

Sustainability of drinking water and waste water systems developed with state support and impact on achievement of environmental goals

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Summary of audit results

The National Audit Office audited whether the investments made in water management have helped to achieve the required quality of waste water treatment and drinking water in the public water supply and sewerage systems, whether the water management infrastructure is sustainable and whether the investments have helped to improve the condition of the water bodies.

Why is this important to taxpayers?

Since 2000, ca one billion euros has been invested in streamlining drinking water and waste water systems in Estonia and bringing them into compliance with requirements. The majority of environmental investments in Estonia have been made in the area of water management. The investments have been necessary to guarantee clean drinking water for people and that waste water is treated before it is discharged into the environment. Restricting the amount of contaminants reaching the environment helps to maintain and improve the condition of water bodies.

Money received from EU funds and the pollution and resource charges collected by the state of Estonia as well as the money contributed by local authorities and water undertakings has mostly been used for the reconstruction of obsolete drinking water and waste water treatment systems and for the construction of new systems. The Ministry of the Environment has promised that all major drinking water and waste water treatment systems will be made to comply with requirements during the EU funding period 2007-2013. In order to ensure that the money was not invested in vain, it is necessary to guarantee their sustainability, i.e. that a quality drinking water and sewerage service is guaranteed for a long time and that the established environmental goals are also achieved. A water service is sustainable if it covers the costs related to the service, enables to make investments in the system and also cover the damage caused to the environment. However, the water service may not become so expensive for people that they can no longer afford it and therefore have no access to water.

What did we find and conclude on the basis of the audit?

According to the National Audit Office, despite adequate funds, the state has not managed to keep its promise and make all larger drinking water and waste water systems comply with the

requirements. The Ministry of the Environment therefore considers it necessary to invest another 165 million euros of EU money in water infrastructure from 2014-2020. The state has also failed to give sufficient attention to guaranteeing the future sustainability of the drinking water and waste water treatment systems, the establishment or renovation of which cost a lot of money.

The main observations made by the National Audit Office are as follows:

- **The state and local authorities have invested more money in water infrastructure than initially planned.** 409 million euros was allocated for the development of water infrastructure during the EU funding period 2007-2013, which the Ministry of the Environment found would be enough to make large waste water collection areas (agglomerations) comply with requirements. The amount actually invested in water infrastructure is 466 million euros, but the compliance of large agglomerations with EU requirements has not yet been achieved. The Ministry of the Environment estimates that another 165 million euros must be invested in the development of water infrastructure in the next EU budget period 2014–2020 (from the Cohesion Fund).
- **Irrespective of the large investments, waste water is still not collected in the required quantities and many waste water treatment plants have not treated the waste water of urban areas according to requirements and agreed deadlines.** Although the waste water treatment plants of larger urban areas were supposed to be working according to the requirements of the Urban Waste Water Directive by the end of 2010, the pollution indicators of treated waste water have exceeded the limit values in half of all waste water treatment plants. In addition to waste water treatment plants with a smaller workload, problems were still found in the plans of four larger urban areas in 2012. Also, the collection of waste water is not sufficient in almost half (44%) of all large waste water collection areas. In order to make waste water treatment easier, it is necessary to contribute more to preventive activities, such as prohibition of phosphates in detergents.
- **The pollution load in many waste water collection areas (agglomerations) may be overestimated, which means that it is not certain that the money allocated for the reconstruction and establishment of waste water treatment systems goes where it is needed the most.** The pollution load in one-fifth of all large agglomerations is probably less than 2000 p.e., which means that less strict waste water collecting and treatment requirements could have been applied to them. Also, the main reason why many small agglomerations have been is to receive support for streamlining drinking water and waste water systems, because no support has been allocated to individual waste water systems. It would actually be reasonable to consider the development of individual systems which do not require the formation of a waste water collection area. The National Audit Office is of the opinion that the pollution loads of both small and large waste water collection areas, the activities planned to be performed in them and the necessary investments must be critically reviewed.

- **An increase in the price of the water service in the near future cannot be avoided, as this is necessary to guarantee the sustainability of the drinking water and waste water service. The price increase may exceed the 4% limit of the annual average income of a household member currently established for expenses related to the water service.** Since 2000, *ca* one billion euros has been invested in the reconstruction and construction of water infrastructure, mainly as non-refundable aid from the EU. However, the EU does not grant money to operate the existing drinking water and waste water systems, and water management must mainly be funded via the price paid for the water service. As including the depreciation of the assets acquired with non-refundable aid is not permitted by law, the price of many water undertakings that received non-refundable aid is currently too low and the price of the water service will multiply once investments for replacement need to be made. The risk of a price increase that people cannot afford to cover is highest in small urban areas, where large investments have been made with aid, the population is decreasing and the operating expenses of the water service provider per production unit are high. In order to shaft the price increase of the water service, it is necessary to promote the cooperation or merge of water undertakings and to objectively assess further investment needs to ensure that people are guaranteed quality drinking water and waste water treatment services and that the established environmental goals are also achieved.
- **Waste water treatment has reduced the pollution load of urban waste water on the environment, which is a precondition to the improvement of the environmental status.** In addition to diffuse agricultural pollution, urban waste water is an important factor that influences the ecological status of the water bodies and the purpose of waste water treatment is to reduce the quantity of contaminants discharged into the environment and thereby improve the status of water bodies. In the last seven years the quantity of phosphorus discharged into the environment with domestic and industrial waste water has decreased from *ca* 140 tons to 90 tons and the quantity of nitrogen from 1490 tons to 990 tons per year.
- **Some Estonian people who consume water from the public water supply do not have access to drinking water that complies with quality requirements.** Massive efforts have been made to guarantee the quality of drinking water, but as at the end of 2012, 0.6% of people connected to the public water supply consumed water whose consumption may be a health risk (the water did not meet the chemical parameters) and 11% consumed water that may deteriorate their quality of living and damage their pipelines and household devices (the water did not meet the indicator parameters). All of these water supplies have been given more time to meet the requirements and they have had to take measures for quality improvement. The Health Board, however, has not been strict enough in demanding the performance of improvement activities and there is a risk that many water supplies will be unable to guarantee compliance with requirements by the new deadlines. Informing people about the quality of water should be improved first of all, especially on the websites of water undertakings and local authorities, where water

quality data is not easy to find and there are no understandable interpretations of water quality or advice on water consumption.

- **The data declared by water undertakings to calculate the quantities of contaminants discharged into the environment cannot be checked, which means that they do not necessarily give a true view of the actual quantities of contaminants and may reduce the effectiveness of pollution charges.** According to the polluter pays principle, undertakings pay pollution charges on the quantities of contaminants discharged into the environment, which should act as an economic stimulus to pollute less. As the state has not checked the data of the quantities of contaminants discharged into the environment from waste water treatment plants or demanded that the quantities of waste water be reliably measured, the National Audit Office finds that the quantities of waste water discharged into the receiving body of water declared by undertakings may be smaller than the actual quantities, meaning that the pollution charges they pay are also smaller.

Responses of the Minister of the Environment and the Directors General of the Environmental Board, the Health Board and the Competition Board

The **Minister of the Environment** agrees with some of the conclusions and recommendations made by the National Audit Office and acknowledges that the investments made with EU support from 2007-2012 in order to comply with the Urban Waste Water Directive and the Drinking Water Directive have turned out to be bigger than initially planned. The Minister said that the majority of the collection areas (load over 2000 p.e.) have managed to comply with the directives, despite the price increase on the construction market and the volume of work turning out to be larger than planned. The goals set for the funding period can also be achieved. The additional need for investments will be met in the next EU funding period. No support will be granted to large waste water collection areas after the 2014-2020 funding period and water undertakings must guarantee the sustainability of the established systems via the price of the water service.

The Minister of the Environment is of the opinion that regional water undertakings can also guarantee the sustainable management of the systems funded by the state, a quality water service and the opportunity to consume the water service at an acceptable price in sparsely populated areas. Major investments for the replacement of equipment etc. will not be required for 30-40 years, when people's solvency will probably have increased considerably and the water service price increase related to the expiry of support will have a smaller impact on people's ability to cope.

The Minister of the Environment disagrees that many small waste water collection areas were primarily created to obtain support for streamlining drinking water and waste water systems. These waste water collection areas were formed in relatively densely populated regions, where the establishment of a public water supply and sewerage system is generally a more economical solution. When waste water collection areas are formed and changed, the Minister of the Environment considers that the price of the water service should not exceed the level of tolerance when public water supply and sewerage systems are established.

The Minister of the Environment agrees that the pollution load of some large waste water collection areas is over-estimated, but finds that such waste water collection areas only comprise up to one-tenth of all large waste water collection areas. The Ministry of the Environment plans to launch a review of the pollution loads of waste water collection areas in cooperation with local authorities in 2014.

The **Director General of the Environmental Board** agrees with the recommendations made by the National Audit Office, but disagrees with several observations and opinions. For example, the Environmental Board disagrees with the opinion that they have not inspected the quantities of waste water discharged into the environment from waste water treatment plants. On the basis of waste water surveillance monitoring, the Environmental Board inspects the work of waste water treatment plants and the compliance of the parameters of the waste water discharged into the receiving body of water with the requirements of the permit for special use of water. However, the Environmental Board does admit that the data of discharged waste water submitted by undertakings must be made more reliable and adds that it is necessary to amend the regulations that would make it possible to inspect the quantities of waste water discharged into the environment.

The **Director General of the Health Board** agrees with the observations and recommendations made by the National Audit Office and promises to supervise problematic water supply systems more efficiently and turn more attention to informing people about the quality of drinking water. The Health Board says that as at October 2013, there are still 30 water supply systems where fluorides exceed the limit, and 16 of these have already secured the funds required to improve the situation. Proceedings will be initiated against drinking water supply systems where the water does not meet the limit values of indicator parameters by 1 January 2014. The Health Board feels that it is of primary importance that all people have access to drinking water and the supply of drinking water is generally not suspended, unless there is a serious threat to people's health.

The **Director General of the Competition Board** agrees with the opinions and recommendations of the National Audit Office and is prepared to find the best solution to the establishment of the water service price in cooperation with the Ministry of the Environment.

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Definitions

Waste water – water that has been polluted more than is considered harmless and that needs treatment before it is discharged into the environment (receiving water body).

Effluent – water that has been used and thereafter discharged back into the environment (e.g. water treated in a waste water treatment plant and then discharged into a water body).

Domestic or drinking water – water, untreated or after treatment, that is meant for drinking, cooling or other domestic purposes.

Receiving water body – a body of water or part of the earth's crust into which effluent runs.

Pollution load – the quantity of contaminants discharged into the environment, e.g. with effluent, over a certain period of time.

Waste water treatment – removal of contaminants from waste water mechanically (level I treatment), biologically (level II treatment – with bacteria) or biochemically (level III treatment or so-called deep treatment – both with bacteria and chemical substances).

Contaminant – a solid, liquid or gaseous substance, chemical compound or mixture of substances that poses a hazard to health or the environment and that is discharged into the environment as a result of human activity. The most significant water pollutants/water pollution indicators are **P_{gen}** or **general phosphorus**, which characterises the total content of inorganic, organic and polyphosphates in waste water. **N_{gen}** or **general nitrogen** indicates the content of organic and ammonia nitrogen, nitrites and nitrates in waste water.

Pollution indicator – a measurable contaminant or other indicator that shows how polluted water is. For example, the content of organic substances in water is characterised by **BOD₇** or **biochemical oxygen demand**. This is the quantity of oxygen that microbes use to break down the organic substances in one litre of water over seven days. **Suspended solids** indicate the quantity of insoluble particles contained in waste water.

Population equivalent (p.e.) – the unit used to express the average daily notional water pollution load caused by one person. The value of one p.e. expressed via biochemical oxygen demand (BOD₇) is 60 grams of oxygen per day. The pollution load of other sources of pollution (e.g. the food industry) is also calculated in population equivalents.

Waste water collection area – an area of sufficient population or economic activities for the collection of waste water in waste water treatment plants via a public sewerage system or discharging effluent into a receiving body of water. On the basis of the pollution load, waste water collection areas are divided into so-called large (pollution load exceeds 2000 p.e.) and small (pollution load remains below 2000 p.e.) waste water collection areas and they are subject to different requirements.

Pollution load of waste water collection area – the biggest pollution load created in waste water collection areas as a whole depending on the season in human equivalents, which is calculated including permanent residents, tourists, industrial and other companies, the water generated by whom is discharged into the public sewerage system, and also the quantity of waste water that does not reach the public sewerage system.

Eutrophication – enrichment of water bodies with plant nutrients (especially phosphorus and nitrogen compounds), which stimulates excess plant growth and oxygen deficiency in water bodies, deteriorates the quality of water and changes the ecosystem.

Water infrastructure – (in this report) the pipelines, equipment, buildings etc. required to provide the population with drinking water and collecting and treating waste water.

Water service – the drinking water and waste water service provided to consumers via the public water supply and sewerage system.

Public water supply and sewerage system – the system of buildings and equipment via which water is supplied to properties and/or waste water (incl. rain and drainage water) is disposed, and which is managed by a water undertaking or which services at least 50 residents. The public water supply and sewerage system means the public water supply or the public sewerage system either separately or jointly.

Overview

The purpose of waste water treatment is to achieve the good status of water bodies

1. The European Union (EU) has established the goal of achieving the good status of water bodies. The central goal of the EU Water Framework Directive¹ covers surface water bodies (rivers and lakes), coastal waters and groundwater. The status of *ca* one-fourth of Estonian rivers and lakes is not yet classed as good. In 2012 the status of 21% of rivers and lakes was poor and 4% had a bad status. The status of coastal waters is predominantly poor² (incl. a bay, Haapsalu Tagalaht, whose status has been bad for a long time).
2. The ecological status of water bodies depends on the quantity of contaminants discharged into the water bodies, the most significant of which are phosphorus and nitrogen compounds (pollution indicators general phosphorus P_{gen} and general nitrogen N_{gen}). These are the main contaminants that cause eutrophication in water bodies, i.e. changes in the ecosystems of water bodies, and has a detrimental effect on the biota.

¹ 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.

² Pursuant to the Water Framework Directive, the status of 735 flowing and still bodies of water and 16 coastal bodies of water is monitored in order to evaluate it and constantly inspect places in bodies of water that stand out due to their natural conditions or due to human activity. Flowing bodies of water (one river may be distinguished as several flowing bodies of water, each of whose status is evaluated separately), still bodies of water (lakes and reservoirs) and coastal bodies of water are distinguished.

The status of one-fourth of Estonian rivers and lakes is not good. The status of coastal waters is poor

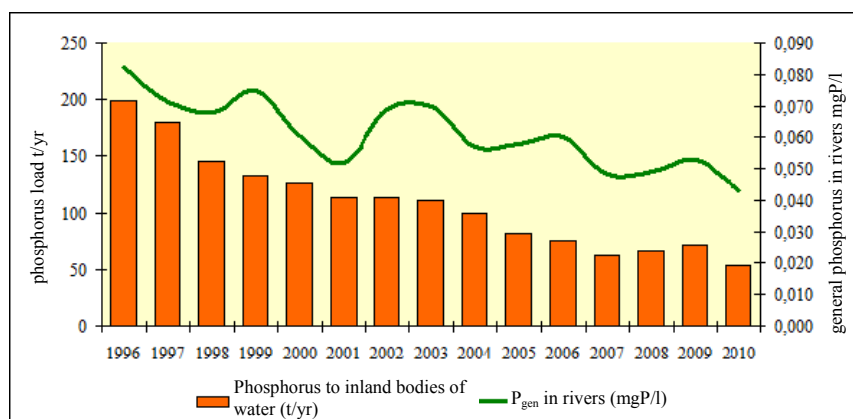
3. The main sources of anthropogenic pollution are diffuse agricultural pollution (arising from the use of fertilisers in agriculture and animal breeding) and point sources of pollution, the most significant of which are effluent from cities, towns and industries, as well as point sources of pollution on farms. This means that urban effluent comprises part of the pollution load of water bodies, and the size of this part may vary greatly in different regions. An earlier audit of the National Audit Office that looked at the ecological status and sources of pollution in Lake Peipus revealed that the phosphorus discharged into the lake in its catchment area (the Estonian side) is divided between the following sources: ca 68% from fertilisation of agricultural land, 19% from urban waste water and 7% from agricultural point sources of pollution.

The phosphorus contained in urban effluent caused the greatest damage to the environmental status of rivers

Receiving body of water – a body of water or part of the earth's crust into which effluent runs.

4. Scientific research³ has indicated that the phosphorus compounds contained in effluent have the worst impact on the status of **receiving water bodies** after effluent is discharged from waste water plants into the environment, which is why reducing the phosphorus content of effluent is the first thing that needs to be done to reduce the environmental impact of urban waste water. The Environment Agency found in its⁴ analysis that there is a clear connection between the quantity of phosphorus found in urban and industrial waste water and in the average general phosphorus content of rivers (see Figure 1). It was also found that effluent plays a small part in the nitrogen content of rivers (see Figure 2), because the nitrogen found in water bodies originates largely from diffuse agricultural load and depends on the use of mineral fertilisers and manures as well as on the number of animals.

Figure 1. Quantity of general phosphorus discharged into inland water bodies with urban and industrial effluent and the average general phosphorus content of Estonian rivers, 1995-2010

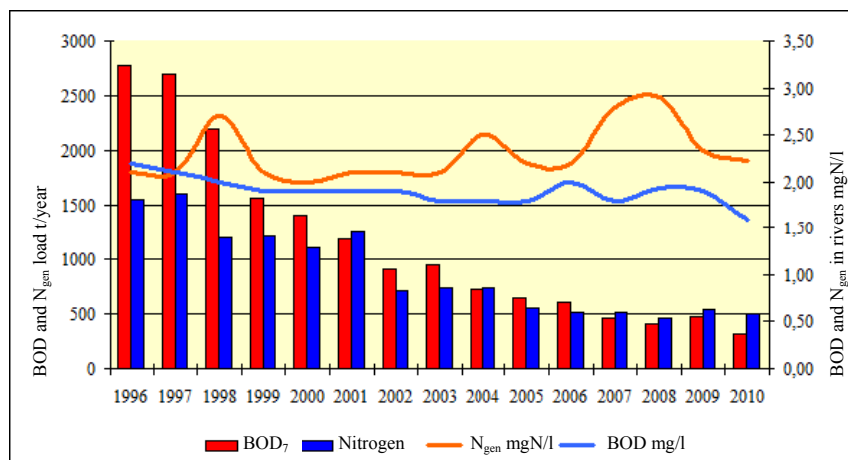


Source: Environment Agency

³ R. Niine, E. Loigu, K. Pachel. Waste water impact on the quality of waterbodies in Estonia. 2012, <http://www.wseas.us/e-library/conferences/2012/Montreux/BIOCHEMENV/BIOCHEMENV-26.pdf>

⁴ P. Marksoo, R. Elken. Eesti siseveekogude ökoloogiline seisund (Ecological Status of Estonian Inland Bodies of Water). Material prepared by the Environmental Information Centre for the Ministry of the Environment regarding achievement of the goals of the Water Framework Directive. 2012

Figure 2. Pollution load caused by urban and industrial effluent (N_{gen}) and organic substances (BOD_7) (columns) and average nitrogen and BOD_7 content of Estonian rivers, 1996-2010



Source: Environment Agency

The quantity of contaminants discharged into the environment with effluent has decreased

5. According to the Environment Agency, emissions of general phosphorus in domestic and industrial effluent⁵ decreased from 140 tons to 92 tons per year from 2005-2012. The decrease has mostly occurred in counties, except Rapla County, where the phosphorus emissions in Kohila municipality have doubled. General phosphorus emissions also increased somewhat in Pärnu (from 3.5 tons to 3.89 tons) during the same period.

6. General nitrogen quantities in domestic and industrial effluent⁶ have also decreased: from 1487 tons in 2005 to 992 tons in 2012. There are also some cases where general nitrogen quantities have increased in this period – as a result of the expansion of the public water supply system, treated waste water has become more concentrated in Rakvere, Kuressaare and Pärnu, where waste water is treated according to requirements and the nitrogen content remains below the established threshold, and the removal of nitrogen must be made more efficient.

7. The total quantity of domestic and industrial effluent in Estonia has not changed significantly in recent years (121 million m³ in 2005; 125 million m³ in 2012). Comparing 2005 and 2012 indicates that in addition to the mechanical and biological treatment of waste water, the biochemical removal of nutrients has also increased significantly, from 67 million to 109 million m³ (a 41% increase).

Almost half of domestic and industrial effluent in Estonia comes from the waste water treatment plant in Tallinn

8. The biggest point source of pollution in Estonia in terms of phosphorus and nitrogen is the waste water treatment plant in Tallinn (Paljassaare), which treats the waste water of the City of Tallinn and several nearby municipalities, and which then pumps the water into the Gulf of Finland via a deep-sea outlet. Paljassaare waste water treatment

⁵ Does not include mining and quarry water or cooling water in terms of industrial effluent. Distinguishing the contaminant quantities in domestic and industrial effluent is a problem, as both domestic and industrial waste water is discharged into many waste water treatment plants and the Environmental Information Centre has not distinguished this information in its information system.

⁶ See reference no. 4

plant generates almost half of the total quantity of domestic and industrial effluent (*ca* 57 million m³ in 2012) as well as general phosphorus and general nitrogen emissions (P_{gen} 43 t (47%) and N_{gen} 415 t (42%)) in Estonia.

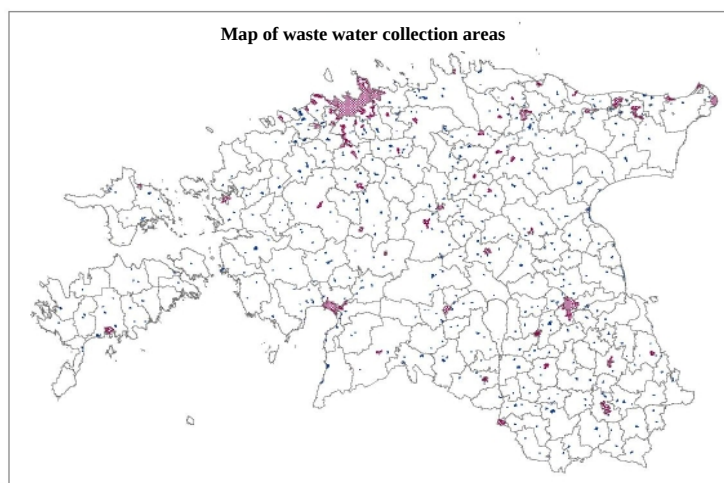
Waste water collection areas and waste water treatment plants

Did you know that...

the waste water from one waste water collection area (agglomeration) may be cleaned by several waste water treatment plants and vice versa – one plant may treat all of the waste water from several collection areas. For example, the waste water from the Tartu waste water collection area is treated by Tartu, Haage, Reola and Anne waste water treatment plants. The regional waste water treatment plant at Kohtla-Järve treats the waste water from the Ahtme, Jõhvi, Kiviõli, Kohtla-Järve and Püssi collection areas.

