Seventy-eight peatland areas (total area ca. 10 thousand hectares) were surveyed on site. Here, thickness of the residual peat layer was determined, as well as peat type at the upper layer, peat decomposition degree and pH value. Photographs and peat samples were taken in all surveyed sites.

Vegetation was surveyed in 32 cutaway peatlands with total area more than 32 thousand hectares. Summary of peatland inventory was used for developing database on areas affected by peat extraction. It is an open access GIS-based database and functions as part of the Latvian Nature Data Management System OZOLS: https://restore.daba.gov.lv/public/lat/datu_baze1/. For visualization of data layers and information analysis, two applications and story map were developed. In the geodatabase, spatial data and information that characterises the surveyed areas are available. The database provides detailed information about the peatlands affected by the peat extraction in Latvia, including their location, area, condition and properties of residual

peat, and thus it will be useful in planning sustainable management of degraded peatlands and choosing the most appropriate after-use type for particular peatlands.

Although completion of activity was delayed, there was no significant impact on the execution of other actions. The Inventory of degraded peatlands was finalised on 30 June 2018, however, some further final revisions were carried out in July and August 2018.

The database, it's relevant tools and usage options has been presented in several seminars, workshops, inter-institutional Steering group meetings and LIFE Restore international conference. This database will be a useful as a tool and the source of information for state and municipal land managers, as well as private land owners and organizations interested in peatland use and conservation.

Problems/delays/changes
Although the activities within this Action were finalised with delays, it has not had a negative impact on the overall implementation of the Project. Delays in activities were related to in-depth data research and complex data acquisition, as well as the need to carry out surveys of several vegetation periods for the vegetation inventory.

The extension of the inventory Action caused a necessity for additional expert workload. Savings on Actions A3 and A4 have been used to cover the human resources needed for Action A5. In the project proposal it was planned that the inventory activity would be implemented within one year, however, during the inventory implementation it was concluded that additional time was required – additional vegetation season was required to obtain complete data and suitable weather conditions were needed to obtain the required missing data.
According to the project proposal the result was fully achieved – report prepared, database and visual cartographic material developed.
Within the framework of Action A5, all necessary information about all peat extraction fields (including abandoned peatland) in Latvia was summarized, as well as all data necessary for the development and usage of the optimization model, was collected.

A.6: Elaboration of the Management Plan, Detail and Technical Designs

Reported and finalised by the 2nd Progress Report.

Status:	Foreseen start date:	01/01/2016	Actual start date:	01/01/2016
Completed	Foreseen end date:	30/06/2017	End date:	18/05/2018
Deliverable name		Deadline		Status
Detail Design for implementation actions within Lauga Mire and demo sites		18/05/2018		Completed
Management plan for Lauga Mire		06/2017		Completed
Milestone name		**Deadline**		**Status**
Management Plan for Lauga Mire and Technical Designs for demo-sites elaborated		18/05/2018		Completed

Within Action A6, several activities relevant to the further Project implementation have been carried out, e.g. the Management Plan for the Lauga Mire Nature Reserve has been elaborated. The area is particularly sensitive because, although the Lauga Mire is a specially protected nature area (Natura 2000), an active economic activity is carried out in its immediate vicinity, which also affects the natural mire area. One of the major challenges, as well as obstacle to the development of the Management Plan, was to combine the needs and wishes of all stakeholders while ensuring the protection of the Lauga Mire and the preservation of its biological value. The developed Management Plan provides justification for the need for re-cultivation of the area and identifies the activities necessary to be carried out. Developed Management Plan for the Lauga Mire has been approved by Ministry of Environmental Protection and Regional Development at 22nd June, 2017.

The developed Management Plan is the first in Latvia to carry out an assessment of ecosystem services, which demonstrates the benefits of the site and at the same time identifies the risks that may result from ill-considered site management.

The developed ecosystem service assessment served as the basis for the ecosystem service assessment developed under the Action C1.

Another important activity of the A6 was the development of reclamation designs for the types of reclamation tested within the Project. According to the current legislation, in order to start the re-cultivation, it is necessary to develop and agree the reclamation design *(rekultivācijas mets)* with the construction authority of the specific area. For such reclamation scenarios as berry, sphagnum and tree planting, reclamation design *(rekultivācijas mets)* was prepared. According to Republic of Latvia Cabinet Regulation

No.570 “Mineral Extraction Procedures” reclamation design is free-form pre-design material that illustrates the reclamation concept.

For Lauga Mire construction design (*būvprojekts*) was prepared. According to the Construction Law, the dams are considered to be hydrotechnical structures, which requires to prepare construction design. Construction Law defines construction design as an aggregate of graphic and text documents necessary for the implementation of a construction intention.

The Project encountered minor problems in implementing this task, which prevented the timely finalisation of the Action. While elaborating the construction design of the Lauga Mire, difficulties occurred in relation to coordination with the owner of the adjacent area (cranberry grower). However, a solution was found – by balancing the owner's wishes and nature protection needs, a new (innovative for Latvia situation) technical solution was developed for stabilisation of the hydrological level. The possibility to regulate water level was tackled incorporating in design built-in pipes which provide a possibility to regulate water level for three different levels from 58.3-58.5 m above the sea level (more detail in Annex C4_4 which contains Section 6.3.4 of Restore book).

The second delay resulted from unforeseen weather conditions. Initially, it was planned to develop a reclamation design for the Kalnu Mire, where cranberry growing areas were foreseen, but unexpected rainy summer delayed the planned peat extraction, which prevented cranberry growing activities and consequently the development of the reclamation design. A solution was found by replacing the Kalnu Mire site with the Kaudzīši Mire site. Changes has been approved by EASME (letter No Ares (2019) 3290314; 20th May, 2019);

Although the implementation of Action A6 required a longer period than initially planned, the extension of the implementation of the Action did not pose a risk to the quality implementation of the Project by carrying out the planned works in parallel.

The works carried out within the framework of the Action A6, the lessons learned, and the deliverables prepared were used for the successful implementation of the Project. Based on the Management Plan, which provides detailed analysis of the situation and the necessary solutions for site conservation, measures to stabilize hydrological water level have been successfully implemented within the Action C4, and the information gathered has been used to develop the optimisation model within C3 (allowing the identification of the necessary steps to be taken and their costs) and the information was used to develop recommendations for further use of degraded peatlands within C5.
The developed reclamation designs have been used in the implementation of reclamation activities within the Action C4.

Problems and delays
The implementation of the Action A6 necessitated additional expert work. When the development of the Management Plan was initiated, it resulted in necessity for a significant increase in the workload of the wetland expert. The need was mainly caused by the specific terms of reference, the assessment of ecosystem services and the complex socio-economic situation of the Lauga Mire Nature Reserve and the radically diverging views of stakeholders.

Although the evaluation of ecosystem services was included as one of the tasks for Lauga Mire Management plan elaboration for Foundation Eco Forum, however, it was very important to involve a knowledgeable expert in this work which would ensure the acquisition of data and information that could be used to carry out the activities necessary for the project. The ecosystem service assessment in Latvia is a quite new approach to analyse territory and wetland expert have significant role to provide assessment of ecosystem services in high quality.
In addition to all the tasks that has been described in previous reports, the days of wetlands expert were needed to ensure a unified approach in data obtaining process, so that the economic evaluation of ecosystem services can be taken, comparison of territories can be made, as well as data integration in peatland re-use optimisation model can be done. (Action C3).
In order to ensure the involvement of the wetland expert in the amount required for the implementation of the Action A6, the hours provided for within the Action C4 were used. For the successful realisation of the reclamation designs, a peat and soil expert was additionally engaged to advise and review the design developed by the service provider. The required expert workload was increased through savings in the Action A3. Detailed explanations of extensions and changes in expert workload were provided in Midterm Report and Progress Report.

Results and deliverables of the Action A6 have been prepared for upload on the project website:
http://restore.daba.gov.lv/public/lat/aktivitates_un_rezultati/dabas_aizsardzibas_plana_un_tehnisko_risinajumu_izstrade/

C.1: Development of peatland re-use optimisation model – Stage I – Assessment of key processes in demo-sites

Reported and finalised by the 2nd Progress Report.

Status:	Foreseen start date:	01/04/2016	Actual start date:	01/06/2016
Completed	Foreseen end date:	30/06/2017	End date:	30/10/2017
Deliverable name		Deadline		Status
4 3D hydrogeological models		06/2017		Completed
4 maps with ecosystem services and their impacts		10/2017		Completed
Milestone name		**Deadline**		**Status**
Demo sites selected and studies of key processes performed		10/2017		Completed

Within Action C1, two major tasks have been accomplished – the development of 3D hydro-geological models and the evaluation of ecosystem services for the pilot areas of the Project.

3D hydrological models were developed for the areas for which changes in the hydrological level were planned within the Project. 3D hydrological models were developed in order to determine the current hydrological level of the territories and the types of activities that need to be performed in order to ensure the implementation of the most successful re-cultivation methods.

Conclusions of Hydrological and hydrogeological model for Lauga mire:

- Vegetation of Lauga Mire is not threatened by hot summer or lack of rainfall, but rather by changes of the water level of the Viższers which is central part of Lauga Mire. In the year 2000, measures were taken to restore the water level in Višezers, but the situation is very unstable due to the technically obsolete dams whose existence is threatened. It is necessary to build (restore) 3 stable dams to ensure the required hydrological level.
- No additional hydrological stabilization measures are required for the Lode Lake.
- The Viršupe does not currently require special management measures to ensure its favourable conservation status. Non-interference with its natural development should be further ensured.

Conclusions of Hydrological and hydrogeological model for Ķemeri mire:

- The most important factor to provide the water level necessary for the vegetation of the bog is to stabilize the hydrological level and the optimum groundwater level for sphagnum growth is approx. 0,3 meters from the ground.
- By preparing the area for sphagnum planting, it is necessary to level the surface of the peat field and to minimize the slope of the surface. The creation of terraces is not rational, because the slope of the relief surface within the territory is not higher than 0,5 meters in any direction.
- By preparing territory for sphagnum planting it is necessary to ensure that hydrological conditions in the nearby areas do not differ from those provided in the demonstration areas

The conclusions were used in the elaboration of the reclamation designs (Action A6) and in the implementation of the reclamation activities within C4.

Within Action C1 ecosystem assessment was prepared not only to analyse current situation, but also to assess scenario development in a 5-year; 25-year and 50-year period.

The developed assessment of ecosystem services demonstrates the natural values of the different areas that are essential for human well-being. The results reflect not only the benefits of choosing different types of re-cultivation, but also the risks expected from leaving peatlands in degraded condition.

The main conclusions of the assessment of ecosystem services are:

- The values of ecosystem services of abandoned peat extraction areas are very low. That kind of territory does not provide provisioning services and provided regulation and maintenance services are very low. Furthermore, unless targeted reclamation measures are taken in these areas the range of ecosystem services provided will not increase even not in 50 years long period.
- According to biophysical ecosystem services assessment the most valuable reclamation scenario of degraded peatland is twenty-five year future for forest establishment. The forest is able to provide high value of regulation services as well as provision services (in comparison with other demo sites).

Economic calculations of ecosystem services have been performed on the basis of the data obtained, and the ES Indicator Sheets developed under C2. Based on an economic valuation of ecosystem services allows to compare different territories and different management scenarios. The results of ecosystem economic valuation is described under Action C2

Problems and delays

The delay in the implementation of the Action C1 was insignificant – originally it was planned to be completed on June 30th, 2017 but was finalised on October 30th, 2017. Delays in the implementation of activities has not had a significant impact on the implementation of the Project, the necessary data for economic assessment of ecosystem services were provided in sufficient time and the extension of the Action was related to data visualisation – preparation of ecosystem service assessment maps.

Results of the Action C1 have been prepared for upload on the Project website: http://restore.daba.gov.lv/public/lat/aktivitates_un_rezultati/purvu_ilgtspejigas_izmantosanas_optimizacijas_modela_izstrade_i_karta_procesu_novertejums_izmeginajumu_teritorijas/

C.2: Development of peatland re-use optimisation model – Stage II – Economic assessment of ecosystem services in demo-sites

Reported and finalised by the 2nd Progress Report.

Status:	Foreseen start date:	01/07/2016	Actual start date:	01/10/2016

Completed	Foreseen end date:	31/07/2017	End date:	30/06/2018
Deliverable name		Deadline		Status
4 studies for economic assessment of ecosystems and their services in the selected demo sites		06/2018		Completed
Milestone name		**Deadline**		**Status**
Economic assessment of the peatland ecosystem services performed in the demo sites		06/2018		Completed

The economic evaluation of ecosystem services was carried out within the framework of the Action C2. Due to a technical error, the outsourcing of the performance of this activity was not initially foreseen in the Project. However, in agreement with the EC (letter from the EC received on 31st of October 2017), it was confirmed that unused funds of A5 and A6 could be used for the economic assessment of ES. An economic assessment of ecosystem services has been conducted for each pilot site for periods of 5, 25 and 50 years. The calculated values are used by integration of them in the optimisation model (C3), which allows estimating the "environmental value" of the potential types of re-cultivation.
The main conclusions of economic valuation of ecosystem services are:

- **Analysing the current situation** within the demo sites in respect to their ability to provide ES, it can be concluded that existing peat extraction fields provide high economic values of provision services but on the other hand, they provide very low values for regulation and cultural services. The natural mire territories provide high values of regulation services and comparatively higher values of cultural services. The ES economic values of degraded peatlands are low in all the ES groups. This conclusion shows necessity for sustainable management measures for increasing the provision of ES from degraded peatlands.
- Analysing the development or management scenarios for degraded peatlands, it can be concluded that a common feature is that the Sphagnum plantations in 5-, 25- and 50-year periods provide the highest economic values of ES. From the economic activity perspective, the highest economic value is for blueberry plantations and energy wood plantations. From the cultural services perspective, the highest economic value is for rehabilitated territory.

The results allowed to explain the natural values of mire and potential risks of leaving peat extraction fields abandoned without any re-cultivation activities. Expressing all benefits at comparable values (both nature-based services that provide economic benefits and nature-based services such as protecting people from disease), stakeholders got much deeper understanding about risks leaving peat extraction areas abandoned. Comparing the economic and the short-term benefits of peat extraction with the expected losses (in monetary values) from leaving degraded peat extraction fields, a most part of the stakeholders was provided with a much deeper understanding of the problem and the necessary solutions to re-cultivate abandoned peat extraction territories.
Economic assessment of ES is an important support tool for decision-making on different land use scenarios, but at the same it is important also to assess the financial return from each of the scenarios.

Problems/delays/changes
The initially scheduled starting date for the Action C2 has been incorrect. One of the prerequisites for successful completion of the Action was qualitative data acquisition from the Action C1. However, delays in the implementation of the activities did not have a negative impact on the overall Project implementation and the necessary information was prepared in time to be integrated into the optimisation model within C3.

Results of the Action C2 have been prepared for upload on the Project website: https://restore.daba.gov.lv/public/lat/aktivitates_un_rezultati/purvu_ilgtspejigas_izmantosanas_optimizacijas_modela_izstrade_ii_karta_ekosistemu_pakalpojumu_ekonomiskais_novertejums_izmeginajumu_teritorijas/

C.3: Development of peatland re-use optimisation model – Stage III – Assessment of the land use scenarios in demo-sites

Status:	Foreseen start date:	**01/10/2016**	Actual start date:	**01/01/2017**
Completed	Foreseen end date:	31/10/2017	End date:	28/12/2018
Deliverable name		Deadline		Status
4 scenarios for sustainable re-use of degraded peatlands		12/2018		Finalised
Milestone name		**Deadline**		**Status**
Assessment of peatland re-use scenarios for demo-sites performed		09/2018		Finalised

Within the Project proposal under Action C3 it was planned to prepare optimisation model – map-based land use decision support tool. Initially it was planned that optimization model will in-depth analyse 4 re-use scenarios of degraded peatlands. Despite the fact that during project implementation 5 re-cultivation scenarios of degraded peatlands were tested in practice, necessary information about other re-cultivation scenarios of peat extraction area was gathered and implemented within optimisation model. Overall 8 re-cultivation scenarios (1) Establishment of cropland; (2) Establishment of sown perennial grasslands; (3) Establishment of large cranberry plantations; (4) Establishment of highbush blueberry and lowbush blueberry plantations; (5) Establishment of paludiculture fields; (6) Afforestation (7) Creation of water bodies; (8) Renaturalization were included in the optimization model– a map-based land use decision support tool to calculate most appropriate one for each territory.

Within the Action C3 all the results of the Project are actually accumulated. The objective of the developed optimisation model is to provide all stakeholders, in particular the owners of peat extraction areas; spatial development planners and other interested user with the opportunity to quickly and easily obtain the necessary information about what kind of re-cultivation is possible in the particular area and the expected socio-economic, environmental and climate mitigation benefits. The model has been developed in close collaboration with stakeholders (Latvian state

forests; Riga forests; The State Environmental Service; Latvia University of Life Sciences and Technologies; Berry farmers and Peat producers) to discuss both the data and values involved and to train them to use the model conveniently and efficiently.
The optimisation model provides users with three types of results that are expressed in comparable value - euro:
(1) to provide information on the nature values expected from the implementation of re-cultivation techniques, results from the economic assessment of ecosystem services were used – Action C2;
(2) To reflect the impact of climate change mitigation, the model represents the results (expressed in monetary values) of aggregated GHG measurements under the Action A4;
(3) in order to reflect the economic benefits of the types of re-cultivation, the model reflects both the information gained through the Action C4 (by implementing the types of re-cultivation envisaged in the project) and additional information from other data sources.
The optimisation model developed reflects the expected socio-economic benefits from the implemented types of re-cultivation, as well as the estimated payback period for the types of re-cultivation.

