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Abbreviations Used

MoE – Ministry of Economics

MoF – Ministry of Finance

MoENV – Ministry of Environment

MoA – Ministry of Agriculture

EU – European Union

HPS – Hydroelectric power station

UNECE – United Nations Economic Commission for Europe

a/g - agriculture

mBs – metres in the Baltic system

ha - hectare

Terms Used in the Programme

Flood – the covering by water of land not normally covered by water. In the territory of Latvia the causes of floods are storm floods at the coastal areas of the sea or the rapid rising of the water levels in rivers and lakes during high water or continuing rain.

High water – a phase of water regime which in specific climatic conditions each year repeats at exactly the same time in the season and is characterised by the greatest capacity of water in the year, long-lasting high water levels and the flooding of floodplains. In Latvia high water occurs in spring (usually in March or April) during the snow thawing period; the high water levels of spring in the large and medium rivers of Latvia usually exceed the summer-autumn flood levels (in separate cases with small high water, the summer-autumn floods can also exceed these).

Flood risk – the probability of flood event and of the potential adverse impact on human health, the environment, cultural heritage and economic activity.

Climatic conditions – long-term meteorological conditions characteristic to a specific location (intensity and volume of precipitation, air temperature and humidity, wind speed and direction).

Hydrographical network – the watercourses and water bodies of a river basin or natural region.

River bed – a deepening of the land surface, along which a river currently flows and the most time of the year the water is located only in the bed.

Floodplain – a territory which systematically overflows during high water and floods and on which alluvial deposits are formed from waters discharged from the bed.

Polders – areas enclosed by dikes from which water is pumped out or drained by the periodic operation of sluices.

River basin district the area of land and sea, made up of one or more neighbouring river basins together with their associated groundwater and coastal waters, which, in accordance with the Water Management Law, is the main unit for management of river basins.

I. Characterisation of the Situation

As a result of climate changes the cases of floods throughout the world have become more frequent, as well as more extreme and devastating. Although floods are natural phenomena, which cannot be prevented, human activities and climate change contribute to an increase in the likelihood and adverse consequences of floods. A lack of research into flood risk areas and non-consideration of these often lead to disastrous consequences. Exploration of these areas is a process of national significance not only to protect human life and the man-made economic environment, but also from the point of view of the rational management of natural resources and conservation of environmental diversity. The performance of spontaneous flood mitigation measures without previous complex research in sufficient detail can also cause additional flood risks, especially in the areas adjacent to those, where flood mitigation measures are implemented, as well as causing adverse impact on the environment and specially protected natural territories.

In Latvia the risks associated with HPS activities and the risks of high water in spring, including that associated with the occurrence of ice jams have been the most researched at present. Hitherto insufficient attention has been paid to the sea coast and river estuaries in respect of floods caused by the storm surge, which are increasing with each year due to climate change and cause even greater threats. The potamal (flat, with virtually no decline) stretches of rivers, the adjacent areas of which are flooded every year in larger or smaller areas, have also been researched very little. In recent years in Latvia the transformation of such areas into residential districts has developed with intensity in vicinity of towns, by performing spaced individual construction and intensive construction of multi-storey block type dwellings. However, neither the state nor the local governments have the necessary data regarding the frequency and volumes of flooding and flooding levels in these areas, and the data available is very generalised. In addition, the development of the areas without observing the flood risks is a great pollution risk – as a result of floods, together with various household effects, unrefined sewage also enters the water, sewage sludge is washed from the sewage sludge storage fields, household waste is washed away, and in the worst cases hazardous chemical substances and dangerous waste may also enter the water.

When performing analysis of the requirements specified in the regulatory enactments of Latvia regarding the management of flood areas, it can be concluded that at present no requirements have been stipulated and specified for the determination and marking of flood areas in the local government planning graphical section (in maps). There are also no maps with clearly defined and marked areas subject to flood risk (with the different potential likelihoods of occurrence), nor have any proposals been developed for the flood mitigation measures to be performed in these areas. Therefore there may be discrepancies between territory planners and the managers thereof regarding which areas can be considered to be flooded and/or at risk of flooding and how these areas should be managed.

Wherewith, in legislation there are practically no specific prohibitions or requirements the aim of which would be to prevent or reduce the likelihood of floods, the scale or damage caused. Separate legislation (for example, the State Civil Protection Plan) regulates the actions to be performed in the case of natural disasters (including floods). However these are intended for situations where the disaster (floods) are approaching or have already taken place.

Council Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (hereinafter – Directive 2007/60/EC) determines that the development of river basin management plans anticipated by Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the requirements of the Directive were adopted by the Water Management Law) and the development of the flood risk management plans anticipated by Directive 2007/60/EC are integrated measures for river basin management. Directive 2007/60/EC assigns to perform a

preliminary flood risk assessment throughout the State territory, specifying on the basis thereof the areas at risk of flooding, and to prepare a flood risk management plans for each river basin district. In accordance with the Water Management Law, the territory of Latvia is divided into four river basin management districts – (the Rivers) Venta, Lielupe, Daugava and Gauja.

In accordance with the requirements of Directive 2007/60/EK if a preliminary flood risk assessment is performed in the State before 2010, a decision taken regarding the development of flood risk maps and legislation is developed and officially approved for the assessment and management of flood risks, including therein the information specified in the Directive 2007/60/EC, an additional risk assessment need not be performed by the State. Currently the State Civil Protection Plan is the only policy planning document which determines the action and co-operation of the responsible authorities, when performing preventive, readiness, response measures and measures for the liquidation of consequences intended for states of emergency in the case of a flood event or in the case of threats thereof. The Plan only contains general information regarding the areas subject to flood risk, but does not offer specific solutions for the prevention or reduction of flood risk in the relevant areas. European Union funding is planned for the activity “**Reduction of Environmental Risks**” in the planning period of finances of the European Union for 2007-2013 in order to prevent the flood threats. Funding is anticipated for the measures for improvement of the infrastructure and establishment of new infrastructure for the prevention of flood occurrence in areas of national significance with increased flood risk.

Therefore, the preliminary flood risk assessment, the determination of areas subject to flood risks at national level on the basis thereof, information regarding measures for the prevention or the reduction of flood risk in these areas and costs thereof are also necessary in order to develop the national programme „Prevention of Environmental Risks” to attract funding from the European Regional Development Fund.

The **National Programme for the Assessment and Management of Flood Risks 2008-2015 (hereinafter – Programme)** has been developed as a mid-term policy planning document in accordance with the task assigned to the Ministry of Environment in Paragraph 2.1 of Cabinet Order No.621 of 17 August 2006, On the Concept “Regarding Measures to be Performed in order to Prevent the Flood Threats Caused in Jēkabpils Following the Creation of Pļaviņas HPS and its Water Reservoirs.

Taking into account the requirements of Directive 2007/60/EC criteria are defined in the Programme for the assessment of flood risks, the flood risks in the territory of Latvia have been assessed, a short analysis of the historical consequences and material losses has been performed and a list of priority flood risk sites has been specified, where detailed research or flood mitigation measures should be taken. The Programme also includes measures to be taken for the reduction of danger at priority objects, the additional financing necessary for the performance of such measures and the responsible authorities. The information contained in the Programme has been compiled in the river basin district perspective. The characterisation of the river basin districts is shown in Table 1 and depicted in Annex 1 to the Programme.

Distribution of River Basin Districts

Table 1

No.	Name of river basin district	River basins included in the river basin district	Area (km ²)	Distribution of national territory according to river basin districts (%)
1	2	3	4	5
1.	(The River) Venta	The basin of (the River) Venta and the small river basins of the Baltic Sea and the Gulf of Riga of Kurzeme in the territory of Latvia, from (the River) Šventoja to estuary of (the River) Lielupe into the Gulf of Riga	15625,24	24,2
2.	(The River) Lielupe	The basin of (the River) Lielupe and a small part of the basin of (the River) Nemuna in the territory of Latvia	8849,27	13,7
3.	(The River) Daugava	The basin of (the River) Daugava and (the River) Veļikaja in the national territory of Latvia	27062,10	41,9
4.	(The River) Gauja	The basins of (the River) Gauja, (the River) Salaca and the small river basins of the Gulf of Riga of Vidzeme	13050,94	20,2

The project report „Development of Proposals for a National Plan for the Prevention and Reduction of Flood Risks” prepared by the State Limited Liability Company „Vides projekti” on 15 May 2007, was used during the development of the Programme. A strategic environmental impact assessment was performed and a public consultation took place for the plan in compliance with the requirements contained in the regulatory enactments (Law On Environmental Impact Assessment and Cabinet Regulation No.157 of 23 March 2004, Procedures for Carrying Out a Strategic Environmental Impact Assessment). „VentEko” Ltd. developed the environmental report for the project „Development of Proposals for a National Plan for the Prevention and Reduction of Flood Risks”. The public was able to acquaint itself with the prepared draft Plan and Environmental Report prior to the public consultation following the placement of these documents on the web pages of the document developers and of the Ministry of Environment. The proposals received during the consultation were taken into consideration when developing the draft Programme.

1. Assessment of the Territory of Latvia in Respect of Flood Risks

200 000 hectares of flood area, forming 3% of the national territory, have been recorded in the Latvian National Planning Report On the Use of the National Territory in Latvia, prepared by the Ministry of Environmental Protection and Regional Development and published in 2002. Devastating floods are possible in part of this area. Significant farming areas and residential areas with a comparatively large population density and infrastructure are situated in the flood areas, and large hydrotechnic structures (such as the Daugava HPS cascade) and polder systems have been built etc.

During the period of developing the Programme the flood risk areas were approximately determined, using topographical plans and maps on a scale of 1:10000 – 1:50000, the water level marks determined in hydroamelioration building projects, information regarding constructed protection dams and polders and hydrological observation data in hydrometrical stations:

- the areas affected by floods from the Baltic Sea and Gulf of Riga are determined by processing the marine flood levels observed at 8 stations in recent years;
- in the river basin district of Venta – at 10 stations;
- in the river basin district of Lielupe – at 9 stations;
- in the river basin district of Daugava – at 20 stations;
- in the river basin district of Gauja – at 12 stations.

Due to insufficient funding there is currently a lack of hydrological observation data in all lagoon type coastal lakes and in the right-bank tributaries of the basin of (the River) Lielupe, in (the River) Daugava near the town of Līvāni, in (the River) Aviekste near the town of Lubāna, in (the River) Malta near the town of Vīlāņi and in the station Balda – Dorotpole, in (the River) Mazā Jugla, in (the Lake) Juglas Ezers and in (the Lake) Lielais Baltezers, in (the Lake) Burtnieku Ezers, in (the River) Roja and in (the River) Seda, and there is a lack in the station with a longer observation line Gauja – Tilderi. In recent years no topographical or hydrographical research of river beds and floodplains have been performed either.

