AS Tallinna Vesi

# Environmental Report 2005

This Environmental Report provides an overview of the environmental impact of the activities of AS Tallinna Vesi as well as describes what we are doing to reduce this impact.

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# Address by the Chairman of the Board

2005 has been an outstanding year for the Company and all its stakeholders. Significant steps have been taken over a wide range of our activities and this has resulted in further improvement in our environmental awareness, performance and protection capabilities.

## IMPROVED ENVIRONMENT

Our focus on the environment is unwavering and in 2005 we have continued to invest heavily in schemes and methods of operation which protect the world we live in. The first phase of the composting fields at Paljassaare has been completed and 100% of sewage sludge is being converted into fertiliser and recycled. In addition the construction of the upgrade of the nitrogen removal process at Paljassaare WWTP was completed during the year. The commissioning process is ongoing and will not be completed until the middle of 2006. At present we are on target to deliver the 25% reduction in nitrogen discharged into Tallinn Bay. Compliance with these higher wastewater quality requirements will also help to protect the Baltic Sea in line with the HELCOM recommendations.

## FIRST EMAS AWARDED COMPANY

The Company is extremely proud to have been recognized by the Ministry of Environment as the first Company in Estonia and in the Baltics to be considered capable of achieving the EU Eco Management and Audit Scheme (EMAS) certification. Following close co-operation within the project managed by the Ministry and the Dutch Ministry of Economics and a very testing external audit I am delighted that the Company received a full EMAS certificate on 14th October 2005. The certificate is valid till 2008. This recognition is a clear sign of our understanding and management of our environmental responsibilities. In addition we were also successful in June 2005 with the renewal of our ISO 14001 based Environmental Management System certificate.

## OUTPERFORMANCE OF SERVICES AGREEMENT

During 2005 the Company continued to outperform the service levels set within its contract with the City.

Drinking water quality reached its highest level yet with 99.9% microbiological compliance and 99.7% chemical compliance. These levels demonstrate that we are already delivering the standards required from 1st January 2007, twelve months ahead of schedule. We are continuing to reduce leakage levels and we are now at a level of leakage below 18.0%, this is 50% lower than five years ago and over 8% below our contractual target. In 2005 a new and challenging level of service was introduced where no unplanned interruptions to supply should last more than 12 hours. Once again by additional investment and using all the skills and expertise available we have been able in 2005 to reduce the number of occurrences by 90% to just 3, and we will continue to look for ways to eliminate those failures completely.

## EXTENSIVE INVESTMENTS

2005 has been a major year for investments in our assets with over 223 million kroon of work being carried out, an increase of 41% over 2004. The major investments were in the replacement and rehabilitation of the network 53 million kroon; network extensions 74 million kroon; the nitrogen upgrade and extension of the compost fields at Paljassaare WWTP 30 million kroon; the ongoing improvement of the raw water facilities and biomanipulation project at Ülemiste WTP 12 million kroons; the delivery of the new work management and customer service IT systems 13 million kroons, and the costs of privatising land at Ülemiste and Paljassaare 21 million kroons.

During 2005 major changes and developments have occurred. These have set a firm foundation for future progress in 2006 and looking forward once again the Company is aiming to further improve across a wide range of activities. Our 2006 capital investment programme will be larger at just under 250 million kroons. Once again the key areas of focus will be on network extension and rehabilitation, with particular emphasis on drinking water quality, with forecast investments of around 150 million kroons. A further 15 million kroons will be spent at Ülemiste, again concentrating on raw water quality. At Paljassaare WWTP over 50 million kroons will be invested on improving our sludge handling process and a further extension to the compost fields. These investments clearly indicate our ongoing commitment to meeting and exceeding our levels of service.

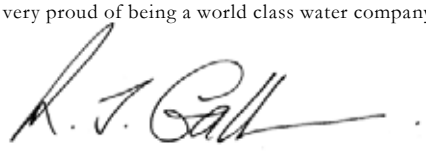
## FOCUS ON CUSTOMERS

We continue with the extension of the water, wastewater and stormwater networks which offers existing and new customers possibility to connect to our network. We will launch in 2006 a Guaranteed Standards Scheme for our customers, which we believe is the first of its kind and scope in the Baltics. Through this scheme the Company will declare over 20 levels of service and if we fail to meet the levels of service a monetary compensation will be paid to the customer.

## EMPLOYEES – OUR KEY ASSET

The people who work for us are our most important asset and once again in 2005 they have all responded magnificently to the challenges they have been presented with. I thank them wholeheartedly personally and on behalf of the Management Board as a whole. We have once again carried out an independent staff opinion survey to which over 50% of our staff responded. I am very pleased to be able to report that staff satisfaction increased again in 2005 to the highest level ever. The level of response and the degree of satisfaction indicates that we are on the right track, but we will continue to strive for further improvement and we have already developed the necessary action plans to address the issues which were raised by the staff in the survey.

Clearly we have come a long way in the year and none of this could have been achieved without all the support and total commitment of our staff who have once again been outstanding. The support and guidance we receive from our partners the City of Tallinn and the Ministry of Environment has been invaluable. During 2005 we achieved outstanding success in our quality of product and the services we provide and I believe can now be very proud of being a world class water company.



**Robert John Gallienne**
*Chief Executive Officer*
*Chairman of the Management Board*

# The Company Overview

## THE COMPANY'S VISION

We will be a Role Model for Every Service Providing Company and Employer, Exceeding the Expectations of our Customers, Employees and Owners and setting a Benchmark for Environmental Behaviour in order to Improve the Quality of Life.

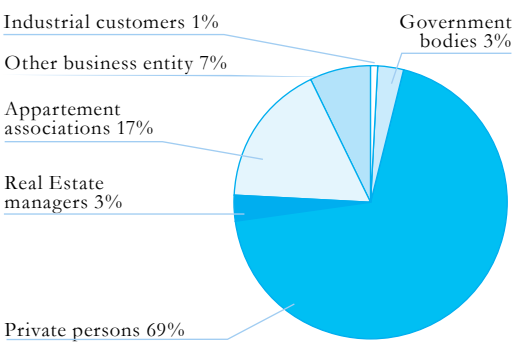
## THE COMPANY'S MISSION

**We create a better life with pure water**

## GENERAL FACTS

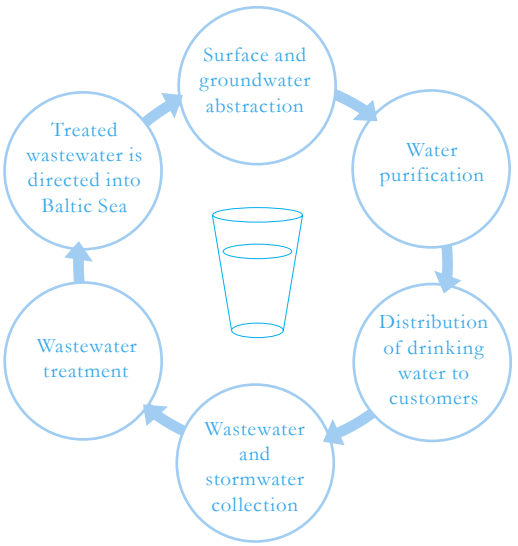
- 90% of Tallinners' drinking water is produced at Ülemiste, 10% comes from bored wells.
- 97 levels of service are required to be complied with according to the Service Agreement concluded between the City of Tallinn and the Company.
- 2005 revenue: 592 million EEK
- 2005 net profit: 174, 4 million EEK
- average 340 employees;
- on June 1st 2005, AS Tallinna Vesi shares were listed on the main list of Tallinn Stock Exchange. The largest shareholders are United Utilities Tallinn BV and City of Tallinn. The company has in total over 1600 shareholders.

### Division of customers in 2005




## THE BUSINESS STRUCTURE

Business activities cover the entire water value chain

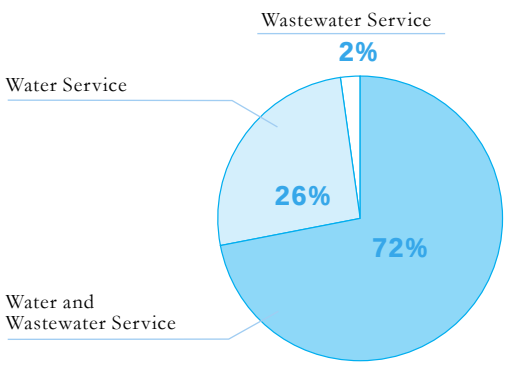



The main process is supported by the activities of the Customer Service and technical support services such as Laboratories, Asset Management, Development and Construction Services as well as Corporate and Commercial Services. The organisation chart is shown in Annex 1.

## OUR CUSTOMERS

In 2005, AS Tallinna Vesi provided water and wastewater services to ca 19 000 contractual customers and for over 400 000 people in Tallinn and its surrounding areas. Private customers, private households form a major part of the company's customer base. The number of private households is ca 13 100. Other larger group of customers are apartment associations (ca 3200 customers) and different business entities (ca 1300 customers). The company provides most customers with both water and wastewater service, however there is a proportion of customers who just use either water or wastewater service.

### Services provided to customers in 2005



Ülemiste Water Treatment Plant

## OPERATIONAL SITES

- Head office, Customer Service, Networks and support services in Ädala 10.
- Catchment area ca 2000 square kilometers in Harju and Järvamaa counties
- Ülemiste Water Treatment Plant, Water and Microbiological Laboratory in Järvevana Road 3
- Networks operational sites situated through the service area
- Paljassaare Wastewater Treatment Plant, composting fields and Wastewater Laboratory in Paljassaare Road 14.
- Sludge composting and experimental site in Liikva village, Harju County.

## COMPANY OBJECTIVES FOR 2005

- **To live our values, be motivated and enjoy the experience**
  Achieved. Staff opinion survey participation was the highest ever and the general satisfaction index increased to 4.3 compared to 4.23 in 2004 and all subscales improved over the previous year
- **To provide development opportunities and new challenges for our staff**
  Achieved. Subscale on Personal Development in the staff opinion survey increased from 3.89 to 4.15 also 20 employees have rotated jobs internally as part of their personal development plan
- **To improve Customer Service by the successful implementation of Customer Information System and a Guaranteed Standards Scheme**
  Partly achieved. Overall percentage of customers satisfied or very satisfied fell slightly, but the proportion of very satisfied increased. Customer Information system was implemented in November 2005 but final tuning of functionality will be completed by June 2006. Delay in Customer Information System implementation created a delay in the launch of the Guaranteed Standards scheme which will now be in May 2006.
- **To meet all our contractual levels of service**
  Achieved. Full level of service compliance in 2001-2005
- **To continue to improve our quality and environmental management systems by renewing ISO 9001 and ISO 14001 quality certificates and obtaining EMAS recognition**
  Achieved. Successful renewal of ISO 9001 and ISO 14001 certificates, company obtained EMAS certificate being the first company in the Baltic States.
- **To meet all our Health and Safety targets**
  Achieved. Independent audit by UU specialist showed 98% compliance with best practice. Only 2work accidents, the same as in 2004. The number of lost working hours and the severity of the accidents has significantly decreased. No accidents with contractors' employees on AS Tallinna Vesi's sites during 2005.
- **To successfully complete the nitrogen project at Paljassaare and meet all our environmental goals**
  Achieved. The plant is operating within the target levels required to meet the Ministry of Environment contractual requirements for the 12 months ending 30th June 2006. Meeting other environmental goals please see the page 11
- **To have excellent working relationships with the City Administration, Supervisory Foundation and Government Departments**
  Achieved. All outstanding issues have been resolved by mutual agreement.
- **To save 3% on our budgeted operating costs**
  Achieved. The budgeted costs were decreased by 9,6 %
- **To increase our budgeted revenues from main services by 1%**
  Not achieved. The budgeted revenue was increased by 0,24 %

## COMPANY OBJECTIVES FOR 2006

**Improve Customer Satisfaction by:**
- Implementation of "Our Promises"
- New payment options for customers
- Web-based services
- Maintaining good co-operation with all stakeholders
- Meeting all our Levels of Service

**Protect environment by:**
- Successful completion of Nitrogen project
- Meeting all our environmental goals
- Meeting all our Levels of Service

**Improve employee commitment by:**
- Developing and motivating them
- Providing company's support to achieve their goals
- Better work environment
- Meeting H&S targets

**To enhance shareholder value by:**
- Delivering a Strategy for Growth
- Increasing revenues by 2%
- Saving 3% on budgeted operating costs by efficient cost management



Paljassaare Wastewater Treatment Plant

# Core Activities

## WATER TREATMENT PROCESS

1. Surface water is gathered to Lake Ülemiste and is directed to Ülemiste Water Treatment Plant .
2. Raw water passes through microfilters which remove algae and plankton from the water.
3. Water is led into reservoirs where a mixture of ozone and air is injected into the water to deactivate microorganisms and oxydize organic substances.
4. A water treatment chemical coagulant is added to clarify the water. During the sedimentation phase particulate matters, chemical floc and precipitates are removed from the water.
5. Water passes through activated charcoal and sand filters, in summer time additionally activated carbon in order to remove any remaining particles and to improve the taste of drinking water.
6. Chlorine is added to the water for disinfection purposes.
7. The water is directed to drinking water reservoirs, from where it is pumped to the city **water network** in accordance with demand.

## WASTEWATER TREATMENT PROCESS

1. Wastewater is collected through **sewerage and storm water network** into the main pumping station.
2. The screens remove larger waste and the grit chambers remove sand and grit, from the wastewater.
3. Coagulant is added to wastewater for chemical treatment. Particulate solids settle in primary sedimentation tanks.
4. In aeration tanks, air and methanol are added to feed the microorganisms which decompose the biodegradable substances.
5. Sludge is separated from wastewater during secondary sedimentation. Clean water is directed into the sea via the deep-sea outlet.
6. Sludge removed during the different phases of the treatment process is pumped into the Sludge Treatment Plant.
7. Sludge is digested in digesters where bacteria make the organic matter decompose.
8. Biogas is created in the course of sludge digestion and is used for the technological process and heating in the plant.
9. Sludge is stabilised, dried and mixed with supporting substances.
10. The compost produced is used as valuable organic fertiliser.

# Environmental Management System

| 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|
| ISO 9001 and ISO 17025 Quality Management System* | | ISO 14001 environmental management system* | Further development of single quality and environmental system | | Further development of integrated management system |
| | | | EMAS (EU regulation 761/2001) pilot project | | |
| ISO 17025 certificate for labs | ISO 9001 certificate | ISO 14001 certificate | | EMAS certificate | |

** required by the Service Agreement concluded between the City of Tallinn and the Company*

## ENVIRONMENTAL POLICY

The environmental policy follows the vision and the mission of the Company, the principles for the sustainability of the environment and the need to reduce pollution of the environment, the specifics of the Company's operation, the obligation to act in accordance with relevant legislation and other requirements recognised by the Company and the objective to continuously improve the operation of the Company. The environmental policy has been approved by top management.

The policy is available to all employees in Estonian, Russian and English in the intranet or, if necessary, in printed format from their direct manager. Employees as well as the wider public also have access to the environmental policy on the Company's homepage www.tallinnavesi.ee.

## OUR CONTRIBUTION TO CUSTOMERS AND THE COMMUNITY

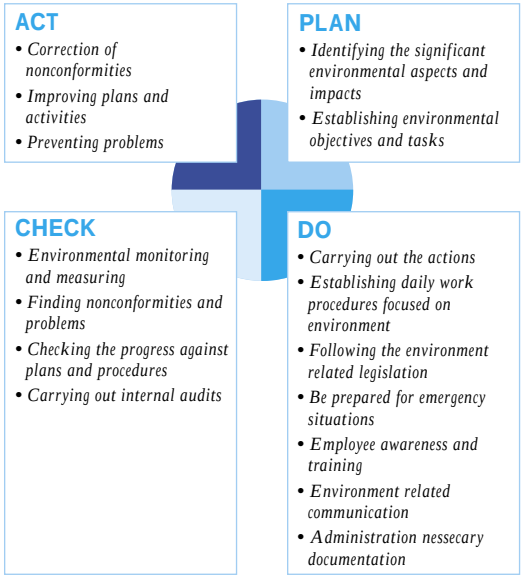
- Our customers always have pure drinking water and the possibility to discharge and treat wastewater and storm water environmentally wisely.
- We understand and take responsibility for our impact on the health and quality of life of our clients and residents.
- Our customers can communicate with us conveniently.
- By open communication we will shape the environmentally conscious way of thinking of our customers and consumers.
- We use natural resources sparingly.
- We ensure our compliance with all applicable legal acts and other requirements acknowledged by the Company.
- To increase customer satisfaction and avoid environmental pollution we are actively seeking for better solutions and continuously improve our work.

## SCOPE OF THE ENVIRONMENTAL MANAGEMENT SYSTEM

The objective of the environmental management system is to at best avoid or at very least minimise environmental pollution via effective environmental activities, whilst the elements of the environmental management system are integrated into the everyday activities of the Company.

Both the international ISO 14001 standard as well as the European eco management and auditing system EMAS establish similar requirements which a company has to meet in order to systematically organise its environmental management and improve effectiveness, thus contributing to avoiding environmental pollution.

The environmental management system of the Company covers all core activities and functions on the basis of the principle of continous improvement:



## SIGNIFICANT ENVIRONMENTAL ASPECTS

The basis for the environmental management system is the identification of the environmental aspects and impacts and defining the significant aspects for the Company on the basis of a predetermined system. That enables us to prioritise environmental activities.