The Optimisation model is available on project website. Under NCA guidance, an interactive web-tool has been elaborated, to provide user-friendly platform to get acquainted with data and information compiled in the model.
https://restore.daba.gov.lv/public/lat/optimizacijas_modelis1/

Problems/delays/changes
Developing an optimisation model required sophisticated mathematical calculations and their appropriate incorporation into the model. The situation was greatly exacerbated by the individual views of each stakeholder on potential costs, expected yields and revenues, resulting in a significant prolongation of the work process and the creation of several model variants. In order to ensure the effective development of the model, it was necessary to provide additional workload for the experts to carry out the activities.

Important input shaping the necessary calculations and allowing to obtain the high quality result was provided by the thematic groups.

Savings from the travel budget section were used to cover costs of the expert working days. The delay of the Action did not have an impact to the other activities

C.4: Testing of the peatland re-use optimization model – Implementation of the land use scenarios in demo-sites

Status:	Foreseen start date:	**01/04/2017**	Actual start date:	**01/01/2017**
Completed	Foreseen end date:	31/12/2018	End date:	31/12/2018
Deliverable name		Deadline		Status
Report of the process and results of development and testing of the peatland re-use optimization mode (=section 6.3 in the		12/2018		Finalised

Manual: **Experience of LIFE REstore in implementation of after-use scenarios and rewetting of drained peatland**)		
Milestone name	**Deadline**	**Status**
Testing of the peatland re-use optimisation model performed	12/2018	Finalised

Within Action C.4, it was foreseen to implement land use scenarios in the project demonstration sites, according to the Reclamation design (four sites) and Construction design for Lauga site prepared within Action A.6. In the final third of the project the demonstration activities has been completed by building of three peat dams in Lauga mire on November 2018. They serve as a barrier for holding the outflowing water within the bog and help to raise the water table. In long term, an appropriate hydrological regime is the most important condition for the conservation of mire ecosystems.
Since the dams are made of peat, peat compaction and dam settling is continuing for some time after the completion of earthwork. In order to avoid significant raise of water table in the territory of the adjacent cranberry farm, and to maintain the water level in Višezers Lake as planned in the nature protection plan, smooth-walled drainage pipelines DN200 were embedded in dams. As dams will continue to settle, also the pipelines will settle. Pipelines will no longer be at the initial height when the peat will be fully compacted. For this reason, pipeline ends are equipped with a bend at an angle of 67°, and they can be adjusted to a level specified in the nature protection plan to the nearest 0.01 metres.
Hydrological and vegetation monitoring has been performed within Action D1.

A Deliverable - Report of the process and results of development and testing of the peatland re-use optimization model is to be found in the Manual, its section **6.3 Experience of LIFE REstore in implementation of after-use scenarios and rewetting of drained peatland** (Annex C4):

6.3.1. Afforestation demo site (page 208-2209)
6.3.2. Highbush blueberry and large cranberry plantation demo site (page 220-225)
6.3.3. Sphagnum reintroduction demo site (page 226-239)
6.3.4. Restoration of drained peatland in Lauga Mire Nature Reserve (page 239-248)

The main results of the afforestation demo site: In the first year after soil improvement, 27–39 plant taxa were recorded in ground vegetation. In the second year, their number increased to 33–42, depending on the type of soil improvement. In the first vegetation season, more diverse vegetation was found in sampling sites where the highest amount of wood ash was applied. In the second year, the highest number of plant taxa was found in plots where 10 t ha-1 of wood ash were applied. In areas where soil was improved using wood ash, the highest growth increment was observed for poplars, birches and alders. In the former production fields where wood ash was not applied, lack of nutrients was observed in birch and poplar plantations where survival rate was by 10% lower. For other tree species, mostly visual differences were observed, such as smaller or paler leaves or needles.

Highbush blueberries were planted in Kaigu Mire (in an area of 4.2 ha) and large cranberries in Kaudzīšu Mire (3.4 ha). During the lifetime of LIFE REstore project and after the end of the project, landowners continue to maintain the plantations. Berry plantations is the most profitable after-use scenario for extracted peatlands, as found by LIFE REstore project team

when developing the optimization model for sustainable management of areas affected by peat extraction (see Chapter 6.4). If plantations are properly managed, seedlings are well cared for and berries are harvested, the investments may pay off in 8 to 13 years. Out of the eight analysed types of degraded peatland after-use, also afforestation is financially profitable, though the payback period of this investment is longer.

To restore peat-forming mire vegetation in a cutaway peatland, reintroduction of Sphagnum and other plants of raised bog was carried out in the LIFE REstore demo site in the north-eastern part of Ķemeri Mire. Prior to Sphagnum reintroduction, suitable moisture conditions were created by removing the upper, highly decomposed peat layer, thus lowering the peat surface, and by filling in the nearby ditch. Due to prolonged drought in summer 2018, the success of Sphagnum establishment was low. However, a few months later survival of some patches of Sphagnum and other bog plants was observed. Hydrological and vegetation monitoring should be continued to evaluate the reintroduction success.

The main conclusions on Lauga mire site: nature protection plan is a suitable tool for planning management activities, as it allows comprehensive evaluation of various aspects, helps to discuss the necessary measures with stakeholders (landowners, state and municipal authorities, general public) in a timely and detailed manner, and it facilitates the approval of planned ecosystem restoration works. This was also confirmed by the rewetting in Lauga Mire. 248 Peat dams have proven to be a suitable and sustainable solution for the elimination of drainage influence in raised bogs. This is confirmed also by ditch blocking experience in Lauga Mire. When constructing dams in Lauga Mire, a technically simple solution was found to ensure optimal water levels by peat dams with built-in pipes. At present, there is not enough experience in construction of this type of dams in Latvia, so it is too early to evaluate their long-term performance.

An overview of demonstration activities, relevant area and section in the Restore Manual is provided in the table below:

Location /scenario	Area, ha	Implemented Works	Comment/ No of Section in Restore Manual
Kaudzīšu peatland/ cranberries	3,4 ha	In order to verify in practice the suitability and possibilities of this after-use scenario for extracted peatlands in Latvia, the cultivation of cranberrie species has been tested	A change of location has been communicated and preliminary agreed on 11 May 2018. More detail in Section 6.3.2. of the Manual: Highbush blueberry and large cranberry plantation demo site
Ķemeri/renaturalisation by planting of sfagnum	0,46 ha	To restore peat-forming mire vegetation in a cutaway peatland, reintroduction of Sphagnum and other plants of raised bog was carried out in the LIFE REstore demo site in the north-eastern part of Ķemeri Mire	More detail in Section 6.3.3. Sphagnum reintroduction demo site
Lauga mire	309 ha	Planning and implementation of bog restoration (rewetting of drained raised bog) was carried out in Lauga Mire Nature	More detail in Section 6.3.4. Restoration of drained peatland in Lauga Mire Nature Reserve

		Reserve. To select appropriate restoration measures and improve the condition of the raised bog neighbouring to peat extraction fields, a nature protection plan was developed	
Kaigu peatland/ high-bush blueberries	4,2 ha	In order to verify in practice the suitability and possibilities of this after-use scenario for extracted peatlands in Latvia, the cultivation of high-bush species has been tested	More detail in section 6.3.2. of the Manual: Highbush blueberry and large cranberry plantation demo site
Kaigu peatland /afforestration	9,45 ha	Afforestation was carried out in order to test the afforestation as an after-use scenario for extracted peatlands and to find out the most effective, optimal dose of biological fertilizer – wood ash – for various tree species	More detail in section 6.3.1. of the Manual: Afforestation demo site
Total area			326,51 ha (rounded to 327 ha)

C.5 LIFE recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands

Status:	Foreseen start date:	**01/07/2018**	Actual start date:	**01/07/2018**
Completed	Foreseen end date:	31/03/2019	End date:	31/03/2019
Deliverable name		Deadline		Status
Recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands		03/2019		Completed
Milestone name		**Deadline**		**Status**
Recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands elaborated		03/2019		Completed

Within the framework of Action C5 recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands were elaborated. The Recommendations include the review and estimation of the current situation of the degraded peatlands, management approaches and assumptions of the peat resources, providing the information and guidance of the use of the developed database and related compilations of scientific data. They present guidance for sustainable management of peatlands and peat resources by providing knowledge related to climate change mitigation, biodiversity conservation and economical aspects, which is suggested to include in elaborated documents. Focusing on reduction of GHG emissions, as well as integrating priorities of biodiversity and economic aspects, the recommendations distinguish scenarios of ecological restoration of

peatland ecosystems and their services, peat industry, horticultural peat sector, paludiculture, agriculture and forestry.
For the first time in Latvia (in the Baltic States and Northern Europe region), different re-cultivation scenarios have been evaluated in the framework of the LIFE REStore project from the aspect of GHG emissions. Based on these studies and project recommendations, it is possible to evaluate and select a site-specific reclamation scenario, both from an environmental, economic point of view, and from a GHG reduction perspective.

The deliverable "Recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands" is to be found in Annex_C5. They have been submitted to the Ministry of Environmental Protection and Regional Development in May 2019 (the letter in Annex_C5 _1) to be included into the National Peat Strategy, being elaborated by the Ministry of the Environment and Regional Development. The National Peat Strategy is scheduled for the adoption by the Cabinet of Ministers in July 2020. The importance of the elaborated Recommendations in the context of the National Strategy for Sustainable Use of Peat Resources has been stated also by the letter of Ministry No 1-16/11000 dated 27 November 2019 (letter attached in Annex_6_3_A as edoc and Annex_6_3_B in Word).

The Recommendations have been also presented to and highly appreciated by the IPS Commission of Peatlands and Economics, and the IPS Commission of Peatlands and Environment (IPS letter attached in Annex_6_3_C). The Growing Media Europe (GME) has appreciated the guidance and practical information and will use the project data in its work on the GHG footprint assessment of different substrates in Europe and worldwide (letter by the GME is attached in Annex 6_3_D).

The Recommendations have been also presented in China, Qingdao 16th - 21th of September in International Symposium on Peat for Food Production and Technology Expo.

The prepared recommendations have been included in the book "Sustainable and responsible after-use of peat extraction areas" issued in the framework of project in Latvian and English, so they can reach wider publicity. Society was introduced with Recommendations also in the "International Conference on Sustainable Management of Degraded peatlands and Climate Change Mitigation", as well as students from the University have been taught the tailor-made lectures presented by project experts in peat and soil issues. Recommendations are also presented to main international and European organisations as International Peatlands Society (IPS) and to Growing Media Europe.

It should be explained that since submitting project proposal until the end of its implementation, there have been changes introduced in methodology for the leased public land evaluation, i.e. re-evaluation of public land - peat extraction sites. As a consequence, after re-evaluation lease for peatland areas where peat extraction licenses were in force, were raised (the fee in certain cases increased two or three times). In view of this increase, it has been concluded that the sufficiently high rent serves as an economic mechanism to facilitate that any acquirer of licence is stimulated to carry out a re-cultivation as soon as possible and to remove the re-cultivated territory from the rental area. In view of the above stated, the initial LIFE Restore project commitment to study and promote within the Recommendations an economic mechanism for stimulating passing of non-used peat extraction lands for agriculture/paludiculture purposes to private companies and farms, therefore contributing to local economic growth with a mitigating effect on climate change impacts, has been already addressed within the legal framework. The

more detail on this issue is in letter on economic means and certain legal measures to stimulate sustainable lease of peatlands for LPA (Annex_C_5_3). On the other hand, after-use scenarios for areas affected by peat extractions[4] which have been developed during implementation of LIFE Restore project have been the main focus of activity C5 and the results are very helpful to choose the best re-cultivation type contributing to local economic growth with a mitigating effect on climate change impacts.

As an interactive webtool providing user-friendly and easy access to the Recommendations and Optimisation model was online, it was decided not to print CD-Rom versions as in the original project plan

Green Peat Award

An important result under framework of Action C5 is the establishment of the Green Peat Award by the Latvian Peat Association It will be awarded every March to the most sustainable, socially and responsible peat producer who will have the best results in previous year. LPA has committed to evaluate all their peat producing companies and their activities against the following criteria:

1) Company certification (KRASS – Latvian Peat Production Site Certification System, RPP - Responsible Peat Production, RHP - Responsible Horticulture Peat);

2) Carrying out monitoring activities at peat production site and adjacent areas;

3) Company participation in educational and awareness raising activities;

4) Company participation in research projects;

5) Companies activity in recultivation (reclamation) of peat extraction areas;

6) Company fire safety activities.

The first Green Peat award will be given out 2020 March for the time period March 2019 – March 2020 (letter on Green Peat Award is to be found in Annex C_5_2).

The project proposal provided for evaluation of the consistency of the potential mechanisms with international standards, in order to enable the inclusion of them in national GHG reporting and voluntary carbon trading markets for peatlands at a later stage. On a basis of information gathered in the area, it is concluded that there are no international standards in place, nor there are pilot schemes for voluntary carbon markets for sectors outside EU ETS like wetlands.

In fact, referring to the replicability potential of LIFE Restore projects, we believe that certain voluntary standards for decision making for sustainable management of peatlands have been established by LIFE REstore project itself. These voluntary standards are based on a common approach set by the Optimisation model for sustainable management of degraded peatlands, and by Recommendations themselves. The Optimization model allows to assess the area according to unified methodology on affected peatlands and to choose the optimal type of re-cultivation in terms of GHG emissions. In addition, the LPA together with LSFRI "Silava" have established a regional working group. The aim of the working group is to develop a common approach how to deal with affected peatland to achieve the best results: to have an correct information and to mitigate the effects. Experts and representatives from responsible state

[4] After-use of areas affected by peat extraction: recommendations and experience of LIFE REstore. Priede A., Gancone A. (eds.) 2019. Sustainable and responsible after-use of peat extraction areas. Baltijas krasti, Riga. P.153-202

institutions from Estonia, Latvia, Finland and Germany are involved. First meeting of the expert group was held in Riga in October and it was decided to continue to exchange views. The working group has used and will use the results of the Project as a basis for discussion.

D.1: Monitoring of the impact of project actions

Status:	Foreseen start date:	**01/01/2016**	Actual start date:	**01/01/2016**
Completed	Foreseen end date:	31/08/2019	End date:	30/08/2019
Deliverable name		Deadline		Status
Project impact monitoring report, including guidelines and indicators for future monitoring of the project impacts		09/2019		Completed Annex_D1_2019
Initial Project impact monitoring report, including monitoring guidelines		03/2017[5]		Completed Annex_D1_MonitoringPlans
Milestone name		**Deadline**		**Status**
Monitoring of the Project impacts implemented		08/2019		Completed

The monitoring of project impact has been analysed for all three major project impacts: GHG emission monitoring by the Tier 2 methodology, vegetation monitoring and hydrological monitoring of project monitoring sites according monitoring plan (Annex_D1_Deliverable_MonitoringPlans).

Vegetation monitoring

Within LIFE Restore project in 2017 and 2019 in Laugas Mire and Ķemeri Mire pilot area vegetation monitoring was carried by establishing permament vegetation plots. In 2017 peatland vegetation monitoring was carried out in the intact and degraded part of Lauga Mire by establishing 10 plots in each area, but in 2019 in total 10 plots were set up in the degraded area where in 2018 water level was stabilized by building peat dams on the drainage ditches, mainly in the vicinity of Višezera Lake. In Lauga Mire vegetation monitoring has to be continued to follow the vegetation changes after water level stabilization in the next years.

In 2017 in Ķemeri Mire pilot area 13 plots were set up in the area where Sphagnum planting was not planned but in 2019 in total 10 plots were established in the area where in May 18, 2018 Sphagnum and other mire species were planted. In the Ķemeri Mire pilot area the following Sphagnum species are observed - Sphagnum fuscum, S. cuspidatum, S. rubellum, S. magellanicum together with Drosera rotundifolia and D. anglica. Also other mire species grow

5

here, like Eriophorum vaginatum, Rhynchosphora alba, Andromeda polifolia, Oxycoccus palustris and Calluna vulgaris.

Thanks to the favourable weather conditions in the vegetation season 2019, the growth of Sphagnum species was much better in comparison to 2018. Very warm and dry summer of 2018 caused increased evapotranspiration and consequently worsened establishment of Sphagnum in the demo site.

One of the hypotheses is that results could be more successful, if planting was implemented at the autumn. However, favourable weather conditions in 2019 have positively influenced the growth of sphagnum and other bog plants in the Kemeri pilot area. After the end of the second year of experiment it can be concluded that it has positive results and if weather conditions in 2018 would be more favourable, results could be much better.It is assumed that applied sphagnum planting technique was crucial for plant hibernation. It was chosen to plant sphagnum groups. Although sphagnum can be grown from small fragments, they are sensitive to moisture, and small fragments are not able to accumulate water as well as larger sphagnum groups.

The vegetation monitoring was carried out by project's biotope experts as a fieldwork. Certain delays were experienced in 2018 summer due to the change of biotope expert in NCA, however, the new biotope expert was in place as from 1st of August 2018 and under guidance of vegetation monitoring expert Ms. M.Pakalne (BC) quickly become familiar with monitoring tasks in the project. The detailed information on the vegetation monitoring is to be found in Annex_D1_2019_Veg.

Hydrological monitoring

Within LIFE REStore project in 2018 and 2019 in Laugas Mire and Ķemeri Mire pilot area groundwater monitoring was carried in the established wells.

In 2018, monitoring of the underground water of the bog was carried out in the natural part of Lauga Mire by installing 7 wells and was monitored following the construction of peat dams in 2018, which will lead to stabilization of the hydrological regime in the area around the Visezers.

In the Kemeri Mire in the pilot area in 2018, 8 wells for monitoring groundwater levels were established. Monitoring started after sphagnum planting in May 2018.

Both, Lauga and Kemeri are experiments whose effectiveness can be evaluated over several years (starting in year 5), therefore today it is too early to talk about the results and draw conclusions. It is important to continue monitoring of groundwater table in coming years.