9. As required in the Urban Waste Water Directive⁷, waste water collection areas (agglomerations) have to be created for collection and treatment of waste water. One waste water collection area is usually comprised of a sufficiently densely populated area of a city or town with its pipelines and treatment equipment. In total, waste water collection areas cover *ca* 1.6% of the territory of Estonia (see Figure 3). The remaining areas are sparsely populated, where households treat their waste water more or less themselves, using so-called individual solutions (e.g. small treatment plants or cesspit or discharging it into the soil), and the requirements of collection areas are not valid there.

Figure 3. Waste water collection areas (agglomerations) in Estonia



Source: Ministry of the Environment

Did you know that...

- in order to form a waste water collection area, there must be at least 50 people living in it and its size must be at least 5 ha;
- a waste water collection area may be established in areas where the natural protection of groundwater is weak if the pollution load exceeds 10 p.e./ha; and in protected areas when pollution load exceeds 20 p.e./ha.

Population equivalent — unit of the average daily conditional water pollution caused by one person. The value of one p.e. expressed via biochemical oxygen demand (BOD₇) is 60 grams of oxygen per day. The pollution load of other sources of pollution (e.g. the food industry) is also calculated in population equivalents.

10. In order to form a waste water collection area (agglomeration), it is necessary to outline its territory and ascertain its pollution load. The number of people living in the territory and the pollution generated in the course of economic activities (tourism, the food industry etc.) and other activities (e.g. schools and kindergartens), which is expressed in **population equivalents**, is considered in the assessment of the pollution load. The level of groundwater protection must also be considered when a waste water collection area is created – the weaker the natural protection, the more sparsely populated an area may be in which a waste water collection area is created.

11. According to the Environment Agency, Estonia currently has 514 waste water collection areas (agglomerations), 59 of which are so-called large areas (pollution load exceeds 2000 population equivalents). 62 waste water plants are used to treat the waste water of large areas. The number of so-called small waste water collection areas (population

⁷ Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment.

equivalent less than 2000) is 455. The total number of waste water treatment plants in Estonia according to the Environment Agency is 1143 (incl. industry), ca 850 of which treat domestic waste water. 80% of Estonian people are connected to the public sewerage network.

Did you know that...

if a waste water treatment plant whose actual load is e.g. 1500 p.e. is located in a waste water collection area where the pollution load exceeds 10,000 p.e., the pollution indicators of the waste water must still comply with the requirements established for areas where the pollution load exceeds 10,000 p.e. (see Table 1).

12. The requirements of Estonian waste water collection areas and waste water treatment arise from the European Union Urban Waste Water Directive and the Convention on the Protection of the Baltic Sea⁸, which have also been transposed into Estonian law⁹. Waste water treatment requirements, incl. the limit values of pollution indicators, depend on the pollution load of the waste water collection area (see Table 1), not on the actual load of the waste water treatment plant located therein. These requirements are established with the permits for special use of water issued by the Environmental Board and they may be stricter than those given in Table 1 if this is necessary from the viewpoint of environment protection (e.g. if the condition of the receiving body of water into which the effluent is discharged is bad).

Table 1. Limit values of effluent pollution indicators by pollution load of waste water collection areas

Pollution indicator	Below 300 p.e.	300-1999 p.e.	2000-9999 p.e.	10,000-99,999 p.e.	Over 100,000 p.e.
Biochemical oxygen demand (BOD ₇) mg/l	40	25	15	15	15
General phosphorus, mg/l	–	2*	1**	0.5	0.5
General nitrogen, mg/l	–	60	45	15	10
Suspended solids, mg/l	35	35	25	15	15
Collecting network	Waste water must be collected using the public sewerage system or leak-proof cesspits, or treated with individual treatment plants; discharge into the soil is also permitted.		98% of waste water must be collected in the public sewerage system or leak-proof cesspits. Use of individual treatment plants and discharge into the soil are not permitted.		
Deadline for guaranteeing compliance with requirements	01.01.2013	01.01.2013	31.12.2010	31.12.2009	31.12.2009

* Enters into force on 31.12.2018. Until then, the issuer of the permit for special use of water assesses whether the limit value of general phosphorus content needs to be regulated.

** 1.5 mg/l until 31.12.2018

p.e. – population equivalent

Source: Regulation no. 99 of the Government of the Republic of 29 November 2012.

Water supply systems and water consumption

13. 46.7 million m³ of domestic water¹⁰ (hereinafter drinking water) was used in Estonia in 2011, i.e. on average 2.9 m³ per resident per month.

⁸ Convention on the Protection of the Marine Environment of the Baltic Sea Area (19 May 1995), which is governed by the Helsinki Commission (HELCOM). In 2007 the parties to the convention approved a 'Baltic Sea Action Plan' for the implementation of the convention.

⁹ Regulation of the Government of the Republic No. 99 "Requirements of Waste Water Treatment and Discharge of Effluent and Rain Water into Receiving Bodies of Water, Limits of Pollution Indicators of Effluent and Rain Water and Measures for Inspection of Implementation of Requirements" of 29 November 2012

¹⁰ Overview of water management of Estonia in 2011 on the basis of the report 'Water Use'. Environment Agency, 2011. www.keskkonnainfo.ee

Quality requirements of drinking water

Drinking water is obtained from public water supply systems (to which 89.6% of Estonian people are connected¹¹) or from private drill wells or shaft wells. Estonian public water supply systems use groundwater (65.8%) and surface water (36.2%, only Tallinn and Narva) as sources of drinking water.

14. The requirements of the quality of drinking water arise from the so-called Drinking Water Directive of the European Union¹², which aims to protect people from polluted drinking water by guaranteeing clean and healthy water. The requirements of the directive have also been transposed into Estonian law and apply to water supply systems where supplying drinking water to people is part of the undertaking's economic activities or public law activities, and to personal water supply systems from which more than 10 m³ of water per day is taken or which supplies more than 50 residents. The number of water supply systems that meet these criteria was 1105 in 2012.

15. Drinking water quality requirements¹³ are divided into three groups:

- microbiological parameters (e.g. *E. coli*),
- chemical parameters (e.g. boron, fluoride, nitrate and mercury) and
- indicator parameters (e.g. iron, manganese, taste, odour and radiological parameters).

16. Exceeding the limit values of microbiological and chemical indicators may be a health risk. Indicator parameters are generally not considered health hazards (unless their quantities are large) and their excessive content is more likely to cause damage to technical equipment.

17. Estonia was permitted to extend the deadline for compliance of the limit value of some indicator parameters following its accession to the European Union in 2004. In terms of the compliance of chemical parameters, the Drinking Water Directive gives each Member State the right to request exceptions for extending the deadline (no more than three times per parameter) and Estonia has made use of this option – three times in the case of fluorides, twice in the case of boron and once in the case of trihalomethanes (see Table 2). Only the water supply systems entered on the list of exceptions (in terms of chemical parameters) or that have special marketing authorisation (in terms of indicator parameters) may provide water that does not comply with requirements.

¹¹ Quality of Drinking Water in 2012. Health Board, 2013

¹² Council Directive 98/83/EC on the quality of water intended for human consumption

¹³ Regulation No. 82 of the Minister of Social Affairs 'Requirements of Quality and Inspection of Drinking Water and Methods of Analysis' of 31 July 2001

Table 2. Deadlines for compliance with drinking water quality requirements

Quality parameter	Water supply system for more than 2000 people	Water supply system for fewer than 2000 people
Microbiological parameters (hazardous to health)		
Escherichia coli, enterococcus	01.06.2002	
Chemical parameters (hazardous to health)		
Chemical parameters for which no exceptions have been requested from the European Commission	01.06.2002	
Fluorides and boron (for water supply systems not on the list of exceptions)	31.12.2003	
Fluorides (for water supply systems on the list of exceptions)	2016–2017*	
Boron (for water supply systems on the list of exceptions)	2015 (may be extended until 2018)	
Trihalomethanes (for water supply systems on the list of exceptions)	2012**	
Indicator parameters		
Indicator parameters for which no exceptions were requested upon EU accession	01.06.2002	
Radiological parameters	01.01.2003	
Parameters with EU exceptions: colour, hydrogen ion concentration, iron, manganese, odour and turbidity	31.12.2007	01.01.2014
Parameters with EU exceptions: chlorides, conductivity and sulphates	31.12.2008	01.01.2014

* A third request for an exception regarding fluorides was submitted to the European Commission in October 2012. Since the Commission has not yet approved the request, it is impossible to tell when the exception will enter into force. An exception is valid for three years from approval.

** Estonia has not requested a second or third exception in terms of trihalomethanes, but the option exists.

Source: Regulation No. 82 of the Minister of Social Affairs of 31 July 2001 and requests for extension of chemical parameter compliance deadlines to the European Commission

Organisation of drinking water and waste water management

18. Local authorities are responsible for the organisation of water supply and sewerage systems in their administrative territories¹⁴. For this purpose, they must prepare public water supply and sewerage system development plans (for 12 years), which must be reviewed every four years. Based on the plan, it is possible to make proposals for the creation or amendment of waste water collection areas, and the plan is also the basis for investments and requesting support for investments from the state.

19. The public water supply and sewerage system may be in public or private ownership. The council of the local authority approves the water undertakings entitled to provide the water service in its territory. The water undertaking must guarantee that the public water supply and

¹⁴ Subsection 6 (1) of the Local Government Organisation Act

sewerage system in its operating territory works as required and is kept in order. Most water undertakings belong to local authorities.

20. The Ministry of the Environment is responsible for the organisation of water management at the level of the state via the preparation and implementation of river basin management plans¹⁵. River basin management plans also contain the activities required to streamline drinking water and waste water systems. The Ministry of the Environment is also responsible for the establishment and implementation of legislation related to waste water management, incl. the approval of waste water collection areas (agglomerations). The requirements that regulate the use of water and discharging water into the environment are established by the Environmental Board in the permits for special use of water it issues. The Board and the Environmental Inspectorate also supervise adherence to the terms and conditions set in the permits.

21. The water undertaking's task is to prepare regular (at least quarterly) reports about its activities as required on the environmental permit which, among other things, contains information about the quantities of domestic water used and contaminants discharged into the receiving water body. The undertaking is obliged to pay environmental charges (resource and pollution charges) for its operations. The undertaking also submits a more detailed report about its activities every year.

22. The Ministry of Social Affairs and the Health Board are responsible for the establishment and implementation of legislation related to the quality of drinking water. The undertaking that handles drinking water (water undertaking) must guarantee that the water meets quality requirements. Water undertakings and the Health Board must inspect the quality of drinking water and inform consumers of the results. The Environmental Board evaluates the health risks (radiological parameters) of drinking water.

23. The price of the drinking water and waste water service is established by the water undertaking, but it must first be approved by the Competition Board in the case of waste water collection areas of over 2000 p.e. and with the municipality or city government in the case of waste water collection areas of less than 2000 p.e. The price must be also coordinated with the Competition Board if the water undertaking wants to establish a uniform price in its operating territory in both collection areas i.e. those of over and under 2000 p.e.

Investments into drinking water and waste water treatment systems in Water infrastructure investments from 2007-2013

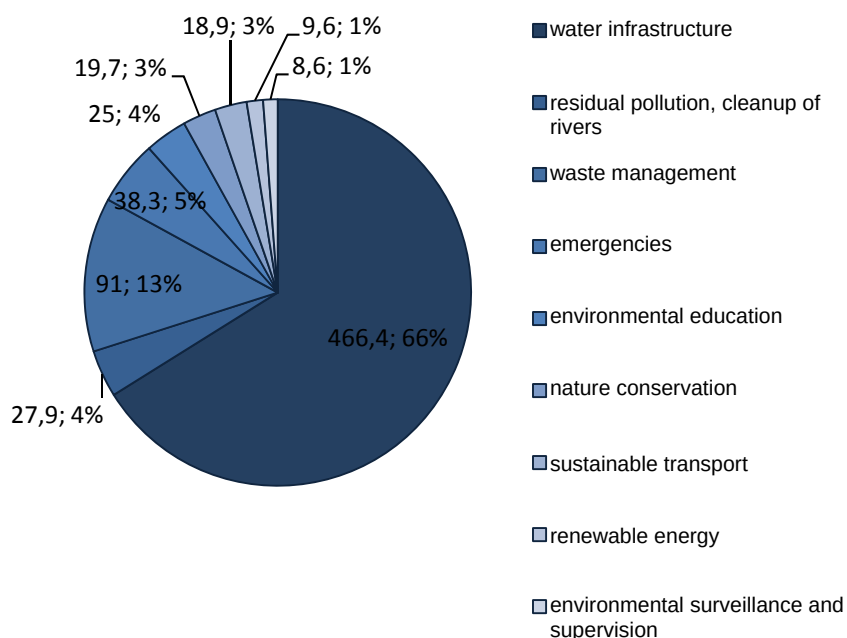
24. Water management has received more funding than any other environmental investment area (see Figures 4 and 5). Ca 860 million euros has been invested in water infrastructure with EU support since the start of the century in order to achieve compliance with the requirements of EU directives (incl. the Urban Waste Water, Drinking Water and

¹⁵ The territory of Estonia is divided into three basins – Western Estonia, Eastern Estonia and Koiva – and a water management plan is prepared for each of them.

Priority Substances Directive and the Water Framework Directive). Self-financing by local authorities and/or water undertakings (incl. loans) for the implementation of projects increases this amount even further, meaning that *ca* one billion euros has been invested in the water infrastructure of Estonia since 2000. According to the Ministry of the Environment, the main water infrastructure support programmes have been the following:¹⁶

- investment programme of small local authorities, SMIP (2000-2006), 35 million euros;
- ISPA/Cohesion Fund period 2000 (2004) – 2006, 239 million euros;
- EU Cohesion Fund period 2007-2013, 466 million euros; and
- Environment Programme of the Estonian Investment Centre since 2001, 123 million euros.

Figure 4. Division of grants of EU Structural Funds¹⁷ period 2007-2013 between areas (million euros and percentages)

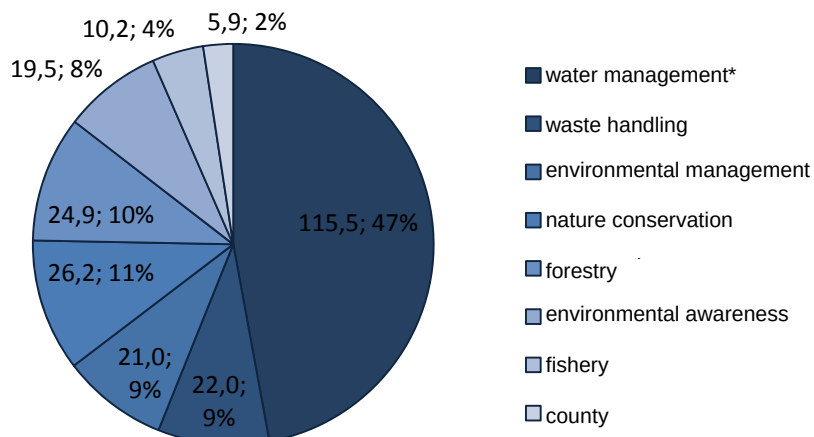


Source: National Audit Office on the basis of the website and annual reports of the Environmental Investment Centre

¹⁶ Presentation by H. Liiv at the Water Conference of the Estonian Water Works Association in May 2013

¹⁷ Structural funds: Cohesion Fund (financed activities related to drinking water, waste water and waste treatment), European Regional Development Fund (nature protection and environmental education infrastructure, development of supervision and surveillance and improving preparedness for emergencies and renewable energy) and European Social Fund (development of environmental education).

Figure 5. Division of funding from the environmental programme of the Environmental Investment Centre from 2007-2012 (million euros and percentages)



* In addition to water infrastructure development, also includes funding for activities related to sanitation of water bodies, elimination of residual pollution and non-technical works.

Source: National Audit Office on the basis of the website and annual reports of the Environmental Investment Centre

Large waste water collection areas were supposed to be streamlined by 2013 with the money received from the EU Cohesion Fund

25. Before the 2007-2013 period of the EU Structural Funds, the Ministry of the Environment estimated that 740 million euros should be invested in drinking water and waste water treatment systems in order to make waste water collection areas comply with the requirements of directives. The ministry also estimated that 351 million euros had to be invested in streamlining large waste water collection areas (over 2000 p.e.). EU grants were supposed to cover an estimated 76.5% of the total investment requirement (i.e. 269 million euros).

26. 409 million euros was allocated from the EU Cohesion Fund for the development of water management in the EU funding period 2007-2013. The Ministry of the Environment estimated that this amount was enough to make all waste water collection areas that exceed 2000 p.e. comply with the requirements of the directives by the end of the 2007-2013 funding period.¹⁸

27. More than 466 million euros has been given from the CF for the development of water infrastructure in the EU funding period 2007-2013.¹⁹ This amount includes both completed projects and projects where a funding decision has been made and which must be completed by the end of 2015. *Ca* 85% of the CF grants have been used to streamline large waste water collection areas. Support has also been granted from the environmental programme of the Environmental Investment Centre (see Figure 5), which is largely aimed at investments in small waste water collection areas, but the data of the EIC indicate that 12 million euros was also given to large waste water collection areas in the 2007-2012 period.

¹⁸ Memorandum of the Minister of the Environment of 1 November 2007 for the Cabinet session

¹⁹ Funds that were initially meant for other areas (e.g. waste handling) were transferred to the water infrastructure development measure.

28. The reasons why more money than initially planned was transferred from the Cohesion Fund to the development of water infrastructure in the 2007-2013 period are, according to the Minister of the Environment, related to the long gap between the planning period and implementation stage (3-5 years) and the specification of the investment needs in the application stage, when it became evident that the amount that would have to be invested was much larger than initially thought. It is worth mentioning that no waste water collection areas had been defined by the start of the funding period (2007)²⁰ and they were only formed with a directive of the Minister of the Environment in 2008 and 2009, which means that when the investments of the funding period were planned, it was still unclear where the money had to be invested in the first place. The volatile economic situation from 2007-2013 influenced the implementation of the project, when construction prices went up (the construction boom) as well as down (the recession). However, construction prices went up as the state's economic environment improved, which made the projects more expensive.

29. Although the amount invested in the development of water infrastructure has exceeded the investment amount initially planned, there are still some waste water collection areas of over 2000 p.e. that do not comply with requirements. According to the Ministry of the Environment, there are still 26 large waste water collection areas among the 59 large waste water collection areas developed with the support of the Cohesion Fund from 2014-2020 where investments must be made in drinking water and waste water infrastructure²¹ (e.g. the waste water collection areas of Keila River, Viljandi and Tartu).

The intention is to invest another 332 million euros in drinking water and waste water infrastructure projects

30. In the opinion of the Ministry of the Environment, which is based on the data submitted by local authorities, it is necessary to invest another 165 million euros in the 2014-2020 period in order to make waste water collection areas of more than 2000 p.e. comply with requirements. This money should also cover the construction of two new and the reconstruction of 11 waste water treatment plants, the construction of 223 km and the reconstruction of 255 km of sewerage pipes as well as the establishment and reconstruction of several waste water pumping stations. When it comes to drinking water supply systems, it is necessary to construct nine and reconstruct seven drinking water treatment stations, and construct 160 km and reconstruct 365 km of drinking water pipes.

31. Waste water collection areas of less than 2000 p.e. also need investments in the amount of 167 million euros. The total estimated investment need of all waste water collection areas is 332 million euros. The Ministry of the Environment requested 271.2 million euros for the performance of these requirements from the EU. The proposal of the Ministry of Finance to support the development of water infrastructure

²⁰ The Water Act in effect until 12 January 2009 required local authorities to define the borders of waste water collection areas in general plans (subsection 24 (5)). However, this was not done and the Ministry of the Environment established waste water collection areas with a directive of the Minister of the Environment.

²¹ The Ministry of the Environment also finds that waste water treatment plants must be built or reconstructed in 11 waste water collection areas.

from EU funds in the 2014-2020 period is 144 million euros, which only covers the investment need of large waste water collection areas.²²

32. The data with which the Ministry of the Environment has justified the need for and volume of investments did not convince the National Audit Office that the state has a clear overview of the shortcomings in the compliance of waste water collection areas with requirements and that the planned investments are fully justified with the need to make large waste water collection areas comply with requirements and therefore of primary importance. The National Audit Office has therefore found that the Ministry of the Environment must review the need for water infrastructure investments with a critical eye and clearly distinguish the expenses necessary to meet the requirements of waste water collection areas.

Did you know that...

the works that still need to be completed and the specification of needs are not the only reason additional investments are necessary, as the requirements of waste water treatment became stricter as of 1 January 2013 (see Table 1).

33. The National Audit Office is of the opinion that the state has made efforts to achieve compliance with the requirements of the Urban Waste Water Directive and Drinking Water Directive with the support of the Cohesion Fund in the 2007-2013 period. Although more money than initially intended has been used to achieve compliance, there are still some waste water collection areas of more than 2000 p.e. that had not been brought into compliance with the requirements by the established deadline and the end of the funding period, because the actual need for funds was underestimated and the volatile economic environment meant that money was also given to projects of lower priority (related to waste water collection areas of less than 2000 p.e.). The National Audit Office is of the opinion that the Ministry of the Environment must critically review investment needs in the 2014-2020 funding period to ascertain the investments that are substantively necessary and of primary importance in order to make waste water collection areas comply with requirements.

34. In order to assess the relevance and effectiveness of the investments made, the National Audit Office analysed the status of waste water and drinking water management in Estonia as well as its sustainability in the long term.

Status of waste water treatment

Many waste water treatment plants do not work as required

35. Estonia undertook to implement the Urban Waste Water Directive following its accession to the European Union. Based on the directive, the waste water treatment plants in waste water collection areas of more than 10,000 population equivalents (p.e.) had to be brought in compliance with requirements by 31 December 2009 and smaller waste water treatment plants of 2000-9999 p.e. by 31 December 2010. Estonia also has to adhere to the Convention on the Protection of the Marine Environment of the Baltic Sea (HELCOM)²³, whose requirements of [waste water](#)

Waste water – water that has been polluted more than is considered harmless and that needs treatment before it is discharged into a receiving body of water

²² Cabinet materials from 26 June 2013. The exact amount of the grant for the development of water infrastructure will be determined by the end of 2013.

²³ In order to implement the Convention, the States-Parties to the Convention agreed on the Baltic Sea Action Plan in 2007, which establishes goals to reduce emissions of phosphorus and nitrogen and defines the requirements of phosphorus removal by domestic waste water treatment plants to prevent the eutrophication of the Baltic Sea.

Effluent – water that has been used and is discharged into a receiving body of water, including waste water that has been treated and is discharged into a receiving body of water

Achieving the limits of pollution indicators was difficult for waste water treatment plants in half of large waste water collection areas after the deadline of the EU directive was reached

treatment are somewhat stricter than those in the directive, as the Baltic Sea and our inland water bodies are sensitive to pollution.