In 2005, the system of assessing environmental aspects was changed, in order to bring out the significance of aspects more clearly. The significance of an environmental aspect is defined with the help of the following criteria on the scale minor, average, great or extreme:

- The probability of the aspect occurring;
- The scope of the impact;
- The duration of the impact;
- The seriousness of the consequences for different parts of the environment and of the business as to the capability of providing a service, public health and life quality, damage of the natural environment as water, earth, air, flora, fauna, landscape, the relationships with the local governments, the authorities and media, the financial damage.
- Link to legislation requirements.

Significant aspects are those different facets of activities of the Company, which may have the most serious consequences to the natural environment, life quality and to the business. The environmental aspects regulated by a legal act, shall definitely be treated as significant despite of the severity level of consequences.

## SETTING ENVIRONMENTAL OBJECTIVES AND TASKS

To influence the impact of significant environmental aspects in the desired direction, environmental objectives and tasks are set by the management according to the general objectives of the company.

Managers of structural units ensure the preparation and carrying out of the actions plans necessary for meeting the environmental objectives and tasks. The managers of structural units shall ensure the awareness of their subordinates of the environmental objectives and tasks and of their responsibility in achieving these objectives.

A detailed overview of the fulfilling objectives and tasks in 2005 is provided in the chapters below. The overview of environmental objectives and tasks for 2006 is given in Annex 5.

## COMPLIANCE WITH ENVIRONMENTAL LEGAL ACTS

The minimum requirement of the environmental management system is to ensure the compliance with environmental legal acts. Improvements of environmental management system have to be in accordance with the requirements and restrictions set out in applicable legal acts.

To a large extent the Company's environmental activities are regulated by requirements arising from EU and national legal acts, the latter include state and local. Fourteen different national environmental legal acts apply to everyday operations of the company, of which the Water Act, Public Water Supply and Sewerage Act, Waste Act , Chemicals Act, Ambient Air Protection Act and regulations adopted on the basis thereof have the most significant impact on the Company.

The following environmental permits have been issued to the Company by the Harju County Environmental Service, the main environmental licensing authority for the Company:

- 3 water permits for special use of water (please see more detailed on page 14);
- 2 waste permits (please see more detailed on page 33).
- 2 air pollution permits and 1 special permit for air pollution (please see more detailed on page 36);

In 2005 legal due diligence of the Company was carried out by law office Raidla & Partners. The Legal Due Diligence Report issued by Raidla & Partners in March 2005 (with a follow-up in May 2005) confirmed the Company's compliance with, among others, environmental legal acts. In the Legal Due Diligence Report Raidla & Partners outlined some areas for improvement, such as completion of several registrations with the Register of Economic Activities and the Buildings Register, registration of the Company's logo, establishment of servitude for the public water supply and sewerage network owned by the Company. The Company has put together an action plan on the basis of the findings presented in the Legal Due Diligence Report and progress is reported to the management monthly.

The compliance with environmental legal acts is also checked during the environmental management system audits. In 2005 audit findings were related to interpretation of legal requirements.

## INVOLVEMENT OF EMPLOYEES

Management of the quality and environmental system has been put in place in accordance with the organisational chart of the Company (please see Annex 1), on the basis of which the principle responsibility for implementing the system rests with the Management Team and the managers of structural units.

Unit managers are respectively involving their employees in performing the tasks. Evaluation of the productivity of the environmental activity of key employees is linked with the company's performance related pay system.

Environment related activity is a natural part of the company's daily work, different issues related with the company's activity, included environmental ones, are solved by cooperation. The main work formats are:

- Meetings on different management levels;
- Work groups, project groups, where specialists are involved;
- Informing employees about important environment related events via monthly issued internal newsletter INFOTILK, also via internal computer network and e-mails. In 2005 in every newsletter the environment related issues were published;
- Training of employees. In 2005 there were on an average 3 training days for every employee, which included management, professional and environmental training;
- Employees from different units and management levels are involved in conducting internal audits. 29 employees have been appropriately trained as environmental and quality system internal auditors both at managerial as well as specialists' level. In 2005 internal auditors were specially rewarded by the chairman of the board.

## ENVIRONMENTAL MANAGEMENT SYSTEM AUDITS

### Internal audits

Regular internal audits for evaluating the functioning of the quality and environmental management system and compliance with legislation were carried out in the Company during 2005. Internal auditors described 107 findings in total in 2005, providing a good source for managers to improve the management system.

| Area | Nonconformities | Observations |
|---|---|---|
| **Total findings** | **35** | **72** |
| Including integrated System | 31 | 46 |
| **Including environmental findings** | **4** | **26** |
| Environmental aspects | 0 | 5 |
| External communication | 0 | 1 |
| Legal requirements | 2 | 9 |
| Preparedness for crisises | 2 | 11 |

### External audits

A regular external audit was carried out in the Company in 2005 by the accredited certifier Det Norske Veritas in order to evaluate the continued compliance of the quality and environmental management system with ISO 9001, ISO 14001 standard requirements and for the first time with EU (EMAS) regulation 761/2001.

As a result of the external audit an audit report was prepared in which Det Norske Veritas confirmed the validity of both certificates. Eight nonconformities were discovered, most of them related to EMAS environmental report requirements, and all eight have been corrected.



Internal auditors

# Environmental Objectives and Tasks for 2005

| Significant aspect | Impact | Goal and tasks | Results as of Dec |
|---|---|---|---|
| Damming the rivers, collecting water into reservoirs | Creating hydroenergy facilities to produce green energy, recreation facilities. Improving self-cleaning ability of river, development conditions of water biota | **Use sparingly surface raw and ground water resources for maintaining environmental balance**<br>• Complying with the permit for special usage of water requirements upon regulating water regimes<br>• To ensure sufficient raw water supply, so that satisfying the maximum demand would be ensured<br>• Directing excess water, free flow amounts of Jägala river to Kaunissaare Hydropoint<br>• In regulating Pirita-Ülemiste channel flow amount, to proceed from the normal damming level of Ülemiste<br>• Developing company policy for potential developers of recreational facilities<br>• To complete actions to increase crisis preparedness in the catchment area<br>• Take surface water connections into ground water areas according to the agreed investment plan<br>• Not to exceed the groundwater extraction standards established in the permit for special use of water | +, see page 15<br>+, see p 15<br>+, see p 15<br>+, see p 15<br>+, see p 15<br>+, see p 41<br>+, see p 41<br>+, see p 16 |
| Taking water from reservoirs | Damaging the development conditions of water biota | | |
| Water catchment from rivers | Distortion of natural flow amounts of the river, damaging the natural balance | | |
| Exceeding Lake Ülemiste water level | Floodings in adjacent areas, bank erosion, decline in life quality | | |
| Taking excess level water from Ülemiste | Excessive decline in water level, damaging the water biota | | |
| Ground water extraction | Decrease of the longterm renewable natural resource | | |
| Breakdown of water catchment facilities in case of natural disaster or vandalism | Floods in the adjacent areas, damage to water biota, danger to population's health, decline in life quality | **Improve the security of catchment area facilities**<br>• To launch the remote surveillance project of hydropoints, in order to get timely information about possible sudden changes in natural water regimes | +, see p 41 |
| Water leakages on the water network | Inefficient usage of water resource, waste of resources | **Minimise the loss of drinking water supplied to the network**<br>• To reduce the annual water loss to the economic level of leakages<br>• To liquidate leakages in optimal time period<br>• To rehabilitate or replace a minimum of 5 km of existing water mains each year | +, see p 17<br>+, see p 17<br>+, see p 22 |
| Quality of Ülemiste's raw water | Improvement of the ecological condition of Lake Ülemiste | **Improve the quality of raw water**<br>• To continue the biomanipulation project | +, see p 18 |
| Drinking water not compliant with standards | Danger to population's health, sudden deterioration of life quality | **Ensure and improve further the quality of drinking water**<br>• To ensure raw water quality control according to the Service Agreement requirements<br>• To ensure water quality in the treatment process, ground water network and at the customer is 100% in compliance with the Min of IA regulation 82 and the Service Agreement<br>• To ensure annually a continuous process for 24h and to improve preparedness for a possible crisis<br>• To ensure that there will be no chlorine leakages into the atmosphere<br>• To prevent drinking water pollution, to make available immediately information about the pollution according to the legislation and the Service Agreement requirements<br>• To ensure rapid liquidation of emergencies, controlling of interuptions according to the Service Agreement requirements | +, see p 18-19<br>+, see p 20-22<br>+, see p 41<br>+, see p 30<br>+, see p 18-19<br>-, see p 22 |
| Compliant drinking water | Retaining and improving the life quality | | |
| Stopping of treatment of drinking water | Deterioration of life quality, danger to population's health | | |
| Chlorine leakage | Danger to population's health, damaging the biota | | |
| Polluted drinking water at the consumer tap | Danger to population's health | | |
| Over 4h interruption to supply due to emergencies at the mains | Decline in life quality, danger to population's health in case of long-term water supply cut | | |

| Significant aspect | Impact | Goal and tasks | Results as of Dec |
|---|---|---|---|
| Stormwater outlet not complying with standards | Deterioration of natural environment (sea, bog) | **To enhance the storm water network system to minimise the risk of storm water floods** | |
| Extensive stormwater floods due to lack of system capacity | Polluting the ground and damage to the property of population | • Plan new storm water systems | +, see p 26 |
| | | • Renovate and extend storm water network according to the Service Agreement requirements and investment plans | +, see p 26 |
| | | • To ensure control over storm water outlets according to the Water Permit | +, see p 27 |
| | | • Improve preparedness for crisis situations in storm water network | +, see p 41 |
| Floods due to sewer collapse | Polluting the ground and sea water, danger to population's health, deterioration of life environment | **To minimise the loss of noncompliant sewage to environment** | |
| | | • To ensure wastewater quality and 100% compliance with the permit for special use of water and the Service Agreement requirements | +, see p 23-25 |
| Wastewater outlet into the sea that does not comply with standards | Deterioration of the condition of sea water | • To complete successfully the Paljassaare nitrogen removal project | +, see p 25 |
| | | • To improve crisis preparedness and avoid emergency overflows | +/-, see p 27 |
| Stabilisation and reutilisation of sludge | Improving the ground qualities and natural environment | **Produce less waste, make more effective sorting and recycling of waste** | |
| Usage of sludge as subsoil | Increasing waste recycling | • To decrease the amount of excavated soil and old asphalt, avoid sending mineral waste (recycled waste) to landfill | +, see p 31 |
| Emergence of non-hazardous waste in the office, units and labs | Polluting the environment with waste | • To look for possibilities to wash desanding system sediments and screenings before transporting to landfill | +/-, see p 31 |
| Emergence of hazardous waste in the office, units and labs | Polluting the environment with hazardous waste | • To make oil removal in Wastewater Treatment Plant more efficient in order to ensure further compliance with Water Permit | -, see p 31 |
| | | • To complete the construction of compliant composting field | +, see p 32 |
| | | • To use sludge more efficiently | +, see p 32 |
| | | • To reconstruct sludge processing plant | +, see p 32 |
| | | • To continue the reforestation experiments project | +, see p 32 |
| Electricity consumption | Contributing to polluting the environment caused by electricity production, decrease in non-recoverable natural resources | **To use energy sparingly in order to decrease the environmental damage caused by energy production** | |
| | | • To use biogas to the fullest extent in the Wastewater Treatment Plant for producing air and for heating | +, see p 35 |
| Utilisation of biogas | Decreasing the usage of fossil fuels | • To install condensators in technically suitable places to compensate reactive energy | +, see p 34 |
| | | • Replacement of Lasnamäe pumps with high power consumption with energy saving ones | +, see p 34 |
| Fuel combustion, consumption | Decrease in non-recoverable natural resource | • To acquire Green Energy certificate offered by Eesti Energia | -, see p 35 |
| | | • To reduce fuel consumption compared with previous period | +, see p 35 |
| Emission of exhausts | Polluting the air | **To minimise air pollution** | |
| | | • To ensure compliance to the Air Pollution Permits | +, see p 36 |
| | | • To use where possible more environmental friendly fuel | +, see p 35 |
| Customers not connecting to public sewerage | Deterioration of environmental condition, danger to population's health | **Decrease environmental pollution, encouraging clients to connect to public sewerage** | |
| | | • To connect new areas to the network | +, see p 38 |
| Customers connecting to public sewerage | Improvement of life quality, environmental condition | • To sign at least 80% connection contracts within 1 year from receiving the usage permit of street pipes | +, see p 38 |
| | | • To shorten the time of concluding connection (max 5 weeks) and service contracts (max 4 weeks) | +, see p 38 |
| Identification of polluters | Balancing the environmental condition | • To conduct Customer Census programme | +, see p 38 |
| | | • To issue penalty invoices to all identified over polluters | +, see p 38 |

| Significant aspect | Impact | Goal and tasks | Results as of Dec |
|---|---|---|---|
| Choice of suppliers in procurements not complying with environmental requirements | Deterioration of life quality, environmental condition | **Prefer environmental friendly suppliers**<br>• To improve the procedure of environmental qualification of bidders<br>• To establish environmental criteria for major purchases (among that energy saving)<br>• To require that potential suppliers meet company's environmental requirements | +, see p 37<br>+, see p 37<br>+, see p 37 |
| Handling environmental issues in the media and through events | Improvement of the public's environment related awareness | **Improve the environmental awareness of the public**<br>• Compile informative booklets of treatment plants<br>• Compile EMAS environmental report<br>• Organise Open Door Days in treatment plants<br>• Continue the presentation of an environment related play in schools<br>• Publish of environment related articles in the media<br>• Continue the cooperation with environmental TV programmes<br>• Better availability of environment related info on company web page | +, see p 39<br>+, see p 39<br>-, see p 39<br>+, see p 39<br>+, see p 39<br>+, see p 39<br>+, see p 39 |
| Exchanging environment related information with interested parties | Making cooperation between the interested parties more efficient | **Improve the environmental cooperation with main interested parties**<br>• Organise press events upon writing about important environmental projects<br>• Organise media training (including crisis communication training)<br>• Introduce of significant environmental projects to specialists<br>• Cooperate with water saving programmes (Ökokratt)<br>• Participate in the preparation process of relevant environmental acts | +, see p 39<br>-, see p 41<br>+, see p 39<br>+, see p 39<br>+, see p 39 |
| Development of Environmental Management system | Avoiding pollution, decreasing environmental risks, decrease in environmental costs | **Improve the effectiveness of the environmental management system**<br>• Implement EMAS system requirements and achieve recognition in the frame of national EMAS project<br>• Improve chemical risk management<br>• To improve crises prevention and preparedness system | +, see p 8<br>+, see p 28-30<br>+, see p 40-41 |



# Special use of water

The activities of a water undertaking in using water resources are regulated by the Water Act and its implementing provisions. Pursuant to the Water Act, to operate as a water undertaking, AS Tallinna Vesi must have a permit for special use of water and the Company must pay a charge for the water resource used.
The permit for special use of water defines different activities, for instance the amount of water that the Company may extract, water quality monitoring requirements, requirements set for accounting for water extracted, the permitted limits of pollutants contained in effluent, pollutants monitoring requirements, and measures reducing the impact of special use of water.

## PERMITS FOR SPECIAL USE OF WATER

The following table contains descriptions of the Company's current valid permits for special use of water. In 2005 all requirements of the permits for special use of water were met.

## FEE FOR SPECIAL USE OF WATER

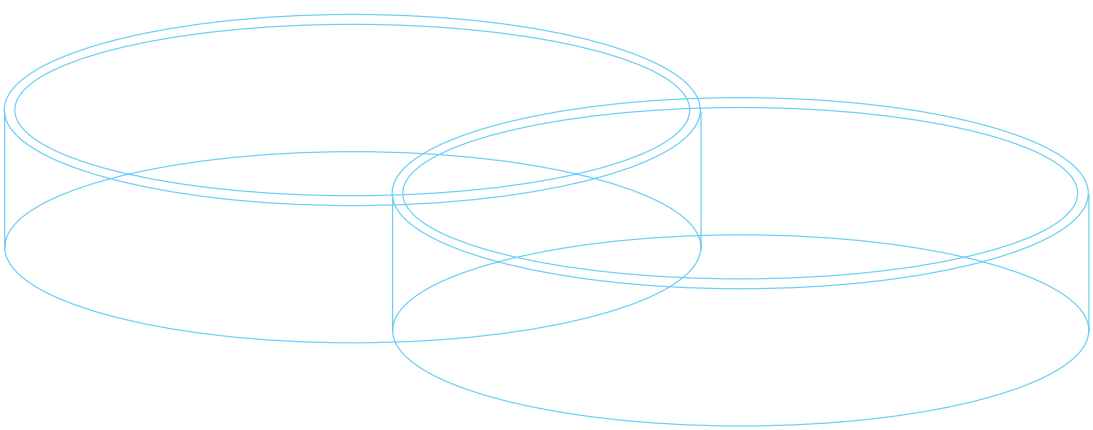
Pursuant to the conditions of the permit for special use of water the Company must pay a fee for special use of water for using Lake Ülemiste surface water and the ground water from boreholes. The fee for special use of water is paid for the water taken into Ülemiste Water Treatment Plant and the water pumped out of the aquifers at the ground water pumping stations.