The hydrological monitoring in Lauga was carried out by project's biotope experts as a fieldwork. Certain delays were experienced in 2018 summer due to the change of biotope expert in NCA, however, the new biotope expert was in place as from 1st of August 2018 and under guidance of hydrological expert Mr O. Aleksāns (BC), and in cooperation with Kemeri National Park staff quickly become familiar with monitoring tasks in the project. The detailed information on the hydrological monitoring, including monitoring guidelines is to be found in Annex_D1_2019_Hydrolog.

GHG emission monitoring

D1 activity refers to the measurement of GHG in demo-sites. An intensive GHG emission monitoring was carried out for 24 months time period 2016-2018. There were quite different weather conditions observed in 2017 and 2018. Indeed, while summer 2017 has been wet and precipitation rich, summer 2018 was extremely dry period. This aspect complicated to the certain extent GHG measurements. As a consequence, one of the most labour intensive task in this action was measurement of GHG fluxes in the reference sites established earlier within the scope of the action A4 to verify if the flux measurement results in the 1st year (action A4) can be verified by the repeated measurements during the 2nd season. The GHG flux measurements were continued for 12 months. The methodology was updated according to results of A4. The most important improvement was measurement of CO2 fluxes with transparent chamber using 4 shading options. The flux measurement data obtained during the 1st and the 2nd season were compared and merged together to elaborate groundwater level and temperature dependant EFs. Nutritional regime was not considered, because N content in soil in the most of the sites, except grassland and cropland doesn't differs significantly. For cropland and grassland separate EFs were elaborated. The study results also proved that rewetting of cropland and grassland most probably would not lead to reduction of GHG emissions, because nitrogen content is increased through the whole soil layer, which means that after rewetting such areas would create amount of emissions characteristic for nutrient-rich soils.

Summary of the assumptions used in calculation of the CCM impact of the actions implemented by the project is provided in Table 1. The net GHG emissions from demo sites before the project implementation were 2856 tonnes CO2 eq. yr-1 according to the results of the LIFE REstore project (Table 2) and 4020 tonnes CO2 eq. yr.-1 according to the IPCC 2013.

Table 1: Established demo sites in LIFE REstore project

Demo site	**Area, ha**	**Current management type**	**Nutritional regime**	**Proposed land use**
Kaigu swamp	9.45	Peat extraction field	Nutrient-poor	Forest
Kaigu swamp	4.2	Peat extraction field	Nutrient-poor	Blueberry plantation
Kaudzīšu swamp	3.4	Peat extraction field	Nutrient-poor	Cranberry plantation
Ķemeru swamp	0.46	Abandoned cutaway peatland	Nutrient-poor	Rewetted area (*Sphagnum* sp. plantation)
Laugas swamp	309	Abandoned cutaway peatland	Nutrient-poor	Rewetted area

Table 2: GHG emissions from demo sites before implementation of the CCM measure according to results of the LIFE REstore project (tonnes CO2 eq. yr.-1)

GHG	**Forest**	**Blueberry plantation**	**Cranberry plantation**	**Rewetted area (*Sphagnum* sp. plantation)**	**Rewetted area**
CO_2	37.74	16.77	13.58	3.12	2095.65
DOC	10.74	4.77	3.86	0.52	351.23

CH_4	2.43	1.08	0.87	0.31	208.38
CH_4 from ditches	6.4	2.85	2.3	0.12	83.82
N_2O	1.95	0.87	0.7	0.01	6.26
Total	59.26	26.34	21.32	4.09	2745.33

Impact of the CCM measures is calculated for the 50 years period. Duration of the period affects the projected mitigation potential, because the period to reach the steady stage differs for different carbon pools. If the results of the LIFE REstore project are applied, the net emission reduction potential equals to 2854 tonnes CO2 eq. yr.-1 (Table 3). The most of the GHG emission reduction are not accounted emissions from rewetted areas. It is assumed in he assessment that the emissions from areas with restored groundwater level, which are not managed any more the GHG emissions should not be accounted. Notably that in spite considerably smaller GHG emissions from forest lands and peatlands after implementation of the LIFE REstore results, the net GHG emission reduction due to afforestation is similar to the values obtained using IPCCdefault values. The most significant difference is found for cranberry and blueberry plantations; in spite of several references proving significant GHG emissions in the berry plantations, it was found in study sites in Latvia that the emissions in these areas are not bigger than from peat extraction sites.

Table 3: GHG emission reduction after implementation of the CCM measure according to results of the LIFE REstore project (tonnes CO2 eq. yr.-1)

GHG	**Forest**	**Blueberry plantation**	**Cranberry plantation**	**Rewetted area (*Sphagnum* sp. plantation)**	**Rewetted area**	**Total**
CO_2	73.64	7.02	7.68	2.21	1483.4	1573.95
DOC	-	-	0.87	0.4	271.92	273.2
CH_4	-2.6	-1.5	0.41	1.46	977.7	975.47
CH_4 from ditches	3.84	-3.27	-	-	-	0.57
N_2O	2.16	-0.9	0.35	0.04	29.97	31.63
Total	77.04	1.35	9.32	4.11	2762.99	2854.81

A part of the GHG emission reduction is CO_2 removals in living biomass and other carbon pools. CO_2 removals are considered in afforested area, as well as in berry plantations. During the 50 years period additional CO2 removals, mainly in afforested areas will reach 4008 tonnes CO_2, while average annual rate of the additional removals will be 80 tonnes CO_2.

The GHG monitoring was carried out with an assistance of NCA subcontract with Severitas OU which also was responsible for the elaboration of methodology and national emission factors. The detailed information on GHG monitoring for 24 months (2016- 2018) is to be found in Annex_D1_2019_GHG_2017 and Annex_D1_2019_GHG_2018. Monitoring methodology to carry out monitoring in demonstration sites is to be found in Annex_A4. In addition, the project manual (Annex E-5) ‘’Sustainable and responsible after-use of peat extraction areas’’ provides for an in-depth overview of GHG monitoring in Section 3.1. GHG measurements and their results in the LIFE Restore project (page 21-43).

One of the most labourous task in this action was testing of the climate change mitigation impact in the demo sites by measurement of GHG fluxes. The scope of the task was to find if the CCM measures have immediate impact on GHG emissions, as well as to evaluate if the adopted flux measurement methodology can be applied to monitor impact of the CCM measures in the selected sites within the scope of implementation of the Rural development program. Only in afforested sites, which were additionally treated with wood ash, immediate reduction of CO_2 emissions was found already in the second year after treatment. It was concluded that revegetation is very important to ensure immediate GHG emission reduction. The task was implemented according to the work plan.

D.2: Monitoring of the socio-economic impact of project

Status:	Foreseen start date:	**01/04/2016**	Actual start date:	**01/10/2016**
Completed	Foreseen end date:	30/06/2019	Anticipated end date:	30/06/2019
Deliverable name		Deadline		Status
Project socio-economic impact assessment plan		12/2016		Completed
Final report of Project socio-economic impact on the local economy and population		06/2019		08/2019
Initial report of Project socio-economic impact on the local economy and population		03/2017 (Modified to 10/2017)		Completed/ August 2018. Annex_D2.
Milestone name		**Deadline**		**Status**
Monitoring of Project's socio-economic impact implemented		08/2019		Completed

The Action D2 included a socio-economic evaluation of the Project. The final report prepared within the activity analyses the peat extraction sector – extraction volumes and statistics from the 1920s, peat export volumes, export countries, revenues, as well as employment in peat sector and regional impact, tax payments. The report also analyses the socio-economic return on the types of re-cultivation implemented within the framework of the Project, as well as the potential benefits of re-cultivating degraded peatlands.

The socioeconomic monitoring includes a detailed characterisation of the peat extraction and processing, looking at the impact of the sector on exports, employment and entrepreneurship, as well as in the context of central and local government budgets, generally assessing the economic contribution of the mineral extraction industry. The collected data show that the consumption of peat in Latvia is insignificant and almost all the peat produced in Latvia is exported abroad, representing 1.4% of the total Latvian export in 2017, thus providing a significant contribution to the Latvian economy. The amount of peat extracted in Latvia

accounts for almost one third or 31% of the amount used in professional horticulture in EU countries.

The peat industry makes a significant contribution to regional development and population, as it is a major employer in the municipalities where peat extraction or processing takes place – in 2017, 66 enterprises are actively operating in the peat sector, employing around 2200 people in the extraction and processing industry, exceeding the number of employees 3000 during a high season.

The socio-economic assessment reflects an analysis of the management scenarios carried out in the pilot areas of the Project, looking at the potential socio-economic benefits of their implementation. Financial and economic evaluation of potential types of re-cultivation has been carried out for the identified 18 thousand ha of degraded peatland making estimates for 5, 10, 25, 50- and 100-year periods according to defined key parameters.
According to the suitability for re-cultivation scenarios, in most cases – around 96% of the identified areas – were identified as suitable for re-naturalisation. Least suitable the former peat extraction sites are for agricultural activities and permanent grassland cultivation - 0.4%, and only 5% for paludiculture. Establishment of blueberry plantations is possible in 70% and cranberry – only in 17% of degraded peatlands, more than half of them can be afforested.
Evaluating re-cultivation scenarios from the aspects environmental, climate and socio-economic benefits shows that while blueberry farming requires the highest financial investment at the start of an economic activity, the financial return from this type of re-cultivation is the highest over a 10-year period. Evaluating re-cultivation scenarios from the perspective of climate change mitigation, it can be concluded that afforestation delivers the greatest benefit over a 10-year period, whereas restoration of natural areas is of greatest value in the context of ecosystem services.
The awareness and knowledge on sustainable management of degraded peat production areas of the peatland owners and managers is considered as increased, and in view of the representatives of this target group the priority is to implementation of re-cultivation scenarios that provide the greatest overall socio-economic benefits according to the Project studies and estimations. Overall, this indicates a positive impact of the Project Actions and results on socio-economic processes, both in the current situation and in the context of the anticipated future impacts on socio-economic indicators in related sectors.

Please find deliverables produced within Action D2 in Annex_D2

E.1: Project website

Status:	Foreseen start date:	01/10/2015	Actual start date:	01/02/2016
In progress	Foreseen end date:	31/08/2019	End date:	31/08/2019

Deliverable name	Deadline	Status
-	-	-
Milestone name	**Deadline**	**Status**
Project website developed and published	03/2016	Completed

Project website restore.daba.gov.lv has been developed, was maintained and updated with information on progress of the project. Besides all information about the project, it's results and deliverables published on website, a strong emphasis was put on highlighting important details and achievements during the implementation of the project (up to 5 news prepared and published on the website, e.g. May, June, July, 2019, Latvian version) in order to facilitate the information use for website visitors and for building the project's image.

The objectives set for the project's website at the project's proposal have been met – the platform for information distribution between the project and it's target audiences has been established, the use of the scientific data and tools developed within the project has been promoted to the identified stakeholder groups.

Website content is promoted via the project's social media accounts by adding links to respective website content to posts and by providing links to website content in the project's newsletters distributed via direct e-mails to the project stakeholders and target audiences. The address of the website is indicated in all communication materials distributed. In order to promote the website materials (presentations, photo galleries of the project's organized events) were published on the website and links distributed to the participants of the events.

Integration of the LIFE REstore developed data base of peat extraction affected territories in Latvia and Optimization model for sustainable management of degraded peatlands web tool into the project website facilitates website employment by the project stakeholders and target audiences in long-term.

The website performance during the project lifetime (01.09.2015.-30.08.2019.) is following:

- 9701 sessions or unique visits (97% of planned in total 10000 sessions or unique visits in KPI indicators);
- 3585 individual visitors (717 % of planned 500 total KPI indicator for visitors).
- 42286 pageviews in total and the average pageviews per month since the launch of the website have been 1175 that is by 370 % more than planned in the project proposal where 250 pageviews per month were planned.
- 3360 downloads of the project publications and e-newsletters in total (210 % of planned total indicator for downloads – 1600 at KPI).
- Average visit duration is 4:35 (25 seconds or 9% less than 5 minutes planned in KPI indicators).

As the Evaluation of the Communication strategy indicates the website is recognized as important /even as the main information source within the project primary target audiences.

Delay of an actual start date of the activity did not delay the achievement of the milestone of the activity and did not have any impact on other project activities as the content for communication was elaborated starting the middle of the project till the end of the project which was the period of the most intense communication and information dissemination.

A detailed information on the structure and performance statistics of the project website is to be found in Annex_E1.

E.2: Public information and educational materials

Status:	Foreseen start date:	01/01/2016	Actual start date:	01/04/2016
In progress	Foreseen end date:	31/08/2019	Anticipated end date:	31/08/2019

Deliverable name	Deadline	Status
3-part documentary film, DVD (Modified to "Documentary films")	06/2019	Completed
Project brochure (submitted with PR1, Annex E2-01, updated version – with PR2, Annex No. E2 – 3)	05/2016 (Modified to 06/2016)	Completed
Milestone name	**Deadline**	**Status**
Give-aways produced and disseminated	08/2019	Completed
Articles, publications, e-newsletters published	08/2019	Completed
3-part documentary film produced and disseminated (Modified to "Documentary films produced and disseminated")	08/2019	Completed
Project brochure produced	05/2016 (Modified to 06/2016)	Completed

There has been elaborated a wide range of informative materials to intensively disseminate information about the project, activities and results to the target audiences and general public and to pro-actively provide information about the project as planned in the project proposal. All deliverables were created and milestones met on a planned schedule.

LIFE REstore documentary short-films (10 films, at least 3 min. length) were produced on scheduled time to demonstrate the project's topics and results. (Proposal to modify Task "Shooting, demonstration and broadcasting of a documentary film" where 3 films 10-12 min length were foreseen with 10 shorter clips (about 3 min length) was included in Progress Report 1 and was accepted by comment No.11 in EC 21/12/2016 letter on Progress report 1). Documentaries were widely published - on the project's Youtube channel, website, distributed via social media accounts and project newsletters to the target audiences, demonstrated at the project's events and international conference and internal events (Steering groups), provided to local and

national media for broadcasting, as well as disseminated by project beneficiaries, and sent upon request to International Peatland Society, peat extraction companies etc. indicating a positive feedback from the target audiences. Total reached audience by LIFE REstore documentaries (viewed on Youtube, demonstrated on the project events) is 2434. Detailed information: Annex E2-1.

The **project's brochure** containing project information has been developed, updated (see Deliverables E2-2-1, E2-2-2 and E2-2-3) and printed (1500 copies) in Latvian and English. All brochures were distributed to the project's stakeholders and target audiences at the project's events and meetings, at the beneficiaries' offices and provided for download on the project's website. (Annex E2-2).

LIFE REstore **give-aways** - pens, pencils, notebooks, re-usable rain coats and water-proof smartphone wallets – (in total 2000 objects) were produced and disseminated at events and meetings with target audiences and media representatives. For the representation needs at the events the project's roll-up banner, outdoor flags as well as corporate clothing for the project experts were produced. (Annex E2-3).

Although not foreseen in Project proposal, accounts in **social media** (Twitter - @LIFE_REstore (93 followers), Facebook - @liferestoreLV (143 followers) and Youtube - @life_REstore) were created and used for dissemination of the project's information and related topics as well as for the project's website promotion.

In total 87 **press releases** about the project's activities and results (Annex E2-4), 22 project **posters** and 1 **fact sheet** (Annex E2-5) about the project for media relations and representation at the events were prepared as well as direct communication with journalists organized thus contributing to extensive media coverage of the project (182 publications/ broadcasts, with more than 3 129 326 reached audience in total – data according to National News Agency LETA media monitoring) on local and national media - in newspapers, internet media, radio and TV. (Annex E2-7).

In total all of 6 planned project's general **publications** and all of 4 planned best practice and initiatives articles were produced – total pageviews on the project's website – 2395 which is 20% more than planned 2000 total pageviews in the project proposal for publications and articles. (Annex E2-8).

There have been produced 4 **scientific articles** (planned in the project's proposal 3) which have been published in peer reviewed scientific journals and international conferences' proceedings like "Research for Rural Development" of the Latvia University of Life Sciences and Technologies, and "Agronomy Research" of the Estonian Agricultural University, and "Environment. Technology. Resources" of Rēzeknes Tehnoloģiju Akadēmija. Annex E2-9.

There have been produced 4 **scientific articles** (planned in the project's proposal 3) which have been published in peer reviewed scientific journals and international conferences' proceedings like "Research for Rural Development" of the Latvia University of Life Sciences and Technologies, and "Agronomy Research" of the Estonian Agricultural University, and "Environment. Technology. Resources" of Rēzeknes Tehnoloģiju Akadēmija. Annex E2-9.

All scientific publications were published on the project's website: https://restore.daba.gov.lv/public/eng/activities_and_deliverables/public_information_and_education_materials/#Publications .

LIFE REstore scientific publication: *Improved Activity Data for Accounting Greenhouse Gas Emissions Due to Management of Wetlands*. RESEARCH FOR RURAL DEVELOPMENT 2018, VOLUME 1, Publisher: The Latvia University of Life Sciences and Tehnologies. DOI: 10.22616/rrd.24.2018.004 (January, 2019)
LIFE REstore scientific publication: *Conversion of an Industrial Cutaway Peatland to a Betulacea Family Tree Species Plantation*. AGRONOMY RESEARCH 2019, Volume 17 - 3. Publisher: Estonian Agricultural University. ISSN:1406-894X. (May, 2019)
LIFE REstore scientific publication: *Economic valuation of Ecosystem Services: a Case Study for Sustainable Management of Degraded Peatlands in Latvia*. ENVIRONMENT. TECHNOLOGY. RESOURCES. Proceedings of the International Scientific and Practical Conference. Rezekne Technology Academy. 110-113 p. (June 2019)
Within this paper, the result of economic valuation of ecosystem assessment carried out in the Project has been presented. The data, presented in this paper were analysed from different angles, both to present the total economic value of ecosystem services and to analyse values by ecosystem service group in each project demo site.
LIFE REstore scientific publication: *Sustainable Management of Peat Extraction Fields*. ENVIRONMENT. TECHNOLOGY. RESOURCES. Proceedings of the International Scientific and Practical Conference. Rezekne Technology Academy. 114-117 p. (June, 2019)
In scientific paper optimization model has been presented, describing main outputs and operating principles. Results of economic, environmental and climate change mitigation benefits of different recultivation scenarios have been presented.