1.1. Types of Flood Risk Areas in the Territory of Latvia

Flood risk areas according to their origin in Latvia can be divided into two basic groups:

natural (with flooding or storm surge) risk areas, which are flooded due to the impact of natural conditions.

The areas in this category are identified in the plains of Latvia: floodplain areas, which are part of a river or lake valley, which floods during cases of high water or floods and storm surge risk areas where the ingress of sea water into river estuaries and coastal lakes takes place during periods of strong gales, as well as sea coastal erosion and flooding associated thereto. As a result of storm surge the water level is raised in the mouths of many rivers and lower reaches thereof. The largest of these are: The mouths and lower reaches of (the Rivers) Saka, Užava, Venta, Lielupe, Daugava, Gauja and Salaca. As a result of storm surge the water levels are also raised in many lagoon-type lakes and the lakes hydrographically connected thereto: (the Lakes) Pape, Liepāja, Engure, Babīte, Kaņieris, Baltezers, Ķīšezers etc.

There are floodplain areas subject to flood risk in all of the largest river basins of Latvia: (the Rivers) Bārta, Užava, Saka, Lielupe, (the River) Lubāna lowlands, (the River) Daugava valley, (the River) Gauja downstream and in other watercourse plains.

The largest lakes of Latvia are also in a similar situation, where the adjacent areas are subject to flood risk. Among the 16 largest lakes of Latvia with a surface area of > 1000 ha the following may cause flood risk: (the Lakes) Liepāja, Engure, Kaņieris, Ķīšezers, Burtnieks and Sīvers.

Artificial – man-made (anthropogenically induced) flooded or flood-affected areas which are connected to artificial changes in the natural regimen of water. These are river beds or coastal as well as lake-type reservoirs; polder areas, if the maintenance thereof in running order is not observed, as well as the proper supervision and operation; HPS and other artificial flooding areas.

In the river beds the small HPS reservoirs are mainly related to the water level regulating structures. At present, as a result of the decrease of current velocity in the largest rivers during ice drifting, a jam may be caused above the reservoirs, caused by the formation of sludge. This causes the potential flooding of the areas above the reservoir.

For the purposes of implementing several aims, 6 out of 16 of the largest lakes in Latvia with a surface area of > 1000 ha are regulated with a water level regulating hydrotechnic structures. The following two lakes may be marked as lake-type reservoirs: (the Lake) Rušons and (the Lake) Rāzna, but (the Lakes) Lubāns, Alūksne, Babīte and Pape have been renewed following draining, by using one of the different types of hydrotechnic structures.

It should be noted that the operational regulations for the water level regulating structures of these lakes are co-ordinated with the natural fluctuation range and flooding area is permissible no more than in the natural regimen. However, a flood risk remains in a situation where the reduction of the lake level prior to flood or high water is not observed up to the recommended mark, which would guarantee the flood inflow accumulation in the lake, not exceeding the maximum level determined for the lake.

1.2. Causes of Floods in Flood Risk Areas

Causes of floods – these are all the natural and climatic conditions which determine or stimulate the formation of floods: intensity and depth of precipitation, air temperature and humidity, wind direction and speed, relief of the area, plant covering, hydrogeological conditions, the hydrographical network and condition thereof, the size of the basin of watercourses and confluence of water bodies, the morphometric and hydraulic parameters of river beds.

The following flood occurrences must be reckoned with in Latvia:

high water and thawing snow in spring, when the air temperature and volume of snow are the factors determining the size of floods;

ice jams and ice drifting which are especially severe when the temperature increases rapidly and the ice does not melt completely when the level rises and pulls the ice from the banks;

floods caused by summer – autumn rain when there is 100 mm and more precipitation. Such floods are usually local and the damage is relatively restricted geographically. Usually the water level rises more rapidly in small rivers where any type of pollution (branches, moss etc.) may cause blockages and the subsequent rupture thereof;

prolonged rainy periods, when the land gradually becomes saturated with water until it is no longer able to absorb it. On continuation of rain, in this case there are preconditions for a rapid increase in water flow. Usually the wider areas around rivers are at risk, but these may be anticipated;

hydrotechnic structure accident and the over-flooding caused thereby, which may be due to the internal erosion of a dam or a sluice accident. A shock wave is formed, which causes more damage flowing rapidly downstream from the dam and pulling with it trees, bushes and loose objects. In addition obstructions near bridges or in other narrow places may enhance its impact. The greatest impact of a dam accident is immediately behind the dam in the section down the river, later this is more similar to that observed in the case of a flood event;

marine storm floods in areas along the sea coast and in estuaries of the largest rivers, resulting from a constant low atmospheric pressure over the Baltic Sea and wind with a speed of 20 metres per second or more.

1.3. Areas Being Flooded Due to Floods and Areas at Risk of Flooding

In Latvia the following areas being flooded and areas at risk of flooding are traditionally divided into the following:

floodplain areas, which are part of a river or lake valley, which floods in the case of high water or flood event;

storm surge risk areas, where the ingress of sea water into river estuaries and coastal lakes, as well as sea coastal erosion and flooding takes place during periods of strong gales;

polder areas, HES and other artificial flooding areas.

• Flood risk areas associated with river high waters

Flood risk areas are most often encountered in potamal or relatively flat river sections (with a gradient of $\leq 0,1\text{m/km}$ to $\leq 0,2\text{m/km}$). During floods, especially due to ice jam, large inhabited or otherwise economically and intensively used areas are flooded, at the detriment of the economic and social environment. When evaluating the available information regarding the morphometric indicators of the largest river beds, the relief of the adjacent areas, height marks and maximum river flow rates in Table 2 and Annex 2 to this Programme, the indicative potamal river sections and adjacent areas where there is a risk of flooding, are presented. In order to determine specific areas and provide detailed characterisation thereof, it is necessary to carry out additional research of rivers and adjacent areas, starting with the priority areas in compliance with flood risk criteria.

Flood Risk Areas Adjacent to Potamal River Sections

Table 2

No. in suc.	River basin district	Approximate area, km ²	Number of residents	Number of residents per 1km ²
1	2	3	4	5
1.	(The River) Venta	1863	76807	41
2.	(The River) Lielupe	2020	118906	59
3.	(The River) Daugava	2756	387201	140
4.	(The River) Gauja	507	33394	66

• Coastal areas at risk of storm surge

Storm surge, although usually short-term, are a real problem in flat coastal areas. On the Baltic Sea, having a continuous low atmospheric pressure area, the sea level may persist for a longer period of time approximately 0,5 metres above normal sea level. Observational data show that marine floods reach the highest levels in the Gulf of Riga.

The Baltic Sea coast of Latvia is characterised by a high diversity of species and natural habitats. Around 90% of the coast is formed by natural habitats and the remaining part is built up (ports, residential houses), or otherwise modified. An increase in coastal erosion and flood threats is to a great extent due to human economic activity (external port hydrotechnic structures and access channels, dredging soil dumps outside the debris flow lanes, sand aggradation from underwater slope or beach on the mainland and reinforcement of

steep slopes of cliffed coast in long sections), resulting in significant disturbance to the natural movement of debris flow and a reduction in the addition of sand material to the flow of silt.

The total length of the sea coast in Latvia is around 496 km. According to research of the topographical plans and the digital processing of materials acquired, it can be concluded that the areas directly affected by storm surge in its coastal areas is in total around 130 km in length with a varying bandwidth from 200 metres up to 1500 metres. During the preparation phase of specific measures for the protection of these areas, the sections of the sea coast at risk may be adjusted, in particular by determining priority sections.

The flood affected areas of the Baltic Sea and the Gulf of Riga are indicated in Annex 3 to this Programme.

• Polders

Polder systems not only provide an optimum moisture regime for utilised agricultural areas, but also in many places protect inhabited areas from being flooded. Despite the fact that the main function of the polders is the protection of areas from flooding, they can also be considered as potential flood risk areas, as they were all built in the last century and some even in the first half of it, but by 2007 only a few have been reconstructed. A significant proportion of polder protection dams are in an unsatisfactory technical state, the polder penstocks and outflow pipes are being poorly operated and are overgrown and polluted. Land drainage is not provided at the required level and the drainage system of parts are degrading, and the large polder areas cannot be rationally used. Research on the use of each polder hydrostructure and area is required in order to develop their reconstruction necessity and priorities. In addition it is necessary to determine ownership of (the Channel) Varkaļu Kanāls sluices (the bridge of the republic significance road Riga-Ventspils has been built on the sluice pillars), because proper functioning of the sluices is of great importance in regulating the water level of (the Lake) Babītes Ezers.

There are currently 58 polders in Latvia occupying 40000 hectares of land. This represents approximately 1,6% of total utilised agricultural area. The largest areas of polder land are in the region of Riga around (the Lake) Babītes Ezers, in the Carnikava and Ādaži neighbourhood, in the Liepāja region around (the Lakes) Liepājas Ezers and Papes Ezers, in the Jelgava region in the neighbourhood of Lielupe and Vecbērze and in the Valmiera region near (the Lake) Burtnieku Ezers and in the rural territories (or *pagasti*) in the neighbourhood of (the Lake) Lubānas Ezers. In accordance with Cabinet Regulation No.142 of 17 February 2006, Regulations Regarding Agricultural Territories of National Significance, 37 polders have been determined as agricultural territories of national significance.

The number of polders in the river basin perspective is provided for in Table 4.

Polders in the River Basin Perspective

Table 3

No.	River basin district	Number of polders	Total area (ha)	Number of polders determined as agricultural territories of national significance
1.	2.	3.	4.	5.
1.	(The River) Venta	12	13922	11
2.	(The River) Lielupe	21	24355	13
3.	(The River)	18	15185	9

	Daugava			
4.	(The River) Gauja	7	8766	4
in total		58	62228	37

• **Flooding caused by hydroelectric power stations and other hydrotechnic structures**

This type of artificial – man-made (anthropogenically induced) flooded or flood-affected areas are connected to artificial changes to the natural water regime. They are river beds or coastal reservoirs, as well as lake-type reservoirs and other backwaters in river beds with water level regulating structures. An important factor of flood risk prevention is correct monitoring of hydrotechnic structures, maintenance thereof in running order, as well as strict observation of operation modes thereof.

The most significant of the river bed and lake-type reservoirs are the Daugava HPS cascade and small HPSs reservoirs. In case of accidents at the small HPSs reservoirs, a particularly dangerous situation is formed when the HPS is located in a cascade.