Of operating costs the fee for special use of water made up:

In 2003 3,8 % of operating costs;
In 2004 4,7 % of operating costs;
In 2005 3,9 % of operating costs.

| Permit | Valid until | Description of special use of water |
|---|---|---|
| Water Permit no. HR0679 (L.VV.HA-19537) | 31.10.2008 | Saue town, Harju County<br>Extraction of ground water from boreholes opening Cambrian-Vendi and Ordovician-Cambrian aquifers. Supplying Saue town with domestic and industrial water across the entire licensed operating area. Collection of wastewater and directing wastewater to Paljassaare Wastewater Treatment Plant. |
| Water Permit no. HR0549 (L.VV.HA-13579) | 31.03.2008 | Tallinn public water supply and sewerage system main licenced operating area, Tallinn surface water catchment system facilities area in Harju and Järva County.<br>The usage of ground water from the Ordivician-Cambrian and Cambrian-Vendi aquifers, discharging storm and drainage water into Tallinn bay and Kopli Bay, Mustjõe stream and Männiku wetland, discharging biologically treated wastewater into Tallinn Bay. |
| Water Permit no. HR0455 | 31.12.2006 | Tiskre village, Harku borough<br>Extraction of ground water from borehole opening Cambrian-Vendi aquifer. Directing all wastewater to Paljassaare Waste Water Treatment Plant |





# Usage of Water Resources

Using water resources sparingly is an important goal for the Company. Thus, it is important to monitor and manage the amounts of water extracted from the water bodies in order not to disturb flora and fauna. The main condition is to meet the requirements of the permit for special use of water.

## USAGE OF SURFACE WATER RESOURCES

The Company collects raw water from a catchment area of approximately 2000 km2. The catchment area system includes the catchment areas of Soodla, Jägala and Pirita rivers, and reservoirs. The main reservoir is Lake Ülemiste with the net volume ca 16 million m³ (please see in Annex 2).

### Assessing resources

Throughout the year AS Tallinna Vesi has continued to manage the catchment in an efficient way, optimising water resources to ensure that compliant raw water is available for Tallinn Water Treatment Plant and to comply with the requirements of the permit for special use of water HR0549.

The size of the water resource in Tallinn's surface water catchment system primarily depends on the amount of precipitation and its distribution over the year. The basis for calculating and assessing the system's water resource is a year of poor precipitation with 95% probability, i.e. a water balance based on a long series of monitoring results and compiled on the basis of a distribution of calculated flow amounts of a water economy year.
On that basis we can say that at the present level of water consumption the surface water resource is sufficient in a year of poor precipitation with 95% probability. In a year of average rainfall approximately 50% of the possible water resource in the system is used.

In 2005 the surface water resource was sufficient and requirements of the permits for special use of water were met.

### Surface water usage from Lake Ülemiste compliance with water permit HR 0549 in m³.

| Special use of water | 2003 | 2004 | 2005 |
|---|---|---|---|
| Actual usage | 27 276 080 | 23 522 647 | 22 764 462 |
| Max amount allowed by water permit | 47 500 000 | 47 500 000 | 47 500 000 |

### Regulation of water regimes

The bases for optimal regulation of water regimes come from the hydrological measuring results that are carried out at hydropoints. The water levels in water reservoirs and flow amounts in the rivers and those directed into channels are surveyed constantly. According to the terms and conditions of the Permit for Special Use of Water, a minimum sanitary flow amount has to be guaranteed in the rivers. On the basis of the measurement results, the necessity and possibility of supplementing the water supplies of Lake Ülemiste is decided, based in the the normal water level of Lake Ülemiste.

This regulating system enables the direction of excess water and free flow amounts of Jägala river to Kaunissaare hydropoint, where the Kaunissaare Hydroelectric Power Plant, which is a private company, can use the free resources. Thus, AS Tallinna Vesi has created hydro-energetic facilities to produce green energy. In addition to the contract with Kaunissaare Hydroelectric Power Plant, an agreement for planning a hydroelectric power plant at the dam of Soodla catchment's hydropoint was signed in 2005.

### Construction of raw water metering points

For the necessary measuring, the company's long-term goal has been construction of water metering system for all hydropoints.

By 2005 water measuring systems had been constructed/ reconstructed at Vaskjala hydropoint, Kaunissaare hydropoint, Pärnu-Jägala channel's water catchment, Paunküla hydropoint, Aavoja hydropoint and Jägala hydropoint. In 2005 the hydropoints' reconstruction and water metering points' construction was finalised at Soodla hydropoint and Raudoja hydropoint.

In order to get timely information about any possible sudden changes in natural water regimes, a remote surveillance project of hydropoints will be implemented. In 2005 the technical preparations were made, the project is ongoing and will be finished in 2006.

### Creating recreational facilities

As a result of establishing water reservoirs, local governments have gained an additional opportunity for developing tourism and recreation, primarily in the surroundings of Soodla and Paunküla water reservoirs. The surroundings of reservoirs are meant for public usage in those parts that do not constitute sanitary protection area. In the sanitary protection area that has been defined in the catchments of the water reservoir according to the Water Act, movement and usage is restricted. AS Tallinna Vesi supports development of organised and arranged recreational activities, which on one hand would offer recreational facilities to people and on the other hand would keep the surroundings of water reservoir protected. In 2005 we developed our position for the organised usage of Paunküla water reservoir and introduced it to the local government bodies in the area.

## USAGE OF GROUND WATER RESOURCES

Approximately 10 % of the drinking water of Tallinn citizens is obtained from groundwater, which is supplied to Tallinn residential areas in Nõmme, Pirita, Merivälja and Kose. Groundwater is used also in Saue. Groundwater is extracted from the Cambrian-Vendi and Ordovician-Cambrian water layers.

AS Tallinna Vesi regularly measures ground water levels in order to continuously control the state of Tallinn's ground water resources. In all the operating ground water facilities belonging to AS Tallinna Vesi, automatic hydrostatic pressure sensors were installed in 2005, which enable the measurement of both the static and the dynamic level of the ground water. Measurement of the static water level in boreholes shows a continuous increase of the ground water resource in all areas of the city during last 10 years.

Conditions of groundwater usage have been determined by the terms and conditions of the permit for special use of water HR0549, HR0679 and HR0455, which establish the requirements for permitted water extraction, in order to reduce the impact of special use of water to the groundwater layer. Although the usage of ground water is limited by the water permits, it is possible to cover the ground water demand and still keep a sufficient reserve to replace the surface water supply in case of a problem of supply from Ülemiste Water Treatment Plant.
All terms and conditions of the permit for special use of water have been complied with in 2005.

### Ground water usage compliance with water permits HR0549, HR0679 and HR0455 in $m^3$

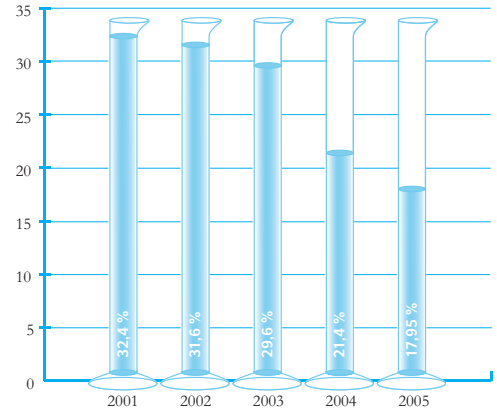
| Special use of water | 2003 | 2004 | 2005 |
|---|---|---|---|
| Actual usage of ground water in Tallinn | 3 026 800 | 2 736 157 | 2 532 519 |
| Cambrian-Vendi aquifer | 2 693 109 | 2 395 645 | 2 246 809 |
| Ordovician-Cambrian aquifer | 333 691 | 340 512 | 285 710 |
| Max amount allowed by water permit | 6 880 250 | 6 880 250 | 6 880 250 |
| Actual usage of ground water in Saue | 244 889 | 213 124 | 207 102 |
| Cambrian-Vendi aquifer | 225 938 | 196 790 | 183 261 |
| Ordovician-Cambrian aquifer | 18 951 | 16 334 | 23 841 |
| Max amount allowed by water permit | 460 250 | 460 250 | 460 250 |
| Actual usage ground water of Cambrian-Vendi aquifer in Pillado* | | | 5720 |
| Max amount allowed by water permit | | | 65 700 |
| * starting from October 2005 | | | |

Lake Ülemiste

## LEAKAGES

Another important aspect of water usage is to reduce the water losses in the network. The company had a contractual requirement to reduce the annual level of leakages to 26 % by the end of 2005. However, the company outperformed this target and achieved the level of 17.95% by the end of 2005.

### Leakage levels in 2001 to 2005 in percentages




Even though we have exceeded the contractual requirement, we continue to pursue excellence and maintain the achieved level.

### Economic level of leakage

The level of leakage at which it would cost more to make further reductions than to produce the water is known as the economic level of leakage. In the calculation of economic level of leakage factors such as the cost of detecting and repairing leaks and the cost of producing the water are taken into account. The calculation of the economic level of leakage has been undertaken for Tallinn and it seems that a 15 - 18 % level of leakage is appropriate for our situation.

In the UK in 2004-2005 the average economic level of leakage rate was estimated at 16.8 %. Our level of 17.95 % is calculated in the same way and is close to this figure. The figure compares well when considering the nature of the situation in Tallinn. In Tallinn all supplies are metered and this tends to reduce the consumption and thereby makes any leakage a larger percentage of the volume supplied. In addition the severe winters compared to the UK and subsequent thaw causes larger ground movements which may damage the network and result in bursts and water loss.

In United Utilities International group, to which AS Tallinna Vesi belongs together with Sofia Water and Manila Water, our results compare very favourably. Sofia Water had leakages level of ca 43% and Manila Water of ca 35% in year 2005.

Good results were achieved due to different actions such as reducing time period to liquidate leakages and continuing the district meter area project.

### Reducing time period to liquidate leakages

In 2005 the quick response capability of the Networks Department improved. The networks team has managed to shorten the average leakage elimination time from 3.7 days (2004) to 2.4 days (2005).

Everyday work is supported by the updated water supply networks monitoring system, a software program, where the information on the entire water and sewerage network of the city has been entered. The leakage teams have specific equipment for leakage location, enabling them to locate possible water leakages on the network more quickly via a remote reading system.

### District meter areas

In 2004, a district meter areas project was launched, enabling the division of the network into sections of more optimum length and a consequent improved monitoring of the network. The employment of district meter areas has made possible to significantly reduce the leakages discovery period within a pressure zone. The project will continue also in 2006.

## WATER METERS

Replacement of water meters contributes to a more accurate accounting of water resource.
In 2003-2004 AS Tallinna Vesi carried out a water meters testing programme, which compared class B and C accuracy, single and multi jet water meters. It was decided, on the basis of the testing programme, to invest into replacing class B water meters with class C water meters as they have a longer useful life and measure more accurately. In 2005 the objective was to replace 5700 water meters, which was fulfilled.



## SURFACE WATER QUALITY

Raw water quality in the year 2005 at the intake to the treatment system complied with the class A2 requirements of European Council directive 75/440/EC. Since we are dealing with surface water, its quality is dependent on weather conditions - for example rainfall, water from melting snow, but also on the geological conditions of the catchment area – high moors, marshlands, areas of forest, etc. The raw water quality is particularly influenced by the humic substances (a natural organic substance) content which has a major effect on the colour, permanganate oxidation and chemical oxygen demand of water. Due to the rainy summer of 2004 and the high level of water in January 2005 the colour, permanganate oxidation and chemical oxygen demand values in all catchment area waters and Lake Ülemiste water were higher than in previous years.

Raw water quality control analyses are conducted by our accredited water laboratory. Raw water quality is checked at the intake to the treatment system once per day for the technologically necessary indicators. Raw water pollution indicators (total phosphorus and nitrogen) are checked once per week. Additionally a detailed raw water analysis is carried out once per month according the indicators that have been accepted by the Harju County and Tallinn Health Protection Authority.

In order to further improve the raw water quality, the biomanipulation project continued during 2005. The biomanipulation project has been ongoing since 2001.

### Biomanipulation

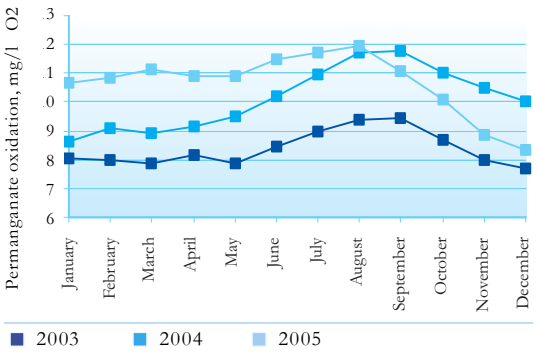
The aim of biomanipulation project is to improve the water quality and thereby in state water ecosystem by establishing a classical food chain. A classical food chain in a body of water is as follows:

piscivorous fish – benthi- and planktivorous fish – zooplankton – phytoplankton.

Currently the food chain is out of balance as before the project was started the piscivores only formed 5 % of total fish resources. Insufficient number of piscivores is not able to "control" the planktivorous fish stock. Planktivorous fish eat zooplankton reducing its weight and the phytoplankton in the end of the food chain grows in masses. There is also quite large number of benthivores in Lake Ülemiste searching for food on the bottom of the lake. While doing that they whirl up mud from the lakebed uncovering phosphorus sediment which in its turn fosters the growth of phytoplankton. The great number of phytoplankton causes turbidity and deterioration in water quality.

During biomanipulation the excess of benthivores like bream and roach are caught and the reproduction of piscivorous fish like pikeperch and pike is fostered. The named method ensures that the food chain in the lake remains balanced and that the micro algae that could cause deterioration in water quality would not reproduce excessively. As a result of making the food chain more efficient the biomass of phytoplankton decreases, transparency improves, the total nitrogen content and pH level in water drop. The improvement of all those parameters provides a much better raw water quality.

### Permanganate oxidation in raw water 2003 - 2005 in mg/l




The reduction of the number of benthivores in the lake continued in year 2005, a total 86 tons of fish were caught. Catches consisted mainly of bream and roach. The intention is to continue fishing also in 2006 in order to reduce the prey fish stock in lake by approximately eight times.

### Catches of benthivores in 2004-2005 in tons

| 2004 | 2005 | 2006 |
|---|---|---|
| 48 | 86 | 30 (planned) |

Intensive fishing has had its effect on the lake and some initial positive results of the project could be seen in 2005.

The period of "clear water" in spring 2005 has extended to eight weeks following the breaking of ice. Biomass of phytoplankton has reduced and the biomass of zooplankton was twice a large in comparison with the previous years. The area of phytobenthos has extended as well.

## QUALITY OF RAW GROUND WATER

Conditions of ensuring groundwater quality have been determined by the permits for special use of water HR0549, HR0679 and HR0455, which establish the procedure for monitoring water quality in the water taken from bore wells. In addition to the requirements of the permit for special use of water, the ground water used as a drinking water source is inspected also according to the Drinking water source inspection plan (2004-2008), coordinated with Harju County and Tallinn Health Protection Authority.

Monitoring includes all quality parameters of decisive importance for assessing the condition of ground water. In all of the bore wells that are in use a water sample is taken at least once a year and a full chemical analysis is made. From the bore wells, which are hydrogeologically situated in a complicated environment, water samples are taken twice a year and from the standby bore wells once a year, during the validity of water usage permit. In addition to the full chemical analysis required by the water permit the company also studies the content of 12 microcomponents and makes analyses of the water both from the Cambrian-Vendi as well as the Cambrian-Ordovician aquifer. In addition, partially also the substances listed as dangerous to water environment in the Water Act are tested for in ground water, e.g. mercury, antimony, arsenic, cadmium, boron, barium and others.

According to European Council Directive 2000/60/EÜ (Water Policy Framework Directive), the quantitative and qualitative condition of ground water is differentiated.

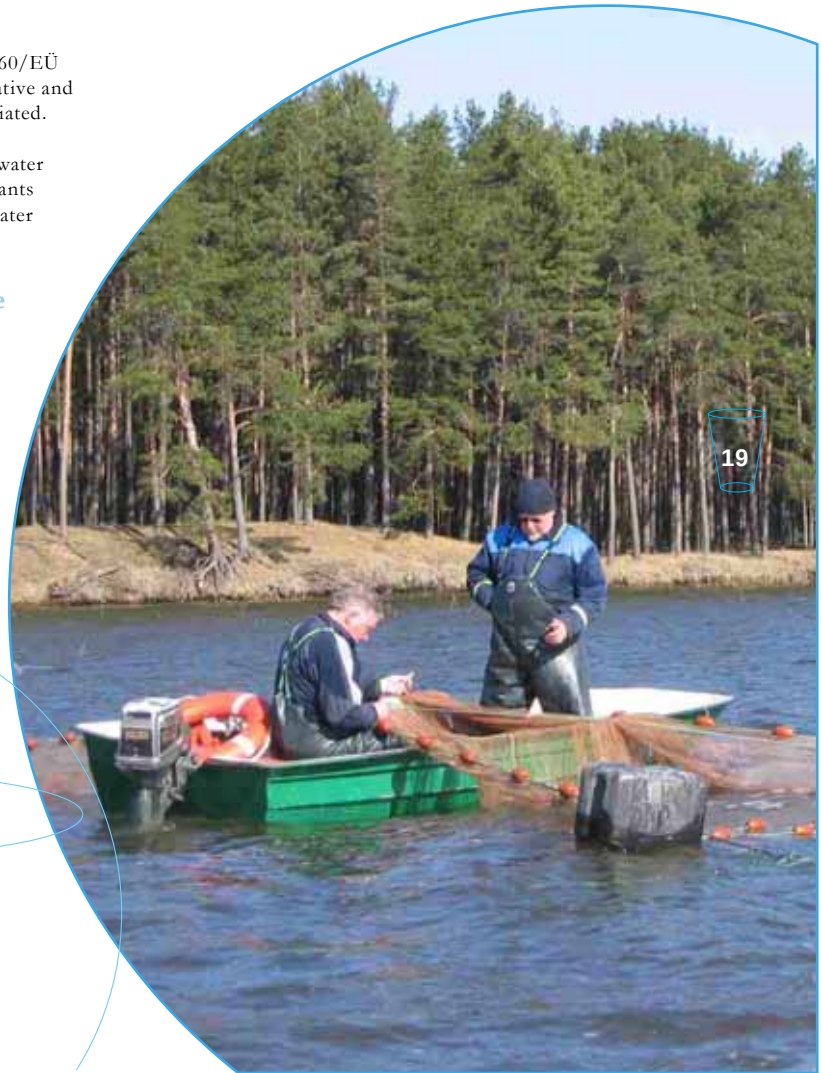
The qualitative or chemical condition of ground water is considered good, if the concentration of pollutants does not indicate inflow of salty water or other water and does not exceed the respective quality standards. The content of chlorides as one of the most significant quality indicators, which cannot show increasing trends, has remained stable within recent years thanks to the reduction in intensive water extraction.