All of 8 planned LIFE REstore **e-newsletters** were produced and disseminated to all of the target audiences: 1) via direct e-mails by e-mail marketing system Mailigen - in total 3654 e-mails sent (although not foreseen in the project proposal). In total 2120 views/ opened e-mails of the newsletters received from Mailigen; 2) and published on the project's website - in total 965 downloads for all newsletters together on the website. If summarized times newsletters viewed/ downloaded from direct e-mails received from Mailigen system by members of target audiences and downloaded from the project website – there are 3085 downloads. Goals set for e-newsletter downloads in the project proposal (1600 downloads for all newsletters together) are exceeded significantly - reaching 193%. Annex E2-10.

Problems/delays/changes
As implementation of Activity was started later than foreseen, clarification of deadlines for Deliverable "Project brochure" was proposed in Progress Report 1 and was accepted by comment No.2 in EC 21/12/2016 letter on Progress report 1.

Slight delay of an actual start date of the activity did not delay the achievement of the milestones of the activity and did not have any impact on other project activities as the content for communication was elaborated starting the middle of the project till the end of the project which was the period of the most intense communication and information dissemination.

LIFE REstore documentaries shown and outdoor flag used at the registration for LIFE REstore international conference at the University of Latvia. Photo: A.Soms

Production of LIFE REstore documentary films - expert interview. Project expert gives an interview in the blue representative jacket Photo: I.Bukovska

Project expert gives an interview for TV journalist in the blue representative jacket, outdoor flags represent LIFE program and the project at the background at Sphagnum planting event in demo-site. Photo: A.Soms

REstore posters at LIFE REstore international conference. Photo: A.Soms

E.3: Public information and educational events

Status:	Foreseen start date:	01/09/2015	Actual start date:	01/04/2016
In progress	Foreseen end date:	31/08/2019	Anticipated end date:	31/08/2019

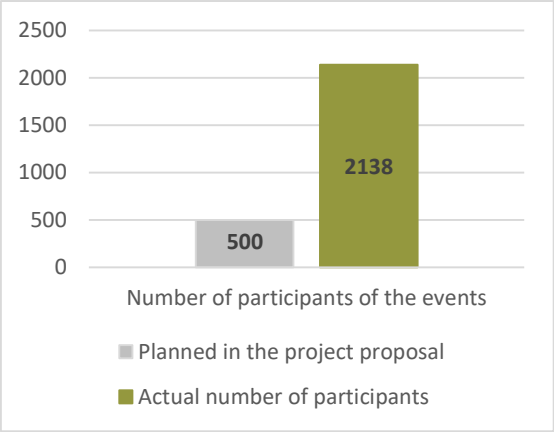
Deliverable name	**Deadline**	**Status**
Presentations and participants lists of the events (published on the Project website)	08/2019	Deleted. Approved by EC 21/12/2016 letter
Milestone name	**Deadline**	**Status**

Project information and education events organised and held	08/2019	Completed

All planned and even additional informational and educational events have been organized and held in a good quality communicating the project and it's results to all of the target audiences, scientific society and general public thus raising awareness and knowledge about peatland ecosystems, their impact on climate change mitigation and sustainable management of degraded peatlands.

During the project lifetime in total **52** informational and educational events and **1** international conference (Activity E6) have been organized by LIFE REstore or the project has been represented in external events organized by other parties. In the project proposal 26 events were planned – the goal has been exceeded by 100%.

The engagement of target audiences in the educational and informative events have been intensive, the total actual number of participants of LIFE REstore events is more than 2138, that is 328% more than planned 500 participants of all events in the project proposal. In addition, LIFE REstore international closing conference gathered 159 participants – see Activity E6.



LIFE REstore events include:

- 6 LIFE REstore seminars (100% of planned 6 seminars in the project proposal; there were 150 participants planned in all seminars together – actual number of participants is 292 that is 95% more than planned);
- 24 external events where LIFE REstore was represented (600% of planned 4 external events in the project proposal; there were 100 participants planned in all external events together – actual number of participants exceeds 1378 that is more than 13 times more than planned. Only those events with participants lists included, but in many cases participants lists were not available of external events due to other parties' organisation of the event.
- 9 LIFE REstore educational events (150% of planned 6 educational events in the project proposal; there were 150 participants planned, however actual number of participants is 185 that is 23% more than planned);
- 8 LIFE REstore informative meetings (80% of planned 10 informative meetings in the project proposal. The LIFE REstore management team put an emphasis on representing the project in large external events instead of informative meetings. There were 100

participants planned in all meetings together in the project proposal, actual number of participants – 175 (75% more than planned).

- In addition to informative meetings the project's Steering group meetings consisting of members of all target audiences to whom detailed progress of the project was presented regularly must be added. There were 5 Steering group meetings during the project lifetime (26.05.2016.; 12.04.2017.; 21.05.2018.; 13.11.2018.; 30.05.2019.) with 108 participants together.

In the last period of the project (01.07.2018.-30.08.2019.). there have been 22 informational and educational events organized (including 2 LIFE REstore Steering group meetings). Detailed information about the events – agendas, presentations, participants' lists with signatures and other information to be found in Annex E3.

Public information and educational events are essential tool of project messages' communication to target audiences accordingly to the results of Communication Strategy Evaluation Reports (deliverables in Activity D2).

The project has organized widely attended events about the results in the main project activities for specific target audiences (e.g. LIFE REstore seminar for peat extraction industry representatives in Latvia about sustainable management and ecosystems of degraded peatlands on 20.02.2019. at the University of Latvia or seminar for governmental institutions and organizations about GHG emission measurement results and elaborated national GHG emission factors on 05.03.2019. at Latvian State Forest Research Institute Silava). Furthermore, LIFE REstore goals, progress and results have been actively represented in large external events connected with the field of interest of the project – e.g. international conference "Baltic Pathway Towards Low Carbon and Climate Resilient Development" organized by the Ministry of Environmental Protection and Regional Development of Latvia on 30.-31.10.2017., annual representation of the project at the international Baltic Peat Producers Forum and others.

There were occasions when specific themes were presented in external events for specific, targeted audiences, e.g. **LIFE REstore elaborated national GHG emission factors for managed peatlands in Latvia were presented at European Commission Joint Research Centre's LULUCF Workshop 2019 in Varese, Italy on 28.-29.05.2019 as well as presented at** European Geosciences Union General Assembly 2018 on 08.-13.04.2018. in Austria.

From small educational events for students or informative events for journalists to participation in international scientific conferences – LIFE REstore used all the potential of informational and educational events as communication channel to disseminate information and the results to identified stakeholders and general public.

LIFE REstore stand, documentaries demonstration and pannel discussion with participation of the project manager at green economy forum "Green Expo" on 21.11.2018. Photo: A.Zālmane

Spfagnum planting demo-site establishment – project seminar and media event at Ķemeri Mire on 18.05.2018. Photo: A.Soms

Thematic workshop for elaboration of Optimization model for sustainable management of degraded peatlands at the Ministry of Environmental Protection and Regional Development on 12.07.2018.

LIFE REstore presentation at Baltic Peat Producers Forum 2018 in Tartu, Estonia on 11.10.2018. Photo: A.Zālmane

LIFE REstore GHG emission measurement results and national GHG emission factors have been presented to the Baltic peat industry at Baltic Peat Producers Forum 2018 at Tartu, Estonia, on 11.10.2018. Photo: A.Zālmane

E.4: Networking with other LIFE and non-LIFE projects

Status:	Foreseen start date:	01/09/2015	Actual start date:	01/10/2015
In progress	Foreseen end date:	30/06/2019	Actual end date:	30/06/2019

Deliverable name	Deadline	Status
-	-	-
Milestone name	**Deadline**	**Status**
Networking actions implemented	01/2019	Completed
Experience exchange visits organised	09/2017	Completed

In order to facilitate the exchange of experience on the best practices, to incorporate and adopt other projects' experience into Latvia's situation in field of ecosystem services, peatland management and GHG emission measurement as well as to share information and results of LIFE REstore many networking activities and experience exchange visits have been organized – in total 30 during LIFE REstore lifetime.

These activities include not only LIFE REstore participation in experience exchange events, but also experience exchange visits of LIFE REstore implementers to:

- LIFE Aukstumala (LIFE12 NAT/LT/000965) – regarding peatland management (Lithuania, 20.-22.09.2016.);
- Cumbria BogLIFE (LIFE13 NAT/UK/000443), **LIFE** Border Mires (LIFE98 NAT/UK/005432), MoorLIFE 2020 (LIFE14 NAT/UK/000070) - regarding peatland management (United Kingdom, 3.-8.10.2016.);

Within experience exchange event new knowledges and experience regarding the possibilities of mire restoration gained. As part of this trip, project experts attended a two-day international conference specially dedicated to the restoration of degraded peatlands. During the conference, knowledge and experience about the risks and opportunities to restore degraded peatlands was gained.
During the conference two site visits were organized, where positive and negative examples of mire restoration could be seen.
By gaining knowledge and experience about mire restoration, it was possible to plan and implement mire reclamation activities planned in the Project both within Action C4 –mire reclamation by sphagnum planting, and within C5 and E5 - by elaborating guidelines of peatland re-cultivation types.

- LIFE PeatLandUse (LIFE12 ENV/FI/000150), LIFE FreshHabit (LIFE14 IPE/FI000023), LIFE MONIMET (LIFE12 ENV/FI/000409), BorealPeatLand LIFE (LIFE08 NAT/ FIN/ 000596) – regarding GHG emission measurement and national GHG emission factors (Finland, 14.-18.05.2017.)

Within experience exchange event four different pilot areas have been visited where hydrological level and the bog vegetation have been restored. Historically these areas were mire, but after re-cultivation activities these areas were afforested, but unsuccessfully. It has been concluded that trees in such areas is not paying off due to low growth and high maintenance costs, it has been decided to restore mire in these areas. Based on findings

gathered in this experience exchange trip, conclusions were made about planned tree planting in LIFE REstore project – what kind of tree species should be selected and what kind of fertilizer should be used.

Also, within the trip different types of peat dams were explored, which were constructed several decades ago and relatively recently - three years ago. It was opportunity to analyze risks and solutions of different type of dams.

Several experience exchange events have been organized by welcoming other project's to LIFE REstore, e.g., Cumbrian BogLIFE (LIFE13 NAT/UK/000443) for demonstration of activities in the project demo-sites, Pennine PeatLIFE (LIFE16/ NAT/ UK/000725) as LIFE REstore international conference's speakers, but LIFE Peat Restore (LIFE15 CCM/DE/000138) representatives participated in establishment of LIFE REstore Sphagnum planting demo-site. As finest example of networking – LIFE REstore international closing conference can be mentioned (Activity E6).

LIFE REstore was asked to share experience in LIFE programme capacity building project CAPLIFELAT (LIFE14 CAP/LV/000002) organized seminar "Communication requirements of LIFE program" at the Ministry of Agriculture on 25.04.2019.

Even after the closing of the project results have been presented – e.g. Nature Conservation Agency hosted the annual conference of European national parks' union - Europark Federation gathering more than 300 participants from 38 countries where distributed LIFE REstore manual and demonstrated project's Sphagnum planting demo- site at Ķemeri National Park with project poster presentations on September, 2019.

Detailed information to be found in Annex E4.

Information and results of LIFE REstore were disseminated to the competent EC authorities, e.g. the Manual "Sustainable and responsible after use of peat extraction areas" was provided to EC DG CLIMA, and to the Permanent Representation of Latvia to the EU. LIFE REstore GHG emission measurement results and national GHG emission factors were presented at EU Joint Research Centre's LULUCF Workshop 2019 on 28.-29.05.2019. in Italy (see Annex E3).

In addition, during initial stage of the project Silava team visited Lithuanian and Estonian GHG inventory teams and researchers involved in elaboration of GHG emission factors for organic soils. The proposed results of the project (emission factors) were presented to Lithuanian and Estonian colleges and further steps of cooperation to implement similar approach in all Baltic states were set. Further cooperation with the inventory experts from other Baltic countries were organized within the scope of the Baltic Expert Network for Greenhouse Gas Inventory, Projections and PaMs Reporting (BENGGI project). The result of cooperation was elaboration of common Baltic research program on improvement of the emission factors for organic soils supplementing outputs of LIFE REstore project.

Very successful cooperation on literature reviews and methodological issues was established with CAR-ES research network and SNS-120 project on GHG emissions from organic soils. In cooperation with SLU (Sweden) new method and software tool (whitebox) was introduced to analyse terrain data for identification of wet depressions and well drained regions. Moisture maps using fill sink method were elaborated for those experimental plots, which have LiDAR data. Further cooperation steps and methods of terrain data analysis that can be tested jointly were identified during several meetings in Latvia and Sweden. Besides of the remote sensing data analysis cooperation was initiated on joint evaluation of different methods of GHG

measurements (gas chromatography, UGGA, OP-FTIR, closed cell FTIR, indirect methods), where joint development would be very efficient due to comprehensive geographical coverage. Joint initiative on evaluation of possibility to use SAR and Sentinel II data for determination of terrain changes and distribution of organic soils was proposed together with Nordic research institutions.

Problems/delays/changes
As technical amendment, we specified Expected results of Action E.4 by removing expected result "improved and finalised Work Plan" with Progress Report 1. Proposal was accepted by comment No.2 in EC 21/12/2016 letter on Progress report 1.

Problems/delays/changes
As technical amendment, we specified Expected results of Action E.4 by removing expected result "improved and finalised Work Plan" with Progress Report 1. Proposal was accepted by comment No.2 in EC 21/12/2016 letter on Progress report 1.

Participation of LIFE "Peat Restore" experts from Lithuania in the Sphagnum re-introduction experiment. Photo M. Pakalne

Peatland renaturalization experiment in Ķemeri demo-site. Photo M. Pakalne

E.5: Manual "Methodology for degraded peatland re-use in Latvia"

Status:	Foreseen start date:	**01/01/2018**	Actual start date:	01/01/2018
Completed	Foreseen end date:	31/03/2019	End date:	17/07/2019
Deliverable name		Deadline		Status
Manual "Methodology for degraded peatland re-use in Latvia"		03/2019		Completed
Milestone name		**Deadline**		**Status**

Manual "Methodology for degraded peatland re-use in Latvia"	03/2019	Completed

Within the Action E5, major task was to prepare manual "Sustainable and Responsible After-Use of Peat Extraction Areas". Within developed material all the results and conclusions of the Project has been reflected. Total pages of Latvian book is – 279 pages and for English version 256 pages.

The content of the book reflects the knowledge and experience gained during the four years of project implementation. The book contains the following chapters:

1. **Glossary** – this chapter in the LIFE REstore book is very important, because definitions of terminology used in peat extraction, mire re-naturalization and climate change mitigation fields are very sensitive and sometimes unclear.
2. **LIFE REstore project, its objectives and main results** – in this chapter short overview about the project is given to describe shortly the main results.
3. **Legal framework for climate policy** – this chapter describes the international legal framework for climate policy as well as gives brief overview of the Latvian regulatory framework for climate policy regarding management of wetlands.
4. **LIFE REstore project contribution to the greenhouse gas emission accounts in Latvia** – this chapter includes information about GHG measurements and their results in the Project; climate change mitigations measures in managed wetlands; the calculation system of GHG emissions for managed wetlands; project contribution to the improvement of GHG inventory.
5. **Studies by LIFE REstore in areas affected by peat extraction** – this chapter includes information about geology and stratigraphy of peatlands; geological inventory of areas affected by peat extraction; three-dimensional hydrogeological modelling in Lauga mire and Ķemeri mire; spontaneous revegetation in cutaway peatlands in Latvia; project database on areas affected by peat extraction.
6. **Peatland ecosystem services** – in this chapter information about assessment and economic valuation of ecosystem services is described
7. **After-use of areas affected by peat extraction of LIFE REstore** - this chapter includes information about legal framework of peat extraction; peatland after-use scenarios suitable for Latvia; detailed description of project implemented after-use scenarios of peat extracted areas and optimization model for sustainable management of territories affected by peat extraction.

The books were prepared in Latvian by July 12th, 2019; therefore, the manuals were distributed to the participants of the conference as originally planned. The manual was also donated to the University of Latvia, which presented it as a gift to its graduates. The copies were also distributed to representatives of municipalities, Ministry of Environmental Protection and Regional Development, State Environment, Geology and Meteorology Centre of Latvia, Latvian University of Agriculture, peat developers, Latvian State Forests, State Environmental Service, submitted to the National Library of Latvia and others.

In order to deliver English-language copies of the manuals to interested parties – foreign participants of the conference – the manuals have been sent by mail.

Even after project, the manuals were distributed in different events by project`s partner " Silava", such as lecture in Latvia University of Life Sciences and Technologies, Annual meeting of the CAR-EU Cooperation Program, attending Third Meeting of the Global Soil Laboratory Network (GLOSOLAN), LIFE OrgBalt project launch meeting, Seminar "Sustainable Soil Management" in Jelgava, Helsinki Research seminar on policy instruments

guiding towards sustainable use of peatlands in agriculture, Meeting with the European Commission for Evaluation of Latvia's Forest Reference Level, Yekaterinburg, Ural State Forestry University, Scientists' Night, The closing event of the contest "Our Little Hike", Latvian Forest Science Day "Forest and Forestry in a Changing Climate".

Problems/delays/changes

The problems encountered with the development of the manual are mostly related to short time frames. As the purpose of the manual was to reflect the experience and results of the Project and to provide guidance for the future use of peat extraction, it was necessary to wait for all results to be obtained and for all Project materials to be prepared. As the implementation of all activities was delayed due to various reasons, the development of the manual was naturally delayed. However, despite the delays, the manual within the Project is developed in two languages (Latvian and English) and most of the printed copies have already been distributed to interested parties and stakeholders.