The Daugava HPS cascade (Pļaviņas HPS, Ķegums HPS and Riga HPS) is recognised as a flood risk area of national significance because the possible accident of the Daugava HPS cascade structures create flood threats in much larger areas and for a much higher number of inhabitants in comparison with floods caused by natural factors in risk areas.

The protection of the towns of Jēkabpils and Pļaviņas against floods is one of the largest problems connected to the Daugava HPS cascade.

The hazard associated with the Daugava HPS cascade is also the impact of possible emergency situations (*force majeure*) of engineering-protection buildings-pumping stations of Riga HPS in the regions of Riga and Ogre, which would lead to flooding as a result of inevitable rising of groundwater. To date the power and control installations of the engineering-protection buildings-pumping stations of reservoirs of the Riga HPS have served for 25 years, are therefore physically and morally outdated, creating risk for the surrounding public and environment.

The location of the HPS in the river basin perspective is provided for in Table 5.

Small Hydroelectric Power Stations in River Basins

Table 4

No.	River basin district	Number of HPS	Number of rivers on which a HPS is located	HPS which are located in a cascade
1	2	3	4	5
1.	(The River) Venta	46	35	9
2.	(The River) Lielupe	19	10	4
3.	(The River) Daugava	35	23	12
4.	(The River) Gauja	50	28	9

Reservoirs of small HPSs are a relatively small, therefore they cannot cause serious floods in case of accident, however the small HPSs located on one river cascade do not always operate in a mutually co-ordinated mode, which could have a positive impact on flood threats. When managing small HPSs, especially those located in cascades, the potential threats of accidents during high water and floods is not always taken into account, including the potential domino effect in cascades when an accident in a HPS located upstream may cause serious threats to the HPS located further downstream. Cascades of small HPSs are located on the Rivers Gauja (its upper reaches), Ogre, Aiviekste, Amata, Abuls, Svēte, Bērze, Alokste,

Ciecere, Eda and other rivers. Nine rivers have the greatest flood risk on which there are more than two small HPSs in the cascade and the most dangerous situation is on (the River) Gauja with 9 small HPSs built in the cascade. To prevent the risk of flooding as a result of operating such HPSs, it is necessary to develop a fully coordinated and optimal operating mode of all cascade reservoirs, in addition to performing the appropriate hydrologic and hydraulic calculations and risk assessments.

1.4. Specially Protected Nature Territories

In some places in Latvia the specially protected nature territories are situated completely or partially in areas subject to flood threats. Most of these areas are included in the Natura 2000 network of protected areas of European significance.

In many cases, as a result of flood and erosion substantial damage can be caused to protected natural values. For example, the following specially protected nature territories are exposed to storm floods and erosion processes in the Baltic Sea and the Gulf of Riga coast: the nature park „Pape”, the nature park „Bernāti”, the nature reserve „Ziemupe”, the nature reserve „Užava”, the nature reserve „Ovīši”, Slītere National Park, the nature park „Engures ezers” and others. The following specially protected nature territories are subject to storm floods in river mouths and associated surface water bodies: the nature reserve „Liepājas ezers”, the nature park „Užavas lejtece”, (the Lake) Kaņiera Ezers of Ķemeru National Park, the nature reserve „Lielupes grīvas pļavas”, the nature reserve „Babītes ezers” and others.

But a large number of specially protected nature territories are those that are subject to regular flooding and it is this regular flooding regime which determines the special state of the relevant nature territory and is one of the preconditions for the existence of natural values present therein. Consequently, retention of the flooding regime is the main task to be taken care of in these territories. These include, for example, the nature park „Daugavas loki”, the nature park „Dvietes paliene”, Rāznas National Park, the nature park „Daugavas ieleja”, the nature reserve „Lielā Baltezera salas”, the nature reserve „Jaunciems”, the nature reserve „Vecdaugava”, the nature reserve „Babītes ezers”, the protected landscape area „Ādaži” and others.

When granting the status of specially protected nature territory, the possibility of flooding in the area was not always analysed in detail, nor was the impact of floods on the ecological functions of the area assessed. Therefore, when performing the measures anticipated in the Programme for the assessment and reduction of flood risk in priority sites, including a wide researches of flood risk and development of activities to address them, at the same time the inclusion of information regarding the need for or prohibition of flood mitigation measures in the flood area should be provided for in the nature protection plans of the specially protected nature territories.

1.5. Historical Consequences and Material Losses of Floods

Flooding in the rivers of Latvia occurs most often in the spring high waters, especially due to ice jams, so special importance is given to studying ice conditions and snow cover over a longer period of time, in order to give more timely warnings regarding high levels of high waters via long-term high waters forecasts and consultations regarding the course of upcoming ice drifting.

The hydrological regime of rivers has best been researched in (the River) Daugava. In earlier centuries the highest flood levels in (the River) Daugava near Riga and upstream of Riga have been caused by the large ice jams. In the 20th century, before the Ķegums HPS on (the River) Daugava was built, ice jams often formed in (the River) Daugava with wide floods. The most complex ice drifting in (the River) Daugava was observed in: 1912., 1917., 1924., 1929., 1932., 1936. 1912, 1917, 1924, 1929, 1932, 1936 and 1937. In other years, for

example, in 1923, the town of Jaunjelgava was completely submerged under water, and the towns of Līvāni and Ogre were also flooded. A jam had formed from the town of Ikšķile to the town of Maruška, blasting works were carried out and ice was broken up near Riga using icebreakers. With the passing of ice and water wave through Riga, many lower places were flooded and burdened with ice, the Lībeka Bridge was destroyed, and on 1st and 2nd May 1931, the maximum water flow rate of (the River) Daugava near Jēkabpils was 7470 m³/s, while at the estuary it was 9460 m³/s.

Since the establishment of Pļavinas HPS reservoir, the section most at risk of sludge and ice jams is (the River) Daugava from the town of Pļaviņas to the town of Jēkabpils. As a result of the large floods in Spring 1981, in the town of Jēkabpils, when the water level reached 83,52 metres in the Baltic system at a flow rate of 2920 m³/sec, one-third of the town was flooded. In the same year the floods caused losses in the amount of 10 million roubles. In the winter of 1997/1998, according to data of the Latvian Hydrometeorological Bureau, the quantity of sludge in the section from the town of Pļaviņas to the town of Jēkabpils was around 12-14 million cubic metres which posed a serious threat to the town inhabitants during the spring high waters, because the water level at the town of Jēkabpils exceeded critical levels.

After the devastating floods of 1981 in the town of Jēkabpils a new residential area was built upstream of the bridge to move the residents from the lower, regularly flooded areas, to a safer area. The construction of the new residential area cost the country and region around 300 million roubles, as around two thousand residents were moved from the flood risk areas. In 1998, 793 810 LVL was spent on flood mitigation measures and covering of losses caused by flood in the town of Jēkabpils and its region, including 420 000 LVL on the reconstruction and development of the existing protection dams. The losses caused by spring floods in 1999 – 137 240 LVL, in 2004 – 118 350 LVL.

The floods of (the River) Lielupe from its middle reaches and its tributaries have caused serious damage in previous centuries. In order to protect the land of Līvberze estate from flooding, in around 1800 (the River) Bērze bed was shifted to (the River) Svēte. The lower reaches of the former river bed of (the River) Bērze now serve as the penstock for (the River) Vecbērze polder pumping station. In anticipating the protection of the areas adjacent to (the River) Garoze downstream from floods of (the River) Lielupe, in the 1830s the upper end of (the River) Garoze was diverted to the town of Iecava by a 17 km long canal. As a continuation of these works, in 1963 the construction of the 6200 ha (the River) Garoze polder was completed, which is operated by a sluice (without a pumping station). In the 1950s in the areas adjacent to (the River) Lielupe up to 35 000 ha of land flooded. Several polders have been constructed in order to protect these areas.

In the river basins of (the Rivers) Venta and Gauja, especially at the mouths of these rivers, each year floods cause considerable material as well as moral losses to the residents in the area.

2. Flood Risk Scenarios and Assessment Criteria Thereof

Directive 2007/60/EC provides that Member States perform preliminary flood risk assessments for the territory of their countries, which could flood according to the following scenarios:

- a) floods with a low probability;
- b) floods with a medium probability (likely return period: ≥ 100 years); and
- c) floods with a high probability.

Summarising the experience of all previous years and in evaluating proposals for the assessment of flood hazards and their criteria, provided for in the works of different Latvian design and research organisations, the following flood scenarios are determined that are applicable to the conditions of Latvia:

• **Floods with a low probability -1st flood risk or extreme event scenario** (*extreme events, extreme floods*) with a return period > 200 years, or floods caused by various specific reasons.

The criteria for a scenario of flood risk with a low probability in Latvia are as follows:

1) for cases of accidents of the highest „A” safety class HPS hydrotechnic structures (for example, the Daugava HPS cascade),

2) for cases of sludge-ice occurrence difficult to predict in (the River) Daugava (the towns of Jēkabpils and Pļaviņas),

3) for cities threatened by a combination of several causes of flooding (for example, Riga, where increased flooding may be caused by storm surge caused by storms in combination with a relatively high flow rate in (the River) Daugava).

The primary evaluation criterion is the number of inhabitants at risk and the extent of the damage.

The first flood risk or extreme event scenario is applied as the most important, and measures for the protection of these areas are primary because they are related to protecting particularly densely populated areas from flood risks.

Floods with a medium probability – 2nd flood risk scenario (likely return period: ≥ 100 years).

The criteria for a scenario of flood risk with a medium probability are as follows:

1) for cities with a number of inhabitants above 2000.

2) agricultural territories of national significance determined by Cabinet Regulation No.142 of 14 February 2006 (for example, existing polder areas),

3) for flood risk areas on which waste water treatment plants have been or are to be built in accordance with Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (for example, Riga, Daugavpils and Liepāja).

4) for flood risk areas on which undertakings are situated, which in performing Category A polluting activities, may lead to an increased risk of water pollution in the event of flooding.

5) Areas that are exposed to storm surge risk, including those subject to coastal erosion.

6) areas where serious flooding has occurred in the past, that have had significant adverse effects on human health, the environment, cultural heritage and economic activity, and could still occur to a similar extent.

Floods with a high probability - 3rd scenario (*frequent, with a likely return period of ≤ 10 years*).

Directive 2007/60/EC provides that a flood assessment for floods with a high probability only needs performing where necessary. Such flood risk assessment may be performed, for example, for wetland area research purposes, in order to assess whether it is possible to preserve them. In areas where priority is given to maintaining their natural regime, measures of flood risk prevention or reduction are not recommended.