During the year 2005 there have been no ground water pollution incidents or any potential risks of pollution that required reporting to the City and the Health Authority of Harju County and the City of Tallinn.

The qualitative condition of ground water is closely connected with quantitative condition.
To improve measurement of quantitative condition, 44 automatic water level and 4 temperature measurement devices have been installed into all company's bore wells during 2005. A professional bore wells videocamera system Fontanus, which is unique in the Baltic countries, has been purchased for inspection of the technical condition of ground wells and for planning of repairs. In 2005 technical monitoring was done for 37 bore wells with the help of video surveys. All boreholes have a sanitary protection zone. It means that according to the Water Permit catchment maintenance works only are allowed in the sanitary protection zone.

The Company's ground water monitoring data is used in public ground water monitoring for assessing the quality of ground water in the region of Tallinn.

**Biomanipulation in Lake Ülemiste**



# Quality of Drinking Water

Tallinners consume an average of 101,8 litres of water per person per day.

Drinking water quality must comply with Minister of Social Affairs Decree no. 82 from 31 July 2001 "Potable Water Quality and Control Requirements and Analysis Methods" that originates from the Estonian Water Act and European Union Potable Water Directive 98/83/EC.

As per the existing regulation the Company will have to comply with a very strict definition of quality requirements, control requirements of drinking water quality and analysis methods requirements. There is an exception for some parameters known as indicators or " soft parameters" (iron, manganese) that are not harmful for health and for which compliance is sought from January 1st, 2007.

The Company has a detailed drinking water control programme, which includes separate quality control for the water treatment plant, the ground water system, and the city network. In June 2005, new drinking water control programme until year 2010 were approved and accepted by the Harju County and Tallinn Health Protection Authority

To measure the quality of Tallinn's drinking water, the accredited Water Laboratory of AS Tallinna Vesi takes quality samples from raw water, from the water in the treatment process as well as from the treated water that has already been through the process.

In 2005, the Company reached the highest drinking water quality ever with 99,9 % microbiological compliance and 99,7 % chemical compliance. The quality of water issued from Ülemiste water treatment plant complies 100% with all requirements. However, the quality of water in the water network and the groundwater quality may be influenced by larger iron or manganese content, due to which 100% chemical compliance is not achieved.

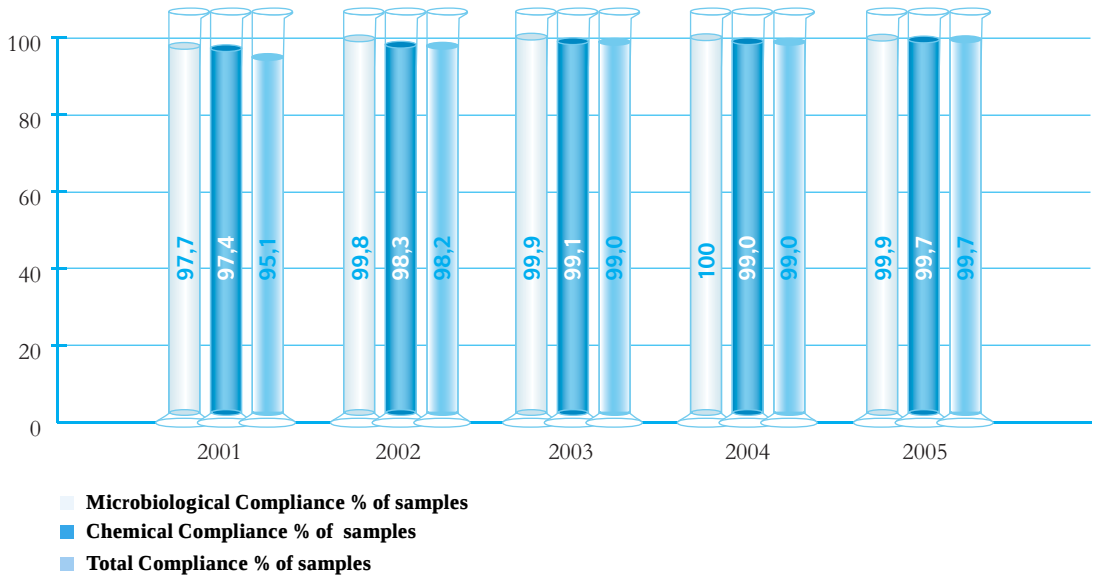
## TREATED WATER QUALITY IN ÜLEMISTE WATER TREATMENT PLANT

Ülemiste Water Treatment Plant has been in operation since 1927. The plant capacity is 123,000 $m^3$/day. In 2005 an average of 60,829 $m^3$ of water per day were produced.

The attached table *Treated water quality in Water Treatment Plant* in 2005 in Annex 4 shows that the 2005 treated water quality at the Ülemiste treatment plant has been in compliance with the requirements of the Decree no. 82.

Drinking water quality is ensured by the treatment process at Ülemiste Water Treatment Plant, which is even more effective than the established requirements. The treatment process is based on the requirements that have been established based on the quality of the raw water. As mentioned on page 20, chapter Surface Water Quality, our surface water complies with the EU directive 75/440 A2 class quality, in case of which it is prescribed to use physical and chemical processing of surface water to ensure drinking water quality – pre-chlorination, coagulation, settling, filtration, and disinfecting. At Ülemiste Water Treatment Plant the water treatment process uses ozone instead of pre-chlorination and pre-

### Drinking Water Quality Compliance 2001 – 2005 in percentages



filtration, which guarantees the high quality of drinking water more efficiently and the process complies with higher demands of our raw water.

In 2005, activated charcoal was used at the treatment plant, to improve the odour and taste of drinking water and reduce organics content during the summer period.

## QUALITY OF DRINKING WATER PRODUCED FROM GROUND WATER

In total AS Tallinna Vesi's bore well pumping stations produce ca 2,8 million m3 of drinking water per year. Consumers receive groundwater from groundwater bore well pumping stations. The Networks operate altogether 56 ground water pumping stations with 85 bore wells on average half of the bore wells are operational.

The attached table ***Water quality of bore well pumping stations 2005*** in Annex 3 shows that the 2005 water quality in ground water boreholes has shown a compliance with the requirements of the Decree no. 82.

Ground water used for drinking water production is of quality class I-III. Water in I quality category does not require treatment, such bore wells are all the Ordovician-Cambrian water complex bore wells in Nõmme.
The ground water of 26 bore wells in usage belongs to the drinking water source II and III quality category, and requires the necessary treatment. II and III water quality category is usually caused by excessive iron-, manganese-, and ammonium content and the non-compliance of colour with the raw water requirements.

The Company uses different ground water treatment methods in order to have guaranteed compliance with the drinking water requirements. At ground water boreholes-pumping stations, during 1999-2005 15 pressure filters were installed for removal of excessive iron and manganese. In pressure filters an aeration and filtration of raw ground water takes place, no chemicals are used. In order to improve water quality, also mixing the ground water of two aqueous layers is employed.
To monitor the efficiency of the treatment process, water samples are being taken from boreholes, after filters and from drinking water tanks before conducting water to the water network. Water samples taken after the filters show that water turbidity, iron and manganese content decrease substantially, colour and stability index improve, and water oxygen content increases.

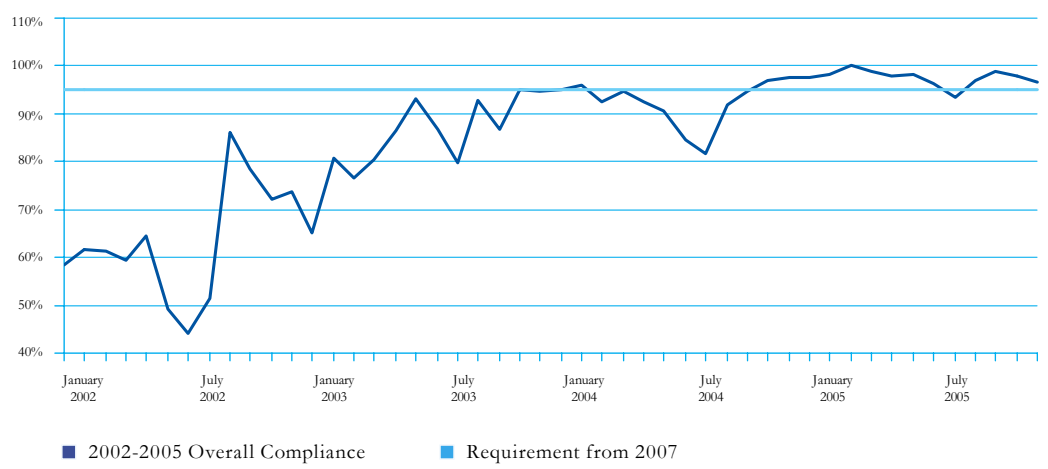
## WATER QUALITY IN NETWORKS AND AT THE CONSUMERS PREMISES

The Networks operate close to 900 km of water network, and 14 water pumping stationssupply the consumers with drinking water. During 2005 the water quality in networks and at the consumers premises has improved once again.

Taking into account the 0,2 mg/l iron limit content, a "soft" parameter coming into force from January 1st, 2007, the Tallinn city drinking water quality has increased significantly over the past years. Already at the end of 2004 or two years before the deadline more than 90% compliance with the new requirements had been achieved, in 2005 even higher compliance of 97,6 % has been achieved.

To improve the quality of drinking water supplied to the homes of Tallinners different actions have been carried out during the year, mainly flushing of networks and network rehabilitations. The usage of the new water treatment chemical polyaluminium chloride at Ülemiste Water Treatment Plant in 2003 has had a positive impact on water quality, decreasing the iron content and regulating the pH value in the water.

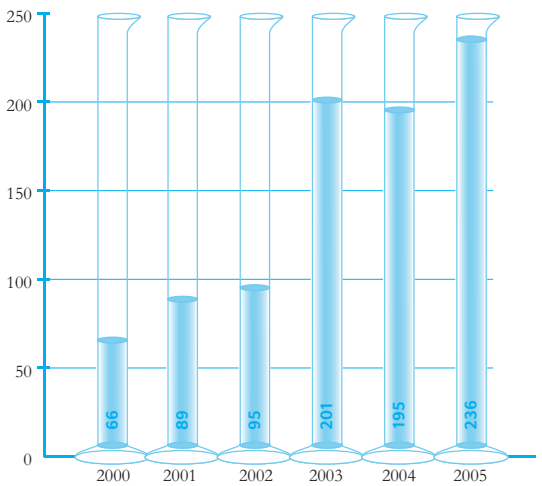
**Water quality compliance 2002 - 2005 with the requirements of decree 82 coming into force in 2007**



## FLUSHING NETWORKS

The Networks Department carries out airscouring and flushing works on the networks on a regular basis. The flushing helps to remove the sediment that has formed on the walls of water pipes and improves the quality of the water at the customers tap. The lenght of networks dealt with in this manner has been significally increased over the last three years.

### Flushed Water Networks 2000-2005 in km

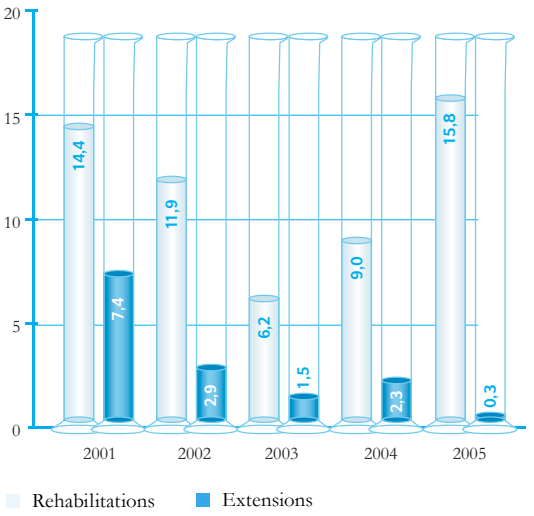



The volume of water used in flushing in 2005 (ca 111 500 $m^3$ per year) is not significant, compared with the benefit gained from the improvement in quality.

## WATER NETWORKS REHABILITATION AND REPLACEMENT

Investments in the replacement of old water pipes and water network extensions have contributed both to the improvement of water quality and more effective usage of water resources. Reconstruction plans were compiled taking into consideration the City of Tallinn roads asphalting programme, general condition of pipes and regional perspectives. In 2005 the bulk of construction of new water network took place in Nõmme and City Centre districts.

### Water Network Rehabilitations and Extensions 2001 – 2005 in km




## CONTROLLING LONG TERM WATER SUPPLY CUTS

The company has to ensure fast liquidation of emergencies, taking no longer than 12 hours, in order not to cause a reductin life in quality and endanger the population's health.

Despite all the measures that have been implemented within the Company, there were 3 water supply interruptions at Nõmme road, Tööstuse and Sõpruse street lasting longer that 12 hrs in 2005, due to emergency repair works on the water network.

The company has taken every possible action, but, considering the combined effect of technical and geological conditions, it was not possible to complete repair works on time and restore water supply faster than within 12 hours.

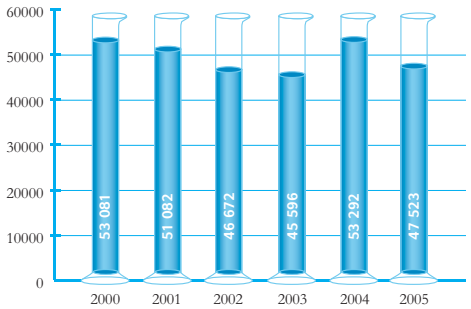
In order to further decrease the discontinuation of water supply to the consumers due to unplanned interruptions, the company improved contracts with subcontractors for the use of special equipment, which ensure a quick response in water leakages liquidation. The Company has special equipment, such as for example suction tank trucks, combined jetting and suction vehicles, pumps of different capacity for fighting water and other necessary equipment. In some specific situation where it was technically possible, a temporary connection was built to avoid any cut.

The company takes its responsibility to minimise the loss of noncompliant sewage to the environment very seriously.

## VOLUME OF WASTEWATER

Since 1980 Tallinna Vesi has the operated waste water treatment plant at Paljassaare. The treatment capacity of the plant is 350,000 m³/day. The volume of wastewater treated at Paljassaare Wastewater Treatment Plant in 2005 was equivalent to volume 47,523 thousand m³, 130,200 m³/day

### Treated wastewater volume 1999 – 2005 (thousands of m³/year)




thus being in the similar level with the usual volumes of last years. In 2004 the amount of wastewater treated was higher due to the particularly wet summer.

## TREATMENT RESULTS

The quality of the water discharged to the sea is set by legal acts and a permit for the special use of water HR0549 and HR0679.

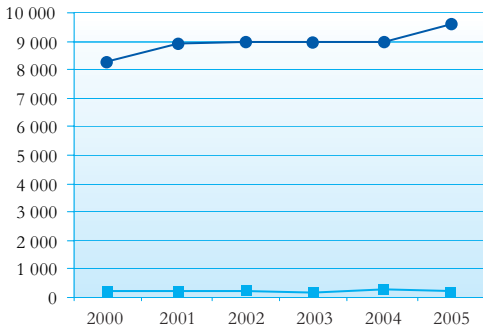
To assess wastewater quality, the concentration of pollutants in the sewage received by the treatment plant and in the wastewater coming from treatment, and the efficiency of treatment process are monitored. The concentration of pollutants of incoming wastewater has increased during past years. To ensure the compliance with the indicators for the outgoing wastewater, the company had had to increase its efforts in the treatment process.