The initially estimated workload of experts for the development of the manual has been significantly lower than necessary. Savings on Actions E3 and E4 were used to ensure the necessary expert involvement in the development of the manual.

Results of the Action E5 have been prepared for upload on the Project website: https://restore.daba.gov.lv/public/lat/aktivitates_un_rezultati/rokasgramata_kudras_ieguves_ietekmetu_teritoriju_atbildiga_apsaimniekosana_un_ilgtspejiga_izmantosana/

E.6: International Conference for degraded peatland management and re-use

Status:	Foreseen start date:	01/04/2018	Actual start date:	01/04/2018
Not started	Foreseen end date:	30/06/2019	Anticipated end date:	30/06/2019

Deliverable name	Deadline	Status
-		

Milestone name	Deadline	Status
LIFE Restore Conference organised	06/2019	Completed

The LIFE REstore international closing two – day conference “Sustainable management of degraded peatlands and climate change mitigation” was organized on June 13-14, 2019 at the Academic Centre for Natural Sciences of the University of Latvia. **The conference was visited by 159 participants and viewed by 998 persons on online - streeming services** provided by the University of Latvia and National News Agency LETA. Total number of local and international participants of the conference was 1157, thus 150 participants planned in the project proposal was exceeded by 670%.

The audience consisted of all LIFE REstore target audiences - experts from environmental protection, peat industry, policy makers from related governmental bodies, municipalities, non-governmental organizations, academic institutions and students.

The goal of the conference was to raise awareness of peatlands' role in climate change mitigation. Themes of the conference included:

- The influence of differently managed peatlands on climate change mitigation; development of national GHG emission factors;
- After-use of peatlands affected by peat extraction; recommendations for their sustainable management;
- Inclusion of assessment of ecosystem services in the planning of future use of degraded peatlands.

There were 19 conference oral speakers with presentations – including representatives of Ministry of Environmental Protection and Regional Development, European Commission Joint Research Centre (video-bridge with Mr. Giacommo Gracci), Latvia University of Life Sciences and Technologies, one of the largest peat extraction companies in Latvia - Laflora, Peatland ACTION Project (Crichton Carbon Centre, Scotland), Pennine PeatLIFE (United Kingdom), LIFE Peat Restore (Lithuania), LIFE Mires Estonia (Estonia) as well as all partners of the project presenting all the results of LIFE REstore (6 presentations).

There were 29 poster presentations both about LIFE REstore results in detail (18) and the posters from other research institutions, scientists – themes related to peatland ecosystem services, sustainable management of degraded peatlands, GHG emissions and climate change mitigation.

The conference was moderated by a professional analytical journalist Gundars Rēders from Latvian Television.

The agenda of the conference was disseminated on April, 2019, and the Book of conference presentation's thesis published in printed version and PDF and distributed to all of the participants of the conference together with LIFE REstore manual "Sustainable and responsible after use of peat extraction areas". Abstracts/thesis submission date was set on 22.03.2019.

The online panel discussion was held participating Giacommo Gracci (EC JRC), Andis Lazdiņš and Ainars Lupiķis (both SFRI "Silava"), Bernd Hoffer (International Peat Society, Chair of Peatland and Environment Commission) and Ilze Prūse (Ministry of Environmental Protection and Regional Development). Main themes of the discussion – GHG emission measurement results in Latvia, national GHG emission factors, LULUCF sector and peatlands as potential for climate change mitigation.

LIFE REstore documentaries, project's elaborated database of peat extraction affected territories as well as Optimization model for sustainable management of degraded peatlands were demonstrated.

On the second day of the conference - June 14, 2019 - field trip to LIFE REstore demonstration sites took place where after-use scenarios are implemented in peat extraction affected territories - afforestation and highbush blueberry plantation in Kaigu Mire. The participants of the conference were introduced to greenhouse gas emission measurement process.

During the conference peat researcher and artist Edgars Ameriks unveiled the peat sculpture "Human and Nature" and gave as a present it to the Academic Center for Natural Sciences of the University of Latvia. The present was received by rector of the University of Latvia - professor Indriķis Muižnieks. This allowed to emphasize the different possibilities for peat use.

LIFE Peat Restore project photography exhibition “Restoring Peatlands for Climate” invited to learn about mires, their role in nature, as well as mire restoration and research in five European countries.

The conference was recorded and the records in Latvian and English as well as all other informative materials from the conference (speakers and poster presentations, thesis book, agenda, LIFE REstore manual, photo galleries) are available on the LIFE REstore website and were e-mailed to the conference participants via LIFE REstore newsletter.

Detailed information to be found in Annex E6.

Registration for the conference at the University of Latvia – project documentaries are demonstrated on large screens. Photo: A.Zālmane

Conference took place at the largest auditorium of the Academic Centre for Natural Sciences of the University of Latvia – gathered more than 150 participants, translation into English/Latvian was provided by professional translators, it was recorded simultaneously in two languages. Photo: **A.**Zālmane

The conference gathered 19 local and international oral speakers – policy makers, peat industry representatives, researchers, environmental specialists. I.Mendziņa, Ministry of Environmental Protection and Regional Development. Photo: A.Soms

Technically challenging event – simultaneous translation was provided into Latvian/English, the conference was recorded in two languages, online live video-bridge / online presentation and participation in panel discussion from EC JRC, as well as live video stream was provided at the Universities conferences' channel and at National News Agency LETA (998 online viewers). Photo:A.Soms

LIFE REstore results presented at the conference – general results in oral presentations (6), results in detail – on 18 project posters. Photo: A.Soms.

LIFE REstore Optimization model for sustainable management of degraded peatlands and Database of peat extraction areas in Latvia were demonstrated on touchscreens. Photo: A.Soms

Live video-bridge – pannel discussion between Latvia and Italy – EC JRC representative Mr.Giacommo Grassi discussing LULUCF issues with B.Hoffer, International Peat Society, I.Prūse, Ministry of Environmental Protection and Regional Development, A.Lazdiņš and A.Lupiķis, researchers of SFRI Silava. Photo: A.Soms

Rector I.Muižnieks of the University receives a present – peat sculpture from peat artist E.Ameriks. Peat art demonstrates the untraditional use of peat. Photo: A.Soms

E.7: Layman's report

Status:	Foreseen start date: 01/01/2019	Actual start date: 01/01/2019
Not started	Foreseen end date: 30/08/2019	End date: 30/08/2019

Deliverable name	**Deadline**	**Status**
Layman's report	06/2019	Completed
Milestone name	**Deadline**	**Status**
Layman's report compiled and published	06/2019	Completed

LIFE REstore Layman's report was compiled, published and printed (1000 copies- in Latvian and English combined) before the LIFE REstore international closing conference on June, 2019, in order to be disseminated as widely as possible. It was included in conference materials of the participants, distributed together with LIFE REstore manual "Sustainable and responsible after use of peat extraction areas" as well as published on the project website and sent to target audiences via e-newsletter.

Layman's report in Latvian and English available here: https://restore.daba.gov.lv/public/lat/aktivitates_un_rezultati/layman_zinojums/ and as Annex No.E7.

F1 Project management

Project management has been reported in Section 5. The Milestone ''All project actions are implemented, expected project results and objctives reached'' has been finalised.

F2 Audit

As reported with Midterm Report, implementation of the audit is carried out in three stages:
1) project activities until 30 June 2017;
2) for current reporting period 01/07/2017 – 30/06/2018;
3) audit report on whole implementation period of the Project.
Please find the Audit report for current reporting period in Annex_F2.

F3 Indicators

The project's performance achieving the KPI targets is analysed in Section 7. The list of KPI indicators is to be found in Annex_7

F.4: After-LIFE plan

Status:	Foreseen start date:	01/01/2019	Actual start date:	01/04/2019
Completed	Foreseen end date:	30/08/219	End date:	30/08/2019
Deliverable name		Deadline		Status
After LIFE plan		08/2019		Completed
Milestone name		Deadline		**Status**
After LIFE plan elaborated		08/2019		Completed

For the continuation of the project actions and ensure the sustainability of the project achievements, the After-LIFE plan has been elaborated in the final stage of the project. The After-LFIE plan provides information on how the beneficiary and project partners plan to continue applying the results and ensure their wider application by others.

Following actions foreseen within After-LIFE plan should be implemented after the end of the project:
- Maintaining the database application in the nature data management system OAK;
- Maintaining an interactive web tool for an optimization model;
- Management of peat dams;
- Management of sphagnum planting site;

- Management of afforestation site;
- If necessary, replacement of the information stands;
- Monitoring of the greenhouse gas measurements in the project demo sites;
- Hydrological monitoring in Ķemeru mire and Laugas mire;
- Vegetation monitoring in Ķemeru mire and Laugas mire;
- Maintenance of project home page;
- real estate tax payments.

Most of the actions will be carried out by Nature Conservation Agency (please note that a commitment clause on maintenance of project results is in the cover letter submitting the Final report) , and one action by Latvian State Forest Research Institute "Silava" (letters in Annex F_4_). There are also Cooperation Agreements regarding Kaigu and Kaudzīšu bog in Annex F_4_support_documents. In line with the Agreement Laflora Ltd will be responsible for maintenance works in afforested site in Kaigu bog.

Please find attached the After-LIFE plan in Latvian and English in Annex_F4_After-LIFE plan.

6.2.Main deviations, problems and corrective actions implemented

Implementation of actions A4, C4 and D1 required an extensive GHG sampling in reference and demo sites. Such studies were not implemented earlier in Latvia and methodological base was continuously developing requiring adaptation of the method applied in the project to conform to the requirements of high level peer review scientific magazines. During the project implementation the workload in actions A4, C4 and D1 considerably increased due to measurement of photosynthetic removals of CO2 and collection of plant litter. The complexity of measurement also increased due to large transportation distances because the initial design of the experiment had to be optimised, since the initially selected reference sites did not conform with the quality criteria (e.g. soil type and nutritional regime) or it was not possible to install permanent study plots. As a consequence, the study plots were located more far from each other as originally planned, and in many cases only one site could be visited during a day for GHG sampling in contrast to 3 sites as it was planned initially. The implemented approach allowed to avoid the increase of costs but at the same time provided an opportunity to do additional measurements, e.g. photosynthesis by LSFRI Silava. However, it is recommended in future studies to pay even more attention to the planning of logistics. It is important to underline, that though the work-load within activity was almost doubled, it has allowed to collect also data on photosynthesis in our region. Only in the implementation stage of the project, when communicating with the experts in the sector, it was found out that there are practically no data on photosynthesis, hence these data had to be collected ourselves. In addition, in the implementation stage of the project, there became available publications which substantiated a need to carry out measurements with different degree of shading of chambers. These recommendations were taken on board in the measurement methodology, e.g. measurement of CO2 fluxes with transparent chamber using 4 shading options were carried out. All these modifications provided for the best scientific practice in the field and enabled a possibility to share project results in high-level peer review scientific magazines..

The main data source for characterization of water regime and vegetation in action A5 according to the proposal was LiDAR data, but these data were not available until 2019, therefore alternative data sources including optical (manual) evaluation of orto-photo images and satellite data sets had to be introduced to evaluate site conditions and create spatial datasets. Due to considerable delay in national scale high resolution terrain scanning it was not possible to elaborate DTW maps, which are important for tier 3 modelling of GHG emissions from peatlands; however, it was found in selected sites that spatial information on culverts in forest lands, farmlands and, especially, around roads is incomplete and quality of available data is insufficient for analysis of water regime. Therefore, the development of DTW maps required additional task – creation of culvert network to ensure modelling of water regime.

A change of location of cranberry planting demo site was required due to the delays in peat extraction in foreseen area. The alternative site was chosen with characteristics as close to the foreseen site as possible: e.g. location of the site, which is important for GHG measurements.

6.3 Evaluation of Project Implementation

The project was ambitious and had important tasks, in particular regarding the climate change aspects and contribution to the sustainable management of extracted peatlands. The tasks in climate change policy area became even more topical following the adoption of LULUCF Regulation in 2018, a part of Europe's 2030 legal framework for climate action. The project contribution to the improvement and further development of the national GHG inventory in LULUCF sector, in particular the elaborated methodology for GHG measurement in the sector and the national emission factors are to be considered an excellent and topical result. The outstanding importance of the elaborated methodology for GHG measurement in the sector, the national emission factors and activity data of managed wetlands has been stated also by the letter of Ministry No 1-16/11000 dated 27 November 2019 (letter attached in Annex_6_3_A as edoc and Annex_6_3_B in Word format).

The results are importance not only for Latvia, but also to the other countries in hemiboreal region as up to now the LIFE REstore project provides the most comprehensive data set for development of GHG emission factors for North-Eastern part of the temperate climate region. The elaborated GHG flux measurement methodology is approved by scientific community in Latvia and is already transferred to several research and development projects including LIFE Peat Restore and LIFE OrgBalt projects dealing with demonstration of the CCM measures in degraded peatlands and nutrient-rich organic soils, accordingly.

The country specific emission factors for National GHG inventory in LULUCF sector is demonstrated not only in national, but also international events, including presentation of the elaborated methodology in EC JRC meeting in May 2019. The project results and their replicability will be an important element to further work towards the climate-neutral policy planning, balancing climate, nature and economic interests.

The other deliverable of LIFE REstore project - the elaborated Recommendations for management and re-use of degraded peatlands will form a valuable contribution to the National Strategy for Sustainable Use of Peat Resources – a long-term policy planning document, currently being elaborated by ministry. The importance of the elaborated Recommendations in the context of the National Strategy for Sustainable Use of Peat Resources has been stated also by the letter of Ministry No 1-16/11000 dated 27 November 2019 (letter attached in Annex_6_3_A as edoc and Annex_6_3_B in Word). The Recommendations have been presented to the International Peatlands Society (IPS) and the Growing Media Europe, thus facilitating the replicability (letter by the GME Annex X). We believe that the Recommendations will facilitate an in-depth understanding on choosing the most appropriate

after-use scenario for extracted peatlands. The Recommendations will be an important contribution to sustainable and responsible management of areas affected by peat extraction. Already today there is demand for the book.

The drafting of different chapters of REstore book, their editing and translation was more time consuming than planned in the project application and envisaged in the final third of the project before immediate commencement of drafting. The above mentioned delays took an extra time that could be devoted for additional promotion of the project results. On the other hand, as far as possible, Nature Conservation Agency is continuing to present results of LIFE REstore project beyond the original timetable, often in cooperation with the other project in nature conservation area. As a good example is the recent international Europarc conference on 24-27 September 2019, 370 participants from 40 countries when representatives of NCA in cooperation with Baltic Coasts guided the first part of field trip on 26 September to Kemeri National Parc to REstore demo-site for three groups of delegates. (https://www.europarc.org/europarc-conference/previous-conferences/europarc-conference-2019/). On the next day, 27 September, the project was represented in the EUROPARC Marketplace by NCA colleagues which allowed to introduce the recent project outcomes, in particular REstore book and films.

The detailed comparison of the results achieved against the objectives and expected results foreseen in the proposal are described in table below.

Action	Forseen in the revised proposal	Achieved	Evaluation
A1 - Stakeholder mapping and current situation analysis	**Objectives:** - to carry out self-assessment for evaluation of the existing situation as a basis for the further actions; - to perform stakeholder mapping for the further development of a stakeholder engagement strategy; - to establish the framework for the implementation and monitoring of the progress and impact of the Project Actions; - to to develop knowledge basis regarding the legislative and pracitcal peatland management aspects **Expected results:** - stakeholder mapping performed and Stakeholder engagement strategy developed - 1 strategy; - Work Plan for the evaluation of ecosystems and their services selected Pilot implementation Areas - 1 Work Plan. - Project impact monitoring guidelines developed; - Quality Assessment tool developed - 1 QA/QC programme.	- self-assessment performed; - stakeholder analysis performed, in line with the Communication strategy; - stakeholder meeting held and updated Work Plan; - current situation assessed; - objectives, indicators and impacts for each action set out in timeline; - Project impact monitoring guidelines developed in line with the overall Work Plan of the Project	All objectives where reached and expected results was met. -

A2 - Elaboration of Project Communication Strategy	**Objectives:** The overall objective is to improve the knowledge base on peatland ecosystem services, their values in Latvia, their role in climate change mitigation, and to stimulate the integration of this knowledge in planning and decision making for sustainable peatland management. Specific objectives: - to stimulate research on the capacity and resilience of peatland ecosystems to provide goods and services in a sustainable manner, and develop tools and guidelines for practical applications and integrated ecosystem services assessments; - to highlight the importance (value) of peatland ecosystem services for governments, communities and corporations; identify the users/beneficiaries (stakeholders) of ecosystem services; and stimulate partnerships and other incentive mechanisms to conserve and restore peatland ecosystems and their services; - to communicate the knowledge and applications of optimal peatland re-use scenarios to decision makers at all scales and the general public, thus building local and political support and convincing (potential) donors that benefits of conservation,	The draft of activities of Communication strategy approved by the Working group of the Project and the Steering group. Communication strategy developed in line with the Stakeholder analysis and Work Plan for the Project implementation. Evaluation of the communication strategy	All objectives where reached and expected results was met. LIFE REstore public relations component has been acknowledged as strength (LIFE National Coordinator in Latvia, at the LIFE Restore)" and Project Communication Strategy is recognised as success by stakeholders.

	restoration and sustainable use of peatland ecosystems usually outweigh the costs; **Expected results:** - 1 Communication working group established; - 1 effective Communication Plan elaborated: - target indicators defined; - communication Target Audiences defined; - Project messages developed; - communication channels chosen for specific Target audiences; - communication activities planned in detail. - Communication strategy is in line with the overall Project objectives.		
A3 - Criteria for classification of degraded peatlands and optimal management approach definition	**Objectives:** - to prepare the framework for classification of degraded peatlands and the inventory process within the project - to prepare the framework for definition of applicable management approaches for the optimisation model **Expected results:**	- 7 main branches with sub-branches etc. developed (ecologic services, climate, geology, hydrology, biology, civil aspects and landscape). - list of all criteria for degraded peatland areas and their possible impacts. - interdependence and interactivity hierarchy determined; - multi-criteria analyses performed	All objectives where reached and expected results was met. Criteria were basis for planning GHG measurements to develop further GHG inventory of Latvia for LULUCF sector, and managed peatlands in particular. -