The Programme does not include measures to reduce flood risk in the third flood risk scenario cases assuming that the commonly occurring floods mainly affect floodplains or specially protected territories in which flood mitigation measures that reduce the areas of floodplain meadows and change the hydrological regime therein are not permissible for the purposes of conservation of biological diversity and specially protected species and habitats. It is also specified in Article 14 of the preamble of Directive 2007/60/EC that Member States

as far as possible should not only maintain floodplains, but perform measures for their restoration, with a view to giving rivers more space.

In accordance with the requirements of Directive 2007/60/EC, the flood risk criteria are to be taken into account for:

- 1) preliminary flood risk assessments;
- 2) the development of flood hazard maps and flood risk maps;
- 3) the development of flood risk management plans.

The relevant criteria characteristics and their designations for flood risk scenarios are given in Table 1 of Annex 4 to this Programme.

The following characteristics should be considered for flood hazard assessment, depending on the scenario:

- 1) terrain topography;
- 2) the position of water bodies and watercourses;
- 3) the geomorphology;
- 4) hydrological characterisation, including the formation mode of ice and sludge, ice flow and deposition mode, the formation mode of ice – sludge congestions, flood levels (flood depth) mode;
- 5) the risk of storm surge inc. coastal erosion;
- 6) the location of the residential areas subject to flood risk and the indicative number of inhabitants potentially affected;
- 7) the threats of flood damage to long-term development intended in the spatial plans, economic activities (types of economic activity performed) or infrastructure;
- 8) cultural and historical sites or specially protected nature territories;
- 9) Category A polluting activities which could cause significant environmental pollution or have a significant adverse effect on the health of the inhabitants;
- 10) location of wetland areas, in which a natural flood regime is to be preserved as far as possible;
- 11) hydrotechnic structures which affect the groundwater level of the surrounding areas;
- 12) the impact of the flood protection dams (polders) on the flood risk areas;
- 13) reservoirs (river bed and coast, as well as lake-type) and other water bodies with water level regulating structures, potential coastal wash threatening the adjacent territories;
- 14) descriptions of previous serious flooding that has had significant adverse effects on human health, the environment, cultural heritage and economic activity and which could continue to repeat to the same extent, and a description of the extent thereof and the flood conveyance routes, as well as an evaluation of the resulting adverse effects;
- 15) a realistic time frame and costs for flood risk prevention and reduction.

II. Link of the Programme to the Priorities and Supporting Policy Documents of the Government and Ministries, as well as to the Priorities Determined by the Development Programmes and Strategies of the Planning Regions

The National Programme for the Assessment and Management of Flood Risks 2008-2015 complies with and the Programme is formulated from:

Policy Planning Documents

- The tasks specified in the government declaration - to promote and participate in the implementation of measures for preventing natural flood risks to residential areas, and for the prevention of flood risks arising from the building of Pļaviņu HPS (Paragraph 5 under the section "Sustainable and Effective Use of Natural and Energy Resources").

- The tasks specified in the National Development Plan of Latvia for 2007-2013 (Cabinet Regulation No.564) – to improve the civil defence system and promote inter-institutional co-operation in this sphere (Task 2 under the section "Ensuring Internal Security") and to encourage public participation in environmental protection and preservation by providing timely and true information to the public about environmental quality and natural resources (Task 3 under the section "Reasonably Used and Well-preserved Environment").

- The policy objectives set in the Latvian Sustainable Development Guidelines and National Environmental Plan 2004 - 2008 - to ensure protection against floods.

- The Ministry of Environment operational strategy for 2007 – 2009 (Cabinet Order No.359 of 22 May 2006) also specifies the medium-term priority task to be the reduction of environmental risk, including flood risk in areas which are subject to the flood threats.

- The need to develop a Programme arises from the draft National Strategic Reference Framework (Cabinet Order No.389 of 20 June 2007) and Operational Programme "Infrastructure and Services" (Cabinet Order No.806 of 18 October 2006). Measures for the prevention or restriction of potential flood threats in threatened areas are specified in the referred to planning documents, as priorities to prevent the risk of potential accidents.

- Development of the Programme is also anticipated in the Government Declaration Action Plan (Cabinet Order No.333 of 28 June 2007), and the development of the Programme also arises from the task appointed to the Ministry of Environment in Cabinet Order No.621 of 17 June 2006 On the Concept „Regarding Measures to be Performed in Order to Prevent the Flood Threats Caused in Jēkabpils Following the Creation of Pļaviņas HPS and its Reservoirs.

The Programme shall ensure the execution of several international conventions, EU legislation and the laws and Cabinet Regulations of Latvia.

International Conventions

The UNECE Helsinki Convention of 1992 On the Protection and Use of Transboundary Watercourses and International Lakes, ratified by Latvia in 1995.

European Union Directives

- Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. The task specified in the Directive – to achieve a good ecological status for each water body, indirectly mitigating the effects of floods to areas subject to flooding.

- Directive 2007/60/EC prescribes that the development of the river basin management plans provided for in Directive 2000/60/EC and the flood risk management plans provided for in this Directive are integrated river basin management measures. Directive 2007/60/EC provides that the preliminary flood risk assessment shall be performed and flood risk management plans are to be prepared for each river basin district.

Laws of Latvia

- Environmental Protection Law (2006);
- Water Management Law (2002);
- Spatial Planning Law (2002);
- Law On Local Governments (1994);
- Civil Protection Law (2006);
- Protection Zone Law (1997);

- Law On the Safety of the Hydrotechnic Structures of Hydroelectric Power Stations (2001);
- Law On Specially Protected Nature Territories (1993);
- Amelioration Law (2003).

Development Programmes of Planning Regions

At present flood threats have not been assessed in the development programmes, plan and strategies of planning regions, and no measures are provided to prevent or reduce the potential flood threats in flood risk areas.

III. Objectives and Sub-objectives of the Programme

The objective of the Programme ties in with the objectives of Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, the UNECE Helsinki Convention of 1992 On the Protection and Use of Transboundary Watercourses and International Lakes and Directive 2007/60/EC – to establish such water protection system which promotes the reduction of flood impact, as well as a framework for the assessment and management of threats caused by floods, in order to reduce the adverse impact for human health, the environment, cultural heritage and economic activity associated with floods occurring in the Community.

In order to achieve the objectives set, the Programme focuses on practical measures which are achievable within the time period referred to, by setting the following sub-objectives and tasks:

1. Detailed research of flood risk areas according to the flood risk criteria.
2. A preliminary assessment of areas subject to flood risk and planning for further action.
3. Clarification of priority areas at risk of flooding and determination of the specific measures for the prevention or reduction of flood risks.
4. Implementation of measures to be performed for the prevention of flood risks and the reduction of flood risks in priority areas.

IV. Planned Results of the Programme Policy and Results of the Activity

When implementing the Programme, the following policy and results of the activity will be achieved:

- National legislation will be prepared for the assessment and management of flood risk in compliance with the requirements of Directive 2007/60/EC.
- Justification for attracting European Community funding for the reduction of flood risk will be prepared.
- Clearly defined and specified areas subject to flood risk, as a result of research.
- Areas on which building must be restricted are identified.
- The priority flood risk areas are specified, in which flood mitigation measures are to be performed in the first instance.
- Measures have been performed in order to prevent the flood threats caused in the town of Jēkabpils and Pļaviņas following the creation of Pļaviņas HPS and its reservoirs.
- Measures have been performed which limit the impact of sea and river coastal erosion on the safety of inhabitants and the surrounding environment.

- Projects have been formulated and measures implemented for the reconstruction of depreciated hydrotechnic structures for the protection of flood risk areas.

V. Result-based Indicators for the Achievement of Results of the Programme Policy and Results of Activity

1. Polder pumping stations have been technically restored and the required humidity mode has been ensured in 51 polder areas, including: 15 in the river basin district of Venta, 16 in the river basin district of Lielupe, 15 in the river basin district of Daugava and 5 in the river basin district of Gauja.

2. Sea coast research has been performed for a distance of approximately 130 km and environmentally friendly technical solutions have been performed for strengthening the sea coast and for the reconstruction of existing embankments in specific areas (see Annex 3 to the Programme).

3. Research on the impact of storm surge on the areas adjacent to 18 river estuaries and the development and performance of environmentally friendly coastal protection measures have been performed.

4. Flood threats have been reduced or prevented in 9 areas of the largest cities of Latvia, including 5 areas of the republic cities.

5. Information has been compiled and around 400 km of potamal river sections have been studied, the borders of areas subject to flood risk have been defined and marked on maps and appropriate information has been prepared regarding the possible extent of flood in compliance with the requirements of Directive 2007/60/EC.

VI. Main Tasks for the Achievement of Results of the Programme

The tasks of the measures anticipated in the Programme are aimed at reducing flood risk and flood management, providing for the reconstruction of existing hydrostructures (in some cases the construction thereof) and a wide research programme in order to update the areas subject to floods, flood risk assessment and an assessment of the potential impact of the anticipated building and reconstruction works on the environment. When performing complex research of areas subject to flood risk, the areas in which flood mitigation measures that reduce the areas of floodplain meadows and change the hydrological regime therein may not be performed, for the purposes of the conservation of biological diversity, including specially protected species and habitats, shall be clarified.

The main task for the implementation of these measures is the prevention or reduction of flood risks in the areas of dense population, treatment plants and facilities performing Category A polluting activities. In such way the adverse effect especially on human health and life, the environment, cultural heritage, economic activity and infrastructure associated with floods will be prevented or reduced. The measures will also reduce the potential pollution risk of surface water bodies and the coastal erosion process on the sea, river, lake and HPS-caused flooding on the coasts.

The detailed measures for the implementation of the Programme, the expected results, the approximate costs as well as the authorities responsible for performing the tasks and the planning of the time for the performance of tasks are indicated in Tables 2 and 3 of Annex 4 to the Programme.

VII. Programme Funding

Performance of the tasks of the Programme has been specified for the period commencing 2007 and until 2015. As extensive research is intended prior to the

implementation of each measure, the anticipated funding for the performance of the measures is indicated indicatively, taking into account the information provided in existing similar projects and the approximate costs evaluated by experts, which are necessary for the performance of the respective tasks of the measures to be implemented. The total funding required for implementation of the Programme for the period commencing 2008 until 2015 comprises LVL 49,73 million, of which:

- in case of the first flood risk or extreme event scenario (floods with a low probability – extreme) – the total cost of measures for the prevention and reduction of flood risk comprises LVL 34,21 million;

- in case of the second flood risk scenario (floods with a medium probability) – the total cost of measures for the prevention and reduction of flood risk comprises LVL 15,52 million.