36. In consideration of these requirements, the environmental permits issued to each undertaking will specify the limits for the quantities of certain contaminants (see Table 1) that the **effluent** discharged into the environment may contain. The specific qualities and pollution sensitivity of the receiving body of water must also be considered.

37. The National Audit Office analysed whether all of the waste water treatment plants located in waste water collection areas of over 2000 p.e. (62 treatment plants²⁴) and a sample of waste water treatment plants in waste water collection areas of less than 2000 p.e. (60 treatment plants) complied with the pollution indicator limits²⁵ established by environmental permits during the period from 2009 to Q3 2012.

38. The analysis revealed that half of the large waste water collection areas failed to treat waste water as required during the period reviewed: the contaminant content of effluent repeatedly exceeded the limits (the limit set for all contaminants was exceeded more than twice). Half of the treatment plants also repeatedly exceeded the limits²⁶ after 31 December 2010. Tallinn waste water treatment plant was among them – before 2012 its effluent contained more general nitrogen than permitted by the limit, but they did manage to sort out their nitrogen removal by 2012.

39. The problems of many waste water treatment plants had been solved by 2010, but the contaminants in one-third of all treatment plants located in large waste water collection areas still exceeded the limits. Four of these waste water treatment plants – in Haljala, Muuga, Väike-Maarja and Tapa – had large actual loads (over 2000 p.e.); the other problematic plants were so-called small treatment plants located in large waste water collection areas. The waste water treatment plants in Haljala, Tapa and Väike-Maarja are being reconstructed in the course of ongoing projects in 2013; the decision to fund the reconstruction of Muuga waste water treatment plant was made in July 2013.

40. Half of all waste water treatment plants located in small waste water collection areas also failed to treat water according to requirements during the period from 2009-2012 (Q3): the contaminant content repeatedly exceeded the limits (more than twice in the case of all contaminants).

41. General phosphorus is the contaminant that exceeds the limit most frequently and there are also problems with BOD₇ and suspended solids.

²⁴ 59 large (p.e. over 2000) waste water collection areas are served by 62 waste water treatment plants, whose self-designed or actual load may be less than 2000 p.e.

²⁵ The reviewed contaminants included general phosphorus (P_{gen}), general nitrogen (N_{gen}), biochemical oxygen demand (BOD₇) and suspended solids, which are the most important parameters characterising the work of a waste water treatment plant. Water undertakings analyse these parameters at least once a quarter and calculate the pollution charges payable by them on the basis of the quantities of these contaminants.

²⁶ There are waste water treatment plants with large and small (over and under 2000 p.e.) actual loads among the waste water treatment plants located in these large waste water collection areas. A waste water treatment plant was deemed to be non-compliant if the some of the contaminants contained in water exceeded the limit on two or more occasions after 31 December 2010.

The state should turn more attention to prevention, e.g. prohibiting the use of phosphates in all detergents

Did you know that...

washing up liquids, washing powders, universal and bathroom cleaning products, shampoos, conditioners and soaps **contain phosphates and phosphorus compounds.**

Did you know that...

Estonia's green movement has repeatedly highlighted the passivity of the state of Estonia in prohibiting phosphates.

Did you know that...

in the Netherlands, chemical companies decided to voluntarily stop using phosphates in detergents. The result was a 40% decrease in the quantity of phosphorus in domestic waste water.³⁰

Treatment plants with smaller actual loads (small treatment plants in large and small waste water collection areas) were the most problematic.

42. As we found above, removing phosphorus from waste water is the biggest problem for waste water treatment plants and phosphorus is also one of the most significant nutrients that causes the enrichment of water bodies with nutrients. Phosphorus from household cleaning products comprises *ca* 30-40% of the phosphorus contained in the domestic waste water that reaches waste water treatment plants. The phosphate content of detergents consumed in Estonia is 400 t/a.²⁷ This means that restricting and prohibiting the use of phosphates would considerably reduce the amount of phosphorus in waste water.

43. At the level of the European Union, it has been found that the best way to restrict eutrophication is to prohibit the use of phosphates in all detergents, but prohibiting it in laundry detergents would suffice at first.²⁸ However, the European Commission has not issued any precepts to Member States regarding the restriction of or prohibition on the use of phosphates in detergents. The Netherlands, Belgium and Italy, for example, have fully prohibited the use of phosphates in laundry detergents. Sweden, Finland and Denmark are the Baltic Sea countries that have practically stopped using phosphates. Studies carried out by the European Commission have indicated that when it comes to avoiding phosphates, we are among the last six countries and that using phosphate-free detergents would help us reduce eutrophication. Despite this, Estonia has been hesitant to make any moves on the matter, so the requirement to reduce the use of phosphates in dishwashing detergents (but not in other detergents) will finally enter into force in June 2013, just like in other EU Member States.²⁹ This means that compared to other EU Member States and Nordic countries, Estonia has done nothing to more strictly prohibit the use of phosphates.

44. Restricting the use of phosphates has an environmental aspect and also an economic one – removing phosphorus from waste water biologically is difficult. This is why sedimentation with chemicals is used to remove phosphorus. This, however, is an expensive approach that increases operating expenses and the price of water. Moreover, the requirements of phosphorus removal force waste water treatment plants to invest more money in waste water treatment technologies and cope with larger quantities of sewage sludge, which is also reflected in the price of water. Everyone would therefore benefit from reducing the quantity of phosphorus that needs to be removed from water.

²⁷ Pan-European assessment of the eutrophication risk associated with the use of phosphates in detergents. CEEP, 2009, p. 142

²⁸ The regulation of the European Union and of the Council amending Regulation (EC) No. 648/2004 in regard to the use of phosphates and other phosphorus compounds in domestic households. Summary of impact assessment. European Commission, 2010

²⁹ Regulation (EC) No. 648/2004 of the European Parliament and of the Council on detergents.

³⁰ DG Environment. 2002. Phosphates and alternative detergent builders – final report

Problematic waste water treatment plants are reconstructed, but works after often delayed

45. The National Audit Office analysed the situation of 20 waste water treatment plants where the treated water repeatedly contained more contaminants than allowed in the permit for special use of water from 2009-2012 to identify the causes of the problems and find solutions. In general, it can be said that these waste water treatment plants were old, built in Soviet times and in disrepair, and they were used to treat larger quantities of waste water than intended at the time the equipment was constructed. Also, old equipment was often only used to treat water mechanically and there was no biochemical treatment. Water management projects funded via the Environmental Investment Centre have been initiated to solve the problems and establish waste water treatment plants that correspond to actual waste water loads and have greater treatment capacity.

46. Four of the 20 reviewed waste water treatment plants had solved their problems and the new reconstructed waste water treatment plant now works as required.³¹ Reconstruction of 13 waste water treatment plants was ongoing at the time of the audit. Money for reconstruction had been allocated from the water management project budget funded by the Environmental Investment Centre.

47. Options to solve the poor situation of three waste water treatment plants have been sought, but no solutions had been found by the time of the audit. These treatment plants are:

- The waste water treatment plant of the Port of Muuga (in a waste water collection area of over 2000 p.e.), owned by the municipal enterprise Viimsi Vesi. Money was requested for its reconstruction, but the request was declined (stage III of water management in Viimsi) because there were problems in the design and selection of solutions, and there was not enough money for self-financing. The Environmental Investment Centre decided to fund the updated project application (stage IV of water management in Viimsi) in July 2013.
- Aegviidu waste water treatment plant (in a waste water collection area of under 2000 p.e.) was reconstructed, but excess general phosphorus content in effluent has remained a problem since the launch of the plant. The representative of the municipal government that manages the plant has said that they did not have sufficient knowledge to measure general phosphorus and remove it chemically when the waste water treatment plant was launched. A new person has been hired to manage the plant and sent to Tallinn University of Technology for training.
- Padise waste water treatment plant (in a waste water collection area of under 2000 p.e.) is technically obsolete (launched in 1974); only general phosphorus exceeds the limit in treated water. The parameters were generally in order in 2012. The municipality is working on the Harju-Risti water management project until the end of 2013 and reconstruction of the Padise water treatment plant is next in line.

48. The National Audit Office found no waste water treatment plants whereby no action had been taken to solve the plant's problems. However, the deadline for compliance with the Urban Waste Water

³¹ Estimated on the basis of the pollution charges declared by undertakings.

Directive (31 December 2010) has been exceeded in the case of many large waste water collection areas and construction projects are ongoing. There are several reasons for this. There may be a lack of money, competent people or administrative capacity. The following reasons can be highlighted on the basis of interviews:

- The ability of local authorities to provide self-financing for projects is very limited. This is why they are unable to manage several big-budget projects at the same time and are forced to streamline their water economy in stages. Local authorities have also been dealing with other major projects funded by the EU (e.g. waste management). In many places, water management has been streamlined in stages (e.g. stages I-III as separate projects in Viimsi and Elva). Local authorities have borrowed money, e.g. from the Environmental Investment Centre, to provide self-financing for projects.
- As experience in the preparation of major projects and applying for EU funds for such projects was initially small, many mistakes were made at first and applications were rejected as a result. This has postponed the start of actual work. In many cases, no funding was received even if the project application was prepared by experienced consultation companies.
- The rise in construction prices and the economic instability of construction companies has caused many problems. The rise in construction prices was steep at the height of the economic boom. Many construction companies went bankrupt in the middle of projects and were unable to finish them. Organisation of procurements to find new construction companies, amendment of designs etc. has taken a lot of extra time.

**Tallinn University of
Technology finds that half of
all small treatment plants
have problems**

49. Experts from Tallinn University of Technology (TUT) found in an analysis of small (under 2000 p.e., incl. in small waste water collection areas) domestic waste water treatment plants prepared in 2011³² that in more than half of all cases the work of the plants is not satisfactory: the treated water contains too much of one, several or all contaminants for which limits have been established by law.

50. The experts from TUT feel that the main problems of small treatment plants since 2000 have been design errors and incompetent designers; treatment plants not being maintained or errors being made in maintenance; and the technical solutions of certain small treatment plants not being good. Experts consider it important that all small waste water treatment plant designs are analysed by experts, who assess the suitability of the plant's technical solution to the existing situation. Maintainers of waste water treatment plants have also claimed that the reasons for the problems are the complicated structure of the plants, the complexity of tuning the process and difficult and inconvenient access to the equipment (especially in winter). Experts advise small Estonian settlements to use waste water treatment plants that are technologically as simple as possible, as practice has shown them to be more reliable. They also

³² E. Loigu et al. Preparation of recommendations and guidelines of technological and technical solutions for small waste water treatment plants for local authorities. 2011, Tallinn University of Technology, Department of Environmental Engineering.

advise them to provide more training to waste water treatment plant operators.

51. The National Audit Office is of the opinion that irrespective of the large environmental investments, half of all waste water treatment plants in large waste water collection areas had not been made to comply with requirements by the deadline agreed with the European Union. Four treatment plants with larger loads still had problems with contaminant limits in 2012. This means that the achievement of environmental objectives will also take longer. However, the good thing is that problematic and obsolete treatment plants tend to be actively reconstructed. It is impossible to give a final assessment of the results yet, because many construction projects are ongoing and most of the projects regarded as problematic will be completed by the end of 2013.

52. Recommendations of the National Audit Office to the Minister of the Environment:

- consider the option of offering independent consultations to local authorities and small water undertakings regarding the selection of suitable technologies and launching new plants;
- apply preventive measures to avoid nutrients reaching the environment. A legislative act should be prepared with the Ministry of Social Affairs for this purpose which would prohibit the use of phosphates in all detergents in order to ensure that phosphorus compounds do not end up in waste water treatment plants and consequently in the environment.

Response of the Minister of the Environment: The Ministry of the Environment plans to continue organising training for waste water treatment plant operators. Joint tenderers OÜ Aqua Consult Baltic and Tallinn University of Technology were chosen as instructors until 2015 as a result of a public procurement. The objective of the training is to give the people involved in waste water treatment the knowledge and skills they need.

Also, on 18 December 2012 the Environmental Investment Centre made the decision to fund the project 'Evaluation of the efficiency of the waste water treatment plants established and reconstructed with EU and EIC funds from 2004-2012'. The project includes the preparation of guidelines for small water undertakings and local governments which will allow them to avoid making mistakes in selecting the right technology for their waste water treatment plants and in launching new plants. The results of the work will be published on the website of the Environmental Investment Centre. We are also planning to introduce the results at seminars, training events and consultations in cooperation with the Estonian Water Works Association and the EIC.

The Ministry of the Environment is prepared to develop various measures in cooperation with the Ministry of Social Affairs to reduce the quantity of phosphorus compounds in detergents that end up in the environment.

Did you know that...

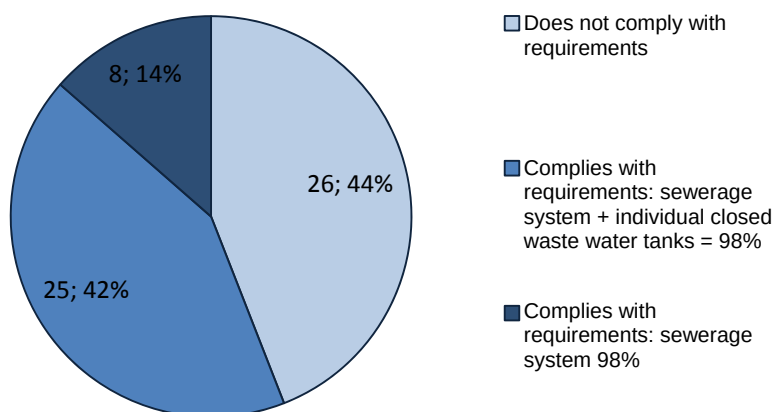
according to the guidelines of the European Commission, the collecting systems of large (over 2000 p.e.) waste water collection areas are considered to be in compliance with requirements if 98% of the pollution load in the waste water collection area is collected (either via a public sewerage system or with individual cesspits) and the 2% that is not collected does not exceed the pollution load of 2000 p.e.

Waste water collection in waste water collection areas is inadequate

53. Waste water must be collected from the collection area (agglomeration) to the required extent pursuant to the requirements established for large collection areas. In waste water collection areas of over 2000 p.e., waste water must be collected using the public sewerage system or individual leak-proof tanks, as discharge into the soil is not permitted.³³ Use of individual treatment equipment for waste water treatment and discharging effluent (if it has been biologically cleaned) into the soil is permitted in small waste water collection areas. If these conditions are not met, the waste water collection area does not comply with the requirements of the Urban Waste Water Directive and may pollute the environment. This is why the state must have a true overview of households that have been connected to the sewerage system and that use individual cesspits as well as of waste water collection as a whole.

54. The report of the Ministry of the Environment to the European Commission reveals that as at the end of 2010 (when compliance with the requirements of the Urban Waste Water Directive had to be guaranteed), 26 of the 59 (44%) collecting systems in waste water collection areas of over 2000 p.e. did not comply with requirements (see Figure 6).³⁴

Figure 6. Compliance of waste water collecting systems of large waste water collection areas (n=59)



Source: National Audit Office, on the basis of the report of the Ministry of the Environment on compliance with the requirements of the Urban Waste Water Directive (2012)

55. In the case of almost half (25) of waste water collection areas, the Ministry of the Environment has reported that their waste water collecting system complies with requirements, as they have closed cesspits. However, the data about the existence of cesspits used by the Ministry are estimates and obtained from local authorities via telephone interviews. The National Audit Office is aware that not all local authorities keep account of the individual solutions used by households, which means they have no accurate overview. The National Audit Office sees the risk that

³³ § 24 of the Water Act

³⁴ Compliance with the requirements of the Urban Waste Water Treatment Directive in Estonia. Ministry of the Environment, 2012

the data reported about individual cesspits are incorrect and the percentage of waste water collection in the collection areas is even lower.

56. The problem seen by the National Audit Office in the waste water collection report is that the percentage of residents connected to the public sewerage system does not indicate whether all of the pollution has been collected from the waste water collection area. Data on the collection pollution caused by business and other activities should also be presented.

57. The fact that the Ministry of the Environment finds that more money must be invested in collection areas of over 2000 p.e. also indicates problems in waste water collecting systems. The total amount required for waste water systems is 93 million euros and the majority of this amount (65 million) will be used for the construction and reconstruction of pipes.

58. Since the compliance of a collecting network is assessed on the basis of the pollution load in the waste water collection area and not the size of the population, and requirements of waste water treatment depend on the size of the collection area's pollution load, it is very important that this is correctly assessed.

59. The National Audit Office noted that the officially approved pollution load in several waste water collection areas of over 2000 p.e. was many times higher than the actual number of people living in the area (see the examples in Table 3). In general, the number of residents and the pollution load in the waste water collection area should be the same. A higher pollution load is justified if economic activities (the food industry, tourism etc.) are carried out in the waste water collection area or the number of residents changes in different seasons (e.g. in summer cottage regions), which causes additional pollution. The National Audit Office is not convinced that the pollution load of large waste water collection areas has been correctly assessed, because the Ministry of the Environment does not have source data on the creation of large waste water collection areas.

60. The National Audit Office is of the opinion that estimates of the pollution loads of waste water collection areas have been inflated or incorrect in some areas, and that such a load is not actually created (see Table 3). The reasons here are overly optimistic population forecasts, liquidation of industries and reduction of their load, and the desire of local authorities to create large waste water collection areas to receive money from the state as a priority.

The pollution load of waste water collection areas is overestimated

Did you know that...

the total load from 59 waste water collection areas of over 2000 p.e. is 1.7 million population equivalents (p.e.). The majority of this – 90% – comes from 22 waste water collection areas of over 10,000 p.e.

Table 3. Waste water collection areas (selection), number and percentage of people using the sewerage service and officially approved pollution load of waste water collection area (based on data of the Environment Agency)

Waste water collection area (over 2000 p.e.)	Total number of residents in urban area*	Number of sewerage service consumers	Share of sewerage service consumers of total number of residents (%)	Pollution load (p.e.) (approved with a directive of the Minister of the Environment)
Keila river	280	180	64	9520
Türisalu	887	425	48	5090
Vääna-Jõesuu	796	135	17	6880
Püssi	1950	1335	68	6793
Järva-Jaani	1089	872	80	12000

* Number of people living in waste water collection area

Source: Compliance with the requirements of the Urban Waste Water Directive in Estonia. Ministry of the Environment, 2012

There are many small waste water collection areas in Estonia

Did you know that...

there are 16 waste water collecting areas in Estonia whose pollution load is less than 100 p.e.

61. Overestimating the actual pollution load of waste water collection areas may result in the implementation of requirements for the collection and treatment of waste water that are stricter than necessary and money for the establishment of waste water collecting systems being given to areas where it is not of primary importance. According to the Ministry of the Environment, the population of 13 of the 59 large waste water collection areas was below 2000. This means that one-fifth of large waste water collection areas are potentially areas where requirements could be less strict and the expenses incurred to meet the stricter requirements could have been avoided or could be avoided in the future.

62. There are 455 small waste water collection areas in Estonia whose pollution load is under 2000 p.e. These areas are not required to collect 98% of waste water and the use of individual treatment solutions and discharge into the soil are permitted (see Table 1). Estonia has mainly created small waste water collection areas in order to protect the environment and to give preference to funding more important water management projects. When distributing the money of the environmental programme, the Environmental Investment Centre (EIC) prefers waste water collecting and treatment systems that are located in waste water collection areas.³⁵ Since the EIC does not support the establishment of individual systems, local authorities have actively created small waste water collection areas and given less consideration to the creation of individual systems. This means that the funding scheme promotes putting pipes in the ground rather than establishing individual systems.³⁶

63. The National Audit Office is of the opinion that the state does not have the money needed to streamline the waste water collecting system of small waste water collection areas by the established deadline (31 December 2018). According to the Ministry of the Environment, the reconstruction of the drinking water and sewerage systems of small waste

³⁵ The CF does not give grants to waste water collection areas whose pollution load is less than 2000 p.e.

³⁶ Local authorities submitted applications for the creation of three waste water collection areas and the expansion of one collection area in June 2013.

water collection areas requires *ca* 167 million euros. This is similar to the amount required to streamline large waste water collection areas. Since funds are only planned for large waste water collection areas during the 2014-2020 period of the European Union Structural Funds, the money required for investments in small waste water collection areas must come from the state's own funds (the Environmental Investment Centre, local authorities and water undertakings). 115 million euros has been allocated to streamline the water management from the environmental programme of the Environmental Investment Centre from 2007-2012. This means that the state must continue supporting the water sector to the same or an even larger extent. Otherwise, the state will not be able to meet the goals it has committed itself to and the quantity of contaminants discharged into the environment by waste water treatment plants will be bigger than desired.

64. The National Audit Office is of the opinion that there are still considerable problems in the appropriate collection of waste water from waste water collection areas whose pollution load exceeds 2000 p.e. The data on the collection of pollution loads and individual solutions in waste water collection areas must be specified and there is a risk that the quantity of pollution discharged into the environment is larger than the quantity reported to the European Commission. The occasional overestimation of the pollution loads of both large and small waste water collection areas is probably the result of the inaccuracy of source data (e.g. population and pollution load), but also the desire to receive money from the state for drinking and waste water systems. Reviewing the pollution loads of water collection areas would make it possible to focus activities, incl. funding, on areas where the pollution load and threat of environmental pollution are higher.

65. Recommendations of the National Audit Office to the Minister of the Environment:

- analyse and specify the actual pollution load of large waste water collection areas in cooperation with the local authorities (incl. use of census data) and assess the changes occurring in pollution loads in the near future. Reassess the pollution loads of waste water collection areas that do not correspond to the actual loads and implement the waste water treatment and collecting system requirements that correspond to the size of the waste water collection area;
- in cooperation with local authorities and water undertakings, carry out detailed stocktaking of the existence and status of individual systems (cesspits, septic tanks etc.) to obtain a correct overview of the waste water collecting systems in waste water collection areas. This would make it possible to specify the investment needs of waste water collection areas;
- analyse and consider the options of supporting the establishment of individual solutions in waste water collection areas from the Environmental Investment Centre, especially in small (under 2000 p.e.) areas where their establishment and maintenance is more sustainable than the reconstruction or establishment of a public water supply and sewerage system.

Response of the Minister of the Environment: The Ministry of the Environment plans to start reviewing and adjusting the pollution loads of waste water collection areas in cooperation with local authorities in 2014 in order to make compliance with the directive's requirements more efficient. After the specification of pollution loads, the Ministry of the Environment will be able to propose to the Environmental Board that the requirements established for waste water treatment in waste water collection areas with adjusted pollution loads be reviewed.

The Ministry of the Environment plans to map the areas in waste water collection areas not covered by the public water supply and sewerage system in cooperation with the Estonian Water Works Association (EWWA). The EWWA has submitted to the EIC the programme application 'Definition of consumers who are outside the service regions of water companies in waste water collection areas but who are potential consumers of public water supply and sewerage, and planning measures for the implementation of drinking water and waste water handling in accordance with requirements'. This work can start once the council of the EIC decides to fund the application. The Ministry of the Environment is considering the option of including a stocktake of the individual systems used in waste water collection areas in this work.