	Elaborated criteria for assessment and classification of degraded peatland areas in Latvia Elaborated significant criteria for impacts of particular management scenarios.		
A4 - Approbation of the methodology for GHG emission accounting	**Objectives:** - To elaborate a gas flux measurement based emission factors for GHG (CO_2, N_2O and CH_4) emissions accounting in managed wetlands and restored peat-lands in accordance with the Supplement to the 2006 Guidelines for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement) **Expected results:** 1 Adapted methodology for GHG emission accounting	- analyses of GHG emissions in degraded peatlands in Latvia. - methodology adoption and verification.	All objectives where reached and expected results was met. - There were developed national greenhouse gas emission factors for raised bog and transition mire peat soils and for agricultural peat soils, as well as the approved method for measuring greenhouse gas emissions which will form an important component in climate policy in Latvia. -For the first time in Latvia such methodology was applied. The results of A4 are major outputs of the project, and have been appreciated by the Climate Change Department of Ministry of Environment (letter in Annex 6_3), EC DG JRC (International conference on 13 June 2019 /panel discussion on LULUCF sector and national GHG emission factors).
A5 - Inventory of degraded peatland areas and development of database	**Objectives:** - to obtain accurate information of the degraded peatland areas and their ecosystems; - to prioritise the areas according to the potential climate change	40 sites for GHG samples and analysis. approx. 800 geological surveys approx. 800 biological, vegetation, habitat grids	All objectives where reached and expected results was met. - In total, ca. 50 thousand hectares of areas affected by peat extraction were identified. -That action has been time-consuming due to the necessity visit all sites where

	mitigation effect; - to prioritise the ecosystems and their services and identification of key problem issues, particularly in relation to synergies and trade-offs between ecosystem services, between ecosystem services and other ecosystem functions, and between ecosystem services and land uses; - to develop maps which can be used as a communication tool to initiate discussions with stakeholders and for planning purposes; - to develop illustrative scenarios to show that multiple pressures and impacts may affect a particular biodiversity descriptor (considering from quantitative and qualitative aspects) **Expected results:** 1 Inventory report with all degraded peatland areas according to criteria developed within A5, example, collected data about geology, peat store, vegetation and habitats, GHG emissions, maps etc. 1 data base with merged information.	approx. 800 maps of degraded peatlands impact maps for adjacent territories and infrastructure classification of obtained data total area of degraded peatland explored approx. 50000 ha	geological and vegetation exploration was carried out.

A6 - Elaboration of the Management Plan, Detail and Technical Designs	**Objectives:** - to ensure the implementation of the Project actions in accordance with the legislative and normative documents - to perform studies for the accurate technical implementation of the selected re-use technique **Expected results:** - elaborated and approved Management Plan for Lauga Mire - elaborated and approved Technical Design required for implementation of selected management scenarios	- procurement procedures for the elaboration of Management Plan for Lauga Mire and Technical Designs for the management scenarios prepared and implemented in line with Project time schedule - Management Plan for Lauga Mire developed and approved - Technical Design required for implementation of selected management scenarios elaborated and approved	All objectives where reached and expected results was met. -The developed Management Plan is the first in Latvia to carry out an assessment of ecosystem services, which demonstrates the benefits of the site and at the same time identifies the risks that may result from ill-considered site management. -One of the major challenges, to the development of the Management Plan, was to combine the needs and wishes of all stakeholders while ensuring the protection of the Lauga Mire and the preservation of its biological value -the elaborated four reclamation designs and one construction design have been basis to implement five demonstration activities.
C1 - Development of peatland re-use optimisation model - Stage I - Assessment of key processes in demo-sites	**Objectives:** - to establish the sites for implementation e peatland re-use optimisation model according to the selected land use scenarios - to perform biological and habitat studies for the input data for optimisation model implementation and testing - to carry out hydro-geological studies for the development of 3D model of the impact area of prospective hydrological regime change	- the demosites for multi-criteria analysis, resulting in development for the framework for optimisation mode for degraded peatland re-use selected in line with project schedule - the data from the studies of key procesess of the demosites obtained and is usable and comparable for the implementation of the peatland re-use scenarios of	All objectives where reached and expected results was met.

	Expected results: 4 maps with ecosystem services and their impacts 4 3D hydrogelogical modells Elaborated data base of optimisation model	the optimisation model	
C2 - Development of peatland re-use optimisation model - Stage II - Economic assessment of ecosystem services in demo-sites	**Objectives:** - Economic assessment of ecosystems and their services for the management measures according to the optional land use, economic and environmental impact assessment of management activities, input data obtained for the optimization model - to carry out economic valuation for the ecosystem services in order to obtain monetary data for the further assessments - to compare the values of the ecosystem services against the various social factors identified as influenced by or influencing the values of the ecosystem services - to use the obtained data for the assessment of the ecosystem services in order to establish the current value of the identified ecosystem services in the in the Pilot Implementation Areas for	Economic assessment of ecosystems and their services performed according to the maping of ecosystem services of he degraded peatland areas in demo sites carried out within the Action C1	All objectives where reached and expected results was met. Economic evaluation of ecosystem services is important building block for the Optimisation model elaborated within Action C3.

	further use as a reference point for the assessment of the development scenarios **Expected results:** 4 studies for economic assessment of ecosystems and their services in the selected demo sites cost-benefit analysis for the territories under various management approaches carried out, comparing short-term, medium and long-term efficiency. Carbon market prices assessment - 1		
C3 - Development of peatland re-use optimisation model - Stage III - Assessment of the land use scenarios for demo-sites	**Objectives:** - to develop an framework for evaluation of the scenarios of the degraded peatland re-use, which would be based on GHG emission balance, values of ecosystem services, as well as the socio-economic aspects of the land use types **Expected results:** 4 scenarios for sustainable re-use of degraded peatlands in specific areas assesed and selected for implementation	3-4 management scenrios for degraded peatland re-use selected and assesed 1 Development of the peatland re-use optimisation model finalised	All objectives where reached and expected results was met. The developed Optimisation model provides for 7 management scenarios for degraded peatland re-use. Optimisation model allows to quickly analyse and calculate economic, financial and environmental benefits of each scenario. The optimisation model was tested in seminars and thematic groups. It was further developed on a basis of received recommendations and comments, and has been presented for potential users in seminars.

C4 - Testing of the peatland re-use optimisation model - Implementation of the land use scenarios in demo-sites	**Objectives:** - to perform testing of the optimisation model for degraded peatland re-use in demo-sites **Expected results:** - 3-4 scenarios implemented in selected demonstration territories according to the optimisation model for the degraded peatland re-use - data of the ecological, biodiversity and economic impacts obtained for the comparison against the estimations according to the criteria of the optimisation model - sites established for monitoring of the potential impacts on climate change mitigation of the implemented peatland management scenarios after the Project end	- the implementation of the scenarios of peatland re-use according the optimisation model are carried out in line with the project schedule - the data obtained and measurements of selected criteria are used for the verification of the optimisation model for degraded peatland management and re-use	All objectives where reached and expected results was met. Five scenarios were implemented thus providing considerable diverse experience of different reclamation activities. Implementation of land use scenarios in some demo sites was very challenging. In Ķemeri bog it was extremely dry summer in 2018 together with location and land terrain features at the site. In Lauga mire it was the financial factor as the mobilisation of additional national funding was required to implement works. In addition, the local private land owner and user (neighbour to the demo site, owner of cranberries plantation) proved to be a difficult person to cooperate with. The involvement of that neighbour into the implementation of works at Lauga Mire required real effort and negotiations to agree solutions. On the other hand, without that effort, the achieved results would not be sustainable. It should be also acknowledged that as the above mentioned neighbour is impressively knowledgeable regarding local conditions and nature processes at Lauga site, his support to the project implementation was beneficial.

C5 - LIFE REcommendations for multi-purpose application of support tools for management and re-use of degraded peatlands	**Objectives:** - to improve the application of financial and other governmental and self-governance tools for sustainable peatland management - to facilitate decision and policy making process for land-use planning - to establish an evaluation framework for the most beneficial use of the potential of the degraded peatlands **Expected results:** 1 LIFE REcommendations developed and integrated within National PEAT strategy Recommendations, including the optimisation model web tool published online and publicised Peatland re-use optimisation model will be available in Latvian and English languages. 1000 CD-ROM versions .	First draft of recommendations elaborated Second draft of recommendations elaborated The final version of recommendation developed, published The LIFE Recommendations integrated within the National PEAT Strategy	All objectives where reached and expected results was met. The recommendations provide guidance for sustainable peatland management, after peat extraction. Recommendations summarize the most effective use of the degraded peatlands in Latvia. Recommendations will be included into the National Peat Strategy, being elaborated by the Ministry of the Environment and Regional Development (letter Annex 6_3). As an interactive webtool providing user-friendly and easy access to the Recommendations and Optimisation model was online, it was decided not to print CD-Rom versions as in the original project plan. Project recommendations and results have been communicated internationally, for example in the International Peat Organization IPS, Peat Associations of EU countries, Growing Media Europe.
D1 - Monitoring of the impact of project actions	**Objectives:** - to perform the monitoring of the impacts of the Project actions according to the developed Project impact monitoring guidelines (	- 2 monitoring reports; - data provided for the Recommendations to be developed within the Project	All objectives where reached and expected results was met. Monitoring of the impact of project actions was challenging especially the ground

	mid-term and final evaluations) - to compare the identified impacts against the target indicators set out in the guidelines - to prepare overview reports based on the monitoring results with an outline of the Project implementation progress **Expected results:** - 2 Reports on the monitoring of the impacts of the Project actions in accordance with the developed Project impact monitoring guidelines The impacts will be monitored throughout all the project implementation period, the changes in the data compared against the initial indicators measured in the beginning of the Project.		water monitoring in Lauga mire in high water seasons, getting to the monitoring wells was difficult. Regarding vegetation monitoring the biggest hurdle was extremely dry summer of 2018.
D2 - Monitoring of the socio-economic impact of project	**Objectives:** - to monitor the impacts of the Project Actions for assessment of the success of the Project implementation - to evaluate the identified impacts of the Project Actions in order to determine how the implementation of the Actions have contributed to the Project objectives	- list of social-economic indicators for each Action; - list of initial survey data.	All objectives where reached and expected results was met.

	- to provide timely identification of the risks related to separate Actions or Project in general **Expected results:** - 2 Reports on socio-economic impact monitoring; - 2 Social surveys on socio-economic impact comparing.		
E1 - Project website	**Objectives:** - to establish a platform for information distribution and exchange between the target audiences - to promote the use of the scientific data and tools developed within the Project to the identified stakeholder groups **Expected results:** 1 Project website developed, published and regular updates ensured	1 Project website developed, published and regular updates ensured. <u>Project web-site progress monitoring includes</u> - monitoring the website hits in connection with certain events, after having sent out a press release etc. - social media activities <u>General indicators:</u> Number of website hits: - average per month in the first year: 150 - average per month in the last year: 250 - bounce rate after certain events: 25%	All objectives where reached and expected results was met. achieved, in some parts KPI indicators exceeded significantly. There was 42286 pageviews in total and the average pageviews per month since the launch of the website have been 1175 that is by 370 % more than planned in the project proposal where 250 pageviews per month were planned.
E2 - Public information and education materials	**Objectives:** - to communicate pro-actively, providing the information	- the production of the planned public information and education materials is in line with the time	All objectives where reached and expected results was met.

	regarding the Project topics, process and results to the identified stakeholders and general public; - to raise the public awareness regarding the role of peatlands in the environment and the economy, and their wise use; - to promote the involvement of the identified stakeholders and general public in the Project activities. **Expected results:** informative leaflet/brochure about the project (LV, ENG) - 1500 copies; - publications: - general articles on Project topics (6); - scientific publications in internationally acknowledged sources (3); - articles/interviews about the good examples and initiatives (4);\ - shooting, demonstration and broadcasting of a short documentary film series. (Broadcastings - 1-3); give-aways (4 objects, 500 pcs each); - e-Newsletter (8); - mapping and publicising of the good examples (1);	schedule; - the responses and reactions of the target audiences for the publications prove them to be efficient.	-LIFE REstore documentary short-films (10 films) - Total reached audience (viewed on Youtube, demonstrated on the project events) is 2434. -The project's brochure – 1500 copies – all were distributed. -Give-aways - pens, pencils, notebooks, re-usable rain coats and water-proof smartphone wallets – (in total 2000 objects) all were disseminated. - In total 87 press releases about the project's activities and results (Annex E2-4), 22 project posters and 1 fact sheet was prepared. Extensive media coverage of the project (182 publications/ broadcasts, with more than 3 129 326 reached audience in total – data according to National News Agency LETA media monitoring) on local and national media - in newspapers, internet media, radio and TV.

E3 - Public information and education events	**Objectives:** - to organise events for communicating the information regarding the Project topics, process and results to the identified stakeholders and general public; - to organise events for raising the public awareness regarding the benefits of sustainable management for peatland re-use for the society and climate change mitigation potential; - to organise events for promotion the involvement of the identified stakeholders and general public in the Project activities. **Expected results:** - seminars for all the identified stakeholder groups – 6 events; - presentation of the Project results in external events – 4 events; - public information and education events with demonstration of the films – 10 events; - educational events for students of universities and local schools – 6 events;	- the planned events are organised when and as planned; - the number of participants is according to the target indicators; - the responses of the participants and further level of involvement proves that the event organisation was efficient.	All objectives where reached and expected results was met. -During the project lifetime in total **52** informational and educational events have been organized, In the project proposal 26 events were planned.

E4 - Networking with other LIFE and non-LIFE project	**Objectives:** - to facilitate the exchange of experiences on the good practices through a structured process of consultation and interaction; - to develop a set of good practices as well as the experiences gained from their practical implementation in order to incorporate and adopt them for the situation of Latvia. **Expected results:** - visit of the Project internal experts group to the selected organisations for experience exchange; - new communication and knowledge sharing network; - improved and finalised Work Plan	- key organisations for networking identified; - experience exchange visits held; - partnerships for cooperation and experience exchange established.	All objectives where reached and expected results was met. - Many networking activities and experience exchange visits have been organized – in total 30 during LIFE REstore lifetime.
E5 - Manual "Methodology for degraded peatland re-use in Latvia"	**Objectives:** To make a manual that provides the summarisation of all information obtained and approaches developed within the implementation of the Project with a focus on the climate change mitigation aspects of the management of degraded peatland areas. Make manual as a	- summarisation of the Recommendations elaborated - draft of the manual developed - the final version of the manual text elaborated and edited - the layout of the manual finalised - manual published and	All objectives where reached and expected results was met. As the purpose of the manual was to reflect the experience and results of the Project and to provide guidance for the future use of peat extraction, it was necessary to wait for all results to be obtained and for all Project materials to be prepared. As the implementation of all activities was delayed due to various reasons, the development of

	summarised version of the developed Recommendations for the sustainable and responsible management and re-use of the degraded peatlands, based on the analysis of the land use scenarios and results of the evaluation of GHG emission coefficients, and additional instructions and peatlands objectives philosophy. To make a manual thas is designed for researches, students, environmental and climate experts, governmental and municipalities specialists, as well as interesents to ecology and interaction of earth systems. **Expected results:** The manual "Methodology for degraded peatland re-use in Latvia" - a summarised generalisation of the Recommendations developed within the Project is compiled, edited and published - 2000 copies	printed - distribution of the manual organised in accordance to the distribution plan	the manual was naturally delayed. The books were prepared in Latvian by July 12th, 2019; therefore, the manuals were distributed to the participants of the Closing conference as originally planned.
E6 - International Conference for the degraded peatland management and re-use	**Objectives:** To organise International Conference for the degraded peatland re-use and integrated management of peatlands	Agenda of conference - 1 Theses list announced - 1 Abstracts submission date - 1 List of participants - 1	All objectives where reached and expected results was met. -Conference was organized on June 13-14, 2019 at the **Academic Centre for Natural Sciences of the University of Latvia. The**

	ecosystem services with focus on climate change mitigation. **Expected results:** New discussions and in-put for further data improovement. 150 participants. Workshop organised. Site seing organised.		**conference was visited by 159 participants and viewed by 998 persons on online - streeming services provided by the University of Latvia and National News Agency LETA.** Total number of local and international participants of the conference was 1157, thus 150 participants planned in the project proposal was exceeded by 670%.
E7 - Layman's report	**Objectives:** The objective of the activity is to produce informative material about Project activities and results **Expected results:** Elaborated Layman's report. 1000 printed copies	Elaborated draft plan of Layman's report with evaluation indicators. Elaborated Layman's report.	All objectives where reached and expected results was met. - Layman's report was compiled, published and printed (1000 copies- in Latvian and English combined) to be distributed also in the LIFE REstore international closing conference in June.
F1 - Project management by NCA	**Objectives:** -to perform Project management and monitoring to achieve the aims set in the Project. **Expected results:** - Project management performed during the all Project time - Project management group established - Project Working group established	Successful Project management performed during the all Project time as indicated by the lack of delays in the performance of Project Actions and deliverables. 1 Project management team created 1 Inception report is provided to EC 2 Project progress reports is provided to EC 1 Mid-term report is provided to EC	All objectives where reached and expected results were met.