The following are the more significant indicators, whereas the smaller the indicator in the outgoing wastewater is, the less sea pollution is generated:

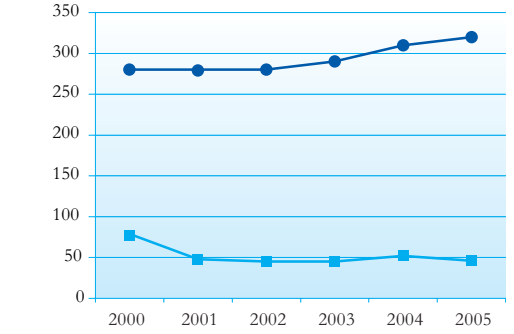
- Biological oxygen demand (BOD7) shows the amount of oxygen required for the defined biological

### Pollutants in incoming and outgoing wastewater in 2005 in tons per year

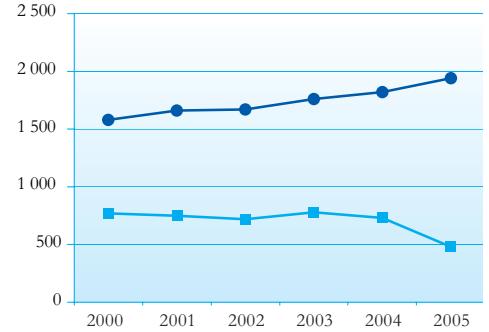
**BOD7 tons per year**



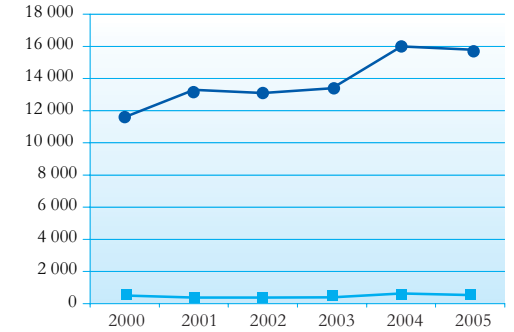

**Total P tons per year**




**Total N tons per year**




**Suspended solid tons per year**




**incoming** **outgoing**

decomposition of organic material in water in the course of 7 days;

- Chemical oxygen demand (COD) is a measure of the decomposition of organic material, measured as the consumption of oxygen in chemical oxidation of all organic material in water;

- Total Phosphorus (P) and total Nitrogen (N) are elements included in nutrient salts that increase the growth of plankton in water. If the content of nutrient salts is too high, such growth can be so strong that the oxygen is used up and a shortage of oxygen arises;

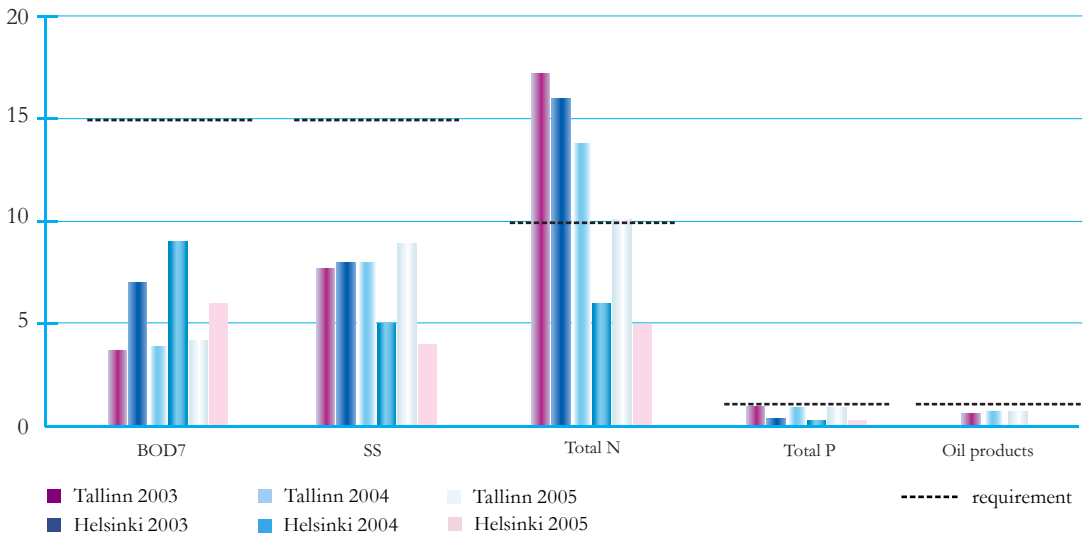
- Suspended solids (SS) shows the volume of solid matter in water than remains in a filter with a mesh of a defined size;

- Oil products show the amount of light (like petroleum) and heavy (like mazut) oils

In 2005, treatment results were broadly similar to previous years. Requirements of the permit for the special use of water were fulfilled in 2005. Particularly positive results have been achieved in nitrogen removal.

Treatment results are also comparable with the results of our close neighbour water company Helsinki Water and with larger Estonian water companies.

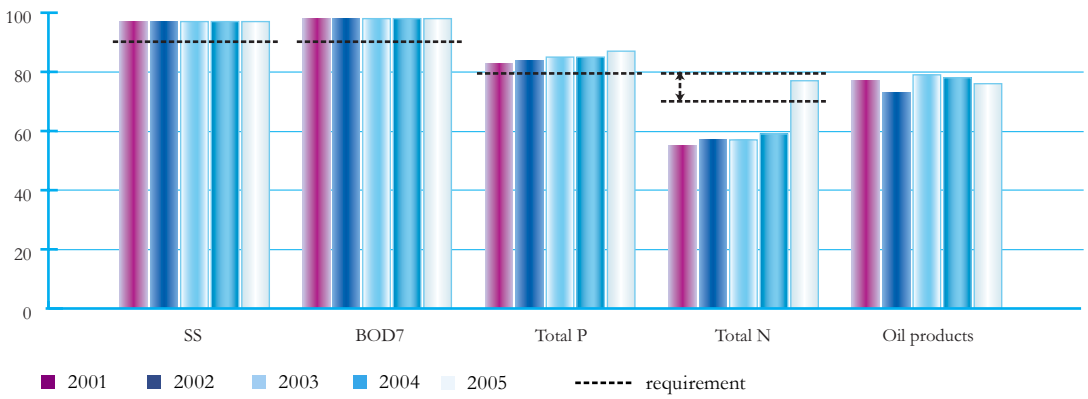
## Average pollution indicators of outgoing wastewater 2003-2005 mg/l compared to legislation requirements and Helsinki Water



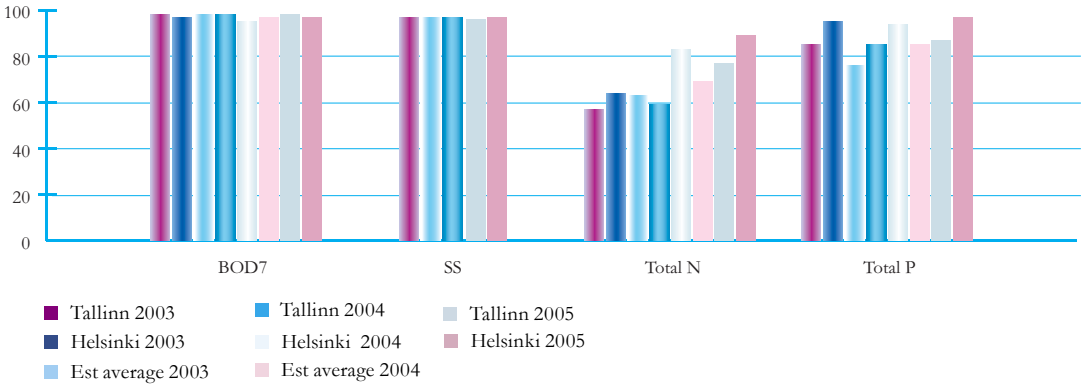

* according to the pollution charge replacement contract concluded with the Ministry of Environment and the water permit HR0653 20 mg/l total N was allowed in 2004. By the end of test year (started 01.07.2005) by 30.06.2006 average total N has to be <11,6 mg/l



## Wastewater Treatment Plant treatment efficiency 2001 - 2005 in percentages



## Treatment efficiency in 2003-2005 compared to Estonian average results* and to Helsinki Water in percentages




* Latest data available for 2004. Calculation is based on data of five bigger Estonian water companies.

### The Nitrogen Project

As the level of pollution in water directed into treatment plant has increased year by year and also the requirements for the permitted effluent nitrogen content have changed, reaching a high quality of effluent discharged into the environment was more difficult than earlier and thus the modernisation of Paljassaare's treatment process was undertaken.

In 2003, an agreement was concluded with the Ministry of Environement to eliminate the pollution charge, whilst the Company was undertaking extensive works, which would enable a decrease in the amount of nitrogen discharged to the Finnish Bay at at least by 25% compared to the characteristic of 2002 by 31.03.2006.

The project was started in summer 2003. The project, which is the first of its kind in all three Baltic States, included modification of the aeration tanks, an increase in air production capacity and the construction of a methanol plant which increases the efficiency of the treatment process.

The test year started from 1 July 2005, during which the results of extensive reconstruction works of technological equipment were be tested. Throughout the whole year, works on re-tuning the technology and optimising various technological regimes in different weather and load conditions have been going on. Based on the 2005 results it can be said that the aim of the reconstruction works is achievable, despite an extremely steep increase in total nitrogen in the influent (annual average concentration increased by ca 16% in 2005 compared to 2004). To achieve the results, supplementary technical solutions and additional resources have been used. Work will also continue in 2006.

### HELCOM

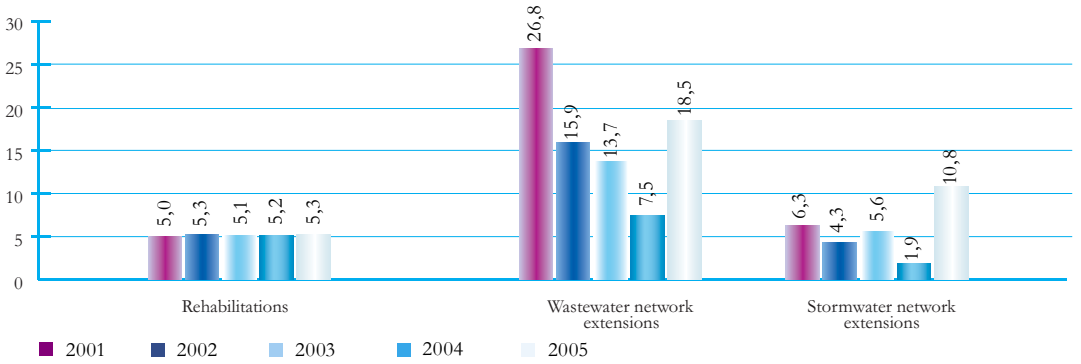
As the nitrogen concentration in the issued wastewater decreases to the desired level, the City of Tallinn will be in a position to achieve positive feedback from HELCOM enabling the exclusion of Tallinn from its list of environmental "hot spots".

The Helsinki Commission, or HELCOM, organises intergovernmental cooperation between Denmark,

Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden in order to protect the marine environment of the Baltic Sea from all sources of pollution. Organising of the cooperation is based on the Baltic Sea environmental protection convention.

Based on the convention, HELCOM recommendations 4/2 and 16/9 have been adopted, where inter alia the marginal values of quality indicators of wastewater for wastewater treatment plants have been set. For example,

## Wastewater Network Rehabilitations and Extensions 2001 – 2005 in km




at least 90% reduction of BOD, at most a concentration of BOD in the effluent of the treatment plant of 15 mg/l; yearly average values of total phosphorus below 1.5 mg P/l; 10 mg total nitrogen/l in the effluent water or 70-80 % reduction of total incoming nitrogen.

## PREVENTION OF FLOODS

The Networks operate the waste water network with close to 800 km of sewerage network, over 300 km of storm water network and 69 sewerage pumping stations.

The main improvments to prevent flooding and thus to avoid the environmental pollution in streets, are connected to the wastewater and stormwater network rehabilitation and extension and preventive flushing of sewer pipelines.

### Sewer and Stormwater Networks Rehabilitation and Extension

During 2005 the Company has been actively renovating existing wastewater network and building new wastewater and stormwater systems.
Reconstruction plans are compiled taking into consideration the City of Tallinn roads asphalting programme, general condition of pipes and regional perspectives.

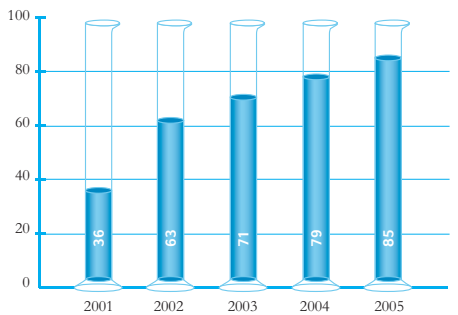
The bulk of construction of new sewerage network took place in Kristiine, Nõmme, Haabersti, North Tallinn and Pirita districts, the new stormwater network was constructed mainly in Kristiine, Haabersti and Pirita districts.

In 2005, the company together with the City of Tallinn and local governments initiated a storm water scheme for Suur-Sõjamäe and Veskimetsa areas. The cooperation will continue in 2006.

### Flushing of the wastewater network

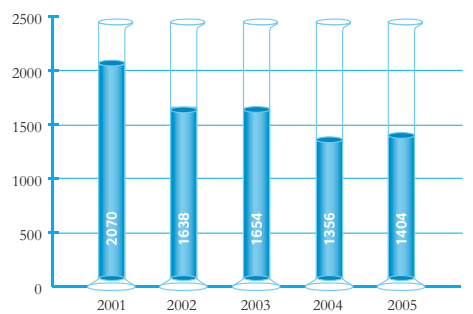
The Company carries out power-washing to liquidate blockages and carry out preventive maintenance. The main reason behind the sewer blockages is the reduction of flow amounts and flow speeds caused by the reduction in water consumption and the consequent increased sedimentation of the pipes. Since networks flushing has produced good results, the volume of networks to be flushed has been increased each year. For that purpose, 3 combined jetting and suction trucks are in constant use.

### Flushed Sewage networks 2001 - 2005 km




Due to flushing the number of blockages has been reduced in recent years. However, the sewer network serviced by the company has increased by more than 11 % during recent years, and as a result the absolute number of blockages has slightly increased in 2005 in comparison with the previous year.

### Blockages 2001 – 2005



### Responding to floods

According to the requirements of the Services Agreement concluded with the City, the time to respond to sewer blockages and floods which may cause an environmental pollution on streets is four hours. During 2005 four local floods in were registered. The company has taken immediate action after receiving the notice and in each case the emergency team started to liquidate the case without any delay.

## SEWER AND STORMWATER OVERFLOWS

### Sewer overflows

Due to the simultaneous rain and thaw the level of Lake Ülemiste increased to a critical point in January 2005, as a result the main pumping station emergency outlet was opened and 130 836 m³ of sewerage water that did not undergo treatment but was highly diluted by storm water, was pumped to the sea. Action in such emergency situations has been foreseen by Estonian legislation, which allows the conduct of wastewater, diluted with stormwater in the proportion 1:4, directly into the water body, i.e into the sea.

Due to the shock loads, which exceeded the capacity of biological treatment, 41 543 m³ of highly diluted sewerage water which had undergone the mechanical treatment was conducted during the year to the sea through the deep-sea outlet. The predominant amount of partly treated sewerage water was conducted into the sea during the extraordinary weather conditions in January, the rest of the amount was distributed over different months due to odd shock loads exceeding the capacity of biological treatment.

By pumping directly into the sea the treatment capability of the plant was preserved, as restoring the plant's tratment process takes a long time and in the interim the deficient treatment capacity would have increased the sea pollution risk to a higher level. Also more serious damage to the environment was avoided as with the facilities working at full capacity, sewer flooding in the streets in the lower parts of the city was avoided, and the level of lake Ülemiste kept below a critical point.

In best practice a wastewater treatment plant is designed on the basis of the actual average indicators of water intake and processing and the possibility to conduct water directly into nature is foreseen for extraordinary situations. Plants not loaded to nominal capacity do not enable the best of treatment, treatment process work is also paralysed by excessive shock loads and too fast flowing of water in the treatment process.

As the operation in the extraordinary weather conditions in January was recognized to be a force majeure situation by the Ministry of the Environment, AS Tallinna Vesi was exempted from paying the extra pollution charge due to the extraordinary weather conditions.

### Waste Water Treatment Plant flow amounts and overflows 2004-2005 in thousands of m³/year

| | 2004 | 2005 |
|---|---|---|
| Flow amount from main pumping station | 53 297 365 | 47 522 789 |
| Overflow before mechanical-chemical treatment | 429 88 | 130 836 |
| Overflow after mechanical-chemical treatment | 1 563 955 | 41 543 |

### Stormwater overflows

In 2005 the company monitored, pursuant to the requirements set forth in the water permit, 16 stormwater outlets. The largest storm water outlets are the Lasnamäe, Harku and Mustoja outlets. Samples from storm water outlets are taken regularly, 1-2 samples each month. The sampling procedure for outlets is determined for the Company by the special use of water permit no. HR0549.

In total, 4 206 384m3 (in 2004 6 344 793 m³ )of stormwater was discharged through the said outlets, which carried tons of pollutants into the environment.

### Pollutants from main outlets 2004-2005 in tons

| | 2004 | 2005 |
|---|---|---|
| Suspended solids | 90,7 | 60,1 |
| Oil products | 7,2 | 4,8 |

In order to minimise possible environmental pollution, local treatment facilities are being designed for some outlets. The City of Tallinn has issued the respective conditions and the construction of local treatment facilities was started in the last quarter of 2005.

The company is obliged to pay a pollution charge for the pollutants discharged to the water bodies. Pollutants contained in treated effluent and storm water are included in the pollution charge calculations. Depending on the specific outlet the permit for special use of water establishes both the pollutants, the discharge of which is not limited by the permit for special use of water, but for which a pollution charge is charged for (SS, total phosphorus, oil products, total nitrogen, depending on the specific outlet) as well as the permitted limits of pollutants (in the part of oil products, depending on the specific outlet).

Pursuant to the Environmental Charge Act a pollution fee was paid into the Environment Fund. Water pollution charge made up the proportin of operating costs:

In 2003 2,9 % of operating costs;
In 2004 4,3 % of operating costs;
In 2005 3 % of operating costs.