We agree that maintaining public water supply and sewerage systems in small waste water collection areas is more expensive than in large waste water collection areas, which is why only projects for the development of public water supply and sewerage systems of waste water collection areas of under 2000 p.e. have been supported from the environmental programme of the EIC since 2013. Reconstruction of systems is also supported outside waste water collection areas.

However, we would like to point out that when waste water collection areas are formed and changed, it must be considered that the establishment of public water supply and sewerage systems in waste water collection areas must not increase the price of the water service so much that it exceeds tolerance. Waste water collection areas are mostly formed in relatively densely populated regions, where the establishment of a public water supply and sewerage system is probably a more economical solution than the use of individual solutions.

If the establishment of individual solutions in a waste water collection area is still economically, technically and environmentally the best solution, it is possible to apply for a grant from the water management programme of the EIC if more than 10 people benefit from the development of the water supply and/or sewerage system. However, we do not think it is possible to support individual waste water handling solutions in waste water collection areas of over 2000 p.e., because the Water Act stipulates that only waste water treatment plants that service more than 50 people may be established in such areas.

Reporting of the quantity of contaminants discharged into water bodies must be improved

Did you know that...

in 2013 the pollution charge rates for discharging contaminants into water bodies, groundwater or the soil were as follows:

BOD₇ – € 1406 /t,

P_{gen} – € 7109 /t,

N_{gen} – € 2137 /t, and

suspended solids – € 1406 /t.

The rate of the pollution charge is reduced twice if the limits are not exceeded (see Table 1) and the annual report on water use is submitted by the deadline.

The pollution charge must be paid in full (coefficient 1) if any of the waste water parameters exceeds the limit and the payment for the quantity of discharged contaminants that exceeds the limit is calculated according to an increased rate (coefficient – 10; hazardous substances – 100).

66. In addition to the contaminant limits set in environmental permits, undertakings are encouraged to pollute less with the implementation of established pollution charges. Pursuant to the polluter pays principle, undertakings pay the state pollution charges based on the quantities of contaminants discharged into the environment and the objective of the charges is to stimulate the undertakings to pollute less. The economic stimulus will work if the quantities of the contaminants discharged into the environment are reliable and checked, as the amount of the pollution charges paid by the polluter (i.e. the water undertakings) to the state depends on this. On the other hand, the correctness of the estimated contaminant loads caused by domestic and industrial waste water depends on the reliability of the quantity of contaminant emissions.

67. Calculation of the quantities of contaminants discharged from waste water treatment plants into the environment is based on the measurement of the containment content in the effluent discharged into the receiving body of water and measurement of effluent quantities (the quantity of contaminants being obtained as a multiple of its content and the quantity of effluent). If the contaminant quantity of effluent exceeds the permitted limit, the company pays pollution charges on the basis of the increased rate (ten times the ordinary rate). The Environmental Board must check whether the undertaking operates according to the conditions established in the environmental permit and declares contaminant emissions and pollution charges as required. Since 2011, the Environmental Board has also been performing the tasks of the tax authority in checking pollution charges, calculating the environmental charges payable and carrying out audits (checking that environmental charges are correctly calculated and declared). For this purpose the Environmental Board organises effluent and receiving body of water surveillance (so-called surveillance monitoring) and uses the results to assess the compliance of the contaminant content of effluent with the limit set in the environmental permit.

68. Water undertakings carry out so-called own surveillance to calculate the quantities of contaminants, analysing the content of contaminants in effluent and measuring or assessing the quantity of effluent discharged into a receiving body of water, and on the basis of this declaring the pollution charge payable to the state in the information system of the Ministry of the Environment. Effluent samples are taken by an attested sampler (either from the undertaking itself or from a relevant research company) and the effluent is analysed in an accredited laboratory (e.g. the Estonian Environmental Research Centre) in order to determine its contaminant content.

69. The National Audit Office analysed the organisation of surveillance monitoring in the Environmental Board from 2009-2012 by reviewing all of the waste water treatment plants located in both large and the sample's (60) small waste water collection areas. Analysis revealed that contaminant content and its correspondence to the established limits is analysed, most waste water treatment plants had been included in the surveillance monitoring sample over four years and the results of the surveillance (i.e. the correspondence of the contaminant content of

effluent samples to limits) were generally the same as the results of the surveillance carried out by the undertakings themselves.

The Environmental Board does not check the quantity of effluent discharged into receiving water bodies

Did you know that...

the most reliable method of measuring the quantity of effluent discharged into a receiving body of water (which is also the easiest to inspect) is to measure it with an appropriately checked (calibrated or verified) instrument meant for this purpose, similar to the clean water meters used in households. Looking at the reading on the measuring device is then enough to check water consumption.

70. The second component used to calculate the quantity of effluent – the quantity of effluent discharged into receiving water bodies (flow rate) – was practically not checked at all by the Environmental Board in the course of surveillance. The effluent flow rate was included in the surveillance monitoring plan on very few occasions during the four-year period reviewed by the National Audit Office. The National Audit Office also found no cases where the Environmental Board or the Environmental Inspectorate had checked the effluent quantities declared by undertakings in any other manner. Therefore, there is a risk that the contaminant quantities calculated and declared by undertakings may not be correct.

71. The Environmental Board explained that the reason so little attention has been turned to checking effluent quantities is that measuring the quantity of effluent discharged into receiving water bodies with an external device is expensive and time-consuming, and if no circumstances are found in the course of an inspection that disprove the data submitted by the undertaking (e.g. water extraction considerably exceeds the quantity of effluent and there is no acceptable explanation of losses), the Environmental Board trusts the data declared by the undertaking. The National Audit Office sought to ascertain whether the effluent quantities declared by water undertakings are reliable and traceable. It found that legislation is contradictory in this respect and that the state agency involved in this topic also interpreted it differently.

72. The Metrology Act stipulates that the traceability of measurement results must be proven if measurements are performed for tax calculation purposes³⁷. A calibrated or traceably verified measuring instrument must be used to take measurements for this purpose. In the opinion of the Technical Surveillance Authority, whose task is to supervise the performance of the requirements of the Metrology Act, the quantities of the effluent discharged into receiving water bodies must be measured in such a manner that the results can be proven, since it is measured for the calculation of pollution charges as a tax, which is why the measuring instruments used to measure effluent quantities must be verified. The effective regulation stipulates that³⁸ the instruments used to measure effluent quantities must be calibrated once a year.

73. The obligation to measure the quantity of effluent is not an absolute requirement pursuant to the Water Act or the Environmental Charges Act: water undertakings can determine the pollution charges by assessment methods without using verified measuring instruments. To date, the Environmental Board has accepted the use of assessment methods in the establishment of the conditions of environmental permits and not required

³⁷ Subsection 5 (2) of the ³⁷Metrology Act stipulates that the traceability of measurement results must be proven in the case of measurements prescribed in customs and taxation legislation.

³⁸ Regulation No. 104 'List of measuring instruments subject to mandatory metrological inspection, significant and special requirements of measuring instruments, including accuracy requirements, and the period of validity of verification of measuring instruments'. Annex 2: Periods of validity of verification of measuring instruments subject to mandatory metrological inspection. Clause 2: Instruments for measuring quantities of liquids, except water, which are used in transactions, pursuant to the requirements of the Customs and Tax Act /---/.

the verification or calibration of effluent meters (even if the undertaking has one), because they find that this is not required under legislation. The Ministry of the Environment is of the opinion that the Metrology Act does not apply to the measurement of effluent quantities, as the pollution charge is not a tax in itself and the Environmental Charges Act is not a tax act (although subsection 3 (4) of the Taxation Act stipulates that “the provisions of this act also apply to pollution charges” and subsection 331 (1) of the Environmental Charges Act states that “the provisions of the Taxation Act that concern taxes apply to the pollution charge”).

74. Despite the above explanation, the Ministry of the Environment finds that a meter should be used to measure effluent quantities in the case of waste water treatment plants of over 2000 p.e., and this meter must be checked either by verification or calibration before it is used for the first time. However, water undertakings have not been required to do this, because the Environmental Board has not specified the requirements of the assessment of effluent quantities in environmental permits and has often not specified the methods undertakings should use for the assessment of effluent quantities. In its response to the National Audit Office’s query, the Environmental Board said that in most large (over 2000 p.e.) waste water treatment plants, the quantity of effluent is measured with an instrument (magnetic induction or ultrasound meter); five waste water treatment plants do not use meters, but estimate the quantity of effluent on the basis of calculations or the quantities of the domestic water supplied to consumers (the quantity of the water pumped from the drill well for consumers being measured). The opinion of the Environmental Board is based on the information submitted by water undertakings.

75. The larger water undertakings interviewed by the National Audit Office said that they use flow meters to measure the quantity of effluent. The instrument measures the effluent discharged from the treatment plant into the receiving body of water or the waste water that is still being pumped into the treatment plant, and has been verified in the manufacturing plant. The work of the meters has not been checked after their installation (this is not required in the environmental permit). For example, AS Tallinna Vesi measures the quantity of the waste water discharged into the Paljassaare waste water treatment plant with meters which were calibrated by the manufacturer in 1996³⁹ and whose measuring accuracy has not been checked since. Also, the quantity of the effluent pumped from the treatment plant into the deep sea outlet is not measured in the Paljassaare waste water treatment plant, although it may differ slightly from the quantity of the waste water pumped into the treatment plant (quantities may change somewhat in the treatment process). Also, treated effluent is a better environment for using a measuring instrument (it is more similar to clean water), as measuring untreated waste water may give a significantly less accurate result than measuring effluent, and waste water may also cause more damage to the measuring instrument than effluent.

76. In the case of small waste water treatment plants, it is accepted that the effluent quantity declared by the undertaking equals the quantity of

³⁹ Letter of AS Tallinna Vesi to the National Audit Office, 25 July 2013. Six magnetic flow meters are used to measure the quantity of water pumped from the main pumping station to the waste water treatment plant.

the drinking water that the undertaking has pumped from the drill well for the consumers. The National Audit Office considers this a robust method, as the quantity of the effluent discharged into the receiving body of water may differ largely from the quantity of the domestic water supplied to consumers. The quantity of waste water diluted by rain water that reaches the waste water treatment plant may be considerably larger due to the condition of the sewerage pipelines and the quantity of rain water that infiltrates or is directed into these pipelines, and the quantity of effluent that comes out of the treatment plant is larger than the measured quantity of domestic water. In this case, the content of contaminants in effluent is relatively smaller (as it is diluted by rain water), but when the quantity of contaminants is calculated they are multiplied by the quantity of domestic water that is smaller than the quantity of effluent, and the general contaminant quantities obtained are smaller than the actual quantities. The differences in absolute quantities are unlikely to be big when this method is used for small waste water treatment plants and the approach is justified, because measuring the quantity of effluent in small treatment plants with measuring instruments is problematic in technical terms (e.g. stabilisation ponds). The method should not be permitted in the case of large waste water treatment plants, as there are no technical obstacles to the use of checked measuring instruments that cannot be overcome.

77. The National Audit Office is of the opinion that the quantities of contaminants currently discharged from waste water treatment plants into receiving water bodies that undertakings declare are not sufficiently reliable, as the state does not check the quantities of the effluent discharged into receiving water bodies, legal acts contain no requirement to use traceable measuring instruments that could be unambiguously interpreted, and undertakings do not check the work of their measuring instruments. It is therefore possible that undertakings declare effluent quantities that are smaller than the actual ones and therefore pay smaller pollution charges. Using verified measuring instruments is particularly important in the case of large waste water treatment plants (over 2000 p.e.), where the quantities of contaminants discharged into the environment are larger. The implementation of verified measuring instruments would make supervision considerably easier for the Environmental Board and it could check whether the calculated contaminant emissions are correct.

78. Recommendations of the National Audit Office to the Minister of the Environment:

- specify the requirements of assessment of effluent quantities in legislation (the Environmental Charges Act, regulation of the Minister of the Environment 'Methods of taking samples') in such a manner that waste water treatment plants of over 2000 p.e. are obliged to use measuring instruments (flow meters) to measure the quantity of the effluent discharged into the receiving body of water, which instruments are regularly verified or traceably calibrated, and guarantee the reliability of their readings;
- stipulate in legislation that the Environmental Board determines the method for the assessment of effluent quantities for small waste water treatment plants (under 2000 p.e.) in the environmental permit based on the solution that is most suitable for the specific conditions, and

guarantees that the data obtained by this assessment method are sufficiently reliable and verified;

- the Environmental Board and the Environmental Inspectorate should check the effluent quantities declared by undertakings and, once the aforementioned additions to legislation have been established, also check that the requirement to verify or calibrate effluent meters is met.

Response of the Minister of the Environment: The requirements of waste water treatment and taking samples are established in Government of the Republic Regulation No. 99 'Requirements of waste water treatment and discharging effluent and rain water into receiving water bodies, limits of effluent and rain water pollution indicators and measures for checking performance of these requirements' (these requirements are not mentioned in the Environmental Charges Act or in the regulation 'Methods of taking samples'). The Ministry of the Environment is considering the specification of the requirements of measuring effluent quantities as well as for the verification and calibration of effluent meters in Government of the Republic Regulation No. 99.

The Ministry of the Environment is planning to analyse the specification of the requirements of measuring effluent quantities in waste water treatment plants of under 2000 p.e. in legislation in order to guarantee the use of uniform methodology and equal treatment.

The Ministry of the Environment is considering the need to amend legislation in order to regulate the issue of supervision in the area of measuring quantities of effluent.

Response of the Director General of the Environmental Board: The Environmental Board is of the opinion that it needs funds to implement the recommendations made by the National Audit Office and order the relevant measurements of the flow rates. The Environmental Board admits that the reliability of the data of effluent flow rates submitted by undertakings must be boosted.

Quality of drinking water in public water supply systems

79. Everyone has the right to consume safe water of adequate quality, i.e. everyone must have access to quality and safe drinking water. The quality of drinking water depends on the quality of the raw water that is the source of drinking water, the condition of the drinking water pipelines, the technology used to treat drinking water and the impact of human activities on the quality of groundwater and surface water. Drinking water must meet certain quality requirements in order to be fit for consumption. The quality of drinking water must be guaranteed by water undertakings and the state (Health Board) is obliged to check the compliance of drinking water with quality requirements and demand performance of activities planned for the elimination of deficiencies.

Did you know that...

non-compliance with the limit values of **microbiological parameters** (e.g. *E. coli*) may cause bowel infections: dysentery, hepatitis, typhoid fever etc.;

non-compliance with the limit values of **chemical parameters**, e.g. fluorides, may cause fluorosis of the teeth and bones, thyroid disorders and malignant tumours;

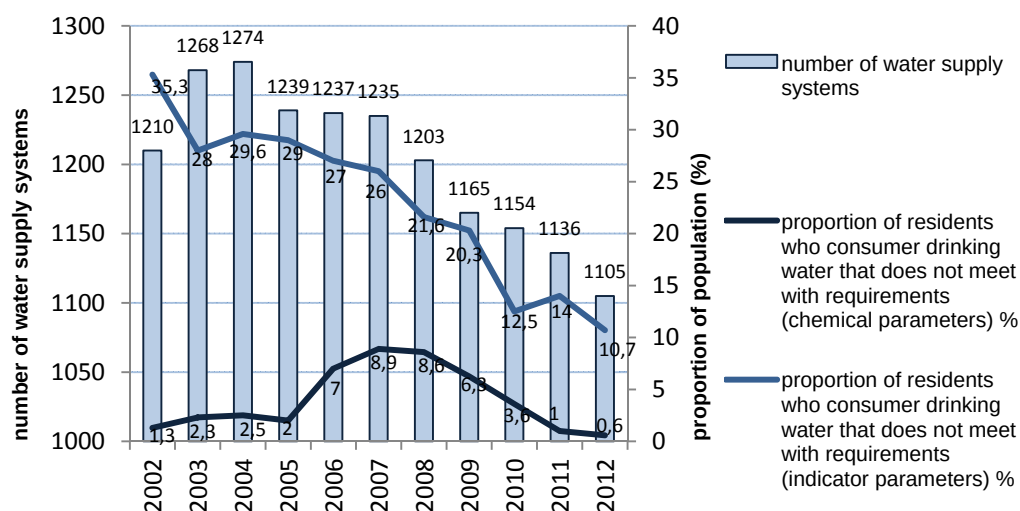
trihalomethanes (chemical parameter) are carcinogens that increase the risk of cancer if contaminated water is consumed over a long period of time.

Safe drinking water is not guaranteed for some people

80. The main objective for meeting the quality requirements set for drinking water is to ensure that the water is safe for human consumption. Pursuant to the European Union Drinking Water Directive and Estonian legislation, water that meets the limit values of microbiological and chemical parameters is considered safe for human health (see Table 2).

81. The quality parameters of drinking water in Estonia have improved over the last ten years (see Figure 7), but deficiencies can still be found. A few cases where the limit values of microbiological parameters were exceeded could still be found in earlier years, but there were no non-compliances in 2012. In terms of health, the problem with the quality of drinking water in Estonia lies mainly in its non-compliance with the limit values of chemical parameters – fluorides, boron and trihalomethanes are the main problems. In 2012, 36 small public water supply systems (0.53% of consumers) did not comply with the chemical parameters. The fact that the limit value of trihalomethanes was exceeded in the drinking water supply system in Narva (the third-biggest public water supply system in Estonia) is the reason why the percentage of people whose drinking water did not comply with the chemical parameters increased suddenly in 2006. Compliance with the values was also guaranteed in Narva in 2012, but the risk that the drinking water may be contaminated will not disappear until the new drinking water treatment station is built (2015).

Figure 7. Number of water supply systems under state supervision* and share of people who consume drinking water that does not meet quality requirements in Estonian population (2002–2012)



* All water supply systems that offer water to more than 50 people or extract more than 10 m³ of water per day via a water supply system, or also smaller water supply systems for which supplying drinking water to people is part of their economic or public law activities, are under state supervision.

Source: National Audit Office on the basis of the drinking water quality reports of the Health Board

Deadlines for guaranteeing the quality of drinking water have been extended

82. If the value of microbiological parameters is exceeded, the consumption of drinking water must be immediately stopped and the reasons for the non-compliance must be investigated. However, it is possible to request exceptions for chemical parameters under the European Union Drinking Water Directive to extend the deadline by which compliance is achieved, and Estonia has repeatedly done so. For example, the Ministry of the Environment has once again requested from the European Commission an extension of the deadline until 2015 in

respect of fluorides (which cause most of the non-compliances in Estonian water supply systems) for 33 public water supply systems (the request was submitted in the end of 2012).⁴⁰

83. Although the number of non-compliant water supply systems has decreased every year, the same systems keep appearing on the list of exceptions (one exception is valid for three years and it must include a description of improvement activities), having not carried out the improvement activities or having postponed deadlines. 13 of the 33 water supply systems in the latest exception request for fluorides were also on the first list sent to the European Commission in 2005. New problematic water supply systems have also appeared. When the last exception was applied for, the European Commission pointed out that the fluoride content in 13 water supply systems was particularly high (over 2.5 mg/l).⁴¹ Most of these water supply systems are working on the elimination of the non-compliances, either with money received from the Environmental Investment Centre or in another manner (e.g. the water supply system is being merged with another or bottled water is supplied to consumers).

84. The National Audit Office carried out a broader analysis of the water supply systems that did not meet requirements in 2011. The water of all 15 water supply systems in the sample, whose service is consumed by less than 2000 people, did not meet the requirements in terms of chemical parameters. The water undertakings found that the main reason for this is the poor quality of groundwater. There are water supply systems that have received support from the Environmental Investment Centre several times, but still have no quality drinking water. Reverse osmosis technology is used to remove fluoride and boron from groundwater, which is expensive and difficult for smaller water supply systems to afford. Some water supply systems say that they have not received money from the Environmental Investment Centre (their applications were incorrect) or that carrying out improvement activities in parts and with a smaller budget is sometimes more reasonable, as self-financing and managing the project are difficult and the results cannot always be predicted, e.g. it is impossible to tell how good the quality of water is before the well is drilled or which technological solution is most suitable.

85. The Health Board has sent memoranda to all problematic water supply systems, but many of them have not carried out the promised activities. In general, no sanctions have since been applied.

People must be better informed about the quality of drinking water

86. Consumers must be informed if the quality of drinking water does not meet requirements.⁴² The National Audit Office inspected how consumers are informed by the 17 water supply systems to whom the European Commission had given more time to make the fluoride content of their water comply with requirements and which were on the last list of exceptions. According to this list, the water supply systems have informed people about the poor water quality on their own or the local

⁴⁰ The European Commission had not yet approved the request for the exception in September 2013. An exception is valid for three years from its approval (probably until 2016-2017 in this case).

⁴¹ Letter of the European Commission regarding the 3rd exception request (ref. ares (2013)137499-04/02/2013)

⁴² Subsection 10 (2) of Regulation No. 82 of the Minister of Social Affairs of 31 July 2001

authority's website. The Health Board said that people are informed at the local level (e.g. bulletin on an information stand), but the National Audit Office presumed that since the quality of drinking water in these water supply systems still does not comply with requirements and the fluoride content in 10 of these water supply systems was particularly high, the relevant information should be easy to find on the websites of the local authorities and the water undertakings.

87. None of the reviewed websites of water undertakings or local authorities clearly mentioned the fact that water in the supply system does not meet the requirements of chemical parameters or advice about what people should do to reduce the threat to their health (except one case, where people were advised not to use fluoride toothpaste). The non-compliances can be ascertained from the drinking water analysis records of some water undertakings, but they are difficult for ordinary people to find and these non-compliances have not been explained. Information about the quality of drinking water provided by water supply systems is easy to find on the website of the Health Board, but it may not occur to ordinary people that the information can be found there.

88. The **National Audit Office is of the opinion** that water undertakings and local authorities have not informed people adequately on their websites about the non-compliance of the drinking water with chemical quality parameters. Informing people better would allow them to consciously reduce the health risks arising from poor water quality.

The state is unable to guarantee that the quality of drinking water complies with indicator parameters by the established deadline

Did you know that...

indicator parameters include aluminium, ammonium, chloride, manganese, iron, sodium, sulphates, turbidity, taste, odour, colour and radiological parameters.

When Estonia joined the European Union, it received an extension until the end of 2013 to achieve compliance with the limit values of some indicator parameters.

89. In addition to microbiological and chemical parameters, the quality of drinking water must also meet indicator parameters. They are not considered a direct threat to human health, but in large quantities they may have an impact on health and they also damage pipelines and equipment. Iron, manganese, ammonium, chloride and radiological parameters are the biggest problems in Estonia. The water in so-called large water supply systems (serving more than 2000 people, n=53) was supposed to meet the indicator parameters by the end of 2008 and the deadline set for small water supply systems (serving less than 2000 people) was the end of 2013. Water undertakings must hold special marketing authorisation to sell drinking water that does not comply with indicator parameters.⁴³

90. The data of the Health Board indicate that four large water supply systems (Loksa, Narva, Kohtla-Järve (Järve District) and Märjamaa (Oru, Jaama and Rausa streets)) did not comply with the values of indicator parameters in 2012. Selling such water should actually not be permitted, but it is still done on the basis of a permit for special use of water, as the implementation of improvement activities takes time (e.g. the water management project of Narva will end in 2015).