	- Project Steering and Monitoring Groups established	1 Final report is be provided to EC All project actions are implemented, expected project results and objectives reached.	
F2 - Audit	**Objectives:** To performe an Audit by independent authority in line with LIFE+ Common Provisions. Audit activities include: - assessment of eligibility of financial spending; - assessment of investments in infrastructure **Expected results:** Audit statements received timely for each partner of the Project.	- Initial tasks for financist/bookkeeper developed; - Internal audit for each partner of the Project, annually (within the line of LIFE + Common Provisions).	All objectives where reached and expected results were met. -Implementation of the audit was carried out in three stages: 1) project activities until 30 June 2017; 2) reporting period 01/07/2017 – 30/06/2018; 3) audit report on whole implementation period of the Project.
F3 - Compilation of information for indicator tables	**Objectives:** To compilate of information needed to complete the indicator tables (quantitative and qualitative). These indicators will contribute to evaluating the impact of the LIFE project in view of the overall objectives of the LIFE Programme, in line with the Regulation and the Multiannual Work Programme for 2014-2017.	Indicator tables (quantitative and qualitative) completed and submitted with the first Progress and Final Reports in order to perform accurate monitoring of the project progress.	All objectives where reached and expected results were met.

	Expected results: Indicator tables (quantitative and qualitative) completed and submitted with the first Progress and Final Reports in order to perform accurate monitoring of the project progress		
F4 - After-LIFE Plan	**Objectives:** To elaborate After-LIFE plan for the continuation of the project activities and ensure the sustainability of the project achievements. **Expected results:** - 1 After-Life Plan elaborated; - sustainability of Project results, communication and networking ensured .	- indicators and evaluation criteria for After- LIFE Plan set out; - After-Life Plan developed following the Project Monitoring guidelines and Communication Strategy, as well as taking into account the experiences and results of the implementation of the Project	All objectives where reached and expected results were met. -After-LIFE plan provides information on how the beneficiary and project partners plan to ensure sustainability of project achievements..

Project management.

When evaluating project, it has to be noted that there was a change of core project management in NCA in middle of 2018. Even though, such changes have a moderate risk to be time consuming as it required time and effort to establish state-of-play of the project implementation, and sometimes there is a risk to loose so called institutional memory of the project, one has to conclude that the change of core management team was implemented smoothly, and substantial delays were not experienced. On the contrary, the effort to advance a timetable for certain activities was successful, and the whole project implementation was intensified. As a result the project final third was really demanding, especially in the first half of 2019 when the drafting of REstore book and preparation of the Closing Conference were underway. This could not be achieved without true effort and commitment from all partners.

The important risk to be noted in this evaluation is the experienced difficulties to implement works in the demonstration sites due to the limited interest of constructors to carry out small-scale works in mires (Lauga demo site), and due to the really high demand for constructors in other object and in market as a whole. Therefore, it is recommendable for future projects to provide certain reserve in planning in order to address the risk that the procuremert procedure may need to be repeated, That approach was used for the works in the mire Lauga where procurement was carried out repeatedly.

6.4. Analysis of benefits

1. Environmental benefits

It is important to be aware, that re-establishment of peat-forming vegetation is the only way to at least partially compensate the loss of peatland ecosystems due to the peat extraction. Peat-forming vegetation is essential for recovery of peatland ecosystem functions, including accumulation of peat and carbon sequestration (please refer to section 6.33 on Sphagnum reintroduction demo site of Restore manual). In view of that, the issue of these important environmental benefits – recovery of peatland ecosystem function - has been tackled by REstore project, not only on analysis level, but also by practical demonstration activity of sphagnum reintroduction in Ķemeri site. In addition, the elaboration of nature protection plan followed by the restoration of drained peatland in Lauga Mire Reserve, where innovative three dams with built-in pipes on drainage ditches were built, to ensure optimal water levels, demonstrate environmental benefits ensured by suitable and sustainable solution for the elimination of drainage influence in raised bogs.

The direct quantitative environmental benefits equals to 2855 tonnes CO2 eq. yr-1, if the rewetted areas set aside for nature conservation purposes are considered emissions' neutral, just like natural peatlands. This value is an average of the 50 years age period, when the GHG emissions in demo sites will reach steady state. The project has significant role in development of the climate policy because this is the first time, when the real GHG mitigation potential of the peatland management is demonstrated, as well as it is the first time when reliable information on the GHG emissions from degraded peatlands is demonstrated in hemi-boreal region, covering nearly the whole spectrum of land uses and management approaches. The project also contributed to ruining of several myths represented in the available good practice guidelines for management of peatlands, for instance, myth of increasing GHG emissions from

blueberry and cranberry plantations and afforested peatlands. At the same the project highlighted demand of further work to improve the activity data base, e.g. on water regime in degraded peatlands, integration of GHG emissions and climate models and further research on GHG emissions from nutrient-rich organic soils, which were represented in LIFE REstore by croplands and grasslands.

The developed optimization model and results were presented to national level decision-making stakeholders, to take the lead in to the planning process and implement controlled and balanced re-cultivation of territories. That kind of supervising would allow to plan even distribution of different types of re-cultivation to all Latvia territory.

The selection criteria of the optimization model allow to examine the possible type of reclamation for a specific area. Not every type of reclamation is feasible for all peat extraction areas, because there are specific requirements for each type of re-cultivation. For example, in order to establish a water area in a degraded peatland it is important that the soil is impermeable to water and the water would not drain. Based on optimisation model and inventory data it has been concluded that 96% of identified degraded peatlands are suitable for re-naturalisation, moreover, if all benefits, that can be received from each reclamation type, are expressed in same value (in optimisation model – EUR), it could be concluded that most valuable scenario is renaturalization of peat extraction territories. The calculated results of renaturalisation are compared with other reclamation types for identical size of areas and identical time periods - calculations were made for 10 ha areas for 10 years. Such conclusions have been drawn, because of high ecosystem services value that are provided in re-naturalised mire. The economic value of ecosystem services is the highest value each type of reclamation provides. Looking at the sales revenue from production and comparing them with monetary values of ecosystem services it can be seen that even for blueberries and cranberries (with high sales revenue), this revenue is not as high as the economic value of the ecosystem services provided by the areas.

At the same time results of optimization model shows that, berry and tree planting are the most economically profitable re-cultivation types of the peat extraction territory. That kind of results are natural, as these scenarios are directly related to economic income. At the same time, it is too early to assume that for all degraded peatlands such re-cultivation scenarios will be used. There are several reasons for such conclusion: (1) not all peat extraction areas are suitable for such re-cultivation scenarios, and (2) not all peat producers are interested in reorganizing their professional activities and start to grow berries or wood.

It is also important to highlight that any reclamation is better than leaving peat extraction fields without any reclamation. While duty to reclaim is in the current legal framework, there are historical extraction sites that have remained without reclamation as the socio-economic system has changed (these have been identified in the inventory of degraded peatland areas in Action A5). By leaving peat extraction area abandoned, the opportunity to get any kind of benefits has been lost - biodiversity development, income from agricultural activities, reduction of GHG emission.

Rehabilitation of peatland according to the optimization model is the most advantageous scenario not only in terms of economic benefit but also in terms of promoting biodiversity compared to other reclamation scenarios. Raising the water level contributes to the environmental conditions for the growth of sphagnum, which in turn gradually promotes the development or succession of the natural mire environment. Thus, unless the aim is to grow

sphagnum for economic benefit, provide the opportunity for the mire to develop similarly to the natural ecosystem and to achieve the highest levels of biodiversity. Such conclusions have been drawn, because of high ecosystem services value that are provided in re-naturalised (restored) mire.

Peatlands have a significant impact on biodiversity also by regulating the hydrology and microclimate of adjacent areas. Peatlands play an important role in landscape hydrology. They act as sponges in the landscape, storing water and maintaining water levels in adjacent areas. They mitigate droughts and hard frosts, providing cool air in summer and warm air in winter. This is important in regulating regional and local climate for adjacent ecosystems too. LIFE Restore project optimization model shows that most valuable scenarios for biodiversity raising is renaturalization and rewetting of peat extraction territories. Both scenarios include raising the water levels and that provides positive peatland impact on biodiversity (mentioned above).

2. Economic benefits (e.g. cost savings and/or business opportunities with new technology etc., regional development, cost reductions or revenues in other sectors); state the number of full time equivalent (FTE) jobs created, showing a breakdown in qualified/non-qualified staff.

Although the project was not aimed to gain an economic benefit during its implementation period, it is possible to speak about the long-term economic benefits that could be gained by using developed decision support tool (optimisation model) and planning re-cultivation activities of peat extraction fields.
Based on the project results it has been concluded that in Latvia 18 thousand hectares are abandoned extracted peatlands. By those territory re-cultivation economic benefits could be gained. Based on optimisation model calculations it has been concluded that although blueberry farming requires the highest financial investment at the start of an economic activity, the financial return from this type of re-cultivation is the highest over a 10-year period. Expected incomes from 10 ha blueberry yield in 10 years period would be approx. 900 thousand EUR.

Leaving peat fields abandoned results in the loss of potential economic benefits every day.

3. Social benefits (e.g. positive effects on employment, health, ethnic integration, equality and other socio-economic impact etc.).

As most degraded peatlands are located in the regions of Latvia, the future use of the land will play a significant role in the socio-economic development of the region. For example, the establishment of fast-growing tree plantations will reduce GHG emissions at the site and bring economic benefits in a short life cycle, creating berry plantations will also create jobs and enable people to continue living in their ethnic place of origin. Recclamation of brownfields will improve the quality of the landscape.

Not only economic, but also social benefits can be expected through the efficient management and re-cultivation of above-mentioned areas. Calculations made within socio-economic monitoring shows that by afforestation of the abandoned area, it is expected that within 10-year period amount of GHG emission (eq.CO2) will decrease for approx. 84 million. EUR. Of course these are only hypothetical results, because not all extracted peatlands can be used for tree planting. Another significant social benefits that will be gained through abandoned peat extraction field re-cultivation is improvement of ecosystems and services provided. Most valuable re-cultivation scenario is restoration of mire
For example, for a 10-ha re-naturalization, the value of ecosystem services over a 10-year period will be approx. 10 million EUR

4. **Replicability, transferability, cooperation.**

The highest visibility of the project was generated by the deliverables - REstore book in particular, but also web-tool to inform about the information summarised in the Optimisation model and Recommendations on after-use scenarios for peat-extraction affected areas.

REstore book.

In addition to Latvian version the English version has proved already to be sought-after item. Copies of it have been distributed to: Ministry of Environmental Protection and Regional Development (LV), Ministry of Agriculture (LV), LEGMC (LV), environmental consulting companies (LV), members of Latvian Peat Association, Estonian Peat Association, Lithuanian Peat Association, Bioenergy Association of Finland, German NGO "NABU", Greifswald Mire Centre, International Peatland Society, Growing Media Europe, RPP (Responsible peat production, IVG - Industrieverband Garten Germany, GBVB Substrates The Netherlands, GGS - Gütegemeinschaft Substrate fur Pflanzen Germany, Ukraine Peat association, Kekkila BVB OY, Ireland peat association. Belarussia peat, Growing Media Association United Kingdom, Institute for Peat and Mire Research China, University of Latvia; Vidzemes University; Latvia University of Life Science and Technology; National Library of Latvia; Estonian Fund for Nature; Institute of Forest Science, Russian Academy of Sciences; Latvian State Forests; Riga City Forests .

The Recommendations have been presented and highly appreciated by the IPS Commission of Peatlands and Economics and Commission of Peatlands and Environment (IPS letter attached in Annex_6_3_C). The results of the project were used as a basis for a meeting of GHG research and evaluation experts in Riga on October 15-16, 2019 thus facilitating the replicability. Meeting was organised by the Latvian Peat association, Latvian State Forest reseach institute Silava. The participants of the meeting include the chair of IPS Commission Peatlands and Environment, experts and representatives from state institutions from Estonia, Latvia, Germany and Finland.

The Growing Media Europe (GME) will use the project data in work of GME working groups of expertise and communication. Further, GME will use results of LIFE Restore in its work on the GHG footprint assessment of different substrates (growing media) in Europe and worldwide (letter by the GME is attached in Annex 6_3_D).

Based on the data and methods used in the Project, regarding the ecosystem assessment and economic valuation, the Ministry of Finance of the Republic of Latvia is carrying out a "Socio-economic Assessment of Restoration of Conservation Status of Habitats and Species", to analyse ecosystem services of all protected habitat and species.

The aim of the evaluation is to develop a methodology for comparing the benefits between habitat restoration and water management investments, analyse potential benefits of investment gains and losses, as well as the impact of investments on the economy including relevant intercomparison between implementation of habitat restoration activities under the Operational Program and implementation of additional water management activities.

To evaluate Habitats and Species, economic valuation of ecosystem services is used. To achieve the aim, data gathered and methodology approbated in LIFE REstore project has been used. Economic valuation of ecosystem services has been used to compare economic return from both habitat restoration and water management investments.

5. Best Practice lessons: briefly describe the best practice measures used and if any changes in the strategy employed could lead to possible adjustment of the best practices.

The elaborated methodology for GHG measurement, the national emission factors and activity data for managed wetlands and the recommendations for after-use of areas affected by peat extraction are also best practice measures which will be used both on national level (implementation of national climate action policy) and local level (after-use scenarios suitable for Latvia). Importantly, this information and experience of LIFE Restore in implementation of after-use scenarios and rewetting of drained peatland has been summarised in LIFE Restore book ''Sustainable and Responsible After-Use of Peat Extraction Areas''. It should be underlined, that in particular the book is effective tool to disseminate results of project to the widest auditorium in national, local administration, practitioners and Universities. As explained in more detail in report's section on Replicability, not only nationally but also internationally the information on best practice measures has been disseminated, therefore we believe that best practice measures on after-use of areas affected by peat extraction, will impact practices in other countries, members of IPS and represented in Growing Media Europe.

The project identifies afforestation and berry plantations as the most effective GHG-reducing reclamation types for managed wetlands (NB: the natural wetlands, and therefore renaturalised areas after certain number of years are not within the scope GHG inventory as climate policy targets anthropogenic emissions). On the other hand, it is important to be aware, that re-establishment of peat-forming vegetation is the only way to at least partially compensate the loss of peatland ecosystems due to the peat extraction. These aspects should be taken into account in future projects when reclamation work is planned. In particular, the aspect of climate dimension up-today has not been addressed when choosing the type of reclamation measure. The draft National Peat Strategy, in the light of results of LIFE Restore project, provides a framework for further work to implement reclamation activities.

Best practice lessons include recovery of peatland ecosystem functions by sphagnum reintroduction demo site in Ķemeri site, and restoration of drained peatland in Lauga Mire Reserve, where innovative three dams with built-in pipes on drainage ditches were built, to ensure optimal water levels, by suitable and sustainable solution for the elimination of drainage influence in raised bogs. Also, information on cranberry planting, assumptions and information from the Optimisation model, has become a frequently demanded information. The experience of afforestation demo-site is already replicated in another site of Kaigu bog by Lafora Ltd. These are important best practise activities which are and can be repeated in similar places, building on experiences gathered in Restore project and formulated in LIFE Restore book ''Sustainable and Responsible After-Use of Peat Extraction Areas''.

6. Innovation and demonstration value:

The experimental sites of project demo objects have not only reclaimed 327 ha but also serve as a demonstration objects for knowledge transfer on the reclamation of cutaway peatlands, which is helpful to evaluate methods and effectiveness of the methods applied, also in longer term.

In particular, the sphagnum reintroduction in Ķemeri site, has to be acknowledged as in Latvia it is a new, little tested solution. In small areas, experimental cultivation of Sphagnum in cutaway peatlands has been previously tested in Latvia. However, Ķemeri site, for the first time in Latvia, targeted such a large area (0,46 ha), providing for testing of paludiulture technique and adoption of this method to Latvian condition. Please refer for more detail in Section 6.3.3 of Restore book.

7. Policy implications:

LIFE REstore project has directly contributed to the development of climate change policy, by establishing methodology to measure GHG, by elaboration of national GHG emission factors and activity data (letter of MEPRD in Annex 6_3). Further, on a basis of results and knowledge from LIFE REstore project, the very concreate measures to mitigate climate change in former peat extraction sites were designed for the next decade, i.e. the National Energy and Climate Plan of Latvia 2021–2030 (draft for submission to the EC) lists "Support to restoration of former peat extraction sites by rewetting or establishment of perennial energy crops in private lands" with a CCM target of 884 ktonnas CO2 ekv.

There are also several unexpected climate policy related findings in LIFE REstore project. The most significant of them is an essential difference between the default IPCC 2013 and measurements based N_2O EFs in cropland and grassland. It was found in the project that the currently applied EFs leads to double accounting of N_2O emissions due to fertilization, as well as it demonstrated huge CCM potential of conversion of cropland to grassland in agriculture sector because of decrease of N_2O emissions from soil.

The implementation of LIFE REstore project resulted in set of the field measurement driven tools for planning and implementation of CCM measures in degraded peatlands. The project also contributed to understanding of the CCM potential of organic soils in forest land, cropland and grassland, approving that measures like afforestation or conversion of cropland to grassland has significant CCM potential.

The methodology adopted by the project team for the GHG flux measurements and transformation of the obtained data into EFs already became a research standard in Latvia and is implemented already in several spin-off projects, e.g. LIFE OrgBalt dealing with nutrient-rich organic soils, LIFE PeatRestore aimed at elaboration of remote sensing method for estimation of GHG emissions in rewetted areas and Forest sector competence centre project on elaboration of tools for implementation of CCM measures in forests on wet and drained organic soils.

One of the biggest gains of the LIFE REstore is awareness raising of stakeholders including policy makers, NGOs, forest owners, farmers and peat industry having for the first time measurement data, not rumours or emotions, based discussion on the role of organic soils and peatlands in the CCM and reaching the neutrality target in 2050 [13]. The LIFE REstore project demonstrated that this target is reachable without collapsing peat industry, forestry or agriculture and management of the organic soils has a key role in this process.

EU ADDED VALUE OF THE PROJECT AND ITS ACTIONS.