## AMOUNTS, TYPES AND HAZARDOUSNESS OF CHEMICALS

The Company uses approximately 470 hazardous and less hazardous chemicals in its operating activities. The largest volumes of chemicals are used by the Treatment Plants, the widest range of different chemicals is used by the Laboratories and the Asset Management Department.

Chemicals become hazardous first and foremost due to their characteristics which pose a danger to the population and the environment, on the other hand the level of hazardousness depends on the amount of chemical used.

Pursuant to the Chemicals Act and its implementing provisions AS Tallinna Vesi has been classified as a category B company with a risk of a major accident. This is due to large amount of chlorine used in the water treatment process. In the water treatment process water is disinfected, so that the water would be safe to human health. The most common disinfectant in use is chlorine, which is effective and has a longer-term effect in the water distribution network. As a chemical chlorine is a heavier than air poisonous gas causing irritation and having a corrosive effect, which affects mucous membranes both internally and externally, thus in the case of a chlorine emergency the people in the affected area, who are exposed to the gas, may suffer serious damage to health or die.

The usage of chlorine has dropped considerably over the past decade. In 1996, for example, the Company used 251 tons of chlorine annually, but by 2005 the usage had decreased to 51 tons. The main reason for this decrease is the use of ozonization of water instead of prechlorination. Ozone is produced on site by the Company in the amounts required, due to a closed process and that no stock held, the hazard to the environment is minimum.

### Usage of chemicals in treatment process

In addition to chlorine, significant amounts of other chemicals are used in the water and wastewater treatment processes as coagulants and polymers.

In water treatment process the polymer and coagulant help to remove the particulate matter in the water, such as suspended solids, organic substances and others. In wastewater treatment coagulant is used for chemical processing of wastewater with the aim to remove the phosphor. Polymers are used to change the qualities of sediment and as a result of adding these water is more easily detached from the sediment.

Both coagulants and polymers are used in liquid form, they do not have as strong poisonous characteristics as chlorine and are not hazardous to the environment or the population provided that safety requirements are followed.

In 2005 methanol started to be used in order to increase the biological treatment efficicency. The amounts of chemicals used at the Treatment Plants mostly depends on the characteristics and volume of the water coming into the plants, which in turn is influenced by weather conditions in the case of raw water and the pollution level in the case of wastewater. Looking at the chemicals usage per unit produced, it becomes clear that despite very different characteristics of water and very different weather conditions the efficiency of chemicals usage has remained relatively stable.

However, in the water treatment process considerably more coagulant was used in 2005 than in previous years. This was caused by raw water that in 2005 was rich in humines, for the treatment of which larger doses of chemicals had to be used.



## Usage of chemicals in the water treatment technological process 2002-2005

| Type of chemical | Unit | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Liquid chlorine | | | | | |
| Total usage | ton | 73 | 69 | 56 | 51 |
| Usage per unit produced | g/m$^3$ | 2,6 | 2,5 | 2,4 | 2,3 |
| Coagulant - polyaluminium chloride | | | | | |
| Total usage | ton | 218 | 1018* | 1 476 | 1 577 |
| Usage per unit produced | g/m$^3$ | 67,2 | 61,6 | 62,8 | 69,3 |
| Coagulant aluminium sulphate | | | | | |
| Total usage | ton | 5 045 | 1997** | 0 | 0 |
| Usage per unit produced | g/m$^3$ | 200,4 | 186,1 | 0 | 0 |
| Polymer | | | | | |
| Total usage | ton | 3,9 | 2,6 | 1,7 | 2,1 |
| Usage per unit produced | g/m$^3$ | 0,1 | 0,1 | 0,07 | 0,1 |
| Ozone | | | | | |
| Total usage | ton | 196 | 158 | 173 | 163 |
| Usage per unit produced | g/m$^3$ | 8,0 | 6,4 | 7,4 | 7,2 |

* June - Sept **Jan - May

In wastewater treatment considerably more chemicals are used as a result of several factors. On one hand, people are using more chemicals in the household and at the same time are consuming less water, which consequently reduces the volume of wastewater but increases the concentration of phosphor in wastewater. Resulting from changing of the technological process, only chemical phosphor removal is possible, due to which more chemical has to be used for achieving the required phosphor levels in the discharged wastewater.

More chemical has to be used also for nitrogen removal from sewage, the concentration of which has been also increasing over the years in the incoming sewage. Increase in the nitrogen level is apparently caused by the changes in people's eating habits and new food products, which appears as nitrogen in the received sewage. The technology and amounts of chemicals were tested in different circumstances.

## Usage of chemicals in the wastewater treatment technological process 2002-2005

| Type of chemical | Unit | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Coagulant ferric sulphate | | | | | |
| Total usage | ton | 1 186 | 1 453 | 1 991 | 2 120 |
| Usage per unit produced | g/m$^3$ | 25,4 | 31,9 | 37,4 | 44,6 |
| Polymers | | | | | |
| Total usage | ton | 49,1 | 36,5 | 39,3 | 43,7 |
| Usage per unit produced | g/m$^3$ | 1,1 | 0,8 | 0,7 | 0,9 |
| Methanol | | | | | |
| Total usage | ton | | | | 812 |
| Usage per unit produced | g/m$^3$ | | | | 17,1 |

### Chemicals Inventory

In 2005, the Company improved its chemicals inventory. The chemical database was created, based on the already existing labs chemical database. It holds the information about the substances and hazardousness of chemicals, safety methods, suppliers, safety data sheets and users.

During the creation of the database of chemicals the existing chemicals' safety data sheets, which can be used as the basis for organising safe handling of chemicals, were reviewed. Availability of the chemicals' safety data sheets from suppliers has improved and these exist practically on all chemicals. The chemicals safety data sheets are available in the Company both electronically from a single folder as well as in the form of hard copy at usage sites.

## ACCIDENTS INVOLVING CHEMICALS

The probability of accidents connected with chemicals has been minimized, as the handling systems of chemicals comply with security and safety requirements.

The probability of accidents involving chlorine has been minimised by applying the required safety measures. The technology of chlorine storage at Ülemiste complies with the German design norms and construction with the Finnish norms, as in Estonia there were no requirements for the chlorine storage construction. The construction of the new chlorine storage facility, which is one of the most modern of its kind in Europe, was completed during 2003.

In addition to the previously mentioned new chlorine storage, the necessary conditions for chemicals storing and usage have been established for other chemicals in usage, based on information on the safety cards of chemicals, legal acts and safety instructions. The handling sites of important chemicals are supplied with automatic warning and degassing systems for the early detection of the possible leakage and its neutralization. Absorbents and personal protective appliances are available at the usage locations of chemicals.

Although the probability of the occurrence of large chemical accidents is small, the consequences of accidents connected with hazardous chemicals used in large amounts – like chlorine, methanol, methane gas (see page 35) – may be severe, if the chemical exits the operating premises. In this case there is a high risk that people's health will be damaged and there will be an environmental pollution.

A chlorine accident, which is defined in the company as a crisis situation, has he most serious potential consequences. In order to be prepared for fast liquidation of the unlikely but still possible chlorine accident, an emergency action plan has been compiled and there are annual chlorine accident trainings in cooperation with Harju County Rescue Service.

Possible accidents related with other chemicals are not assessed (assessed on the basis of significance of consequences) as a crisis. As a rule these are smaller leakages that do not exit the operating premises customized for that and do not damage the environment and people. Smaller emergencies were liquidated pursuant to the procedures for handling non-conformities, which have been put in place in the Company.

There were no chemicals accidents with serious or minor consequences in 2005, which would have caused damage to people or the environment.

## AMOUNT OF WASTE

The largest amount of waste in the Company is created by the Wastewater Treatment Plant, followed by Networks, Water Treatment and Asset Management. In 2005 the total amount of waste decreased.

### Waste produced 2003-2005 in tons

| Waste produced | 2003 | 2004 | 2005 |
|---|---|---|---|
| Total waste, included | 37 169,0 | 43 100,8 | 39 545,6 |
| Ordinary waste | 37 154,5 | 43 096,5 | 39 541,9 |
| Hazardous waste | 14,5 | 4,3 | 3,7 |

## HAZARDOUS WASTE

Almost half of the hazardous waste created in 2005 was waste oil, which emerges in the course of maintenance of machines and equipment. The other large part is made up of lead-plate batteries, these are mainly the old batteries of large means of transport collected and handed over in Paljassaare. Also quite many appliances containing PCB were collected, these are old appliances removed from the process, which are not used any longer.

### More considerable hazardous waste produced 2003-2005 in tons

| Type of waste | 2003 | 2004 | 2005 |
|---|---|---|---|
| Old oil | 1,4 | 1,2 | 1,5 |
| Lead-plate batteries | 1,4 | 0,5 | 1,2 |
| Devices containing PCB | 0,7 | 0 | 0,24 |
| Paints- varnishes | 2,7 | 0,5 | 0.1 |
| Laboratory chemicals containing hazardous substances | 0,2 | 0,6 | 0,2 |
| Fluerescent lamps and articles containing mercury | 0,2 | 0,3 | 0,2 |
| Ni- , Cd- batteries | 0,6 | 0,1 | 0 |
| Disposal of electronical devices | 0,1 | 0,8 | 0 |
| Others | 7,2 | 0,3 | 0,2 |
| Total | 14,5 | 4,3 | 3,7 |

## ORDINARY WASTE

Approximately 90 % of ordinary waste is sludge, a by-product of waste water treatment. The volume of sludge, waste from screens and sandtraps' sludge are directly influenced by amounts of incoming waste water.
In 2005 action wast taken to look for possibilities to wash desanding system sediments and screenings before transporting them to landfill, in order to decrease the amount of waste going to landfill. In addition, the company also had the task to make oil removal in Wastewater Treatment Plant more efficient in order to ensure further compliance with the water permit. Although some analyses were done, further steps were not agreed during the year. The task fulfillment will be continued in 2006.

In 2005, the amount of excavated soil and old asphalt significally decreased. The excavated soil was reused in construction sites.

In 2005 the Company continued to separate paper and cardboard, as well as packages (plastic soft drink bottles) from mixed municipal waste. The idea of sorting metal waste was finalised, aluminium, copper and copper alloys, iron, steel and cast iron are collected separately.

### More considerable ordinary waste produced 2003-2005 in tons

| Type of waste | 2003 | 2004 | 2005 |
|---|---|---|---|
| Mixed municipal waste | 221,4 | 151,2 | 171,5 |
| Paper and cardboard* | 2,6 | 12,3 | 10,5 |
| Packages* | 0,6 | 1,7 | 0,9 |
| Excavated stones and soil** | 7861,0 | 6125,5 | 1619,6 |
| Waste from screens | 107,4 | 173,9 | 272,7 |
| WWTP wastewater sludge** | 27952,0 | 35770,0 | 36404,0 |
| Sandtrap's sludge | 413,2 | 715,2 | 312,8 |
| Asphalt waste | 155,5 | 83,1 | 80,8 |
| Concrete | 31,6 | 17,1 | 33,7 |
| Mineral waste | 303,2 | 43,7 | 491,5 |
| Metal scrap** | | | 102,9 |
| Other waste | 105,9 | 2,8 | 41,0 |
| Total | 37154,5 | 43096,5 | 39 541,9 |

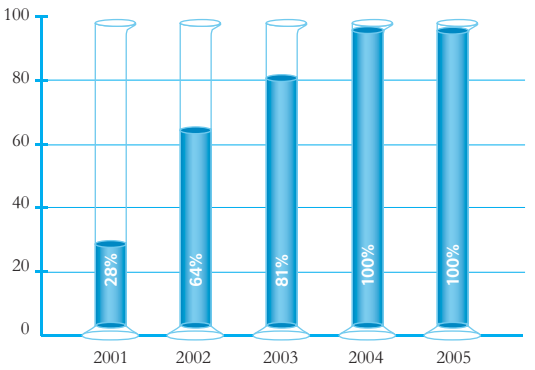
* separately collected from mixed municipal waste

** reused

## SLUDGE REUSE

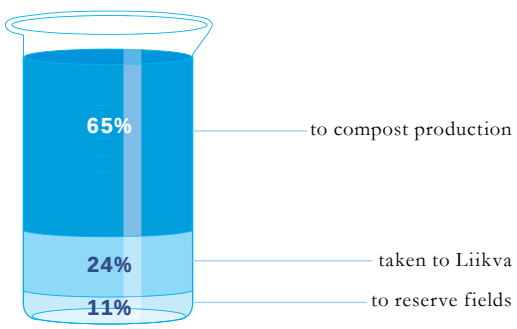
The biggest part of recycled waste was made up of sludge, which the Company stopped depositing to landfill in 2003.

### Percentage of recycled sludge 2000-2005




In total, 36 404 tons of sludge was recycled.

### Sludge usage in 2005




The compost can be used in gardening. The quality of the compost is examined regularly by the waste water laboratory. The compost is valued by our customers, since a significant amount, 19 300 tons of compost was sold in 2005.

### Compost fields

As the Company stopped disposing sludge to landfill in 2003 and wishes to use it for compost production, the need for addition composting fields arose. Thus the construction of new composting fields with a total area of 10 hectares was started in 2004. In 2005 a storm water collecting pond and ca 6 ha of composting fields, which have been taken into use, were completed within the framework of this project. The construction will be completed in 2006.

### Reconstruction of sludge processing plant

In order to increase the sludge proccesing capability and be able to extract more sludge out of the process if necessary, a reconstruction of sludge processing plant started in 2005. During 2005 design of the plant was done, project will be continued in 2006.

### Forest planting experimentation

In 2002, a study of different possibilities for the use of wastewater sludge was initiated. The main purpose of this study, which is planned to run until 2006 is to evaluate the different options for the use of sludge in afforestation and in recultivation of exhausted and closed quarries and in afforestation of alvars. Also, any environmental impact to surface water and ground water, due to the use of sludge in afforestation, is being studied. The study is being carried out in two areas - alvar in Liikva village and Rae mire. In order to collect comparative data, different tree species such as Norway spruce, white birch, alder, European larch, poplar, hybrid aspen and European ash have been planted to the trial grounds.

In 2005 the study of sludge usage was conducted. The results of the study indicated the improvement of site conditions for trees both in alvars treated with sludge and peatland. Based on the studies the peat from bogs is the most suitable soil for afforestation. All species used so far have grown very well on peat soil fertilised with wastewater sludge and the trees exceed the parameters of the trees on trial ground many times. The tolerance of different tree species against the amount of sludge used differs being higher among bigger plants with a strong root system. The main factors hindering tree growth in bogs are an insufficient air content of the soil and an excess amount of sludge. Therefore the studies are being continued for finding out the optimal sludge amounts and the soil treatment methodology is being improved as well. The results of the study show a minimum environmental impact to surface water and ground water involved in using wastewater sludge for afforestation.

Results of the study has been publiched also in the publication Forestry Studies issued by the Institute of Forestry and Rural Engineering of Estonian Agricultural University.

In support of the research, the company's employees have been taking part in tree planting actions for the last two years.

### Waste Permits

Since sludge reuse qualifies as waste recycling, the Company has obtained waste permits in accordance with the requirements of the Waste Act.

| Permit | Valid until | Description of waste permit |
|---|---|---|
| Waste permit no. L.JÄ.HA-34941 | 30.12.2009 | Issued for recycling of stabilised waste and for transporting waste to Liikva as well as for recycling of biodegradable waste. |
| Waste permit no. L.JÄ.HA-31326 | 08.09.2009 | Issued for recycling of stabilised waste in Paljassaare in the part of stabilised waste, domestic wastewater sludge and biodegradable waste. The first type of waste created is domestic wastewater sludge, which processed, i.e. stabilised in the digesters. After stabilisation we have stabilised waste which is in turn reused – composted by mixing it with peat on the composting fields. Thus the processing of wastewater sludge into compost takes place via two recycling processes. |

The conditions of waste permits related to sludge recycling were met in 2005.

### Compliance with Paljassaare Waste Permit L-JÄ.HA-31326 in tons

| Type of waste | Permit | 2004 Actual | 2005 Actual |
|---|---|---|---|
| Stabilised waste | 40 000 | 35 770 | 36 404 |
| Domestic wastewater treatment sludge | 300 000 | 35 770 | 36 404 |
| Biodegradable waste | 10 000 | 0 | 0 |

### Compliance with Liikva Waste Permit no L.JÄ.HA-34941 in tons

| Type of waste | Permit | 2004 Actual | 2005 Actual |
|---|---|---|---|
| Stabilised waste | 15 000 | 5 526 | 8 857 |
| Biodegradable waste | 3000 | 0 | 0 |

Paljassaare compost fields

# Energy Consumption

## CONSUMPTION OF ELECTRICITY

The bulk of electricity consumed is used for running the core processes of the company - in the Water and Wastewater Treatment Plants, and in Networks to operate pumping stations and other equipment.

Total consumption of electricity in 2005 increased compared to the previous year, mainly because of the need to uprate the technological process of nitrogen removal in wastewater treatment. New equipment was added, which has to operate continuously 24h a day. In 2005 the consequences of crises caused by extraordinary weather conditions in summer 2004 and January 2005 were still perceptible, and some power-consuming additional equipment was needed for drying the increased amount of sludge that emerged due to that. Because of difficult operating conditions in year 2005, the consumption of electricity per unit produced, showing the efficiency of equipment operation, has increased too in Waste Water Treatment Plant. In order to reduce the electicity consumption condensators were installed in technically suitable places to compensate reactive energy and more electricity from biogas was used in 2005.

In Water Treatment and in Networks, the consumption of electricity has decreased. In water treatment the replacement of the main high energy consumption Lasnamäe pumps with energy saving ones helped decrease the consumption.