During the EU financial planning period, it is planned to attract European Regional Development Fund (ERDF) funds for the prevention of flood threats, within the scope of the activity "Reduction of Environmental Risks" in the amount of EUR 15,0 million (or LVL 10,53 million). Therefore, the additional funding required for the implementation of the Programme from the State and local government budgets will comprise LVL 39,2 million, including LVL 1,86 million for co-financing of the ERDF funded projects (15% of the total costs of the ERDF projects).

The performance of the tasks and funding necessary, indicated in the Programme may differ each year. The funding necessary for the measures may be clarified following research of the measures, and may be clarified for individual measures depending on available EU funding, as well as on the provision from the next EU Fund planning period.

Minister for the Environment

R. Vējonis

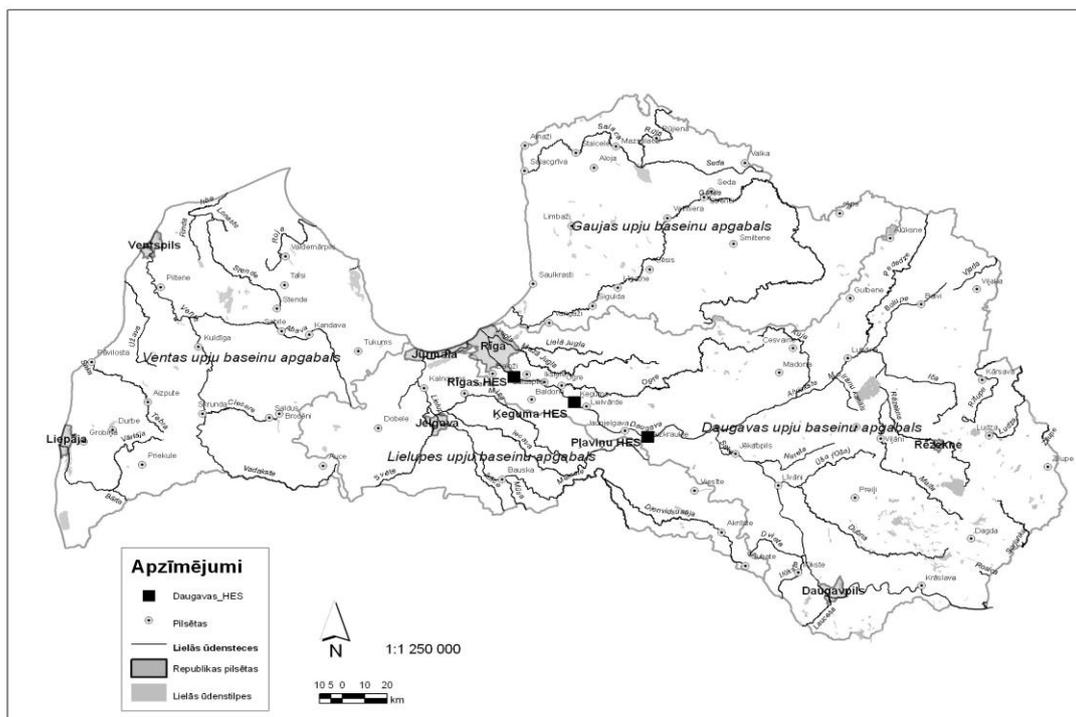
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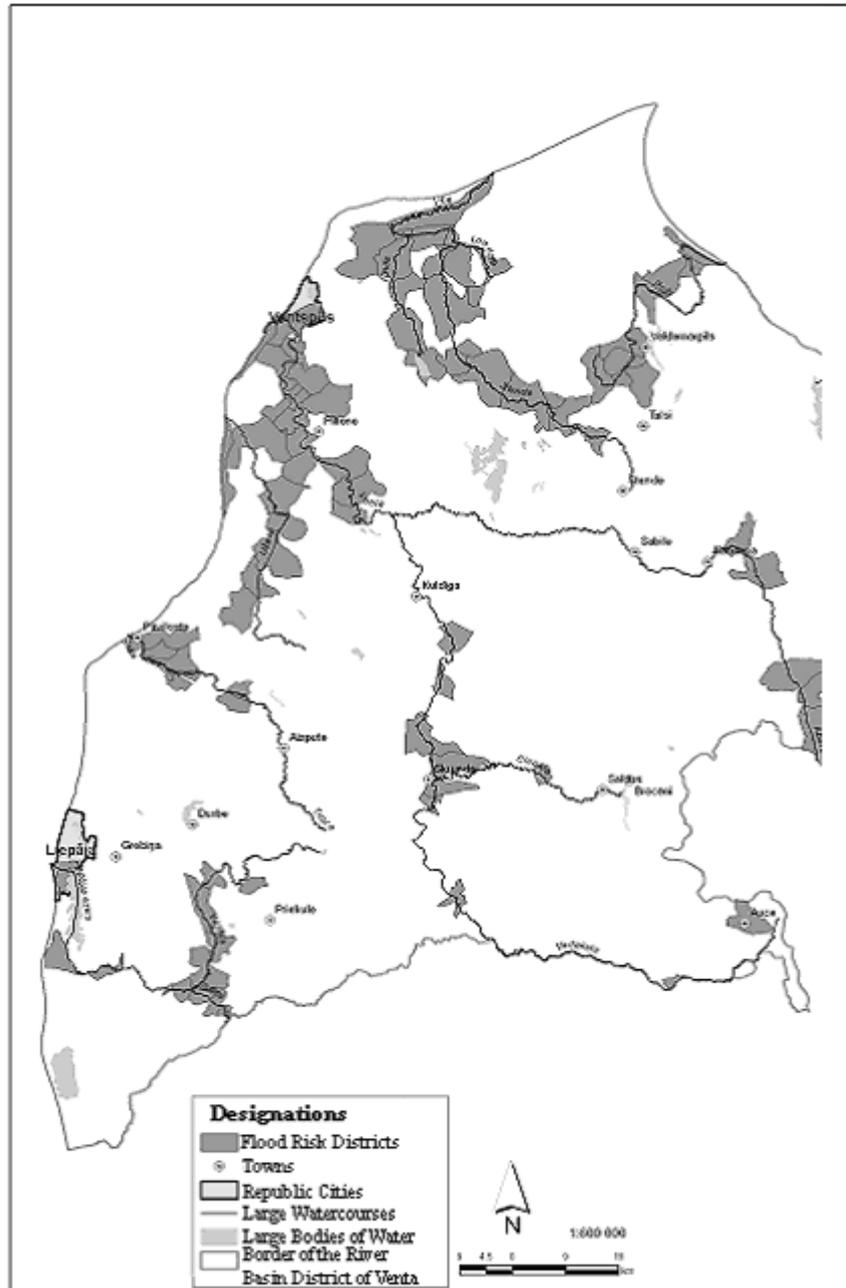
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River Basin Districts of Latvia