91. All Estonian water supply systems that have been issued with permits to sell water that does not meet quality parameters but is not a health hazard had to apply measures to make their water comply with

⁴³ Regulation No. 152 of the Minister of Social Affairs of 21 December 2001

parameters by the end of 2012, when all permits expired. However, 255 water supply systems (10.7% of all consumers, see Figure 7) still did not meet the requirements of indicator parameters and should not have been allowed to continue providing their services.

92. As 255 water supply systems failed to meet the requirement, an amendment was made to legislation on 22 December 2012 and the deadline was extended until the end of 2013. All non-compliant water supply systems had to apply for new marketing authorisation which is valid until the end of 2013. As at 3 September 2013, the Health Board had issued marketing authorisation to 163 applicants; 35 applications are pending. 21 of these 198 have managed to make their water quality comply with requirements. This means that at the end of September 2013 there remain 177 water undertakings whose water still does not correspond to the limit values of indicator parameters. There are examples where the iron content of drinking water permitted with the marketing authorisation exceeds the limit value 50 times.

93. The reasons why the quality of water does not correspond to the limit values of indicator parameters are the same as highlighted in Article 84 – the natural quality of groundwater is bad, using water of other aquifers is not possible, the technology and equipment used to treat drinking water are obsolete, problems in applying for money from the Environmental Investment Centre (e.g. errors in applications or lack of self-financing) etc. The bad condition and corrosion of the drinking water pipeline is also a problem.

94. However, many water supply systems have not implemented the measures they promised to take to eliminate the problems (so-called programmes of measures) and the Health Board has not been strict enough in demanding that improvements be made. During an interview with the Estonian Water Works Association, it was admitted that there is a considerable threat that small water supply systems will not be able to guarantee compliance with quality parameters (indicator parameters) by the deadline, i.e. 31 December 2013. Marketing authorisation expires after this deadline and they will no longer be permitted to sell water to consumers. This may be followed by breach proceedings by the European Commission, as the requirements were not met by the deadline.

Lack of clarity in the radiological parameters of drinking water

Effective dose – sum of equivalent doses weighted with the tissue factors characterising the different radiation sensitivity of human organs and tissue.

95. Radioactivity is one of the indicator parameters of drinking water quality. It is calculated as an **effective dose**. The EU Drinking Water Directive gives the effective dose as a recommended parametric value with the clause that the risks to human health must be analysed if the value is exceeded. In Estonian legislation the effective dose is described as a limit value, i.e. that the effective dose in drinking water coming from a tap or in the groundwater used as the source of drinking water may not exceed 0.1 mSv/year. In exceptional cases (e.g. when another source is not accessible or when it is guaranteed that water treatment and water do not pose a threat to human health), the Health Board has the right to permit the use of such water, but it must be checked that the water is not a health hazard. Exceeding the level that is safe for people may cause health damage, especially in children, so it is important to assess the risks and restrict the use of such water if necessary.

96. In Estonia, groundwater in deeper layers is naturally more radioactive than usual. According to the data for 2012, 14% of the Estonian

population or 184,000 people (predominantly in northern Estonia) use water from the Cambrian-Vendian aquifer, whose radionuclide content is higher than permitted. 129 drill holes were established in the Cambrian-Vendian aquifer from 2006-2013, 26 of which provide water to public water supply systems. Most of them (22) provide water where the effective dose exceeds the limit value; in the worst case it was five times higher than permitted (0.547 mSv/a). According to the Health Board, the effective dose content was exceeded in the drinking water of one-third of water supply systems in 2012. This indicates that the number of people who consume water that requires risk analysis is relatively large.

97. The audit revealed that health risk analyses have not always been carried out and use of the Cambrian-Vendian aquifer has also not been restricted. There are references to studies⁴⁴ which suggest that the radioactivity of groundwater poses no major threat to human health. However, the same studies highlight that the effective dose indicator that characterises radioactivity exceeds the limit value multiple times in the water from some drill wells, the risk assessments have only considered adults and drinking water requires treatment. The Health Board itself has recommended avoiding the use of water from the Cambrian-Vendian aquifer (especially by children and pregnant women) and that establishment of new drill wells for the use of Cambrian-Vendian groundwater should not be permitted.

Did you know that...

in 2013 AS Viimsi Vesi completed its water management project, which includes the implementation of innovative technology for the removal of radioactive radium from drinking water.

98. The lack of clarity as to whether guaranteeing the compliance of the radiological parameters of drinking water to limit values needs to be dealt with and the lack of risk analyses means that the Environmental Board and the Health Board do not restrict the use of groundwater whose radiological parameters exceed the limit value. Since compliance with the effective dose parameter is not required, companies do not consider it necessary to remove the radiological parameters from drinking water (although some companies have been doing this) and consumers are unaware of the possible health risks, despite the fact that children should avoid consuming such water.

Some water supply systems that have received money do not work according to requirements

99. Since a lack of money is one of the reasons drinking water cannot be made to comply with chemical or indicator parameters, the National Audit Office analysed how many drinking water supply systems have received support from the Environmental Investment Centre and how successful these investments have been.

100. Four large water supply systems (see art. 90) which did not meet the indicator parameters in 2012 according to the Health Board have all received support and their projects will be completed by 2015 at the latest. The most problematic water supply system – Narva – has received 30 million euros from the Cohesion Fund for the reconstruction of pipelines and guaranteeing the quality of drinking water. The project (total budget 46 million euros) will be completed in 2015.

⁴⁴ Radiation Centre. 2005. Assessment of the health risk caused by radioactivity of drinking water; in 2009, the Health Board and Italian experts carried out the Twinning Light project “Assessment of the concentration of radionuclides in Estonia’s groundwater and the resulting health risks”; in 2010 the Health Board and the Radiation Centre carried out a risk analysis for assessment of the impact of radioactivity in the drinking water of drill wells in Nõmme, Maardu, Saue, Tiskre, Pillado, Pirita, Merivälja, Pärnamäe and Keila on the health of consumers.

Did you know that...

support in the total amount of 4.94 million euros was allocated to households from the **low density area programme** of the Ministry of the Interior from 2008-2012. Local authorities contributed *ca* 4 million euros to the implementation of the project and one-third was contributed by people themselves – *ca* 12 million euros in total. 3841 households with 13,551 people benefitted from the projects, which had ended by 2012.⁴⁵

101. Drinking water in 252 water supply systems, which serve 50–2000 people, did not meet the quality parameters in 2011. According to the Environmental Investment Centre, half of them (127) had received support by January 2013 (the project was ongoing, had been completed or was waiting for contracts to be signed), but 122 did not request or receive money from the Cohesion Fund or the environmental programme. Keeping in mind that applying for support and implementing a project takes at least a year and that EU funds are generally used for the development of water management, these water supply systems have exposed themselves to the risk that they may be unable to make themselves comply with the requirements by the end of 2013, after which water that does not correspond to the limit values of indicator parameters can no longer be sold. The Ministry of the Environment estimates that more than 72 million euros should still be invested in ensuring the compliance of drinking water systems located in large waste water collection areas in the CF period of 2014-2020.

102. More than 10% of Estonian people consume water from personal drill and shaft wells, and the Health Board has no overview of the quality of this water. People who do not receive water from the public water supply are also entitled to clean drinking water. It is impossible to request money for the improvement of the quality of the drinking water used by these people from the Environmental Investment Centre, because it only supports the establishment of public water supply systems. The water programme for low-density areas carried out by the Ministry of the Interior is a positive example of guaranteeing the quality of drinking water in sparsely populated areas and ensuring that drinking water is accessible in areas without a public water supply system (establishment of shaft and drill wells, pipelines, water pumping and treatment facilities).

103. The **National Audit Office is of the opinion** that failure to be stricter in demanding that the activities required for the improvement of drinking water quality are carried out may result in an inability to guarantee the required quality of drinking water by the deadline and people will not have access to quality drinking water. Consumption of water that does not comply with requirements deteriorates people's quality of living. Although another three-year extension (ending in 2016–2017) was requested from the European Commission for some water supply systems to achieve compliance with chemical parameters, the compliance of these systems should be guaranteed as quickly as possible, as consumption of their water may have an adverse impact on people's health. Water that does not comply with indicator parameters can no longer be sold after 2013, and at present we do not know what will happen with the water supply systems that are still struggling with their water quality at that time. People must be better informed about the non-compliance of drinking water quality. The initiation of breach proceedings by the European Commission is possible.

104. Recommendations of the National Audit Office to the Director General of the Health Board:

⁴⁵ The Ministry of the Interior has launched a new low-density area programme for 2013-2014, which in addition to the establishment of drinking water wells and pipelines also supports the establishment of waste water treatment systems. However, the programme only supports young families and the creation of individual systems outside waste water collection areas.

- be stricter in demanding that water undertakings take measures to make their drinking water comply with chemical and indicator parameters by the established deadlines (2006-2017 and 2013, respectively);
- find a solution to guarantee quality drinking water for people currently supplied with water by water supply systems that are unlikely to achieve compliance with quality parameters by 1 January 2014 and whose authorisation to sell non-compliant water will expire on 1 January 2014;
- check that water undertakings and local authorities inform people of the parameters that their drinking water does not comply with and of the fact that the water may have an adverse impact on their health (especially in the case of children and pregnant women);
- finish studying the radiological parameters of aquifers in Estonia and establish definite criteria for water supply systems in the case of which measures must be taken (e.g. treatment of water) to reduce the content of radiological substances in drinking water if it exceeds the limit value of the effective dose stipulated by law.

Response of the Director General of the Health Board: The Health Board (HB) exercises state supervision of the drinking water provided by public water supply systems on the basis of § 13¹ of the Public Health Act. The Health Board increases the efficiency of supervision of problematic water supply systems within the scope of its competence to apply more pressure on water undertakings that do not offer quality drinking water at present. An action plan for this has been prepared (informing drinking water undertakings and local authorities, additional inspection etc.). As at 11 October 2013, there are 30 water supply systems where fluorides exceed the norm. 16 of these already have the necessary funding and project; the rest are waiting for approval or funding for their projects. The water supply systems that have both the funding and the project should get their water quality in order from 2013–2014 (Q1–2). The owners of 177 water supply systems whose water does not comply with the requirements established for indicator parameters have been informed about the expiry of the sales permit for drinking water which does not comply with quality requirements but is safe for health and that proceedings will be initiated against non-compliant water supply systems as of 1 January 2014. Each case will be handled separately and proceedings will be carried out pursuant to law if the application of measures is demanded. The Health Board finds that it is of primary importance that all people have access to drinking water and that the supply of drinking water is generally not suspended, unless there is a serious threat to people's health. The water supply systems that have been unable to obtain funding for their projects to date can send their applications to the Environmental Investment Centre (EIC). In order to improve cooperation, the Health Board and the EIC agreed that the HB will take part in reviewing projects, send information about problematic regions to the EIC and inform problematic water supply systems and local authorities again about the option to apply for funding from the EIC.

We agree that the population has not been sufficiently informed about the quality of drinking water. We are planning to pay more attention to this in 2014 and have developed guidelines for inspectors to guarantee an

improvement in the information activities of water undertakings and local authorities.

The Health Board is currently working on the project 'Determination of radionuclide content in Southern Estonian water provided by water supply systems', which will give us a better overview of the little-researched groundwater in Southern Estonia. Additional data are also collected in the course of supervision. After the potential entry into force of the EC Directive which determines the requirements of protecting the population's health from the radioactive substances found in domestic water (at present this is still a draft) and which also discusses the effective dose, the HB and the Radiation Department of the Environmental Board will develop criteria to determine the need to remove radiological substances from drinking water.

105. Recommendation of the National Audit Office to the Minister of the Environment: find possibilities to support, via the Environmental Investment Centre, the establishment of individual drinking water supply solutions in waste water collection areas where people do not have access to compliant drinking water and where the reconstruction or establishment of a public water supply system is not reasonable.

Response of the Minister of the Environment: We would like to point out that when waste water collection areas are formed and changed, it must be considered that the establishment of public water supply and sewerage systems in waste water collection areas must not increase the price of the water service so much that it exceeds tolerance. Waste water collection areas are mostly formed in relatively densely populated regions, where the establishment of a public water supply and sewerage system is probably a more economical solution than the use of individual solutions.

If the establishment of individual solutions in a waste water collection area is still economically, technically and environmentally the best solution, it is possible to apply for a grant from the water management programme of the EIC if more than 10 people benefit from the development of the water supply and/or sewerage system.

106. Recommendation of the National Audit Office to the Director General of the Environmental Board: guarantee that options for using alternative sources of drinking water are analysed (including the economic aspect) before a drill well is established in an aquifer where the radiological parameters of water are likely to exceed the limit value (especially the Cambrian-Vendian aquifer), and that the approval of the Health Board is requested if necessary.

Response of the Director General of the Environmental Board: The EB agrees that the proposal is justified. At the same time, it suggests that the comparison of alternatives could be given in the drill well establishment project submitted to the EB for approval.

Sustainability and affordability of water and sanitation services

What is a sustainable water service like?

The water resources management is **sustainable** if the following aspects are met:

- a) ecological** (water consumption does not exceed the environment's tolerance and environmental damage is remedied);
- b) economic** (water is used efficiently and mostly in priority areas and the value of water is reflected in its price);
- c) financial** (the price covers the expenses of providing a quality water service); and
- d) social** (everyone has access to and can afford water and expenses are fairly distributed).

Source: OECD

Did you know that...

building a waste water treatment plant is one way of avoiding environmental damage. The investment required for the purification of one pollution load unit (population equivalent) as calculated in 2009 is 767 euros.⁴⁷

Did you know that...

the price for water services must be such that the water undertaking can:

- a) cover justified operating expenses
- b) make investments in order to ensure the sustainability of the existing public water supply and sewerage systems
- c) comply with environmental requirements
- d) comply with quality and safety requirements
- e) ensure the justified profitability of the capital invested by the water undertaking
- f) develop the public water supply and sewerage system /---/ pursuant to the public water supply and sewerage development plan /---/

Source: Subsection 14 (2) of the Public Water Supply and Sewerage Act

107. The water resources management must function in a manner that is **sustainable**. In the broader sense, this means that water is consumed in the most efficient manner and the polluter/consumer covers all costs related to consumption, distribution, collection and purification of water as well as the prevention and remediation of environmental damage. It is also important that the service is accessible to and affordable for people.

108. The area of water management requires considerable investments and maintaining the system is expensive. The recommendation made at the international level is to finance water management via the price of the water service as much as possible (and less via charges and grants), which is paid by water consumers⁴⁶. The price of water must include the following expenses in order to ensure that water use is sustainable from the economic and environmental aspects:

- the undertaking's operational and maintenance costs in order to provide the water service. These expenses are production, maintenance, investment, depreciation, administrative and other direct expenses (incl. profit);
- environmental costs or the expenses related to the environmental damage caused by the water user. Environmental damage is considered to be financially equivalent to the expenses required to remedy or prevent the damage (e.g. the expenses related to the remediation of water bodies);
- resource costs⁴⁸ or the money spent on remedying the damage to natural balance to other water users (e.g. overuse of groundwater means that there will not be enough for everyone and expenses are incurred in relation to the establishment/use of an alternative source of water).

109. The European Union Water Framework Directive also emphasises that in the case of water supply services, Member States must consider the principle of covering all costs, incl. environmental and resource costs. This must motivate everyone to use water efficiently and help improve the status of water bodies. If the price of the water service does not contain all of the above mentioned costs or if the price of water is too expensive for people, society as a whole must pay the difference and the state has to find extra resources and measures for this.

⁴⁶ Managing water for all. An OECD perspective on pricing and financing. OECD, 2009

⁴⁷ Preparation of methods for assessment of environmental costs and assessment of environmental costs by main pressure factors affecting the aquatic environment. SWECO Projekt, 2009

⁴⁸ Resource expenses should not be mistaken for resource charges. For the purposes of the Environmental Charges Act, pollution and resource charges are environmental costs. Resource expenses are not separately discussed in this report.

The price of the water service does not contain all costs and the price of water will increase in the future

110. The most important thing in the provision of water service is to guarantee that all of the costs required for the provision of the service and to make investments are covered. Money to cover the costs should primarily come from the sale of water services.

Did you know that...

the price of water service is approved by local authorities. The water price of larger water undertakings (70 in total) has been approved by the Competition Board since 1 November 2010.

111. Including the costs in water price is a problem in many countries.⁴⁹ Since the drinking water and waste water systems of Estonia were in very poor condition or non-existent at the time the country joined the European Union, the majority of Estonian water service providers have used the grants paid from the European Union's and also Estonia's resource and pollution charges. This means that most of the assets of Estonian water undertakings were acquired within the scope of non-refundable aid.

The current water service price does not contain all expenses

112. The problem is that pursuant to legislation, the price of water cannot at present include the depreciation of the assets acquired as non-refundable aid. One of the reasons why all costs are not included in the price of water is that undertakings do not want to ask consumers to pay more for water. The survey of water undertakings carried out by the National Audit Office revealed that the establishment of the water price by local authorities is often a political decision and council members or the persons appointed as management board members of the water undertaking are not competent to decide on the price of water. The Organisation of Economic Cooperation and Development (OECD) also emphasises that the price of water should not be influenced by political decisions. This means that regulation of the price by an independent agency, i.e. the Competition Board, is positive. Provided that the price regulation methodology is the best possible and accepted by the parties, regulating the price should guarantee that the quality of the water service is good and that a fair price is paid for the service.

Did you know that...

the National Audit Office pointed out in its 2007 audit report 'Development of waste water treatment in rural areas with the support of Cohesion Fund projects' that the area is not sustainable, because water tariffs do not include all expenses and the income earned is therefore not sufficient for the reconstruction and renewal of facilities.

113. The water price regulation⁵¹ stipulates that depreciation of the assets acquired with aid may not be added to the water price. On the one hand, it is understandable that the price of non-refundable aid is not included in the price, because it is a grant that comes from EU taxpayers and it would be unfair to collect it once again from Estonian consumers. On the other hand, assets depreciate and water undertakings are unable to collect money for the future renewal of the drinking and waste water systems built and reconstructed non-refundable aid.

Did you know that...

40 years is considered the useful life of waste water treatment equipment, buildings and pipelines; 15 years is considered the useful life of machinery and equipment.⁵⁰

114. The water price regulation does not forbid adding the depreciation of assets acquired from the water undertaking's or local authority's own funds or loans to the water price. According to the Competition Board, it is presumed that water undertakings will use their own funds or loans for any replacement and other investments to be made in the future. The price of the water service will definitely increase after this is done (the greater the share of assets acquired with grants among fixed assets, the more the price will increase) – the price of replacing parts that wear out

⁴⁹ Pricing water resources and water and sanitation services. OECD, 2010, p. 21

⁵⁰ Regulation No. 34 of the Minister of Social Affairs of 1 July 2009, Annex 2

⁵¹ § 14 of the Public Water Supply and Sewerage Act; Water price calculation guidelines of the Competition Board

more quickly (e.g. pumps) being added to the water price earlier and the price of more durable equipment (e.g. tanks of waste water treatment plants) later.

Did you know that...

the economic analysis of water services commissioned by the Ministry of the Environment indicates that in Estonia, people (households) cover one-third of the expenses related to central water extraction and waste water treatment.⁵²

115. The actual sustainable price of water is sometimes many times higher than the current prices. Water undertakings have managed to keep the price of water services low for consumers by basing their pricing strictly on costs, but the price is even more affected by the fact that the costs which were covered by non-refundable aid has not been added to the water price. This means that European Union taxpayers are currently paying most of the price of the water services provided to Estonian consumers.

Did you know that...

in 2009 the National Audit Office of Lithuania analysed the provision and pricing of water services and found that that the total loss of water undertakings in 2009 was 8 million euros. Some water undertakings were only able to provide the service due to the support of local authorities.

116. The price of water has increased in many regions despite EU grants. The seemingly well-functioning situation is a result of the fact that most of the investments supported by the EU were made in recent years, so that equipment and pipelines are new and generally work well. However, not considering the depreciation of the assets acquired for non-refundable aid means that there is no stock for which equipment could be replaced or reconstructed in the future. This situation is also reflected by the position of water undertakings – at present, they are generally able to guarantee compliance with drinking water and environmental requirements (80% of respondents), but the price of water should be higher to ensure that they have money to make investments in the future. The impact of the EU grants, which keeps the price of water low, will disappear as soon as water companies are forced to use their own funds or loans to invest in equipment, because these investments may be immediately included in the price of water.

117. Including all capital costs in the price of the water service and its impact on the price of water varied largely in different companies. In the case of the three sample companies within the scope of the expert analysis commissioned by the National Audit Office, the prices of water would double if all capital depreciation was considered (see Table 4).

Table 4. Increase in drinking water and sewerage service price upon inclusion of all capital expenditure in the example of small, medium-sized and large companies

Company size	Present price (€/m ³)	Price incl. total capital depreciation (€/m ³)	Price increase
Small	3.08	7.07	+129
Medium-sized	2.59	5.08	+96
Large	1.61	3.46	+114

Source: expert analysis, data of undertakings

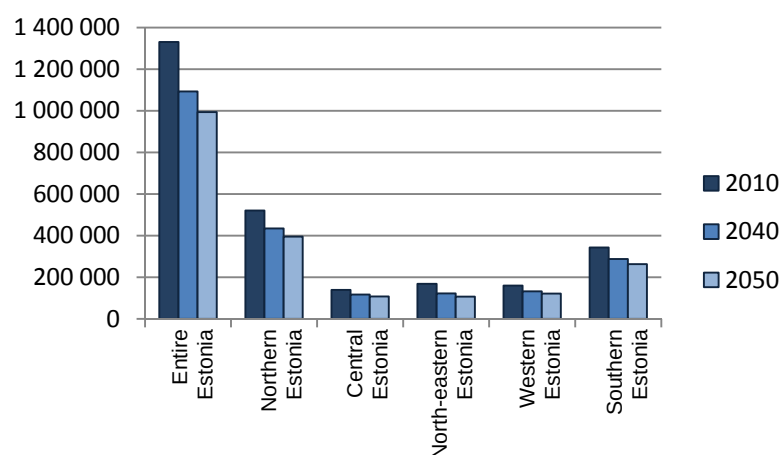
118. The Competition Board itself has also used some companies as examples to analyse what the price of water would be like if it contained the capital costs of assets acquired for non-refundable aid. In four out of 20 undertakings, the price would more than double and in 10 companies more than one and a half times. However, if we also added the maximum

⁵² Economic analysis of water use (draft). Ministry of the Environment, 2013

rate of the justified profit earned on the total capital assets, the water price of 12 out of 20 undertakings would exceed €5 per m³ –and in one company it would be as high as €12. The ratio of the water undertaking's 'own' assets and the assets acquired with the non-refundable aid of the EU is important here – the larger the share of the undertaking's fixed assets acquired for non-refundable aid, the higher the price increase would be.