Electricity consumption by other users, such as the main office and support services located at Ädala increased in 2005. This was mainly due to the moving of the Asset Management unit and workshops to Ädala site.

### Consumption of electricity in total and per unit 2002-2005

| Department | Unit | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|
| Water Treatment | | | | | |
| Total usage | kWh | 13 495 858 | 12 182 867 | 11 206 594 | 10 968 383 |
| Consumption per unit produced | kWh/m3 | 0,48 | 0,45 | 0,48 | 0,48 |
| Wastewater Treatment | | | | | |
| Total usage | kWh | 14 889 755 | 15 575 937 | 16 478 684* | 17 655 111 |
| Including electricity from biogas | kWh | | 1 250 223 | 889 560 | 2 330 691 |
| Consumption per unit produced | kWh/m3 | 0,32 | 0,35 | 0,31 | 0,38 |
| Networks pumping stations | | | | | |
| Total usage | kWh | 6 691 148 | 6 126 094 | 6 000 153 | 5 554 768 |
| Other consumers | | | | | |
| Total usage | kWh | 443 075 | 717 319 | 870 376 | 981 480 |
| **TOTAL** | **KWH** | **35 519 836** | **34 602 217** | **34 555 807** | **35 159 742** |

* including electricity from biogas



## GREEN ENERGY

A good opportunity to reduce the damage caused to the environment by electricity consumption is to use green energy and to utilise as much of the biogas produced at Wastewater Treatment as possible.

Because of higher costs of electricity the company did not achieve its plan to acquire the Green Energy certificate offered by Eesti Energia, but the usage of biogas increased in 2005.

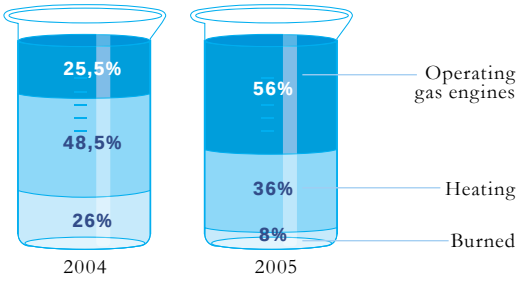
### Biogas usage

As a result of the wastewater treatment process, a biogas which contains approximately 60 % methane is produced in the methane tanks where the sludge is fermented.

2, 234, 000 $m^3$ (1, 883, 000 $m^3$ in 2004) of biogas was produced in the digesters at Paljassaare Wastewater Treatment Plant in 2005, almost 20 % more than 2004.

In 2005 92 % (~2, 072, 000 $m^3$) of the biogas was used to either operate the gas engine or produce heating. This was an almost 20 % improvement over 2004 when 26 % of the biogas was burned off. Some of biogas was burned because of lower need during the works of the nitrogen removal project, but also during summer when there is no need for heating.

### Biogas Usage at Paljassaare Wastewater Treatment Plant in 2004-2005




Methane contained in the biogas is explosive and decreases the ozone layer. In 2005, there were no biogas accidents that would have caused methane to be released into the air.

## CONSUMPTION OF FUEL

Altogether the Company has 149 vehicles and special purpose vehicles for the purpose of carrying out different operating tasks. The biggest group of vehicles is operating vehicles, which include the cars used by foremen, minivans, team vans including leakage labs and asset management vans and team cars with a lifter. Special purpose vehicles include jetting and suction trucks, watertankers and sludge transportation trucks.

### Types of vehicles 2004-2005 in numbers

| Vehicles | 2004 | 2005 |
|---|---|---|
| Passenger cars | 42 | 62 |
| Operating vehicles | 66 | 54 |
| Special purpose vehicles | 9 | 9 |
| Tractors, trailers | 13 | 16 |
| Water tanks | 4 | 4 |
| Others | | 4 |
| **TOTAL** | **134** | **149** |

Consumption of fuel has decreased compared to previous years. In 2005 we considered the use of fuel of higher quality as the substances contained in higher quality fuel pollute the environment less and because of higher quality we need to spend less fuel. However the decision was taken not to pursue it further under the frame of the existing contract because of no evidence of additional efficiency effect. Nevertheless, the employees can use it according to the valid contract and the usage of the higher quality and thus more environment friendly fuel has been increased compared to the previous year.

### Fuel consumption 2003-2005 in litres

| | 2003 | 2004 | 2005 |
|---|---|---|---|
| Petrol | 93 000 | 105 000 | 103 006 |
| Including more environmental friendly fuel | | 3 721 | 10 557 |
| Diesel | 279 000 | 262 000 | 198 886 |
| **TOTAL** | **372 000** | **367 000** | **301 892** |

## AMBIENT AIR POLLUTION PERMITS

The ambient air pollution permits issued to Tallinna Vesi regulate the amount of pollutants of primary importance, such as nitrogen dioxide, carbon monoxide, volatile organic compounds, emitted from the boiler houses of Ülemiste and Paljassaare as well as the emitted amount of ozone that is produced for drinking water treatment.

| Permit | Valid until | Description of ambient air pollution permit |
|---|---|---|
| Pollution Permit no. L.ÕV.HA-21334 | 31.12.2010 | Valid for Ülemiste Water Treatment Plant pollution sources – the chimney of the boiler house and the exhaust pipe of the diesel generator. Establishes the list of pollutants emitted into ambient air and the annual permitted emission amounts thereof. |
| Pollution Permit no. 696 | 31.12.2005* | Valid for Paljassaare Wastewater Treatment Plant pollution sources – the chimney of the boiler house, exhaust pipes, The chimney of the combined heat plant. Establishes the list of pollutants emitted into ambient air and the annual permitted emission amounts thereof. |
| Pollution Permit no. L.ÕV.HA-21490 | 31.12.2010 | Valid for a pollution source at Ülemiste Water Treatment Plant - the ventilation system of the ozone production plant. Establishes the list of pollutants emitted into ambient air and the annual permitted emission amounts thereof. |

* New permit from 2006

The conditions established with Ambient Air Pollution Permits have been met in 2005.

### Ambient Air Pollution from Wastewater Treatment Plant boiler house 2003 –2005 in tons

| Substance | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|
| | Permit | Actual | Permit | Actual | Permit | Actual |
| Nitrogen dioxide | 31,6 | 29 | 31,6 | 11,3 | 31,6 | 26,5 |
| Carbon monoxide | 216,4 | 193,8 | 216,4 | 73,7 | 216,4 | 190,1 |
| Volatile organic compounds | 14,4 | 12,9 | 14,4 | 4,9 | 14,4 | 12,7 |

**Ambient Air Pollution from Water Treatment Plant boiler house 2003 – 2005 in tons**

| Substance | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|
| | Permit | Actual | Permit | Actual | Permit | Actual |
| Nitrogen dioxide | 2,4 | 1,6 | 2,4 | 1,6 | 2,4 | 1,6 |
| Carbon monoxide | 2,4 | 1,6 | 1,9 | 1,6 | 1,9 | 1,6 |
| Volatile organic compounds | 0,16 | 0,1 | 0,17 | 0,1 | 0,17 | 0,1 |

In respect of ozone a thermic destructor of the residual ozone has been integrated into the process, in which the residual ozone emitted from the process is burned and the air emitted from the destructor is diluted. 100% of residual ozone was destroyed in 2005.

## AMBIENT AIR POLLUTION CHARGE

The Company pays the minimum pollution charge for pollutants emitted into ambient air. In 2005 it made up 0,6 % of the total pollution charge paid.

# Environmental Awareness Of Suppliers

Environmental criteria for the qualifying of suppliers have been established in the procurement procedures of the Company. The environmental compliance of bidders is evaluated in the course of procurement through questionnaires completed by the bidders. A bidder who is unable to prove the compliance of its environment related activities with Company requirements, will not be accepted to the next stage of the procurement.

The construction works bidders must also confirm that they employ environmental protection measures on site, including the compliance of noise levels with norms and possibilities for reducing noise. The environmental activities of subcontractors on the sites are monitored by the construction supervision staff of the Company.

In January 2005 we organised a seminar for our subcontractors introducing our activity, where we talked about the necessity of environmental requirements and significant environmental aspects.

Information about the significant environmental aspects is available at our company's web page, and it has been referred to also in the tendering documents.

# Connections To The Public Sewerage System

By the end of 2005 we had ca 14 500 wastewater connections and ca 19 000 existing service contracts. The Company actively encourages customers to connect to public sewerage, which decreases the risk of environmental pollution.

## NEW CONNECTIONS

Today ca 97 % of the company's service area in Tallinn is covered with the public sewer network. In collaboration with the City of Tallinn, the Company is planning to cover the whole City with the public sewer network by the end of 2010.

As a result of the construction works, each year the Company provides 500 - 600 immovables with the opportunity to connect to the public network. In 2005 the possibility to connect was created for more than 600 immovables, in Nõmme, Lilleküla, Merivälja, Haabersti, Põhja-Tallinn.

Through connecting to the public network it is possible for the city inhabitants to improve their living environment. New networks are built in collaboration with the City of Tallinn. The City of Tallinn is providing the customers with a connection fee compensation depending on how quickly the customer is going to connect after the connection possibility became available. The Company's previous experience, however, shows that not all households who have the opportunity to connect with public sewer network with the City's compensation take the advantage of the possibility.

The Company has a target to sign at least 80% of all possible connection contracts within 1 year from receiving the usage permit of street pipes. In 2005 77 % of potential customers had connected with the public sewerage, that was 3% below the target. The reasons for smaller number of connectees than planned were primarily the following - resolving the ownership issue of immovables takes in some cases longer than anticipated, the potential connectee does not have the necessary resources for constructing the pipeline within the property, and regardless of the benefits some customers may not be interested in connecting to public sewerage.

In order to make connection process more efficient and effective for customers, the Company's target was to shorten the time of concluding contracts and offer more actively the connection possibility.

The task to shorten the time of concluding connection contracts to a maximum of 5 weeks was exceeded as the the average time to conclude connection contracts was 4.1 weeks in 2005. The target to shorten the time of concluding of service contracts to a maximum of 4 weeks was not achieved due to an earlier backload. The average result was 4.5 weeks in 2005.

## OVERPOLLUTION CAUSED BY CUSTOMERS

The Company's Wastewater Inspectorate regularly monitors the sites discharging wastewater into Tallinn's public sewerage system, verifying the compliance to requirements provided in legislation.

The dominant industrial wastewater in Tallinn's sewer system is the wastewater of the food-processing industry and the average quality indicators of the wastewater of larger industries are presented in the Statement which the Company regularly submits to Harju County Environmental Service.

In 2005, the Customer Service presented to all identified overpolluters invoices for over pollution according to the legal requirements and contract concluded with the clients.

# Environmental Communication

Tallinna Vesi, due to the services it provides, is within the scope of interest of stakeholders and the general public. Therefore, the Company has evaluated its environment related information and agreed on the significant aspects and tasks deriving from them.

## Media coverage on environment-related topics

In 2005, Tallinna Vesi continued cooperation with the environmental magazine Keskkonnatehnika which published the Company's articles on environmental projects. In addition, news about the Company's daily work and overviews about water treatment, construction works, wastewater treatment and community projects were published by different media channels like Eesti Päevaleht, Postimees, Linnaleht and TV channels. The company does regular monitoring of published articles to measure the company related media coverage.

In addition, Tallinna Vesi has been publishing the customer information newspaper "Veeleht" ("Water Paper") in Estonian and Russian. Twice a year the newspaper is sent to 130 000 households in Tallinn for the third year in a row. Independent customer survey showed that 25% of the respondents have read the newspaper and found the content of the paper informative.

## Environmental events

Different groups have taken active interest in the company's activities. Thus, the company's experienced specialists carry out regular presentatins and tours in the water and wastewater treatment plants. In addition, presentatins and visits to introduce the company, its treatment plants as well as the significant environmental aspects are carried out for many interest groups, partners and press. All press events organised by the company during the year provide an overview of the key environmental projects.
Also wider public interest events were carried out. For example, a Run around Lake Ülemiste in August and Hansabank Run from spring till autumn during which beautiful territory around the lake, that usually is closed for the public, was opened. In these sport events company also introduces the environmental friendly tap water drinking habit and offers pure drinking water to the participants for free.

## Educational Children's Play on Environmental Protection

In 2005, the company continued collaboration with the children's theatre Trumm to cast an educational play on environmental protection called "Järvevanake" and play it in the schools and kindergartens of Tallinn. Children have enjoyed the play very well and during the year, over 30 shows were done in schools all over the city.

## Water saving programme

The company also participated in a non-profit organisation Ökokratt's educational water related educational programme "How to save and protect water". Specialists from Tallinna Vesi gave several lectures for schoolteachers on how to present water-related information in classrooms. We also organised tours in our Ülemiste and Paljassaare plants as a part of the environmental weeks in the schools.

## Regular Information Exchange with Stakeholders

In order to improve the environmental related information exchange with our stakeholders, the company took several steps. The company published a special booklet providing an overview of the catchment area and the Ülemise WTP processes which is distributed to all people visiting the plant. A similar booklet concerning Paljassaare WWTP a published in early 2006.

The EMAS environmental report provides an exhaustive overview of all the company's environmental activities and performance indicators during the year. The report together with additional environmental information is available at Tallinna Vesi's homepage at www.tallinnavesi.ee



One of the company's key stakeholder is the City of Tallinn. Information exchange with the City of Tallinn and its different offices (Utility Board, Sustainable Development and Planning Office, Environmental Office) is carried out by regular reporting, letter exchange and meetings during which different aspects of the company's development are discussed. An important point of cooperation is action planning in crisis situations and an operative problem solving during that period.

The company has a good working relationship with Harjumaa Environmental Service and Environmental Ministry. All regular environmental reporting has been submitted on time and in 2005, the company improved the corresponding procedure to have a clear overview of the reports submitted, their deadlines and responsible parties.

AS Tallinna Vesi is a member of the Estonian Water Companies Association (EVEL) and a senior representative of the company sits on the board of the organisation. Together with EVEL, the company organises various water and wastewater related seminars and trainings for the members. In addition, cooperation with EVEL enables the company to be involved in the changing process of the law applying to the water business.

Being a member of the Estonian Environmental Management Association (EKJA) improves collaboration with other businesses.

## Preparedness For Crisis Situations

### POTENTIAL CRISIS SITUATIONS

A crisis is an extraordinary situation with a significant negative impact that can effect a large proportion of the service area and that can cause the company to not function properly, where:

- the life quality and health of humanity is under danger;
- providing services to clients and customers can be disturbed long term or has been cancelled;
- remarkable threat of environmental pollution can happen;
- the financial situation of the company substancially worsens;
- key operational assets have been damaged;
- the reputation of the organization has been seriously damaged.

In the Company we have identified the following potential situations as crisis situations because of different reasons:



#### • Chlorine emergency in WTP

Due to technological failures, chlorination points breakdown, damage to chlorine containers during transport or staff shortage

#### • Too high level of Lake Ülemiste

Due to extraordinary weather conditions

#### • Inability to treat water

Main reasons for that can be long-term extensive breakdowns of the automatic control system, equipment or pumping stations and other inadvisable situations, such as raw water pollution in Lake Ülemiste (plain crash, accidents with chemicals etc), fire at the main facilities, long-term electricity cut, the impossibility to use the diesel generator, chlorine emergencies, terrorist act, bomb threat or staff shortage.

#### • Inability to supply drinking water to customers

If there is a failure concerning the main pipeline of water supply network, as a result of which the water supply is discontinued or there is a high degree of danger that supply of water may be discontinued for more than 4 hours for the critical spots such as a whole city district, main hospitals etc.

#### • Inability to transport wastewater and discharge it

Because of the collapse of the tunnel sewer or failure of sewerage pumping stations, as a result of which extensive floodings and pollution of environment could happen.

### • Inability to receive stormwater

Due to extensive floods that are in the service area of ASTV caused by major rainstorms and sudden thaws.

### • Inability to treat wastewater.

Main reasons for that can be long-term extensive breakdowns of the automatic control system, main pumping station or other equipment as the blowers, the air mains. Also other inadvisable situations such as extensive fire at main facilities, hazardous chemicals (methanol, coagulant) emergencies, long-term electricity cut; large breaking of sea outlet pressure mains, unfavourable weather conditions (heavy or extreme rainfall), terrorist act, bomb threat or staff shortage.

### • Terrorist act, bomb threat in ASTV territory

Because of extraordinary external situations.

### • Extensive fire

If fire safety instructions are not followed.

### • Work accidents resulting in death or several serious injuries

If work safety instructions are not followed.

## EMERGENCY ACTION PLANS

The Company has put in place the basic principles for crisis situation prevention and preparedness and developed emergency action plans for defined crisis situations. Crisis action plans are reviewed and improved regularly and tested in practical trainings in cooperation with State and City emergency facilities, where possible.

In 2005 the important trainings related with preparedness in the crisis situations were:

- Practical testing of too high level of Lake Ülemiste
- Basic Fire Safety Training for employees
- Evacuation training in Ädala
- Participating in crisis training of liquidation consequences of extensive floods organised by the City of Tallinn
- Chlorine Emergency Training

## IMPROVEMENTS IN PREPAREDNESS FOR CRISES

2004 was extraordinary for the company in the sense that twice, in July and August, a crisis situation was announced in the company. In July there were extensive floods and in August due to the heavy rain the level of Ülemiste rose rapidly over critical level. Extreme weather conditions due to simultaneous rain and thaw brought the Lake Ülemiste water level to the highest level also in January 2005.