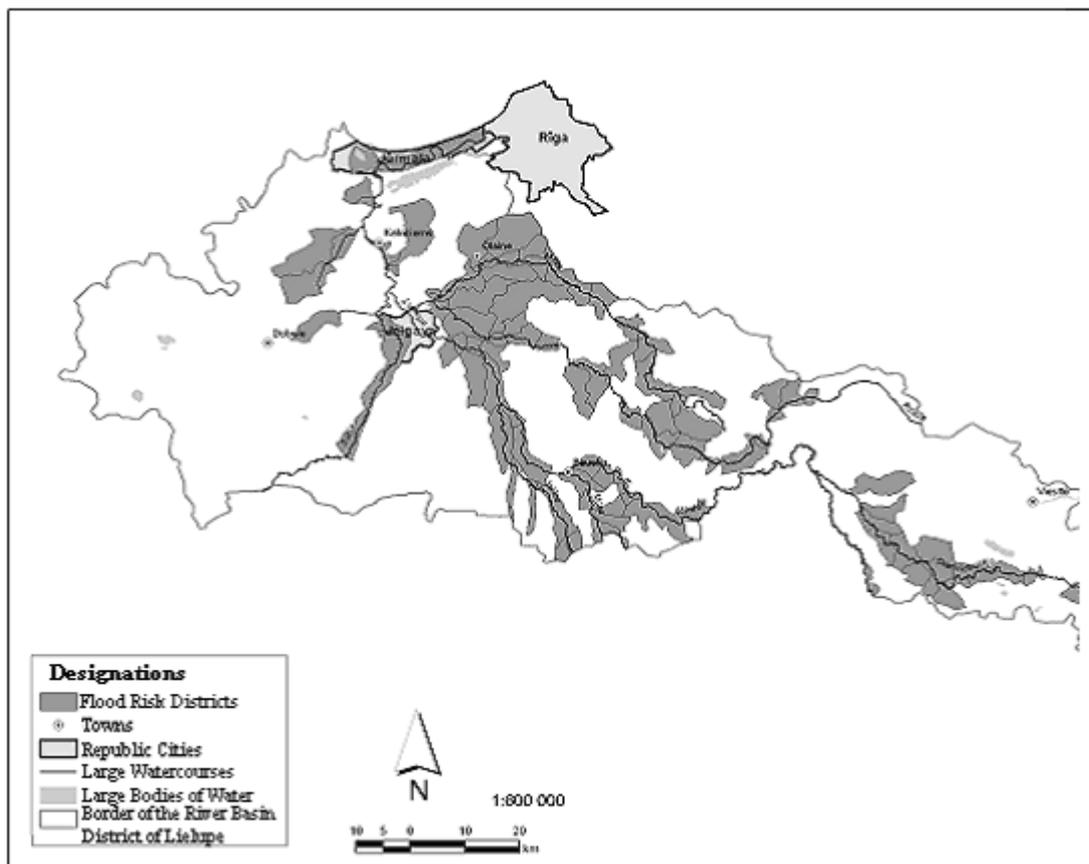


Flood Risk Areas In River Potamal Sections

2.1. River Basin District of Venta

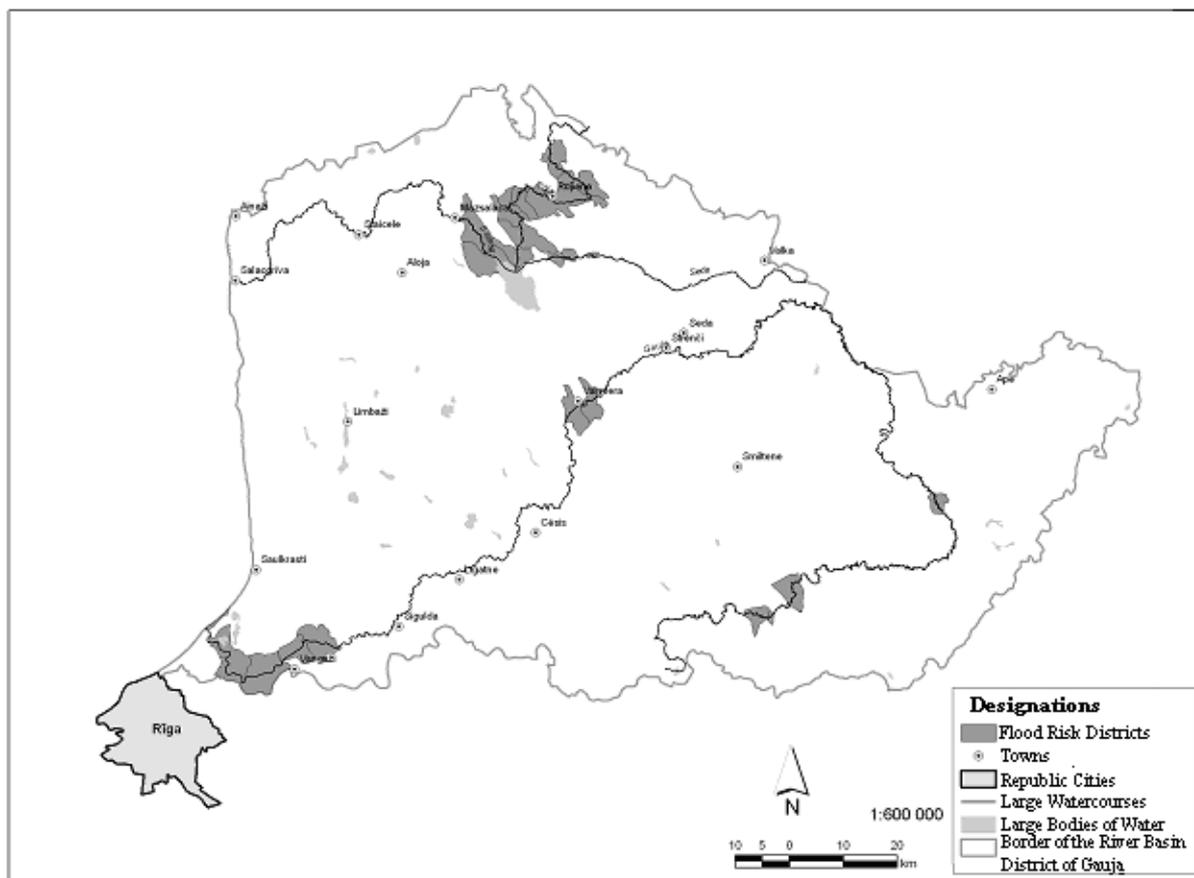


2.2. River Basin District of Lielupe

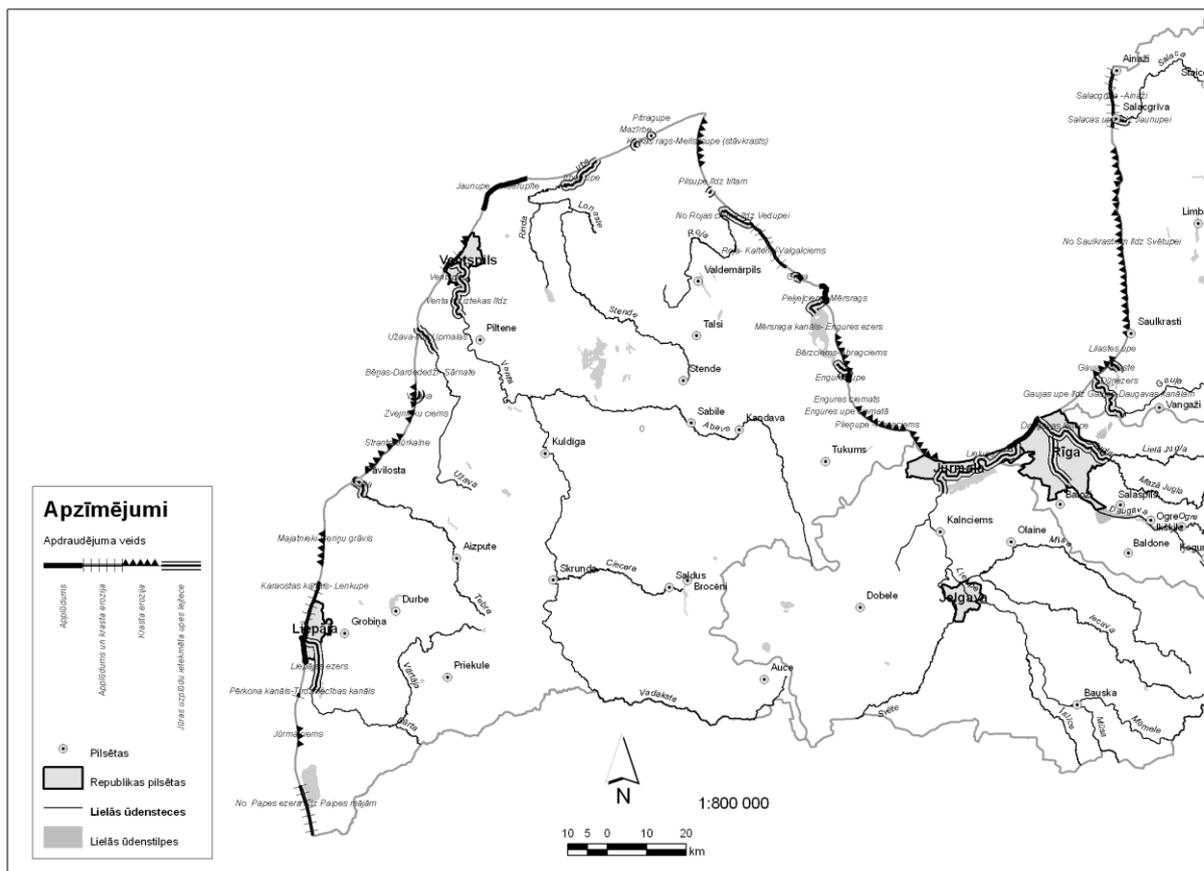


2.3. River Basin District of Daugava

2.4. River Basin District of Gauja



Coastal Flood Risk and Coastal Erosion Risk Areas of the Baltic Sea and the Gulf of Riga



Measures for the Assessment and Reduction of Flood Risks

The Characterisation of the Criteria Relevant to Flood Risk Scenarios and Designation
Thereof

Table 1

No.	Designation of Criteria	Characterisation of Criteria
1.	First flood risk or extreme event scenario - floods with a low probability (extraordinary, extreme flood scenarios with a return period ³ ≥200 years)	
1.1.	1A	For cases of accidents with the highest “A” safety class HPS hydrotechnic structures
1.2.	1B	For cases of sludge-ice phenomena difficult to predict
1.3.	1C	For cities which are at risk of a combination of several causes of flooding
1.4.	1D	For cities with inhabitants over 10000
1.5.	1E	Reservoir cascades on large and medium rivers, where an accident may cause a wave of flooding which may cause the dam below to break, as well as flooding of the adjacent areas
2.	Second flood risk scenario - floods with a medium probability (with a likely return period ≥100 years)	
2.1.	2A	For cities with number of inhabitants above 2000.
2.2.	2B	Agricultural territories of national significance determined by Cabinet Regulation No.142 of 14 February 2006
2.3.	2C	For flood risk areas on which waste water treatment plants have been or are to be built in accordance with Council Directive 91/271/EEC (Programme 800+)
2.4.	2D	For flood risk areas on which undertakings are situated, which on performing Category A polluting activities, may lead to increased danger of water pollution in the event of flooding.
2.5.	2E	For areas that are subject to storm surge risk, including those subject to coastal erosion.
2.6.	2F	Areas where serious flooding has occurred in the past, that have had significant adverse effects on human health, the environment, cultural heritage and economic activity, and could still occur to a similar extent.
2.7.	2G	Reservoir cascades on small rivers, where an accident may cause a wave of flooding which may cause the dam below to break, as well as

		flooding of the adjacent areas
2.8.	2H	Damp forest areas
2.9.	2I	For populated areas subject to river basin channel flood risks
3.A	Third flood risk scenario - floods with a high probability (frequent floods with a likely return period ≤ 100 years) For the purposes of researching of protected or wetland areas in order to assess whether it is possible to preserve them	

First flood risk or extreme event scenario - floods with a low probability (extraordinary, extreme flood scenarios with a return period ≥ 200 years)

2. Table 2

No. in suc.	Name of the flood risk area and the measures (tasks) for reducing the risk	Criteria due to which included in the list of priority objects	Responsible authorities	Execution time, years	Approximate costs, LVL millions	Expected result
1	2	3	4	5	6	7
1. River Basin District of Venta						
1.1.	Research of the flood area of the city of Liepaja and development and performance of the necessary protective measures	1C 1D	Liepaja City Council	2008 - 2015	3.85	Reduced risk in the flood risk areas of the city of Liepaja; reduced fluctuation of the levels of (the Lake) Liepājas Ezers; strengthening of the sea coast and reconstruction of the old embankment performed; weir constructed on (the Channel) Tirdzniecības Kanāls
1.2.	Research of the flood risk area of the city of Ventspils and development of the protective measures	1C	Ventspils City Council	2008 - 2012	0.2	Specific risk areas identified and measures developed for the prevention or reduction of flood

						risk; measures performed for the reduction of flood risk;
2. River Basin District of Lielupe						
2.1.	Reconstruction of (the Channel) Varkaļu Kanāls sluices	1C	Local governments	2008 - 2012	1.34	The water level in (the Lake) Babītes Ezers and the polders next to the lake will be stabilised and reduced, and the coastal erosion risk to the City of Jūrmala reduced.
2.2.	Recurrent cleaning of the bed of the River Lielupe from the estuary to the railway bridge	1C	Jūrmala City Council	2008 - 2010 annually	0.04 0.02	Removal of sand silt from the bed of (the River) Lielupe will reduce flood risk in Jūrmala during the spring floods; maintenance measures of the cleared beds must be performed regularly
2.3.	Reconstruction of the bank reinforcement from the left bank of (the River) Lielupe (the section from the Station Dzintari to the Station Dubulti)	1C	Jūrmala City Council MoT	2008 - 2010	0.35	The threat of the railway collapsing will be rectified in the section from the Station Dzintari to the Station Dubulti, as well as flood risks will be reduced in Jūrmala
2.4.	Reconstruction of Babīte polder	1C	MoA	2008.- 2013.	2.95	Flood risks will be rectified in the city of Jūrmala and the surrounding area of the city, as well as in the rural territories (or <i>pagasti</i>) of Sala and Babīte
2.5	Exploration of the city of Jelgava and the adjacent areas subject to flood risk, development of a flood mitigation plan, implementation of the measures required to prevent or reduce the flood risk in the city of Jelgava and the adjacent areas (reconstruction and improvement of protection dams and other	1D, 1C	Jelgava City Council Local governments	2008.- 2013.	8.50	Exploration of the bed of (the River) Lielupe and the adjacent areas, a flood mitigation plan developed for the city of Jelgava; flood risks in the city of Jelgava and the adjacent areas will be prevented