119. Water undertakings themselves feel that the inclusion of all costs may raise the price of water from 10-30% to three times, especially in rural areas. Pricing the water service in smaller places is the most problematic, as they acquire most of their fixed assets for non-refundable aid and their borrowing capacity is poor. They also have fewer consumers who pay for the service. According to the forecasts of Statistics Estonia⁵³, the population of Estonia will decrease in all regions by 25% on average by 2050 (compared to 2010). Water undertakings see the decrease in population and consumption as the main problem in guaranteeing the sustainability of the water service (see Figure 8).

Figure 8. Estonian population forecast 2010-2050



Source: Statistics Estonia. 2005–2006. Population. Possible number and age composition of Estonian population until 2050. Variant 1.

Did you know that...

a special fund to which undertakings pay capital renewal charges has been created in Switzerland. This money is used to fund the construction of pipelines and the construction and expansion of waste water treatment plants.

The price of water includes environmental costs

120. The National Audit Office finds that including all depreciation calculated on capital (including on assets acquired for non-refundable aid) in the price of water may not guarantee future investments unless use of this money for future investments is ensured. The experience of other countries shows that it is possible to create a fund to save this money and companies can apply for support or a loan from the fund when they need to invest.

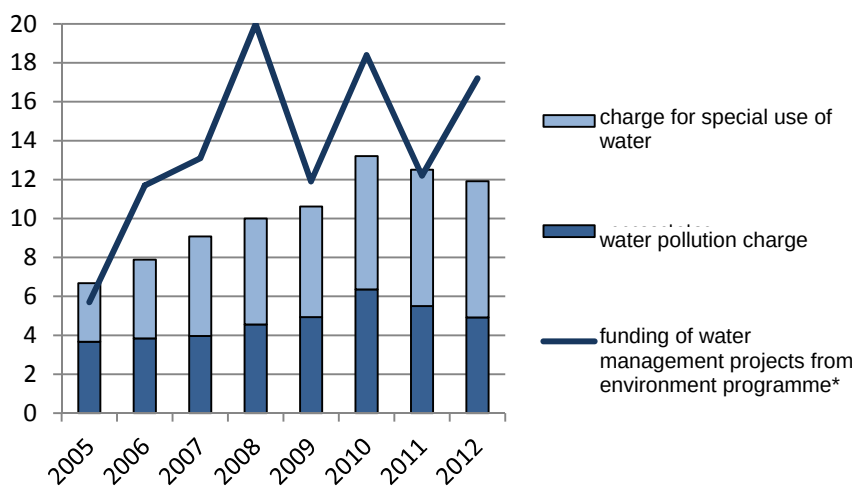
121. In Estonia, the price of water also includes the environmental charges that are expressed in the charge for special use of water (water extraction) and the contaminants discharged into water. The analysis of the expenses of water undertakings approved by the Competition Board reveals that environmental charges generally comprise less than 10% of an undertaking's operating expenses. In 2012 the state budget revenue obtained from water pollution charges amounted to 4.9 million euros and

⁵³ Data of 2000 census. Statistics Estonia confirmed that variant 1 is the most up to date.

the charges for special use of water added 7 million euros⁵⁴ – ca 12 million euros in total⁵⁵. As 61% of the total environmental charges paid into the state budget were transferred to the Environmental Investment Centre (EIC), it can be said that the EIC received 7.2 million euros from charges related to special use of water and pollution. Pursuant to the principle of sustainability of the water sector and the Environmental Charges Act⁵⁶ this amount should at least cover the expenses incurred from the funds of the environmental programme for the development of water management and remedying environmental damage. More than 17 million euros was paid out in 2012 from the funds of the sub-programmes of drinking water management, waste water management and remediation of watercourses, over 21 million euros if the co-financing of water management projects is included.

122. This means that the environmental programme funds spent on the development of water management exceeded the amounts of charges for water use and pollution multiple times. In recent years the expenses of water management have generally been exceeding the amounts received from water pollution and special use charges (see Figure 9), so water management projects are therefore financed on the account of other areas, and environmental charges (incl. those included in the water price) do not cover the expenses of remedying and preventing the environmental damage related to water management.

Figure 9. State budget revenue from charges for special use of water and water pollution and funding of water management projects from environmental charges via the environmental programme of the Environmental Investment Centre (2005-2012) (million euros)



* Only the waste water, drinking water and sanitation of water bodies sub-programmes of the environmental programme of the Environmental Investment Centre were considered.

Source: Ministry of the Environment, Environmental Investment Centre

⁵⁴ Includes the charge for special use of water pumped out from quarries and mines, and cooling water.

⁵⁵ Local authorities also collected 6.4 million euros in charges for special use of water in their budgets in 2012.

⁵⁶ Subsection 4 (3) of the Environmental Charges Act stipulates that “the state budget revenue obtained from environmental charges is used for the purposes of maintaining the state of the environment, restoration of natural resources and remedying environmental damage”.

123. The **National Audit Office is of the opinion** that the price of water does not cover all costs based on the principle of sustainability. The investments required to replace the fixed assets acquired for non-refundable aid that will be added to the price of water in the near future will multiply the price of water. The price of water may end up being even higher in regions where the number of people and water consumption are decreasing, because the fixed costs of maintaining the drinking and waste water system are high.

Paying the price of water may become a struggle for people

People cannot afford to pay the right price for water

124. In addition to including all costs in the price of water, it is also important to keep in mind that the service must be affordable for people.

125. In order to guarantee all people access to the water service, the OECD has advised that the price of the water service should not exceed 3-5% of the average net income of a household member. Estonia has taken this advice and the price of the water service here may not exceed 4% of the average annual net income of a household member in their county of residence.⁵⁷

Did you know that...

the cost of the water service is one of the few household expenses for which a recommended limit (4% of the net income of a household member) has been set at the international level. For example, no such limit has been established for the price of electricity or heating.

126. The National Audit Office analysed the ratio of the prices of 47 larger water undertakings⁵⁸ to the average annual net income of a household member in the respective county where the water undertaking operates. The average water consumption in Estonia according to the Environmental Agency is 2.9 m³ per person per month. The average price of the water service found by the National Audit Office in the course of the analysis was 2.6 euros/m³, i.e. the total cost of the water service is 7.5 euros per person per month.⁵⁹ The average amount spent on the water service is 1.95% of the average annual net income of a household member. The minimum and maximum value in the analysis were 1.08% and 3.99%, but the latter was an exception and the cost of the water service predominantly remained within the range of 1.3-2.5% of the average net income of a household member. The price of water depends on the operations, location etc. of the specific company, so the tariffs can be presumed to be different. It is therefore possible to double the price of water for people on average in order to remain within the permitted limit of 4%. The average price of the water service could be 5.6 euros/m³.

127. According to the Competition Board's calculations referred to in Art. 118 (using 20 undertakings as examples), it is possible to conclude that adding all capital expenditure to the price of water would not make the service unaffordable (proceeding from the 4% limit) for the average consumer (with some exceptions). However, if the maximum profit

⁵⁷ Government of the Republic Regulation No. 57 'Criteria for determination of waste water collection areas¹⁾ of 19 March 2009; based on the project evaluation criteria of the EIC, support is not granted to projects where the expected price of the water service exceeds the 4% limit.

⁵⁸ Members of the Estonia Water Works Association and undertakings approved by the Competition Board as at 31 December 2012.

⁵⁹ Water consumption per person is very different across counties, ranging from 1.34 m³/month in Hiiu County to 4.12 m³/month in Harju County. However, using the Estonian average (2.9 m³) for calculations seems right, as the average consumption in Estonia according to the Ministry of the Environment is 80-120 litres per day (2.4-3.6 m³/month) and 120 l person/day is used as the estimated consumption when pipelines are designed.

permitted on the total assets were also added to the price of water, it would in most cases exceed the 4% limit.

128. In addition to the Estonian averages, the National Audit Office also analysed the ability of people with lower income to pay for the water service. It is a concern that most members of low income households already spend more than 4% of their net income on the water service, even at present prices. A water service that costs more than 5 euros per m³ already exceeds the 4% limit in the third quintile (see Table 5). This means that a water price that covers all expenses is not affordable for many Estonian people based on the 4% of net income criterion.

Quintile – one-fifth of the population. Division on the basis of income places the 20% of the population with the lowest income in the first quintile and the 20% of the population with the highest income in the fifth quintile.

Table 5. Average net income of a household member in Estonia by quintile (2011) and maximum water price based on the criterion that the water service may not cost more than 4% of the average annual net income of a household member

Population group (quintile) A	Average annual net income of a household member in Estonia (euros) 2011 B	4% of average net income of a household member per month C = B/12*4%	Maximum price of m ³ of water when the limit is 4% of net income of a household member (consumption 2.9 m ³), euros D = C/2.9	Ability of people to pay for water service in the case of different water prices (€/m ³) 2.6 5.58 E=D-water price	
Lowest quintile	1737,89	5,79	2,00	-0,6	-3,58
Second quintile	3161,67	10,54	3,63	+1,03	-1,95
Third quintile	4034,41	13,45	4,64	+2,04	-0,94
Fourth quintile	5531,07	18,44	6,36	+3,76	+0,78
Highest quintile	9816,96	32,72	11,28	+8,68	+5,7
Average	4857,08	16,19	5,58	+2,98	0

Source: National Audit Office on the basis of data from Statistics Estonia for 2011

Did you know that...

in 2011 housing costs comprised 17% of the total expenses of a household member (47 euros per month). The water service cost ca 6-7 euros per household member per month.

129. It must also be kept in mind that the water service is one of household expense. Housing costs have increased in recent years mainly due to the increase in electricity and heating prices. A price increase may result in people not joining the drinking water and sewerage system, which in turn means that waste water collection areas will not achieve their goals – the people living in the waste water collection areas have not joined the water network, waste water is not collected to the required extent and groundwater and surface water remain under threat. On the other hand, people not joining the network also has an adverse economic impact on water undertakings.

130. The National Audit Office notes that the 4% limit of people's income is currently the main obstacle to the establishment of a water price that includes all expenses, rather than the omissions in adding all costs, incl. environmental costs, to the price of the water service. However, it is important for the state to see what the price of the water service will be like if it includes all of the costs required for the provision of a sustainable water service, because the difference that emerges between the so-called right price and the affordable price is paid by the state and

society as a whole after all. If the costs of providing the water service cannot be covered with sales revenue, the state must find other ways of covering the expenses.

Water undertakings must become more efficient

131. The activities related to the provision of the water service must become more efficient and better organised in order to guarantee the sustainability of water resource management and reduce price pressure on people. Cooperation between water undertakings must be promoted and, in addition to the option to join the drinking water and waste water pipeline and the treatment plants working according to requirements, it is also important to motivate undertakings to reduce their operating expenses.

132. The water undertakings that are responsible for the organisation of water management and provide the water services must be motivated to make their operations more efficient, and price regulation should favour this. Water undertakings are of the opinion that their operations could be made more efficient by investing in modern technology and pipelines, automating processes and checking them remotely, training staff, merging smaller companies with big ones and including different services. They also feel that the state should support the construction of drinking and waste water systems (especially if environmental requirements become stricter) in order to allow them to provide a sustainable water service, and the state should also continue granting support for water infrastructure in regions where population density is lower and water undertakings are smaller.

Did you know that...

the Estonian Water Works Association (EWWA) has carried out joint procurements to save money on electricity and motor fuel. The estimated amount that the companies can save as a result of the joint procurement of motor fuel is 33,000 euros per year.

133. Two-thirds of the water undertakings interviewed by the National Audit Office felt that regulation of the price by the Competition Board does not motivate them to become more efficient and effective. For example, there is not much interest in keeping expenses low if investment-based return (profit) is regulated. Approval of a strictly cost-based price does not motivate undertakings to become more efficient either, as the price of water and cash flow will then decrease.

134. The **National Audit Office is of the opinion** that the state should contribute more to making the area of water management more efficient and to cooperation and prevention so that the water service could be offered at a lower price and the investments made could be maintained, which would help water management as a whole become more sustainable.

135. Recommendation of the National Audit Office to the Minister of the Environment: decide whether all of the expenses related to the provision of the water service will be paid by the consumer. It must thereby be kept in mind that consumers may start struggling in regions where incomes are lower and the population decreasing, which means that the provision of the water service must then be supported; analyse which regions, undertakings or population groups the state could support in the longer term and decide how and with which funds this will be done if the local authority is unable to do it.

Response of the Minister of the Environment: The public water supply and sewerage system is developed pursuant to the public water supply and sewerage development plan. The amounts and schedule of investments which determine the price of the water service are

determined in the plan. Local authorities can keep the price of the water service affordable for people through the reasonable planning of investments. If steps have been taken in planning investments as a result of which the price of the water service is not acceptable for people on lower incomes, local authorities will have to find a solution to halt the price increase or compensate it to people. A detailed analysis must show whether compensation is necessary and if so, in what amounts.

We do agree with the suggestion that the Ministry of the Environment analyse and decide on the regions that the state should keep supporting in the future. In planning for EU 2014-2020 we have taken the position that the state should no longer support the development or reconstruction of systems in waste water collection areas of over 2000 p.e. after the funding period. The public water supply and sewerage systems in all larger waste water collection areas will have been renewed by then and further management of the systems will be a duty of the water undertaking and the local authority.

136. Recommendations of the National Audit Office to the Minister of the Environment and the Director General of the Competition Board:

cooperate to analyse the methodology of approval of the price of the water service currently based on the Public Water Supply and Sewerage Act to find the best solution to the establishment of the water price, which would motivate water undertakings to become more efficient without sacrificing the quality of their services and which would guarantee the achievement of environmental goals at the same time.

Response of the Minister of the Environment: The Ministry of the Environment will analyse the water service pricing methodology and the need to specify it in cooperation with the Competition Board.

Response of the Director General of the Competition Board: Pursuant to the recommendation made by the National Audit Office, the Competition Board is ready to analyse the price of the water service based on the Public Water Supply and Sewerage Act to find the best solution to the establishment of the water price, which would motivate water undertakings to become more efficient without sacrificing the quality of their services and which would guarantee the achievement of environmental goals at the same time.

Evaluation of water management projects

137. Water management projects are financed from the EU Cohesion Fund (CF) via the Environmental Investment Centre (EIC) and also from the environmental programme of the EIC, which is carried out using the state budget revenue from environmental charges.

138. Since the organisation of the funding of water management projects has a significant impact on the area's development, the National Audit Office evaluated whether procedures for the Cohesion Fund and the environmental programme and the components required for their implementation have been developed, and whether they are implemented. Since project selection and evaluation principles of the EU Cohesion Fund and the EIC's environmental programme and the manner of processing and supervising projects in the EIC are different, the

programmes were reviewed separately in the example of single projects (two CF projects and two environmental programme projects). In the course of this audit the National Audit Office will not give a generalised opinion on how the procedural and supervision actions of projects have been implemented for all projects.

139. As a result of the analysis the National Audit Office concluded that the EIC and the Ministry of the Environment have developed project selection and procedural actions to finance environmental projects which allow them to finance projects that comply with environmental objectives for the development of the area of water management, and project supervision actions which allow them to evaluate the results achieved with the projects. The following observations about the selection and evaluation of projects highlight possibilities for improving the current funding system.

140. Selection of the projects to be funded is of critical importance for the achievement of good results when the development of the area is financed on the basis of projects. In the evaluation of the project applications submitted for financing, it is important to identify the best projects where the objective is to 'do the right thing the right way'. Selecting the best project applications for the achievement of objectives requires evaluation criteria, which allow different experts to ascertain the best project applications. Also, the project selection and evaluation procedure must be transparent so that it can be ascertained how the opinion of the project application was formed (which expert gave which opinion based on which criteria).

Evaluation of environmental programme applications is not fully transparent

141. The National Audit Office is of the opinion that the evaluation of the projects of the water management sub-programme of the EIC's environmental programme has not been fully transparent, because the evaluation documentation does not indicate how the project score was formed on the basis of single criteria: the scores given by single experts cannot be distinguished and it is also unclear how many experts actually evaluated the project. According to the evaluation criteria the score given to an application is consensual – a unanimous decision of all members of the evaluation committee. However, conversations with the members of the evaluation committee revealed that since the volume of project applications that require evaluation is large, there is no time to have an application reviewed by more than one expert/committee member, who reports their evaluation results and reasons at the evaluation meeting, and they are then discussed together. The consensual opinion is formed as a result of the discussion. The National Audit Office is of the opinion that such discussions of evaluation results and consensual evaluation are positive, but in order to reduce the possible bias of an expert (who is the only one who reads a bulky project) it is important to have project applications evaluated by at least two experts, whose scores can later be identified in the application evaluation process.

142. In order to achieve the (environmental) objectives established in the projects, it is important to understand whether the best possible way (e.g. most suitable/effective technology or project solution) has been selected for the achievement of the objectives when the project application is evaluated. The evaluation of the solution offered in the application, especially in the case of large and complex projects, is made easier if

possible alternatives to the solution offered in the application have been compared in the application. Omitting the comparison of alternative solutions creates the risk that the alternatives which are more suitable or effective than the one offered in the project application are not considered and realised, meaning that the objectives are not achieved or they are not achieved in the best possible manner.

Evaluation of alternative technical solutions of projects must be improved

143. The National Audit Office considers it a problem that the evaluation criteria of the environmental programme contain no clear criteria for evaluation of the suitability of the technical/technological solutions of projects in comparison to actual alternatives. When it comes to the water management projects of the Cohesion Fund, there are clear criteria that are applied to the evaluation of the feasibility studies of project applications in terms of the treatment of alternative technological solutions, their relevance, the costs of their implementation and their environmental impact. Based on the projects reviewed by the National Audit Office (e.g. the water management project of the Kose waste water collection area of Kose municipality), the external experts of the Environmental Investment Centre have not evaluated these criteria adequately. For example, the answer given by an external expert to the question “Have alternative solutions and technological approaches to the achievement of the project’s objectives been sufficiently analysed?” was: “Yes. Alternative solutions have not been analysed in greater detail, as there are no technically or economically feasible alternatives to waste water treatment and drinking water production.” The National Audit Office is of the opinion that the external expert has incorrectly evaluated the criteria concerning alternative solutions, giving the impression that alternative solutions have been sufficiently analysed whilst this is actually not the case.

144. The existence and evaluation of a comparative analysis of alternative solutions is also important from the viewpoint of the future costs and sustainability of the project. The feasibility, financial and economic analysis of the project should consider the future costs of alternative solutions when they are compared, which is why a substantive comparative analysis of alternative solutions and evaluation of its existence and relevance in project applications is also important from the perspective of the financial and economic sustainability of the projects.

145. Recommendation of the National Audit Office to the Minister of the Environment: in the future, turn more attention to the quality of the work done by the external experts hired by the Environmental Centre in the substantive evaluation of Cohesion Fund projects.

Response of the Minister of the Environment: The Ministry of the Environment and the EIC will take the necessary measures to increase the competence of the expert group that evaluates Cohesion Fund projects and to improve the quality of their work.

/digitally signed/

Tarmo Olgo
Director of Audit, Performance Audit Department

Recommendations of the National Audit Office and responses of the Minister of the Environment and the Directors General of the Environmental Board, the Health Board and the Competition Board

The National Audit Office made various recommendations to the Ministry of the Environment, the Environmental Board, the Health Board and the Competition Board. The Minister and the Directors General of the boards sent their responses to the recommendations made by the National Audit Office from 22 October to 15 November 2013.

General comments on audit report

Minister of the Environment: The Minister of the Environment agrees with some of the conclusions and recommendations made by the National Audit Office. The Minister acknowledges that the investments made in the EU 2007-2013 funding period turned out to be bigger than initially planned. However, despite the price increase in the construction market and the specification of the initial volumes of work, it was possible to guarantee that most of the larger (over 2000 p.e.) waste water collection areas comply with the requirements of the Urban Waste Water Treatment Directive and the Drinking Water Directive with the grants given during the funding period. The goals set in the framework document for planning the funding period can also be achieved. Water undertakings and local authorities have also made a significant contribution to public water supply and sewerage projects in the format of self-financing (15-30% of the project cost on average).

Any additional investments requirements will be covered with funds from the next funding period. No support will be granted to large waste water collection areas after the 2014-2020 funding period and water undertakings must guarantee the sustainability of the established systems via the price of the water service. The Minister of the Environment has helped create regional water undertakings and increase their capability. Regional water undertakings can also guarantee the sustainable management of the systems funded by the state, a quality water service and the opportunity to consume the water service at an acceptable price in sparsely populated areas. In the case of sustainable management, investments in the renewal and replacement of the established system will be made as necessary and constantly. Major investments for the replacement of equipment etc. will not be required for 30-40 years, when people's solvency will probably have increased considerably and the water service price increase related to the expiry of support will have a smaller impact on people's ability to cope.

Investments from the environmental programme of the Environmental Investment Centre are continuously made in small (less than 2000 p.e.) waste water collection areas. The Minister of the Environment agrees that there may be a few areas where it would be reasonable to use individual solutions instead of the establishment or reconstruction of the public water supply and sewerage system. The Minister of the Environment disagrees that the many small waste water collection areas were primarily created to obtain support to streamline drinking water and waste water systems. When waste water collection areas are formed and changed, the Minister of the Environment considers that the price of the water service should not exceed the level of tolerance when public water supply and sewerage systems are established. This means that the waste water collection areas that have been formed are relatively densely populated regions, where the establishment of a public water supply and sewerage system is economically the best solution. When applications submitted to the environmental programme are evaluated, the experts also analyse whether the suggested solution is technically, economically and environmentally reasonable. Funding is not given to applications where the selected solution is either too expensive or does not guarantee compliance with environmental requirements. If the establishment of individual solutions in a waste water collection area is still the best solution in all aspects, it is possible to apply for a grant from the environmental management programme if more than 10 people benefit from the development of the water supply and/or sewerage system.

The Minister of the Environment agrees that the pollution load of some large waste water collection areas is over-estimated, but finds that such waste water collection areas only comprise up to one-tenth of all large waste water collection areas. The pollution load is not determined by the number of residents alone, as the load generated by industries and institutions is also considered. It is natural that the load of a waste water collection area must be adjusted as a result of changes in the number of residents or industrial consumption. The local authority must submit an application to change the waste water collection area to the Ministry of the Environment for this purpose. Since there are waste water collection areas whose adjustment has not been requested despite changes in the area's status, the Ministry of the Environment plans to start a review of the pollution loads of waste water collection areas in cooperation with local authorities in 2014.

The Ministry of the Environment also wants to specify that the requirement to determine waste water treatment areas in general plans has been included in the Water Act since 2001, but as it took longer than expected, the Ministry of the Environment has organised the formation of waste water collection areas and the streamlining of data since 2006. The Minister of the Environment disagrees that although the determination of waste water collection areas was ongoing at the beginning of the 2007-2013 funding period, it was unclear at the time where the investments should be made. Investments were planned on the basis of the local authorities' public water supply and sewerage development plans, sub-basin water management plans and the data of investment requirements collected from all local authorities. The Minister of the Environment also finds that the information on the basis of which the 2014-2020 funding period was planned and the methodology that was used to identify investment requirements are adequate and make it possible to assess the amount of the required investments with sufficient accuracy in consideration of the total volume.