LIFE REstore project has significantly contributed to the implementation and development of Union policy and legislation on climate change mitigation, in particular regarding the latest piece

of the EU climate change legislation - LULUCF Regulation 2018/841 which was adopted in 2018 – in the final third of the project implementation period. LULUCF regulation (2018/841) and Decision No 529/2013 provides for the Member States to prepare information on actions, which would set out measures to limit or reduce emissions and to maintain or increase removals and the monitoring and reporting methods to be taken to adopt common accounting rules, to which the efforts of LIFE REstore project are contributing. In the light of these legal acts, the approbated GHG measurement methodology, activity data and national emission factors are essential elements contributing to the overall development of LULUCF implementing framework. Importantly, the project experts, being part of EC DG JRC working group on LULUCF issues, have actively contributed to the discussion to develop the implementing measures related to the LULUCF inventories in managed wetlands and have presented final Restore project results in the EC DG JRC working group thus improving the knowledge base, assessment and monitoring data. Up to now the LIFE REstore provides the most comprehensive data set for development of GHG EFs for hemi-boreal climate region, representing North-Eastern part of the temperate climate region (graph on temperate cool and moist climate zone in Annex A_4). Due to harmonized methodologies these data can be integrated with recent research results in Estonia and Finland, thus covering the whole boreal and hem-boreal climate region.

The representative of EC DG JRC Mr. G.Grassi has acknowledged the work of LIFE REstore project within framework of LIFE REstore closing conference on 13 June 2019, in particular in his intervention in the panel discussion on LULUCF sector and national GHG emission factors.

LIFE REstore has provided a solid basis of practical solutions to mainstream climate related considerations in the management solutions for after-use of extracted peatlands in the form of Recommendations for sustainable and responsible after-use of peat extraction areas and Optimisation model for sustainable management of territories affected by peat extraction. In addition, the practical experience of LIFE REstore in implementation of five after-use scenarious and rewetting of drained peatland are important demonstration activities, in particular with regard to greenhouse gas monitoring and reporting, policies related to land use, land-use change and forestry, as well as conservation of natural carbon sinks.

7 Key Project-level Indicators

In this section a description of LIFE Restore progress towards achieving the key project level indicators will be provided. An overview of each indicator is presented in table in the Annex_7.

Total area to be affected by the project

Within action C4 reclamation measures were implemented in demo sites: reintroduction of Sphagnum mosses, establishment of highbush blueberry and large cranberry plantations, afforestation, and rewetting a drained raised bog neighboring with peat extraction area. As a result, the total area affected by project is 327 ha which is above the planned 195 ha in the project proposal.

Greenhouse gas emissions

The aim of the LIFE REstore project was to reduce emissions by 2227 t CO_2 eq. per year, by implementing reclamation measures in the demo sites. This includes also the planned CO_2 removals of 838 t per year. According to default emission factors used for the project proposal,

implementation of reclamation measures in project demo sites will result in total annual GHG emission reduction by 4581 t CO_2 per year.

By implementing reclamation measures in project demo sites, the project has reached the predefined climate change mitigation indicators. Among the tested options, the establishment of cranberry plantations and Scots pine plantations were considered to be the most efficient after-use types for climate change mitigation. However, since rewetting results in a near-natural functioning ecosystem without anthropogenic GHG emissions, it is assumed that in long term also rewetting ensures a significant reduction of GHG emissions.

Ecosystem services assessment

Within action C1 ecosystem services of all project demo sites have been assessed. Almost all demo site territories (except the Lauga mire) are degraded peatlands with poor vegetation and limited biodiversity. Ecosystem services provided by these areas were evaluated before reclamation and rewetting and estimated for three different time periods. It was concluded that natural areas provide significantly higher regulating services than areas affected by peat extraction. Comparing the future development of LIFE REstore demo sites in terms of ecosystem services, afforestation is the most valuable scenario in the perspective of both five and 25 years, as it can provide high-valued regulating services and high-valued provisioning services compared to other after-use types of sites.

From the perspective of ecosystem services, before implementing after-use scenarios in LIFE REstore demo sites, the value of these areas was low. The highly degraded, harvested peatlands produced high carbon dioxide (CO_2) emissions, contributing to climate change. In addition, these emissions would remain high as long as the peat extraction site remains would not be reclaimed i.e. converted into other land use type. However, already five years after reclamation, positive changes in terms of ecosystem services are expected in all LIFE REstore demo sites. The greatest positive changes are expected in the group of regulation services. Within five and 25 years time period, the most valuable ecosystem services will be provided by afforested area, as it provides high regulation services and, at the same time (compared with other after-use scenarios in LIFE REstore demo sites), also high-level provisioning services. Afforestation is also seen as the most effective after-use scenario for global climate change mitigation. Within 50 years, high value ecosystem services are expected both in afforestation and *Sphagnum* reintroduction areas. Comparing these two areas, tree plantations provide the highest value of provisioning services – providing biomass and timber volumes. On the other hand, from the point of view of the regulation services, *Sphagnum* reintroduction area with expected peat-forming vegetation is more valuable. It is very important to highlight that results described above are based only on ecosystem services biophysical assessment. When we look to results based on economical assessment, the results are little bit different because of changes of rating scale. From ecosystem economical perspective higher total economic value is for reclamation activities. Based on ecosystem economic assessment, provisioning services of afforested area in five and 25 years time period is one of the lowest. But at the same time ecosystem economic value of regulation services of afforested area is the highest of all other demo site value.

Within Action C2 the economic assessment of ecosystem services in demo-sites has been performed for area of 1245 ha as the scope of works included also neighboring areas to the demonstration sites. Comparing the monetary value of the project's demo sites, the highest value in both the 25 and 50 years time period is for the area of highbush blueberry plantation.

Supervisory/enforcement bodies involved

Indicator for supervisory/enforcement bodies is 2. Regarding project these are the Ministry of Environmental Protection and Regional Development and Ministry of Agriculture. Within Action C5 recommendations for sustainable management and re-use of degraded peatlands have been developed and incorporated into the draft National Peat strategy , its Annex Nr 1(responsibility of MEPRD). Within A4 GHG emission factors have been elaborated for Latvia (under supervision of Ministry of Agriculture and MEPRD).

Involvement of non-governmental organisations (NGOs) and other stakeholders in project activities

Indicator for involvement of non-governmental organisations (NGOs) and other stakeholders in project activities are following:

Private enterprises (4) - Ltd Laflora, agricultural farm "Gundegas", LLC "Arosa", LLC "Kaudžu purvs".

Two of LIFE Restore project demo sites are in the Ltd Laflora property: afforestation site and highbush blueberry site in Kaigu bog thus the company is directly involved in the project activities. The company provides a complete operational cycle, beginning with the preparation of peat bogs to the high level peat production. The highbush blueberry plantations have been established in corporation with the "Arosa" Ltd which specializes in growing large-fruited blueberry-bushes and their saplings, as well as selling those.

Territory in Lauga mire is owned by peasant farm "Gundegas" who is dealing with cranberry growing. The peat dams on drainage ditches in Lauga mire were constructed to block the rapid water runoff from the bog and the required water level for cranberry cultivation has been taken into account.

LIFE Restore demo site where large cranberry plantations have been established is located in property of LLC "Kaudžu bog".

NGOs (3) - project associated partner "Baltic Coasts" and "Peat producers association", also Latvian Orchardman Association.

Two non-governmental organizations are project partners "Baltic Coasts" and "Peat producers association". Latvian Orchardman Association has been involved and shared the knowledge and experience needed to develop reclamation recommendations. In addition, REstore project has informed the other NGOs on the main topics in seminars, and also in the bilateral meeting organized by the Consultative Council of the Environmental Protection Fund (initiated by NGOs in the Consultative Council)

Public bodies (>5) - Latvian State Forests, Riga Forests, State Environmental Service, Latvian State Forest Research Institute "Silava", Union of Local Governments and others.

Public bodies are involved in the work of the inter-institutional Steering group and also by participating in the Thematic Workgroups and are one of the main target audiences for raising awareness on the importance of peatland ecosystem services and their monetary value; on the potential of peatlands for the climate change mitigation; on the integration of this knowledge into planning and decision-making for degraded peatlands.

Analytical comparison with the targets at the beginning in Communication activities

Awareness raising of the general public and the project's target audiences in particular is ensured by communicating LIFE Restore and it's activities via the project website, social media accounts and directly e-mailed e-newsletters to target audiences' members as well as by

distributing informative materials and providing information via print and other media, and by organizing and participating in an events providing project specific information.

Website:

The project's website is more informative and useful for the project's target audiences and general public than was predicted. In total 9701 sessions or unique visits have been at the project website that exceeds the target (2000 unique visits/year). It was achieved by ensuring visitors flow to the project's website by regular placement of the project news, providing information from the informative and educational events on the project website, website was communicated via the project's social media accounts and direct e-mails to target audiences. Elaboration and incorporation on the weebsite of the Database of peat extraction affected areas and Optimisation model for sustainable management of degraded peatlands made the website even more usable and attractive for target audience's members. Sessions increased at that time and after the international closing conference where the project was widely communicated.

The target for individual visitors (100 per year) was exceeded because of the same reasons mentioned previously. Number of individual visitors have reached 3585 persons in total.
Number of downloads of the project newsletters, publications and articles reaches 3360 significantly exceeding the planned target – 320 downloads per year due to active communication of the project website and available materials there.

Average visit duration of website is slightly lower than 5 minutes set as target – 4:35 that can be explained with significant growth of individual visitors and sessions.

Other tools for reaching / raising awareness of the general public

There were produced information boards for all project demo-sites as well as 22 project posters most of them for the international closing conference of the project – where they were used for dissemination of the detailed information about project results.
Target set for videos – documentaries is met 10 out of 10 planned documentaries were produced.
Regarding print media – project brochures (1500) and manual (2000) were all distributed to the target audiences.
During the project lifetime in total 52 informative and educational events and 1 international conference have been organized by LIFE REstore or the project has been represented in external events organized by other parties.
There have been 14 publications produced within LIFE REstore – 6 general publications, 4 best practice articles and 4 scientific publications.

Surveys carried out regarding awareness of the environmental/climate problem addressed

Members of the project's primary target groups are surveyed (on-line questionnaire on the project's mid-term and in the end of the project) in order to measure the awareness level and it's dynamics about the sustainable management of degraded peatlands, their ecosystem services and economical assessment, impact on climate change mitigation and the project LIFE REstore and it's activities – 146 individual members of the project's primary target audiences have been surveyed twice.

In conclusion, the indicators of Restore project have been well met in all positions, and the performance is significantly higher regarding actual benefits in climate change mitigation sector

8 List of Deliverables

Annex No	Associated action	Deliverable description
Annex_A1-01	A1	QA/QC programme and Work Plan
Annex_A1-02	A1	Stakeholder analysis
Annex_A2	A2	Project communication strategy
Annex_A3_01	A3	List of criteria for the definition of the optimal management approaches
Annex_A3_02	A3	List of criteria for the classification of degraded peatland areas
Annex_A4	A4	Methodology for GHG emissions accounting
Annex_A5-1	A5	Inventory report (LV)- with three Annexes.
Annex_A5-2_B	A5	Deliverable_Vegetation Inventory
A5-4__	A5	Deliverable_Multi layer map
A5-5__	A5	Deliverable_Additional_information of performed inventory
Annex_A5-2_ A	A5	Excel database with results of performed inventory supplemented by multi-layer maps (LV).
Annex_A6	A6	Reclamation Design for re-naturalization and planting of sphagnum at Ķemeri Nature Park territory (LV).
Annex_A6-1	A6	Reclamation Design for cranberry planting at Kaudzīšu bog (LV).
Annex_A6-2	A6	Construction Design for stabilization of hydrological regime at Lauga Mire (LV).
Annex_A6-3	A6	Reclamation Design for demo-site with afforestation
Annex_A6-4	A6	Reclamation Design for demo-site with planting of high-bush blueberries
Annex_A6-5	A6	Management plan for Lauga Mire
Annex_C1	C1	3D hydrological and hydrogeological model for Lauga mire of NATURA 2000 territory (LV).

Annex_C1-1	C1	Ecosystem assessment of the Project LIFE REstore demo sites with 4 maps with ecosystem services and their impacts (LV) with included summary in English.
Annex_C1-2	C1	3D hydrological model for Ķemeri Mire
Annex_C1-3	C1	3D hydrological model for Lauga Mire, peat extraction area
Annex_C1-4	C1	3D hydrological model for Lauga Mire, cranberry crop area
Annex_C2	C2	Economic assessment of ecosystems and their services in the selected demo sites (LV) with two Annexes.
Annex_C3	C3	Optimisation model (4 scenarios for sustainable re-use of degraded peatlands)
Annex_C4	C4	Report of the process and results of development and testing of the peatland re-use optimisation model: Annex_C4_1. Afforestation demo site (page 208-2209) Annex_C4_2. Highbush blueberry and large cranberry plantation demo site (page 220-225) Annex_C4_3. Sphagnum reintroduction demo site (page 226-239) Annex_C4_4. Restoration of drained peatland in Lauga Mire Nature Reserve (page 239-248)
Annex_C5	C5	LIFE Recommendations for multi-purpose application of support tools for management and re-use of degraded peatlands
Annex_D2	D2	Project socio-economic impact assessment plan
Annex_D2-1	D2	Initial report of Project socio-economic impact on the local economy and population (LV) with Annex effectivity assessment of Communication Strategy (LV, with included summary in English).
Annex_D2-2	D2	Final report of Project socio-economic impact on the local economy and population

Annex_E2	E2	Project brochure
Annex_E2-1	E2	3-part documentary film, DVD
Annex_E3	E3	Presentations and participants lists of the events (published on the of the Project website)
Annex_E5	E5	Manual "Methodology for degraded peatland re-use in Latvia"
Annex_E7_1	E7	Layman's Report, EN
Annex_E7_2	E7	Layman's Report, LV
Annex_F2	F2	Audit Report
Annex_F4_1	F4	After-LIFE Plan, EN
Annex_F4_2	F4	After-LIFE Plan, LV
Annex_12_11_19		The additional information requested to be submitted with the Final Report for verification purposes on 12 November 2019.

9 List of Annexes

Financial Report (electronic pdf file) is to be found in Annex 8

Annex_8	Financial Report: · Annex 8.1 "Payment Request, Beneficiary's Certificate and the Consolidated Cost Statement for the Project" " - completed, signed and dated by the NCA; · Annex 8.2 the "Financial Statements of the Individual Project Partners'' ·Annex_8.3. The detailed overview od costs per Partner and per Action Annex 8.4 Order on the acting Director-General in NCA Mr. A.Svilāns (in Latvian, summary to be found in Section 8.4 of the Report)

A list of other Annexes is as follows:

Annex No	Description
Annex_1	Answers to EASME letter (ENG).
Appendix_EASME_Q25	Supporting documentation of LIFE Restore employees
Appendix_EASME_Q28	Supporting documentation of Severitas OU

Appendix_EASME_Q29	Copies of three highest invoices
Annex_5.1.	Minutes of 4th Inter--institutional Steering group meeting on 13 November 2018, presentations and participant list (LV).
Annex_5.1.-1	Minutes of 5th Inter--institutional Steering group meeting on 30 May 2019, presentations and participant list (LV).
Annex_5_2_A	Amendment to Partnership Agreement Nr 1 between NCA and BC
Annex_5_2_B	Amendment to Partnership Agreement Nr 2 between NCA and BC
Annex_5.2.-1	Amendment request - change of the name of associated beneficiary
Annex_5.2.-2	EASME confirmation Letter Amendment No 4 to Grant Agreement
Annex_A_4	Cool Temperate Moist Climate Zone
Annex_A4-1	Yearly report of „Approbation of greenhouse gas measurement methodology in peatlands in Latvia within the scope of LIFE REstore", reporting period 01.12.2016-31.12.2017 (ENG).
Annex_A4-2	Yearly report of „Approbation of greenhouse gas measurement methodology in peatlands in Latvia within the scope of LIFE REstore", reporting period 01.01.2018-30.11.2018 (ENG).
Annex_A4-3	Monitoring report of „Approbation of greenhouse gas measurement methodology in peatlands in Latvia within the scope of LIFE REstore", reporting period 01.12.2016-31.12.2017 (ENG).
Annex_A4-4	Monitoring report of „Approbation of greenhouse gas measurement methodology in peatlands in Latvia within the scope of LIFE REstore", reporting period 01.01.2018-30.11.2018 (ENG).
Annex_C3	Final version of Optimisation model, presentation, participant list and agenda of Thematic group
Annex_C5_1	A Letter to MEPRD – Reclamation recommendations - Annex to Peat Strategy.
Annex_C5_2	Green Award
Annex_C5_3	LPA on economic means
Annex_E1	Project website
Annex_E2-1	Documentaries
Annex_E2-2	LIFE Restore brochure
Annex_E2-3	Give aways representative objects
Annex_E2-4	Press releases

Annex_E2-5	Posters
Annex_E2-6	Green Expo poster
Annex_E2-7	Media monitoring
Annex_E2-8	Publications articles
Annex_E2-9	Scientific publications
Annex_E2-10	Newsletters
Annex_E3-2	Informative and educational events
Annex_E4	Networking
Annex_E6	Conference
Annex_E6_1	Agenda
Annex_E6_2	Speakers invitation LIFE Restore conference
Annex_E6_3	LIFE Restore conference Book of Abstracts
Annex_E6_4	Participants list
Annex_F4-	Support documentation
Annex_F4	ENG
Annex_F4_	LV
Annex_6_3	Letter of MEPRD in two formats (6_3_A and 6_3_B):
Annex_6_3_A	Word doc (Letter of MEPRD on project results)
Annex_6_3_B	eDoc (Letter of MEPRD on project results)
Annex_6_3_C	IPS LRproj.
Annex_6_3_D	GME LR
Annex_7	Table of Project indicators (ENG).
Annex_12_11_19	the additional information requested on 12 November 2019 to be submitted with the Final Report for verification purposes