	hyrotechnic structures, as well as rainwater collector)					
3. River Basin District of Daugava						
3.1.	Research into the construction and reconstruction of the protection dams of the territory of Daugavgrīva, as well as measures for strengthening the coast	1D, 1C	Riga Municipality	2008-2012 2012-2015	0.02	A plan for flood mitigation measures to be performed in the territory of Daugavgrīva will be developed; the funding needed to perform the measures will be defined
3.2.	Maintenance of the feed-through capability of the bed of (the River) Daugava from its mouth to the Riga HPS dam	1D	Local government of City of Riga Freeport of Riga	continuously	Annual budget planning	Maximum feed-through of flooding will be ensured
3.3.	Research of the measures necessary for flood mitigation in the lower area of the City of Riga for the section of (the River) Daugava from its mouth to Riga HPS	1A, 1C, 1D	Local government of City of Riga	in 2010	0.3	A plan for flood mitigation measures to be performed will be developed
3.4.	Improvement of the operation of Spilve polder and Spilve Aerodrome polder pumping station and installation of backup sources of power at polder pumping stations.	1D	MoA* Riga City Council	in 2009	0.02	Technical assessment of the compliance of the polder with its present type of use will be developed and a plan of measures to be taken will be developed
3.5.	Maintenance of Riga HPS hydrotechnic structures in appropriate technical order in compliance with the requirements of the Class A Structure Safety Programme	1A, 1E	Public limited company Latven ergo	continuously	Annual budget planning	Maintenance of HPS structures in appropriate technical order and the correct operation thereof, ensuring protection in the territories on the downside of the HPS from devastating floods
3.6.	Evaluation of the effectiveness of the protection structures in the territories adjacent the Riga HPS reservoir, and	1C	MoA	2008 - 2010	0.71	A technical assessment for evaluating the protection of the adjacent territories

	increasing the protection abilities thereof, development and implementation of the measures required					will be developed; a plan of measures to be taken will be developed; The polder pumping stations at Spolīte, Tome, Ikšķile I and Ikšķile II polders will be technically restored, and backup sources of power will be installed at pumping stations
3.7.	Maintenance of Ķegums HPS hydrotechnic structures in appropriate technical order in compliance with the requirements of the Class A Structure Safety Programme	1A, 1E	Public limited company Latven ergo	continuously	Annual budget planning	Maintenance of HPS structures in appropriate technical order and the correct operation thereof, ensuring protection in the territories on the downside of the HPS from devastating floods
3.8.	Maintenance of Pļaviņas HPS hydrotechnic structures in appropriate technical order in compliance with the requirements of the Class A Structure Safety Programme	1A, 1E	Public limited company Latven ergo	continuously	Annual budget planning	Maintenance of HPS structures in appropriate technical order and the correct operation thereof, ensuring protection in the territory on the downside of the HPS from devastating floods
3.9.	Protection of the towns of Pļaviņas and Jēkabpils and adjacent territories thereof against flood threats	1B	Jelgava City Council Jēkabpils District Council Aizkraukles District Council		10	Technical research of the protection dams, development of technical projects, the improvement and reconstruction of the existing dams, cross-section enlargement of the river bed of (the River) Daugava restoring the filled-in section of the Bridge Zelķi, removal of dolomite siftings from the bed of (the River) Daugava
3.10.	Development and implementation of the measures required for the	1D	Daugavpils City	2008-2013	6.04	Reconstruction of the protection dams of the city of Daugavpils will

	protection of the city of Daugavpils and adjacent territories thereof		Council			be performed; recurrent cleaning of silt from the bed of (the River) Daugava has been performed; the flood risk to the city of Daugavpils has been reduced
4. River Basin District of Gauja						
4.1.	Research of the areas adjacent to (the River) Gauja and protection against flood threats in the section from the mouth of (the River) Gauja to the town of Ādaži (reconstruction and improvement of the existing protection dams, installation of coast embankments)	1B	MoEN V, Local governments MoT	2008 - 2013	1.23	Reconstruction and improvement of the existing flood defences will be performed; reduction of flood risk in the areas near the River Gauja estuary into the sea, as well as near the railway bridge and bridge of the Tallinn highway, and the metal bridge in the town of Ādaži, preventing risks to transport as well as densely populated areas

Second flood risk scenario - floods with a medium probability – (likely return period: \geq 100 years).

Table 3

No.	Name of the flood risk area and the measures (tasks) for reducing the risk	Criterion due to which included in the list of priority objects	Responsible authorities	Execution time, years	Approximate costs, LVL million	Expected result
1	2	3	4	5	6	7
1. River Basin District of Venta						

1.1.	Protection of the territory adjacent to (the Lake) Papes Ezers (renewal and construction of sluices on (the Channel) Papes Kanāls, reconstruction of Pape polder station)	2B; 2E; 2F	Local governments, MoA	2008 - 2015	0.32	Renewal of (the Channel) Papes Kanāls sluices will be performed with an environmentally friendly construction solution and operation regime; improvement of the operational efficiency of Pape polder and prevention of territorial flooding will be performed
1.2.	Research of the condition and reconstruction of 7 polders adjacent to (the Lake) Liepājas Ezers	2B; 2E	Local governments MoA	2008 - 2015	2.2	Protection of the polder areas from sea floods will be ensured and the required humidity regime ensured in the areas
1.3.	Research of the sea flood risk area of the municipality of Saka and the development and performance of necessary mitigation measures	2F, 2E	Municipality Council of Saka	2008 - 2015	0.12	Flood areas and the required technical, including environmentally-friendly, solutions will be determined and sea coast protection will be performed
1.4.	Research of the areas at risk of storm surge and storm surge impact on the small river mouths on the shore of Kurzeme, forecasts of the level of coastal erosion threats and development of environmentally-friendly mitigation measures and performance thereof	2E	Local governments on the shore of Kurzeme, MoENV	2009 - 2015	1.5	Flood areas will be determined and the required technical, including environmentally-friendly, solutions and coast protection will be performed
1.5.	Research of the ice-sludge problem of (the River) Bārta and an assessment of the reconstruction of the polders associated thereto	2F	MoA, Local governments	2010	0.1	Recommendations for the reduction of flood risk in populated areas will be developed.
1.6.	Research and determination of the flood areas of the river potamal sections	2C; 2D; 2I	MoENV	2008 - 2013	0.4	Hydrological-hydraulic calculations will be performed based on the latest hydrometric observation data, the flood risk areas will be determined and marked

						on maps
1.7.	Research of the reconstruction required for 4 polders of (the River) Užava and a flood risk assessment of the adjacent territories	2I	MoA Local governments	2008 - 2010	0.04	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified
1.8.	Research of the need for reconstruction of polders (Kūlciems, Spāre and Upati)	2B	MoA Local governments	2010 - 2012	0.03	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified
1.9.	Assessment of the risk areas downstream from the small HPS located in the cascade on (the Rivers) Vārtāja, Alokste, Abava (with tributaries (the Rivers) Svente, Viesata), Ēda, Ciecere, Zaņa, Losis, Ezere and Engure). Development of HPS cascade co-ordinated operational regulations, maintenance of HPS hydrotechnic structures in technical order in compliance with the requirements of the Class B Structure Safety Programme	2G	MoENV	2008 - 2011	0.4	The likelihood of accidents in the HPS cascades will be assessed; a plan of measures for the prevention or reduction of these threats will be developed; flood threats in the territories downstream from the HPS will be reduced
2. River Basin District of Lielupe						
2.1	Research of the condition of existing polder hydrotechnic structures and the necessary reconstruction (for the polders Vecbērze, Ratnieki – Biteslejas, Straupciems, Jāņupīte, Dzilnupe, Trenči, Bļodnieki, Odiņi – Pavasari, Jelgava airfield, Ozolnieki,	2B, 2I	MoA, Local governments		1.4	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified, polder reconstruction will be performed

	Gate, Gātupe and Namīķi)					
2.2	Research of the condition and operational efficiency of the structures of Vecbērze polder, polder reconstruction	2B	MoA, Local governments	2010 - 2012	0.3	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified and the reconstruction thereof will be performed
2.3	Research and determination of the flood area of the river potamal sections	2C; 2D; 2I	MoENV	2008 - 2013	0.4	Hydrological-hydraulic calculations will be performed based on the latest hydrometric observation data - the flood risk areas will be marked on the maps
2.4	Research of the risk areas downstream from the cascade type HPS reservoirs on (the Rivers) Bērze (with tributary Bikstupe), Svēte, Dienvidsuseja and Platone. Development of HPS cascade optimally coordinated operational regulations, maintenance of HPS hydrotechnic structures in appropriate technical order in compliance with the requirements of the Class B Structure Safety Programme	2G	MoENV	2008 - 2012	0.25	The likelihood of accidents in the HPS cascades will be assessed; a plan of measures for the prevention or reduction of these threats will be developed; flood threats in the territories downstream from the HPS will be reduced
3. River Basin District of Daugava						
3.1	Research of the existing technical condition of the River Mazā Jugla polder and evaluation of the compliance of the polder with its present use, required reconstruction of the	2B	MoA, local governments	in 2010	0.3	Reconstruction of Mazā Jugla polder will be performed and the risk of flooding of the territories will be reduced

	polder					
3.2	Development and implementation of measures required for the protection of the territories adjacent to the town of Ogre in the section of (the River) Ogre from the tributary into the Riga HPS reservoir to the Cardboard Factory dam (inc. installation of a backup source of power at polder pumping stations in Ogre I, Ogre II, Ogre IV and Ciemupe polders)	2A, 2C, 2F	MoA, local governments	2010 - 2011	1.29	A technical assessment of the compliance of the drainage system in the adjacent territories with its present type of use will be developed; a plan of measures to be taken will be developed; the polder pumping stations will be technically restored
3.3.	An assessment of the technical condition of the polders (Zvidziene, Kapūne, Dziļāune, Krēslīte) of (the Lowlands) Lubānas Zemīne, reconstruction and maintenance in compliance with use thereof. Reconstruction of (the Lake) Lubānas Ezers defence structures	2B	MoA, Local governments	2010 - 2015	1.2	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified, their reconstruction has been performed
3.4.	Assessment of the technical condition of the Ošas I, Ošas II, Strimīna and Kreiči polders, research of the flood areas, required reconstruction	2F, 2I	MoA, Local governments	2010 - 2016	0.5	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified, and their reconstruction will be performed
3.5.	Research and determination of the flood areas of the river potamal sections	2C; 2D; 2I	MoENV	2008 - 2013	0.7	Hydrological-hydraulic calculations will be performed based on the latest hydrometric observation data; the flood risk areas will be marked on the maps