The Minister of the Environment would like to highlight that the methodology used in the National Audit Office's audit to evaluate whether larger (over 2000 p.e.) waste water collection areas are operational differs from the evaluation methodology given in the Urban Waste Water Treatment Directive approved by the European Commission. Based on the latter, 82% of large waste water treatment plants comply with requirements as at the end of 2011. According to forecasts, 95% of the treatment plants in large waste water collection areas will comply with requirements by the end of the current funding period.

The Ministry of the Environment gives its opinion on the claims made in the report in the following paragraphs.

1. "Money received from EU funds and the pollution and resource charges collected by the state of Estonia and, to a lesser

extent, the money contributed by local authorities and water undertakings has been used for the reconstruction of obsolete drinking water and waste water systems and for the construction of new systems.” (Page 1 in the paragraph ‘Why is this important to taxpayers?’)

We would like to specify that water undertakings and local authorities also pay pollution and resource charges. The charges received are also used to improve and develop public water supply and sewerage (hereinafter PWSS) infrastructure. Water undertakings and local authorities also contribute to PWSS projects with self-financing, which is 15-30% of the project cost on average. Considering the financial capabilities of local authorities, we find that the contribution made by local authorities and water undertakings to PWSS projects is significant.

2. “The Ministry of the Environment has promised that all major drinking water and waste water systems will be made to comply with requirements during the EU funding period 2007-2013.” (Page 1 in the paragraph ‘Why is this important to taxpayers?’)

We would like to specify here that the initial evaluation proved partially inaccurate and the error made in planning the investment requirements was ca 20%. The inaccuracy was caused by the price increase on the construction market and the specification of the initial volumes of work. Irrespective of this, the goals set in the framework document of planning this funding period – the ‘Development of the Living Environment’ Operational Programme – are guaranteed. We therefore suggest that the wording could be made similar to that of Article 26 of the report.

National Audit Office: The decrease in construction prices also occurred during the EU funding period 2017-2013. The error in planning the investment requirements is bigger than stated, as there are also plans to allocate 144 million euros (plus the self-financing of projects) to the water projects of large waste water collection areas in the new funding period of 2014-2020. The National Audit Office also points out that despite the fact that the main objective pursuant to the Urban Waste Water Directive is to make the waste water systems of large waste water collection areas (over 2000 p.e.) comply with requirements, the projects of small waste water collection areas were also given large amounts of funding (ca 65 million euros) during the period.

The National Audit Office is of the opinion that the achievement of the established goals in the area of water management is not guaranteed under the priority axis of water management and waste handling infrastructure of the ‘Development of the Living Environment’ Operational Programme 2007-2013. The Operational Programme states that in the area of water management, Estonia must continue dealing with two main tasks during the period 2007-2013: improvement of the status of water bodies and ensuring people with drinking water that complies with requirements. The Operational Programme also states that compliance with the requirements established in directives is a priority for the state. The objective, therefore, is to achieve a good status of water bodies and clean drinking water via the performance of directives. These objectives have not been achieved. The National Audit Office would also like to point out the fact that the indicators given in Article 5.1.2 of the Operational Programme do not make it possible to evaluate the achievement of goals. For example, the absolute number of people who have joined the public water supply system and consume clean drinking water cannot be used to assess the achievement of the goal set in the Drinking Water Directive that drinking water in all water supply systems that serve more than 50 people must comply with requirements. This report also highlights that this has not been achieved.

Minister of the Environment: 3. “The National Audit Office is of the opinion that despite adequate financing, the state has not managed to keep its promise and make all major drinking water and waste water systems comply with the requirements.” (Page 1 in the paragraph ‘What did we find and conclude on the basis of the audit?’)

The Ministry of the Environment disagrees with this claim. Our position is that all large drinking and waste water systems will comply with requirements by the end of the funding period.

National Audit Office: based on the requirements of the Urban Waste Water Directive and the Drinking Water Directive, the National Audit Office deems that large waste water systems are the public sewerage systems and waste water treatments located in waste water collection areas where the pollution load exceeds 2000 p.e. and drinking water supply systems and treatment plants that serve more than 50 people. Not all of them comply with requirements.

Minister of the Environment: 4. “The state has also failed to turn sufficient attention to guaranteeing the sustainability of drinking water and waste water systems whose establishment or renovation cost a lot of money in the future.” (Page 1 in the paragraph ‘What did we find and conclude on the basis of the audit?’)

The Ministry of the Environment and the Ministry of Economic Affairs and Communications have implemented a water service price regulation whose purpose is to guarantee the sustainability of the established systems, adherence to which is inspected by the Competition Board. We would like to point out that

the only projects funded by the Environmental Investment Centre (hereinafter the EIC) from the Cohesion Fund are projects whose sustainability is proven.

5. “The pollution load in one-fifth of all large waste water collection areas is probably less than 2000 p.e., which means that less strict waste water collecting and treatment requirements could have been applied to them.” (Page 2 in the paragraph ‘What did we find and conclude on the basis of the audit?’)

According to the report ‘Performance of the requirements of the Urban Waste Water Treatment Directive in Estonia’, which was prepared in 2012 on the basis of data for 2010, there are 14 waste water collection areas of over 2000 p.e. in Estonia where the number of residents is smaller than 2000. However, a smaller number of residents does not necessarily mean that the pollution load of the waste water collecting area is smaller. The load generated by industry and institution is also considered in the pollution load of a waste water collection area.

We would like to add that the Ministry of the Environment plans to start reviewing and adjusting the pollution loads of waste water collection areas in cooperation with local authorities in 2014.

National Audit Office: The Ministry of the Environment was unable to submit the source data used in the formation of waste water collection areas: which data were used to determine the pollution load and what the proportions of the pollution load generated by the population and the load arising from industry and other institutions are. At the same time, the Ministry of the Environment has only evaluated the collection of the pollution load of the waste water collection areas on the basis of the number of people who have joined the public water supply (see ‘Performance of the requirements of the Urban Waste Water Treatment Directive in Estonia’, Ministry of the Environment, 2012).

Minister of the Environment: 6. “Also, the main reason why many small waste water treatment areas have been created is to receive support to streamline drinking water and waste water systems, because no support has been allocated to individual waste water systems. It would actually be reasonable to consider the development of individual systems which do not require the

formation of a waste water collection area.” (Page 2 in the paragraph ‘What did we find and conclude on the basis of the audit?’)

Six applications for the formation of waste water collection areas of less than 2000 p.e. have been satisfied since 2010 – this is only ca 1% of all of the waste water collection areas of under 2000 p.e. Groundwater in four of the six small waste water collection areas is unprotected or weakly protected, which is why special attention has to be paid to the collection and treatment of waste water in these areas. We also emphasise that the formation of a waste water collection area alone does not mean that the application for support is satisfied. The working group of the EIC’s water management programme thoroughly evaluates the reasonability and sustainability of the planned activities given in each funding application.

We would also like to note that the effective evaluation criteria and procedure of the EIC’s water management programme also make it possible to support the reconstruction of drinking and waste water systems outside waste water collection areas, which means that it is not necessary to form a waste water collection area in order to receive support to streamline drinking water and waste water systems. It is also possible to request support for the establishment of individual solutions if more than 10 people benefit from the development of the water supply and sewerage system (e.g. it is possible to request support for the establishment of a water supply and sewerage system for a group of buildings in a waste water collection area). However, we do find that the establishment of individual solutions is not always economically, environmentally or technically justified in many regions (e.g. regions where groundwater is unprotected or weakly protected).

National Audit Office: This report points out that in Estonia there are 455 waste water collection areas where the pollution load is less than 2000 p.e. (incl. 16 where the pollution load is less than 100 p.e.). One of the reasons (in addition to environmental protection) that waste water collection areas are formed is the support granted by the state, because it makes it possible to get higher scores in stages where project financing decisions are made. Otherwise, the local authorities would have no reason to form waste water collection areas.

Minister of the Environment: 7. *“As including the depreciation of the assets acquired with non-refundable aid is not permitted by law, the price of many water undertakings that received non-refundable aid are currently too low and the price of the water service will multiply once replacement investments need to be made.” (Page 2 in the paragraph ‘What did we find and conclude on the basis of the audit?’)*

The Ministry of the Environment is of the opinion that a multiple price increase is rather unlikely in the case of the sustainable management of PWSS systems. Replacement investments will be divided over a long period of time if they are made as soon as necessary. It must also be kept in mind that major investments for replacement of equipment etc. will not be required for 30-40 years, when people’s solvency will probably have increased considerably and the water service price increase will have a smaller impact on people’s ability to cope.

National Audit Office: The National Audit Office has based its water service price forecast on calculations where the investments made with EU funds, which are currently not included in the price of water, have been added to the effective price. There is no reason to believe that in the future water undertakings will not have to invest amounts similar to the EU support they have received to date. Parts that last longer, such as pipelines, buildings and treatment tanks, will need investments after 30-40 years, but there are many parts (pumps and smaller equipment) that will need investments after 10-15 years. We hope that people will be more solvent after 30-40 years, but it is difficult to make such forecasts at present. The National Audit Office’s Overview of the Use and Preservation of State Assets from 2012-2013 highlights that the solvency of Estonian people has decreased in the last five years – average net monthly wages have risen by 5%, but prices have gone up by 12%. Housing costs have increased most. We should not forget the demographic situation either, where a smaller number of people will have to maintain the present investments in a situation where the population is decreasing.

Minister of the Environment: 8. *“80% of Estonian people are connected to the public sewerage network.” (Page 9, Art. 11)*

I would like to specify that ca 80% of Estonian people are connected to the public sewerage network.

9. *“98% of pollution must be collected in the public sewerage system or treated with individual waste water treatment solution (discharge into soil is permitted).” (Page 10 Table 1 – claim about waste water collection areas where the pollution load is below 300 p.e. and 300-1999 p.e.)*

As mentioned in Article 62 of the report, the requirement does not apply to waste water collection areas of less than 2000 p.e. We would like to specify that the methodology for evaluating the compliance of a waste water collection area developed by the European Commission is not applied to waste water collection areas of less than 2000 p.e.

We would also like to specify that leak-proof cesspits may be used for the collection of waste water in waste water collection areas of less than 2000 p.e.

10. *“It is worth mentioning that no waste water collection areas had been defined by the start of the funding period (2007) and were only formed with a directive of the Minister of the Environment in 2008 and 2009, which means that when the investments of the funding period were planned it was still unclear where the money had to be invested in the first place.” (Page 14, Art. 28)*

The requirement to determine waste water collection areas in general plans has been in the Water Act since 10 January 2001. Since the formation of waste water collection areas took local authorities longer than anticipated and the results were uneven, the Ministry of the Environment started organising the formation of waste water collection areas and streamlining the data in 2006. As a result of this, the waste water collection areas were later approved with a directive of the Ministry of the Environment, but the information could also be considered during the preparation of plans. Investments were also planned on the basis of local authorities’ PWSS development plans, sub-basin water management plans and the data of investment requirements collected from all local authorities. We are therefore of the opinion that the Ministry of the Environment had enough information to plan investments at the time the plans were made.

National Audit Office: The waste water collection areas were only officially formed in 2008 and 2009. A conversation with representatives of the ministry revealed that not one local authority had entered the borders of waste water collection areas in general plans by 2008 (when distribution of the money of the CF was intended to start), which is why an amendment was made to the Water Act (3 December 2008) pursuant to which waste water collection areas were formed with a directive of the Minister of the Environment. The legitimacy of the Minister of Environment’s Directive No. 1107 of 21 August 2008 is another matter, as it contravened the Water Act effective at the time, which stipulated that waste water collection areas had to be stipulated in the general plan (e.g. by local authorities).

Minister of the Environment: 11. *“The data with which the Ministry of the Environment has justified the need for and volume of investments did not convince the National Audit Office that the state has a clear overview of the shortcomings in the compliance*

of waste water collection areas with requirements and that the planned investments are fully justified with the need to make large waste water collection areas comply with requirements and therefore of primary importance. The National Audit Office has therefore found that the Ministry of the Environment must review the need for water infrastructure investments with a critical eye and clearly distinguish the expenses necessary to meet the requirements of waste water collection areas.” (Page 15, Art. 32)

The Minister of the Environment is of the opinion that the information used as the basis for planning and the methodology used to identify investment requirements have so far been adequate and make it possible to assess the amount of the required investments with sufficient accuracy in consideration of the total volume. The planned investments are of primary importance, as they are necessary for compliance with the requirements of the Urban Waste Water Treatment Directive and the Drinking Water Directive. However, we do recognise that a sudden change on the construction market may lead to an increase or decrease in the volume of the planned investments.

National Audit Office: The National Audit Office advises the Ministry of the Environment to critically review the justification of investments, as random checks of the table of investment requirements submitted to the National Audit Office revealed a site that required investments, but the water undertaking had deemed it compliant in its last annual report to the Ministry of the Environment and saw no need for additional investments. The Ministry of the Environment was also unable to submit any specifying information to the National Audit Office regarding the content and justification of the planned investments.

Minister of the Environment: 12. *“The National Audit Office is of the opinion that irrespective of the large environmental investments, half of waste water treatment plants in large waste water collection areas had not been made to comply with requirements by the deadline agreed with the European Union.” (Page 20, Art. 51)*

The Ministry of the Environment disagrees with this claim. Unlike the methodology used by the National Audit Office in its audit, the Ministry of the Environment uses the evaluation methodology of the Urban Waste Water Treatment directive approved by the European Commission to evaluate the compliance of waste water treatment plants of over 2000 p.e. Based on this methodology, 82% of large waste water treatment plants of over 2000 p.e. complied with requirements as at the end of 2011. In our opinion, 95% of the treatment plans in large waste water collection areas will comply with requirements by the end of the current funding period.

National Audit Office: The National Audit Office based its opinion on the fact that the waste water treatment plants in all large waste water collection (over 2000 p.e.) areas had to operate according to requirements by the end of 2010. This evaluation was based on compliance with the requirements established in the environmental permits, which the holder of the permit (e.g. the waste water treatment plant) must ensure at all times (quoting the Ministry of the Environment). Even the data given by the ministry itself indicate that not all waste water treatment plants of over 2000 p.e. were brought into compliance with requirements by this deadline. We would once again like to draw attention to the fact that waste water treatments with a small load must also comply with the requirements of the so-called large waste water treatment plants if they are located in waste water collection areas of over 2000 p.e.

Minister of the Environment: 13. *“This means that one-fifth of large waste water collection areas are potentially areas where requirements could be less strict and the expenses incurred to meet the stricter requirements could have been avoided or could be avoided in the future.” (Page 22, Art. 61)*

The Ministry of the Environment disagrees with this claim. We have presented our opinion regarding the claim in Art. 5 of our response.

14. *“Since no support is distributed for the establishment of individual systems via the EIC, local authorities have actively created small waste water collection areas and given less consideration to the creation of individual systems. This means that the funding scheme promotes putting pipes in the ground rather than the establishment of individual solutions.” (Page 23, Art. 62)*

The Ministry of the Environment disagrees with this claim. We have presented our opinion regarding the claim in Art. 6 of our response.

15. *“The National Audit Office considers it a problem that the evaluation criteria of the environmental programme contain no clear criteria for the evaluation of the suitability of the technical/technological solutions of projects in comparison to actual alternatives.” (Page 43, Art. 143)*

The Ministry of the Environment disagrees that the environmental programme should have a criterion for the evaluation of the suitability of the technological or technical solutions given in projects. The working group evaluates the suitability of the solution suggested in the application for the economical, technical and environmental aspects. Applications where unsuitable technological solutions have been selected are disregarded and the EIC is advised not to fund the application.

16. *“The existence and evaluation of a comparative analysis of alternative solutions is also important from the viewpoint of the future costs and sustainability of the project.” (Page 43, Art. 144)*

We agree with this opinion and confirm that these aspects will be considered in the evaluation of applications concerning water management infrastructure.

Director General of the Environmental Board: The Environmental Board would like to draw attention to the following points made in the report.

The last conclusion of the National Audit Office on page 3. The EB disagrees with the claim that the state has not inspected the quantities of waste water discharged into the environment from waste water treatment plants. On the basis of waste water surveillance monitoring, the EB inspects the work of waste water treatment plants and the compliance of the parameters of the waste water discharged into the receiving body of water with the requirements of the permit for special use of water. The EB admits that the reliability of the data of effluent flow rates submitted by undertakings must be boosted.

National Audit Office: In our opinion, the Environmental Board is basically unable to inspect the quantities of contaminants if one of the components required for the calculation of this quantity – the flow rate of effluent – is not or cannot be inspected (and is therefore not reliable). We are trying to make the performance of the supervision obligations of the Environmental Board easier and more efficient with our recommendations.

Director General of the Environmental Board: Article 67. The EB does not agree that surveillance monitoring is organised because the EB performs the tasks of a tax authority. Surveillance monitoring is organised to evaluate compliance with the requirements established in the permit for special use of water and the achievement of environmental objectives. The results of

surveillance monitoring are, indeed, also used to determine environmental charges.

Articles 70-77. /The Environmental Board does not inspect the quantity of effluent discharged into the receiving body of water/. The EB finds that highlighting and emphasising this fact separately suddenly decreases the present reliability of data and results in a decrease in pollution charges. On the other hand, weak legislative regulation means that it is impossible for the EB to inspect this at present. Highlighting this claim deteriorates the payment discipline of undertakings without it being possible to improve it with follow-up inspections.

§ 13 of the Government of the Republic Regulation No. 171 'Water protection requirements of sewerage buildings' of 16 May 2001 stipulates that a large waste water treatment plant (over 2000 p.e.) must be equipped with a flow meter. The forms of the permit for special use of water were amended at the beginning of this year with the amendment of the Minister of the Environment's Regulation No. 18 'Procedure for granting, amending and annulling permits for special use of water and temporary permits for special use of water, list of material required to apply for the permit and forms of the permit' of 26 March 2002, and the field 'Manner of measuring flow rate' was added to the form. The amendment allows the EB to indicate on the permit how the effluent flow rate must be measured. The EB has initiated action in regard to waste water treatment plants that have not installed flow meters, but that must have them pursuant to effective law, in order to guarantee compliance with the requirements of legislation.

Article 73. The EB points out that the Metrology Act is not a tax act. The Environmental Charges Act, however, specifically stipulates that the provisions about taxes in the Taxation Act apply to the Environmental Charges Act. Although an environmental charge is not a tax in itself, its impact on an undertaking's financial status is not the same, which is why reliability is always relative, i.e. there are certain deviations (e.g. a certain tax gap must always be considered when tax receipts are planned). The EB needs more decision-making freedom in order to achieve the stimulating impact of the environmental charge, e.g. in regard to the replacement of the pollution charge. On the other hand, it is necessary to be able to link the tax relief arising from law with substantive indicators as well, instead of just formal ones – e.g. the compliance coefficient of 0.5 presently depends solely on compliance with two formal requirements. We find it necessary to add a third condition for its implementation: performance of the supervision obligation. The EB should be able to take away the benefit if false data are declared (the EB does not have this option at present).

Article 78. Recommendation to the Environmental Board. The EB needs funds to implement the recommendations made by the National Audit Office and order the relevant measurements of flow rates.

National Audit Office: The National Audit Office notes that the establishment of clear legal requirements of the use of instruments to measure the effluent flow rates would make the data of undertakings easy to check and reliable, and the Environmental Board does not even have to order expensive control measurements for the performance of its supervision obligation.

Director General of the Environmental Board: Article 90. The permit for special use of water does not grant the right to sell water. The permit for special use of water grants the right to extract the prescribed quantities of water from the aquifer. A sales permit for drinking water which does not comply with quality requirements but is safe for health must be applied for in accordance with § 13¹ of the Water Act in order to sell water that does not comply with quality parameters.

Article 98. The EB remains of the opinion that the term 'limit value' should not be used for radiological parameters. The EB finds that the value of a parameter should not be regarded as a limit value, but whether non-compliance with the parameter is a health hazard must be assessed instead and, if necessary, the water quality must be improved to a level that is sufficient for the protection of health. When legislation is updated, it must be strictly observed that the present misleading error, whereby the values of indicator parameters are called limit values, is not repeated. The correct translation from English is 'viitetase' (reference level).

National Audit Office: The term 'limit value' is used in the report because this is the term used in Estonian legislation. However, specifying the cases where radiological parameters (when they exceed the limit value/reference level) have to be dealt with and measures must be taken is more important than the term itself.

Director General of the Environmental Board: Article 106. The EB agrees that the proposal is justified. At the same time, it suggests that the comparison of alternatives be included in the drill well establishment project submitted to the Environmental Board for approval.