3.6.	Research of the risk areas downstream from the cascade type HPS reservoirs to (the Rivers) Lielā Jugla (with tributaries Suda and Mērgupe), Ogre (with tributaries Aviekste, Lobe, Sustala), Aiviekste (with tributaries Veseta, Svētupe, Kuja, Libe, Pededze), Rēzekne (with tributaries Malta), Dubna (with tributaries Jaša and Tartaks), Ilūkste and Ludza. Development of HPS cascade optimally coordinated operational regulations, maintenance of HPS hydrotechnic structures in technical order in compliance with the requirements of the Class B Structure Safety Programme	2G	MoENV	2008 - 2012	0.46	The likelihood of accidents in the HPS cascades will be assessed; a plan of measures for the prevention or reduction of these risks will be developed; flood risks in the territories downstream from the HPS will be reduced
4. River Basin District of Gauja						
4.1.	Research of the storm surge risk areas and storm surge impact on small river mouths on the shore of the Gulf of Riga	2E	Local governments, MoENV	2010 - 2015	1.2	Forecast of the level of coastal erosion risk will be performed; flood areas will be determined; technical, including environmentally-friendly, mitigation measures will be developed; sea coast protection will be performed
4.2.	Research and protection of the flood risk areas adjacent to (the River) Gauja in the section from the town of Ādaži to the town of Sigulda	2F, 2E	Local governments, MoENV	2010 - 2015	1.3	Research will be performed and environmentally-friendly mitigation measures will be developed; the risk of flooding of populated areas will be reduced
4.3.	Research and determination of the flood areas of the river	2C; 2D; 2I	MoENV	2008 - 2013	0.4	Hydrological-hydraulic calculations will be performed based on the

	potamal sections					latest hydrometric observation data, the flood risk areas will be determined and marked on maps
4.4	Assessment of the technical condition of Spilve, Laveri, Eimurs-Mangaļi, Ādaži-Centre, Silzemnieki polders and other polders of agricultural territories of national significance of , and maintenance according to their use	2B, 2I	MoA, Local governm ents	2008 - 2012	0.11	Hydrological calculations will be performed based on the latest hydrometric observation data and the need for reconstruction of the polders will be justified, - reconstruction thereof will be performed
4.5.	Research of the risk areas downstream from the cascade type HPS reservoirs on the rivers – (the Rivers) Gauja, Amata, Ābulis (with tributary Nigra), Vecpalsa (with tributary Palsa) and Tirza. Development of HPS cascade optimally co-ordinated operational regulations, maintenance of HPS hydrotechnic structures in technical order in compliance with the requirements of the Class B Structure Safety Programme	2G	MoENV	2008 - 2012	0.6	The likelihood of accidents in the HPS cascades will be assessed; a plan measures for the prevention or reduction of these risks will be developed; flood risks in the territories downstream from the HPS will be reduced

* The ministry responsible for a task shall involve other contractors according to mutual agreement.

Minister for the Environment

R. Vējonis

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T.Jansone

7026561; tatjana.jansone@vidm.gov.lv

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**Summary of the National Programme for the Assessment and Management of Flood
Risks 2008 - 2015**

I. Nature of the Matter to be Resolved

Currently in Latvia (as well as in many other European Union Member States) no requirements have been directly stipulated or specified for the determination and marking of flood areas in the local government planning graphical section (in maps). This is also similar at national level – flood risk areas are not clearly defined and marked on maps and no recommendations have been developed for the flood mitigation measures to be performed in these areas. Flood preparedness (including the National Civil Protection Plan) is understood not as preventive action but action to be taken where there is an immediate threat of flooding. The frequency of floods and their levels are increasing in relation to climate changes and as a result many countries are changing their legislative and regulatory framework in relation to possible flooding of areas.

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks (hereinafter – Directive), determines that the component of flooding should be included in plans for the management of river basins provided for in Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the requirements thereof at a national level are included in the Water Management Law).

The Directive provides for the performance of the preliminary risk assessment of flood risks throughout the State territory, specifying on the basis thereof the flood risk areas, and to prepare a flood risk management plan for each river basin district. In accordance with the Water Management Law, the territory of Latvia is divided into four river basin management districts – (the Rivers) Venta, Lielupe, Daugava and Gauja. If a preliminary flood risk assessment is performed in the country before 2010, a decision taken regarding the development of a flood risk map and national legislation is developed and officially approved for the assessment and management of flood risk (including therein the information specified in the Directive), an additional risk assessment need not be performed in the country in accordance with the requirements of the Directive.

Currently, the National Civil Protection Plan is the only policy planning document which determines the action and co-operation of the responsible authorities, in performing preventive, readiness and response measures, and emergency measures for the liquidation of the consequences in case of flood or flood risk. The referred to Plan only contains general information about the areas subject to flood risk, but does not offer specific solutions for the prevention or reduction of flood risk in the relevant areas.

In the European Union in the financial planning period 2007-2013, European Union funding is planned for the activity “Reduction of Environmental Risks” in order to prevent the flood threats. The funding is anticipated for the measures for improvement of the infrastructure and establishment of a new infrastructure for the prevention of flooding in areas of national significance at increased risk of flooding.

Therefore, the preliminary flood risk assessment, on which the determination of areas subject to the flood risk at national level is based, information regarding measures for the prevention or the reduction of flood risk in these areas and the determination of their costs are also necessary in order to develop the national programme „Prevention of Environmental Risks” to attract funding from the European Regional Development Fund.

2. The Proposed Solutions

The Programme is developed as a medium-term policy planning document in compliance with the task appointed to the Ministry of Environment in Sub-paragraph 2.1 of Cabinet Order No.621 of 17 August 2006 On the Concept „Regarding Measures to be Performed in Order to Prevent the Flood Threats Caused in Jēkabpils Following the Creation of Pļaviņas HPS and its Reservoirs.

Taking into account the requirements of the Directive, flood risk assessment criteria are defined in the Programme, the flood risks in the territory of Latvia have been assessed and the priority flood risk sites specified (a list has been prepared), in which detailed research or flood mitigation measures must be performed. The Programme includes measures for the reduction of danger at priority objects, information regarding the funding necessary for the performance of such measures and the responsible authorities. The information contained in the Programme has been compiled according to the river basin districts.

200 000 hectares of flood area, forming 3% of the national territory, have been recorded in the Latvian National Planning Report on the use of the national territory in Latvia. Devastating floods are possible in part of this territory. Significant farming areas and residential areas with a comparatively large population density and infrastructure are situated in the flood areas, and large hydrotechnic structures (such as the Daugava HPS cascade), polder systems and other facilities have been built. The greatest flood risks are connected to the risk of accidents at the HPS reservoirs and storm surge on the coast and in river estuaries. Due to the intense absorption of the territory it is essential for the proper assessment of the flat (potamal) sections of rivers and the planning of use thereof, as allowing construction in flood risk areas there are threats to life as well a risk of economic loss.

In compliance with the Directive the Programme determines preliminary flood risk assessment and the main flood scenarios appropriate for the conditions of Latvia - floods with a low probability or extreme event scenarios, floods with a medium probability with a likely return period of less than once every 100 years and floods with a high probability occurring more than once every ten years.

The Programme focuses on practical measures which may be implemented in the timescale referred to. Various sub-objectives have been specified therein:

1. Detailed research of flood risk areas according to the flood risk criteria.
2. A preliminary flood risk assessment of areas subject to flood risk and planning for further action.
3. Clarification of priority areas subject to flood and determination of the specific measures for the prevention or reduction of flood risk.
4. Implementation of measures for the prevention of flood risk and the reduction of flood risk in priority areas.

When implementing the Programme a flood risk assessment will be performed and recommendations prepared for flood management in compliance with the requirements of the Directive, wherewith in Latvia justification will be able to be prepared in a timely manner and European Union funding attracted for the reduction of flood risk. This will ensure the possibility of performing measures in the next few years for the reduction of flood risk in the locations affected by the Daugava HPS cascade and other areas at risk of flooding. The clarification of the impact of storm surge and performance of appropriate measures in the cities of Riga, Liepaja and Ventspils is also important.

A strategic environmental impact assessment has been performed for the Programme and the public consultation thereof has taken place. The Programme has also been discussed with the local governments of the towns of Jēkabpils and Pļaviņas, which have been most at risk of flooding to date.

3. Additional Funding Required and Source of Funding

Performance of the tasks of the Programme has been specified for the period commencing 2008 and until 2015. The total approximate funding necessary for the flood risk assessment and the performance of measures to reduce this has been calculated for two flood risk scenarios:

- the first flood risk or extreme event scenario (floods with a low probability - extraordinary, extreme) – LVL 34,21 million;

- second flood risk scenario (floods with a medium probability) – the total cost of measures for the measures to reduce flood risk comprises LVL 15,52 million.

The total cost of the measures for the flood risks assessment and reduction in both scenarios is LVL 49,73 million during a time period from 2008 until 2015.

During the European Union financial planning period, it is planned to attract European Regional Development Fund (ERDF) funds for the prevention of flood threats, within the scope of the activity "Reduction of Environmental Risks" in the amount of EUR 15,0 million (or LVL 10,53 million). Therefore, the additional funding required in addition for the implementation of the Programme from the State and local government budgets will comprise LVL 39,2 million, including LVL 1,86 million for co-financing for the ERDF funded projects (15 % of the total costs of the ERDF projects).

Attraction of funding from State stock company *Latvenergo* and local government participation are planned for the reduction of the flood risk associated with accidents of the Daugava HPS cascade. Research of flood risk of cities and flood mitigation measures also demand considerable financial participation and understanding from local governments. As in many cases flood risks are not properly identified and mapped, the additional research of flood risk is intended in the Programme, wherewith the anticipated funding for performance of the measures has been indicated indicatively, taking into account the information provided in existing similar projects and the approximate costs evaluated by experts, which are necessary for the performance of the tasks of the measures to be implemented.

Minister for the Environment

R. Vējonis