Recommendations of the National Audit Office	Responses of auditees
Status of waste water treatment 52. Recommendations to the Minister of the Environment: - consider the option of offering independent consultations to local authorities and small water undertakings regarding the selection of suitable technologies and launching new plants; - apply different measures to prevent nutrients from reaching the environment. A legislative act should be prepared with the Ministry of Social Affairs for this purpose, which would prohibit the use of phosphates in all detergents	Response of the Minister of the Environment: The Ministry of the Environment plans to continue organising training for waste water treatment plant operators. Joint tenderers OÜ Aqua Consult Baltic and Tallinn University of Technology were chosen as instructors until 2015 as a result of a public procurement. The objective of the training is to give the people involved in waste water treatment the knowledge and skills they need. Also, on 18 December 2012 the Environmental Investment Centre made the decision to fund the project 'Evaluation of the efficiency of the waste water treatment plants established and reconstructed with EU and EIC funds from 2004–2012'. The project includes the preparation of guidelines for small water undertakings and local governments which will allow them to avoid making mistakes in selecting the right technology for their waste water treatment plants and in launching new plants. The results of the work

Recommendations of the National Audit Office	Responses of auditees
in order to ensure that phosphorus compounds do not end up in waste water treatment plants and consequently in the environment. (Articles 35-51)	will be published on the website of the Environmental Investment Centre. We are also planning to introduce the results at seminars, training events and consultations in cooperation with the Estonian Water Works Association and the EIC. The Ministry of the Environment is prepared to develop various measures in cooperation with the Ministry of Social Affairs to reduce the quantity of phosphorus compounds in detergents that end up in the environment.
Collection of waste water in waste water collection areas 65. Recommendations to the Minister of the Environment: - analyse and specify the actual pollution load of large waste water collection areas in cooperation with the local authority (incl. use of census data) and assess the changes occurring in pollution loads in the near future. Reassess the pollution loads of waste water collection areas that do not correspond to the actual loads and implement the waste water treatment and collecting system requirements that correspond to the size of the waste water collection area; - in cooperation with local authorities and water undertakings, carry out detailed stocktaking of the existence and status of individual systems (cesspits, septic tanks etc.) to obtain a correct overview of the waste water collecting systems in waste water collection areas. This would make it possible to specify the investment needs of waste water collection areas; - analyse and consider the options of supporting the establishment of individual systems in waste water collection areas from the Environmental Investment Centre, especially in small (under 2000 p.e.) areas where their establishment and maintenance is more sustainable than the reconstruction or establishment of a public water supply and sewerage system. (Articles 53-64)	Response of the Minister of the Environment: The Ministry of the Environment plans to start reviewing and adjusting the pollution loads of waste water collection areas in cooperation with local authorities in 2014 in order to make compliance with the directive's requirements more efficient. After the specification of pollution loads, the Ministry of the Environment will be able to propose to the Environmental Board that it review the requirements established for waste water treatment in waste water collection areas with adjusted pollution loads. The Ministry of the Environment plans to map the areas in waste water collection areas not covered by the public water supply and sewerage system in cooperation with the Estonian Water Works Association (EWWA). The EWWA has submitted to the EIC the programme application 'Definition of consumers who are outside the service regions of water companies in waste water collection areas but who are potential consumers of public water supply and sewerage, and planning measures for the implementation of drinking water and waste water handling in accordance with requirements'. This work can start once the council of the EIC decides to fund the application. The Ministry of the Environment is considering the option of including stocktaking of the individual systems used in waste water collection areas in this work. We agree that maintaining public water supply and sewerage systems in small waste water collection areas is more expensive than in large waste water collection areas, which is why only projects for the development of public water supply and sewerage systems of waste water collection areas of under 2000 p.e. have been supported from the environmental programme of the EIC since 2013. Reconstruction of systems is also supported outside waste water collection areas. However, we would like to point out that when waste water collection areas are formed and changed, it must be considered that the establishment of public water supply and sewerage systems in waste water collection areas must not increase the price of the water service so much that it exceeds tolerance. Waste water collection areas are mostly formed in relatively densely populated regions, where the establishment of a public water supply and sewerage system is probably a more economical solution than the use of individual solutions. If the establishment of individual solutions in a waste water collection area is still economically, technically and environmentally the best solution, it is possible to apply for a grant from the water management programme of the EIC if more than 10 people benefit from the development of the water supply and/or sewerage system. However, we do not think it is possible to support individual waste water handling solutions in waste water collection areas of over 2000 p.e., because the Water Act stipulates that only waste water treatment plants that service more than 50 people may be established in such areas.
Keeping account of the quantities of contaminants discharged into water bodies 78. Recommendations to the Minister of the Environment: specify the requirements of assessment of effluent quantities in legislation (the Environmental Charges Act, regulation of the Minister of the Environment 'Methods of taking samples') in such a manner that waste water treatment plants of over 2000 p.e. are obliged to use measuring instruments (flow meters) to measure the quantity of the effluent discharged into the receiving body of water, which instruments are regularly verified or traceably calibrated, and guarantee the reliability of their	Response of the Minister of the Environment: The requirements of waste water treatment and taking samples are established in Government of the Republic Regulation No. 99 'Requirements of waste water treatment and discharging effluent and rain water into receiving water bodies, limits of effluent and rain water pollution indicators and measures for checking performance of these requirements' (these requirements are not mentioned in the Environmental Charges Act or in the regulation 'Methods of taking samples'). The Ministry of the Environment is considering the specification of the requirements of measuring effluent quantities as well as for the verification and calibration of effluent meters in Government of the Republic Regulation No. 99. The Ministry of the Environment is planning to analyse the specification of the requirements of measuring effluent quantities in waste water treatment plants of under 2000 p.e. in legislation in order to guarantee the use of uniform methodology and equal treatment. The Ministry of the Environment is considering the need to amend

Recommendations of the National Audit Office	Responses of auditees
readings; - stipulate in legislation that the Environmental Board determines the method for the assessment of effluent quantities for small waste water treatment plants (under 2000 p.e.) in the environmental permit based on the solution that is most suitable for the specific conditions, and guarantees that the data obtained by this assessment method are sufficiently reliable and verified; - the Environmental Board and the Environmental Inspectorate should check the effluent quantities declared by enterprises, and once the aforementioned additions to legislation have been established also check that the requirement to verify or calibrate effluent meters is met. (Articles 66-77)	legislation in order to regulate the issue of supervision in the area of measuring the quantities of effluent. Comment by the National Audit Office: The National Audit Office agreed with the need to add the requirements of measuring flow rates to Government of the Republic Regulation No. 99, which entered into force in January 2013 and which does not discuss the requirements of measuring effluent flow rates and the relevant measuring equipment. Measuring flow rates and measuring equipment are currently discussed in the Minister of the Environment Regulation No. 30 'Sampling Methods' of 6 May 2002 as different options for the sampler, not as a water undertaking's obligation to use specific instruments and check their measuring accuracy. Response of the Director General of the Environmental Board: The Environmental Board is of the opinion that it needs funds to implement the recommendations made by the National Audit Office and order the relevant measurements of flow rates. The Environmental Board admits that the reliability of the data of effluent flow rates submitted by enterprises must be boosted.
Quality of drinking water in public water supply systems 104. Recommendations to the Director General of the Health Board - be stricter in demanding that water undertakings take measures to make their drinking water comply with chemical and indicator parameters by the established deadlines (2006-2017 and 2013, respectively); - find a solution to guarantee quality drinking water for people currently supplied with water by water supply systems that are unlikely to achieve compliance with quality parameters by 1 January 2014 and whose authorisation to sell non-compliant water will expire on 1 January 2014; - check that water undertakings and local authorities inform people of the parameters that their drinking water does not comply with and of the fact that the water may have an adverse impact on their health (especially in the case of children and pregnant women); - finish studying the radiological parameters of aquifers in Estonia and establish definite criteria for water supply systems in the case of which measures must be taken (e.g. treatment of water) to reduce the content of radiological substances in drinking water if it exceeds the limit value of the effective dose stipulated by law. (Articles 79-103)	Response of the Director General of the Health Board: The Health Board (HB) exercises state supervision of the drinking water provided by public water supply systems on the basis of § 13¹ of the Public Health Act. The Health Board increases the efficiency of supervision of problematic water supply systems within the scope of its competence to apply more pressure on water undertakings that do not offer quality drinking water at present. An action plan for this has been prepared (informing drinking water undertakings and local authorities, additional inspection etc.). As at 11 October 2013, there are 30 water supply systems where fluorides exceed the norm. 16 of them already have the necessary funding and project; the rest are waiting for approval or funding for their projects. The water supply systems that have both the funding and the project should get their water quality in order from 2013–2014 (Q1–2). The owners of 177 water supply systems whose water does not comply with the requirements established for indicator parameters have been informed about the expiry of the sales permit for drinking water which does not comply with quality requirements but is safe for health, and that proceedings will be initiated against non-compliant water supply systems as of 1 January 2014. Each case will be handled separately and proceedings will be carried out pursuant to law if the application of measures is demanded. The Health Board finds that it is of primary importance that all people have access to drinking water and that supply of drinking water is generally not suspended, unless there is a serious threat to people's health. The water supply systems that have been unable to obtain funding for their projects to date can send their applications to the Environmental Investment Centre (EIC). In order to improve cooperation, the Health Board and the EIC agreed that the HB will take part in reviewing projects, send information about problematic regions to the EIC and inform problematic water supply systems and local authorities again about the option to apply for funding from the EIC. We agree that the population has not been sufficiently informed about the quality of drinking water. We are planning to pay more attention to this in 2014 and have developed guidelines for inspectors to guarantee improvement in the information activities of water undertakings and local authorities. The Health Board is currently working on the project 'Determination of radionuclide content in Southern Estonian water provided by water supply systems', which will give us a better overview of the little-researched groundwater in Southern Estonia. Additional data are also collected in the course of supervision. After the potential entry into force of the EC Directive which determines the requirements of protecting the population's health from the radioactive substances found in domestic water (at present this is still a draft) and which also discusses the effective dose, the HB and the Radiation Department of the Environmental Board will develop criteria to determine the need to remove radiological substances from drinking water.
105. Recommendation of the National Audit Office to the Minister of the Environment: find possibilities to support, via the Environmental Investment Centre, the establishment of individual	Response of the Minister of the Environment: We would like to point out that when waste water collection areas are formed and changed, it must be considered that the establishment of public water supply and sewerage systems in waste water collection areas must not increase the price of the

Recommendations of the National Audit Office	Responses of auditees
drinking water supply systems in waste water collection areas where people do not have access to compliant drinking water and where the reconstruction or establishment of a public water supply system is not reasonable. (Articles 79-103)	water service so much that it exceeds tolerance. Waste water collection areas are mostly formed in relatively densely populated regions, where the establishment of a public water supply and sewerage system is probably a more economical solution than the use of individual solutions. If the establishment of individual solutions in a waste water collection area is still economically, technically and environmentally the best solution, it is possible to apply for a grant from the water management programme of the EIC if more than 10 people benefit from the development of the water supply and/or sewerage system.
106. Recommendation to the Director General of the Environmental Board: guarantee that options for using alternative sources of drinking water are analysed (including the economic aspect) before a drill well is established in an aquifer where the radiological parameters of water are likely to exceed the limit value (especially the Cambrian-Vendian aquifer), and that the approval of the Health Board is requested if necessary. (Articles 95-98)	Response of the Director General of the Environmental Board: The EB agrees that the proposal is justified. At the same time, it suggests that the comparison of alternatives be given in the drill well establishment project submitted to the EB for approval.
Sustainability of drinking water and waste water service 135. Recommendation to the Minister of the Environment: decide whether all of the expenses related to the provision of the water service will be paid by the consumer. It must thereby be kept in mind that consumers may start struggling in regions where incomes are lower and the population decreasing, which means that the provision of the water service must then be supported; analyse which regions, undertakings or population groups the state could support in the longer term and decide how and with which funds this will be done if the local authority is unable to do it. (Articles 107-134)	Response of the Minister of the Environment: The public water supply and sewerage system is developed pursuant to the public water supply and sewerage development plan. The amounts and schedule of investments which determine the price of the water service are determined in the plan. Local authorities can keep the price of the water service affordable for people through the reasonable planning of investments. If steps have been taken in planning investments as a result of which the price of the water service is not acceptable for people on lower incomes, local authorities will have to find a solution to halt the price increase or compensate it to people. A detailed analysis must show whether compensation is necessary, and if so in what amounts. We do agree with the suggestion that the Ministry of the Environment must analyse and decide on the regions that the state should keep supporting in the future. In planning for EU 2014-2020 we have taken the position that the state should no longer support the development or reconstruction of systems in waste water collection areas of over 2000 p.e. after the funding period. The public water supply and sewerage systems in all larger waste water collection areas will have been renewed by then and further management of the systems will be a duty of the water undertaking and the local authority.
136. Recommendations to the Minister of the Environment and the Director General of the Competition Board: in cooperation, analyse the price of the water service currently based on the Public Water Supply and Sewerage Act to find the best solution to the establishment of the water price which would motivate water undertakings to become more efficient without sacrificing the quality of their services and which would guarantee the achievement of environmental goals at the same time. (Articles 107-134)	Response of the Minister of the Environment: The Ministry of the Environment will analyse the water service pricing methodology and the need to specify it in cooperation with the Competition Board. Response of the Director General of the Competition Board: Pursuant to the recommendation made by the National Audit Office, the Competition Board is ready to analyse the price of the water service based on the Public Water Supply and Sewerage Act to find the best solution to the establishment of the water price which would motivate water undertakings to become more efficient without sacrificing the quality of their services and which would guarantee the achievement of environmental goals at the same time.
Evaluation of water management projects Recommendation to the Minister of the Environment: in the future, turn more attention to the quality of the work done by the external experts hired by the Environmental Centre in the substantive evaluation of Cohesion Fund projects. (Articles 137-144)	Response of the Minister of the Environment: The Ministry of the Environment and the EIC will take the necessary measures to increase the competence of the expert group that evaluates Cohesion Fund projects and to improve the quality of their work.

Characteristics of audit

Purpose of audit

The purpose of the audit was to assess whether the investments made in water management have helped achieve the required quality of waste water treatment and drinking water in the public water supply and sewerage systems, whether water management infrastructure is sustainable and whether the investments have helped improve the condition of water bodies.

Assessment criteria

The general opinion is given on the basis of the following criteria:

1. waste water treatment plants work according to the requirements established in the permit for special use of water. the waste water treatment plants in all large waste water collection areas (pollution load over 2000 p.e.) have operated according to requirements since 31 December 2010;
2. the compliance of waste water treatment and the correctness of the pollution charges paid by undertakings are checked;
3. waste water management is organised in a manner that makes it possible to solve any problems with waste water treatment plants;
4. all public water supply systems that extract water for more than 50 residents or more than 10 m³ which have received grants provide drinking water that complies with all quality parameters;
5. the price of the water service guarantees that the investments and improvements made in drinking and waste water management are sustainable for a long time (20-30 years) without compromising on environmental quality;
6. the grants invested in the sewerage system and waste water treatment plans have helped achieve environmental goals – the good status of water bodies;
7. the funding of water management projects is organised in a manner that guarantees money for important objects, their proper implementation and the achievement of the intended results.

Scope and focus of audit

The audited agencies were the Ministry of the Environment, the Environmental Board, the Environmental Inspectorate, the Environmental Investment Centre, the Competition Board and the Health Board.

The audited period was predominantly from 2004 to 2012.

Evaluation of the status of waste water treatment plants includes analysing waste water treatment plants in large waste water collection areas (over 2000 p.e.), which so far have been the main focus of funding, as well as the treatment plants in small waste water collection areas (under 2000 p.e.). The operations of all waste water treatment plants were analysed in the case of large waste water collection areas (62 total) and a random sample of 60 treatment plans was prepared to analyse the status of waste water treatment plants in small waste water collection areas. Compliance of the operation of waste water treatment plans was analysed from 2009-2012 (Q3) both over the entire period and as at 2012, and in the case of large waste water treatment plants the situation after 31 December 2010, which was their compliance deadline, was also analysed. Compliance with the requirements of permits for special use of water, the results of the company's self-monitoring and surveillance monitoring by the state were compared in the case of treatment plants in both large and small waste water collection areas, which were used as the basis for conclusions about the compliance of treatment plants as well as the organisation of self-monitoring and surveillance monitoring. The contaminants under review were biochemical oxygen demand (BOD₇), general nitrogen (N_{gen}), general phosphorus (P_{gen}) and suspended solids.

In the case of problematic waste water treatment plants, where the contaminant content of treated water exceeded the limit value repeatedly and to a large extent, the National Audit Office carried out a qualitative analysis of the reasons for the problems and possible solutions. For this purpose, a new expert sample of problematic waste water treatment plants was formed on the basis of the analysis results of the previous sample, where 10 plants were located in large and 10 in small waste water collection areas (however, the actual pollution load of the problematic plants selected in large waste water collection areas was usually also smaller than 2000 p.e.). The causes of the problems at these plants were identified, as was the manner in which they had attempted to solve the problems. In order to do this the National Audit Office sent queries to the Environmental Board, analysed the reports of undertakings on the basis of information systems (KLIS2: quarterly declarations of undertakings; and EELIS: water use reports of undertakings) and analysed the applications and reports of water management infrastructure development projects (Structural Funds operational system SFOS). Representatives of water undertakings were also interviewed to obtain an overview and their opinions about the operations of waste water treatment plants and the status of development projects.

In order to assess the impact of waste water treatment on the environmental status of receiving water bodies, the National Audit Office analysed the water use reports of the Environment Agency (formerly the Environment Information Centre) and compared the changes in the total emissions of general phosphorus and nitrogen from domestic waste water treatment plants into receiving water bodies in 2005 and 2012, as these are the main factors that have an impact on the environmental status of the receiving water bodies. The links between the changes in the environmental status of receiving water bodies and changes in the emissions of contaminants from 2005-2011 were also analysed.

Water supply systems that were under the supervision of the Health Board in 2012 (all public water supply systems that serve more than 50 people or extract more than 10 m³ of water per day for the public water supply system and smaller water supply systems provided that supplying drinking water is part of the undertaking's economic activities or public law activities), 1105 water supply systems in total, were reviewed in order to **evaluate the compliance of drinking water supply systems with quality parameters**. Non-compliance was evaluated on the basis of the data and reports about the supervision of water undertakings submitted by the Health Board and the letters sent to the European Commission to request exceptions to extend the deadline for compliance with the chemical parameters of drinking water.

A sample of water supply systems (20) which do not comply with the requirements of the Drinking Water Directive was prepared on the basis of the Health Board's data. The most important factors in the preparation of the sample were the chemical parameters of the water, followed by the indicator parameters. The reasons for non-compliance were analysed (which included telephone interviews with the owners of water supply systems).

A query about the funding of drinking water supply systems that do not comply with drinking water quality parameters (255 in total) was sent to the Environmental Investment Centre.

In the case of waste water treatment and drinking water supply systems, only those that provide public water supply and sewerage services to people (not industries or single households) were reviewed.

Expert analysis was commissioned from Tallinn University of Technology and water undertakings were interviewed (online) in order to **analyse the sustainability of the water service**. The questionnaire was sent to 42 undertakings, 28 of which responded (incl. the largest Estonian undertakings). The data of undertakings sent by the Competition Board were also used.

The water service prices of water undertakings (as at the end of 2012) were analysed and compared to Statistics Estonia's data of the average net income per household member in 2012, which was based on counties and divided into quintiles. 47 water undertakings operating in 51 counties were selected for analysis of the price of the water service provided by the undertakings. The sample included water undertakings belonging to the Estonian Water Works Association and water undertakings approved by the Competition Board.

The organisation of distributing grants from the environmental programme of the Environmental Investment Centre (EIC) and the EU Cohesion Fund and the processing of projects were analysed in order to review the **funding of water management projects**. The legislation that regulates funding and the procedures that regulate the processing of projects by the EIC and their implementation in the example of four projects (two projects of the environmental programme and two projects of the Cohesion Fund) were analysed. Other sources of funding that also contribute to the area of the environment (e.g. Enterprise Estonia and the Estonian Agricultural Registers and Information Board) were not reviewed. The loans granted via the EIC were not reviewed.

Analysis/review of documents

- permits for special use of water and integrated permits (water); use of discretion in permits (decisions of the Environmental Board);
- reviewing international experience (OECD, European Commission and other EU Member States) and research to assess the sustainability of the price of water;
- guidelines for the calculation of the price of the water service and other documents of the Competition Board;
- self-monitoring data and pollution charge calculations in the environmental declarations of undertakings; analysis records;
- the water management plans of Estonian basins; surface water data; surveillance monitoring data and reports of the Environmental Board; annual reports of water use;
- action regulation and evaluation procedure of the environmental programme (different versions); action regulations of the Structural Funds;
- documents related to project applications and processing, especially project evaluations, final reports, follow-up inspections and project audits;
- legislation (Water Act, Public Water Supply and Sewerage Act, Environmental Charges Act and sub-legislation).

Database searches and queries

- database of the environmental programme's project KIKAS, Structural Funds operational system SFOS, database of environmental permits and environmental charges KLIS, effluent database KEIAN and annual reports of water use VEKA;
- queries to the Environmental Information Centre (Environment Agency), the Environmental Board, the Ministry of the Environment, the Environmental Investment Centre, the Health Board and Statistics Estonia.

The following persons were interviewed and asked to provide explanations:

Harry Liiv, Deputy Secretary General at the Ministry of the Environment

Karin Kroon, Head of the Water Department of the Ministry of the Environment

Galina Danilishina, Chief Specialist of the Water Department of the Ministry of the Environment

Rene Reisner, Chief Specialist of the Water Department of the Ministry of the Environment

Peep Siim, Advisor of the Project Bureau of the Water Department of the Ministry of the Environment

Rita Jürmann, Chief Specialist of the Project Bureau of the Water Department of the Ministry of the Environment

Peeter Eek, Head of the Waste Department of the Ministry of the Environment

Andrus Pirso, Head of the Structural Funds Unit of the Environmental Investment Centre

Andrus Pirso, Head of the Structural Funds Unit of the Environmental Investment Centre

Margit Auväart, Surveillance and Quality Manager at the Environmental Investment Centre

Mariina Hiiob, Chief Specialist and Coordinator of Water of the Environmental Department of the Environmental Board

Marika Tamm, Water Management Coordinator of the Environmental Department of the Environmental Board

Olga Kuvatova, Head of the Environmental Charges Bureau of the Environmental Department of the Environmental Board

Pavel Ojava, Chief Inspector of the Environmental Inspectorate

Andre Zahharov, Head of the Water Department of the Environment Agency

Leena Albreht, Head of the Environmental Health Department of the Health Board

Küllike Birk, Chief Specialist of the Environmental Health Department of the Health Board

Knut Tamm, Chief Specialist of the Environmental Health Department of the Health Board

Aune Annus, Chief Specialist of the Environmental Health Department of the Health Board

Märt Ots, Director General of the Competition Board

Klarika Siegel-Lorvi, Head of the Energy and Water Regulatory Division of the Competition Board

Kadri Kaljaste, Chief Specialist of the Water Department of the Competition Board

Priit Poschlin, Deputy Head of the Technical Department of the Technical Surveillance Authority

Vahur Tarkmees, Director General of the Estonian Water Works Association

Marja-Liisa Kruusimäe, Legal Advisor of the Estonian Water Works Association

Hans Liibek, Chairman of the Management Board of the Estonian Water Works Association and Chairman of the Management Board of AS Matsalu Veevärk

Andres Aruhein, CEO at Emajõe Veevärk

Veiko Kaufmann, CET at AS Keila Vesi and Member of the Management Board of the Environmental Investment Centre

Marko Err, CEO at EL Konsult OÜ

Aivar Sõrm, Member of the Management Board of AS Kuressaare Veevärk

Ain Saaremäel, Member of the Management Board of AS Kuressaare Veevärk

Jan Raudsepp, CEO at AS Türi Vesi

Märt Kõrgema, Technical Manager and Management Board Member of OÜ Tepso Labor

Enn Loigu, Director of the Department of Environmental Engineering of the Faculty of Civil Engineering of the Tallinn University of Technology and Head of the Chair of Environmental Protection

Üllas Ehrlich, Head of the Chair of Environmental Economics of the Tallinn School of Economics and Business Administration of Tallinn University of Technology

Sirje Pädam, Associate Professor of the Chair of Environmental Economics of the Tallinn School of Economics and Business Administration of Tallinn University of Technology

Completion date of audit:

The audit was carried out from November 2012 to May 2013.

Audit team:

The members of the audit team were Audit Manager Airi Andresson and Senior Auditors Matis Mägi and Viire Viss.

Contact information

Further information on the audit is available from the Communication Service of the National Audit Office:

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An electronic copy of the audit report (pdf) is available online at www.riigikontroll.ee.

A summary of the audit report is also available in English.

The number of the audit report in the internal records system of the National Audit Office is 2-1.7/13/70059/29.

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Earlier audits of National Audit Office in area of water management

26 March 2012 – Effectiveness of the measures for improving the status of Lake Peipus

12 June 2008 – **Funding environmental projects via the Environmental Investment Centre**

24 May 2007 – Development of waste water management in rural areas with the support of Cohesion Fund projects

All reports are available on the website of the National Audit Office at www.riigikontroll.ee