As a result of detailed analyses of these crises several actions were made in order to improve a preparedness for crises in 2005.

### Construction of Ülemiste bank reinforcements

In summer 2005 reconstruction and extension of the existing bank reinforcements of Lake Ülemiste was started, in order to avoid floods during the high water period. Reconstruction will be finished in 2006.

### Increasing the overflow of Lake Ülemiste

The existing overflow of the lake was reconstructed and additionally a new emergency outlet was constructed from Pirita-Ülemiste channel into Pirita river.

### Taking surface water connections into ground water areas

Based on the Tallinn public water supply and sewerage development directions, the company has compiled its 12 Year Development Plan, which also determines the activities for ensuring alternative water supply in case of the pollution of Lake Ülemiste. One of the possibilities is to create connections between the surface and ground water pipelines, the investments into which were started in 2005 and on part of which the activities will continue over the following years.

### Remote surveillance project

In order to get timely information about possible sudden changes in water regimes, the remote surveillance project of hydropoints and water and wastewater pumping stations was started. In 2005 the technical conditions were elaborated, the project will be ongoing in 2006.

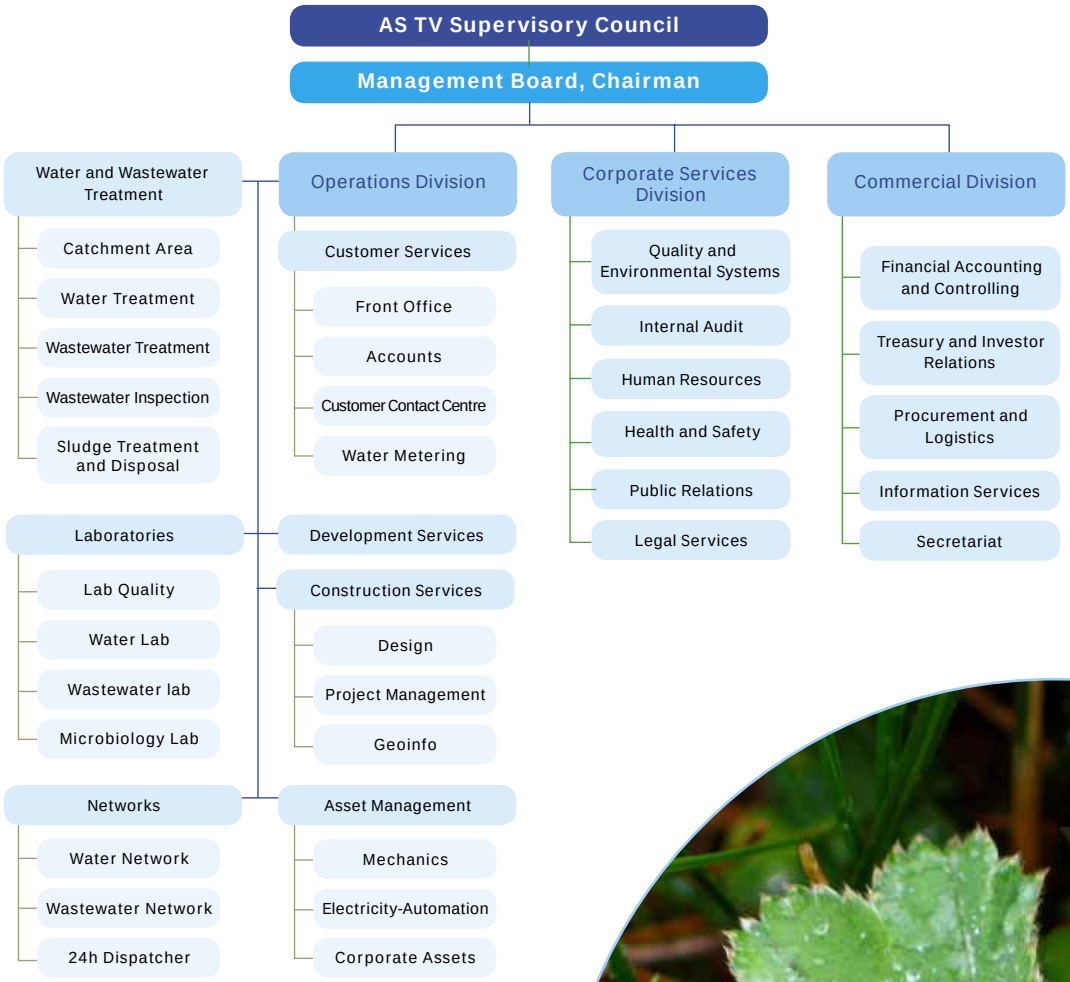


### Development of stormwater network

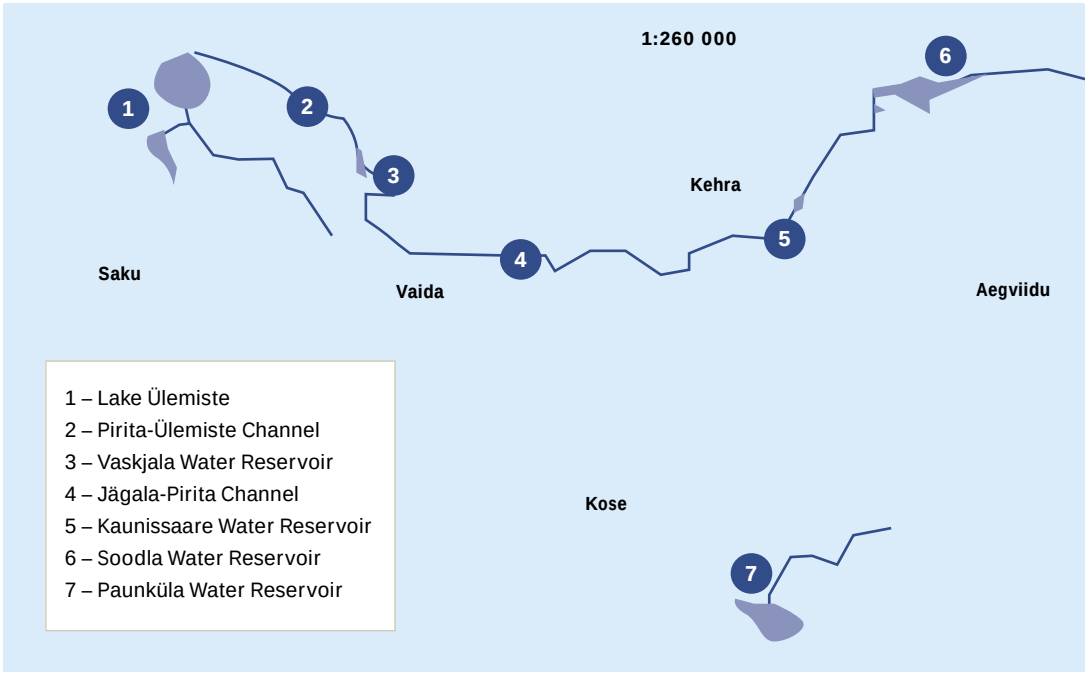
Please see page 26, the chapter Prevention of floods

# Annex

## Annex 1. The organisation chart of Tallinna Vesi as at the end of 2005




# Annex 2. Catchment Area




Reservoirs and rivers have been connected into one system by canals. The water volumes are adjusted at hydropoints built on the rivers. If the water from catchment area just surrounding the lake is not sufficient to maintain the necessary level of the lake, additional volumes are taken from Vaskjala hydropoint through Pirita-Ülemiste canal. All water from the catchment system can be conducted to Vaskjala hydropoint.

## Annex 3. Treated water quality of bore well pumping stations 2003 - 2005

| Parameter | Unit | 2003 | 2004 | 2005 | Decree no 82 and EU Directive 98/83/EC |
|---|---|---|---|---|---|
| Odour | points | 1 | 1 | 1 | Acceptable to consumer |
| Taste | points | 1 | 1 | 1 | Acceptable to consumer |
| Temperature | °C | 9 | 9,1 | 9,1 | |
| Colour | mg Pt/l | 8,2 | 7,6 | 7,2 | Acceptable to consumer |
| Turbidity | NTU | 2,04 | 1,88 | 1,38 | Acceptable to consumer |
| Dissolved O2 | mg/l | 4,5 | 4,6 | 4,6 | |
| pH | pH unit | 8,06 | 8,09 | 8,03 | 6,5 - 9,5 |
| Conductivity | µS/cm | 626 | 590 | 583 | 2500 |
| Permanganate index | O2mg/l | 1,02 | 1,12 | 1,02 | 5 |
| Alkalinity | mg-ekv/l | 2,47 | 2,58 | 2,57 | |
| Total hardness | mg-ekv/l | 3,56 | 3,38 | 3,33 | |
| Temporary hardness | mg-ekv/l | 0,97 | 0,84 | 0,8 | |
| Permanent hardness | mg-ekv/l | 2,58 | 2,54 | 2,53 | |
| Free CO2 | mg/l | 2,7 | 2,7 | 3 | |
| Total iron Fe | mg/l | 0,21 | 0,18 | 0,13 | 0,2 |
| Fluoride | mg/l | 0,68 | 0,66 | 0,69 | 1,5 |
| Manganese Mn | mg/l | 0,053 | 0,043 | 0,039 | 0,05 |
| Ammonium NH4 | mg/l | 0,359 | 0,288 | 0,273 | 0,5 |
| Nitrites NO2 | mg/l | 0,008 | 0,009 | 0,012 | 0,5 |
| Nitrates NO3 | mg/l | 0,39 | 0,5 | 0,54 | 50 |
| Stability index | | 0,25 | 0,24 | 0,18 | |
| Total organic carbon | mg/l | 1,3 | 1,3 | 1,3 | Without unusual changes |
| Sulfides, S2- | mg/l | 0,004 | 0,006 | 0,006 | |
| Dry residue | mg/l | 347 | 280 | 286 | |
| Calcium, Ca2+ | mg/l | 51 | 48 | 48 | |
| Magnesium,Mg2+ | mg/l | 12 | 13 | 13 | |
| Sodium, Na+ | mg/l | 46 | 32 | 32 | 200 |
| Potassium, K+ | mg/l | 6,9 | 6,5 | 6,3 | |
| Sulfates SO42- | mg/l | 14 | 21 | 23 | 250 |
| Bicarbonates,HCO3- | mg/l | 157,7 | 155,1 | 155,9 | |
| Chlorides, Cl- | mg/l | 108 | 100 | 95,8 | 250 |
| Boron | mg/l | 0,17 | 0,23 | 0,18 | 1 |
| Aluminium | µg/l | 1,84 | 2,53 | 2,25 | 200 |
| Arsenic | µg/l | 0,27 | 0,25 | 0,11 | 10 |
| Cadmium | µg/l | <0,09 | <0,09 | <0,01 | 5 |
| Chromium | µg/l | 0,82 | 0,76 | 0,47 | 50 |
| Copper | mg/l | 0,0036 | 0,0033 | 0,0041 | 2 |
| Mercury | µg/l | 0,02 | <0,01 | <0,01 | 1 |
| Nickel | µg/l | 3,14 | 2,35 | 2,86 | 20 |
| Lead | µg/l | 0,27 | 0,49 | 0,37 | 10 |
| Antimony | µg/l | 0,04 | 0,03 | 0,03 | 5 |
| Selenium | µg/l | 1,28 | 1,31 | 1,17 | 10 |

## Annex 4. Treated water quality in Ülemiste Water Treatment Plant 2003 - 2005

| Parameter | Unit | 2003 | 2004 | 2005 | Decree no 82 and EU directive 98/83/EC |
|---|---|---|---|---|---|
| Odour | points | 1 | 1 | 1 | Acceptable to consumer |
| Taste | points | 1 | 1 | 1 | Acceptable to consumer |
| Turbidity | NTU | 0,24 | 0,15 | 0,17 | 1 |
| Colour | Pt mg/l | 3 | 3 | 3 | Acceptable to consumer |
| Dry residue | mg/l | 268 | 291 | 286 | |
| pH | | 6,97 | 7,27 | 7,30 | 6,5 - 9,5 |
| Conductivity | µS/cm | 420 | 447 | 441 | 2500 |
| Alkalinity | mg-ekv/l | 2,4 | 2,9 | 2,9 | |
| Total hardness | mg-ekv/l | 4,0 | 4,3 | 4,2 | |
| Temporary hardness | mg-ekv/l | 2,4 | 2,9 | 2,9 | |
| Permanent hardness | mg-ekv/l | 1,6 | 1,4 | 1,3 | |
| Permanganate index (COD Mn) | mg O2/l | 2,9 | 3,3 | 3,5 | 5,0 |
| Total organic carbon (TOC) | mg/l | 6,2 | 6,7 | 6,9 | Without unusual changes |
| Free CO2 | mg/l | 30,6 | 16,9 | 17,8 | |
| Carbonates CO3 | mg/l | 0 | 0 | 0 | |
| Bicarbonates HCO3 | mg/l | 148,1 | 176,9 | 178,0 | |
| Chlorides Cl- | mg/l | 13,5 | 26,8 | 26,1 | 250 |
| Sulphates SO4 | mg/l | 70,4 | 41,5 | 38,2 | 250 |
| Orthophosphates PO4 | mg/l | 0,019 | 0 | 0 | |
| Fluoride | mg/l | 0,09 | 0,14 | 0,15 | 1,5 |
| Nitrates NO3 | mg/l | 4,3 | 3,6 | 2,5 | 50 |
| Ammonium NH4 | mg/l | 0,007 | 0,002 | 0,003 | 0,50 |
| Calcium Ca | mg/l | 66,5 | 72 | 69,9 | |
| Magnesium Mg | mg/l | 8,6 | 8,0 | 7,6 | |
| Total iron Fe | µg/l | 0 | 0 | 0 | 200 |
| Manganese Mn | µg/l | 8,3 | 4,8 | 7,5 | 50 |
| Aluminium Al | µg/l | 118 | 108 | 132 | 200 |
| Sodium Na | mg/l | 6,3 | 6,7 | 6,3 | 200 |
| Potassium K | mg/l | 2,4 | 2,5 | 2,6 | |
| Chromium Cr | µg/l | 0,79 | 0,61 | 0,56 | 50 |
| Copper Cu | µg/l | 4,0 | 0,6 | 0,6 | 2000 |
| Mercury Hg | µg/l | 0,05 | 0,02 | 0,045 | 1 |
| Lead Pb | µg/l | 0,27 | 0,03 | 0,02 | 10 |
| Selenium Se | µg/l | 0,60 | 0,00 | 0,09 | 10 |
| Zinc Zn | µg/l | 2,0 | 0,5 | 0,3 | |
| Acrylic Amide | µg/l | 0,063 | 0,036 | 0,028 | 0,10 |
| Chloroform | µg/l | 16,4 | 23,2 | 21,6 | |
| THM | µg/l | 18,0 | 25,6 | 26,0 | 150 |
| Enterococh | PMÜ/100ml | 0 | 0 | 0 | 0 |
| No of nests at 22 C | PMÜ/ml | 1 | 0 | 2 | 100 |
| Coli bacteria | PMÜ/100ml | 0 | 0 | 0 | 0 |
| Escherichia coli | PMÜ/100ml | 0 | 0 | 0 | 0 |
| Clostridium perfringens | PMÜ/100ml | 0 | 0 | 0 | 0 |

# Annex 5. Overview of Environmental Goals and Tasks for 2006

## The catchment area

- Minimise the risk of floods caused by too high water level in Lake Ülemiste
- Ensure the constant monitoring and optimal regulation of water regimes
- Improve the response time to significant disturbances in the surface water catchment
- Continue and foster cooperation with undertakings who can affect the condition of Lake Ülemiste in order to minimise risks of emergency

## Water Treatment

- Use the surface water and ground water resources economically
- Ensure uninterrupted treatment process and sufficient drinking water supply
- No chlorine leakages harmful to the population and environment
- Continue to ensure and improve the quality of drinking water flowing out of Ülemiste water treatment plant

## Networks

- Reduce the level of leakages
- Reduce iron content and turbidity in tap water
- No long-term water supply cut at the mains dangerous to population
- To avoid sewage floods that are causing significant damage to the population and nature
- To enhance the stormwater network system in critical areas, improve the storm water scheme of the City of Tallinn
- Decrease the amount of pollutants discharged to the environment with storm water using storm water cleaners whereever possible.
- Increase environmental awareness of subcontractors operating on most important sites of ASTV

## Wastewater Treatment

- Minimise discharge of untreated wastewater into the see, improving equipment
- Recycle of all sludge and reconstruct the sludge process plant
- Decrease the nitrogen level and finish succesfully nitrogen project test year
- Ensure the high level of other quality indicators for wastewater

## Customer Relationships

- To extend the water network in Nõmme and public sewerage areas in Kristiine, Pirita and Haabersti
- To construct connections in neighbouring municipalities and development areas .....
- To make connection process of customers to water network and public sewerage more convenient using the possibilities of the new customer information system
- To influence customers to control their level of pollution
- Reduce the number of complaints related to the environment

## Energy usage

- Reduce consumption of electricity and make it more effective
- Reduce consumption of fuel

## Environmental communication

- Improve crisis communication procedures
- Provide regularly information on important environmental events to public and stakeholders

## Environmental management system

- Find alternative possibilities for the waste reduction, sorting or recycling
- Improve the system for evaluation of the environmental performance
- Renew ISO 14001:2004 and EMAS certificates



## EMAS VERIFICATION

DNV Certification Oy/Ab has an accreditied verifier (FIN-V-002) examined the environmental management system and the information given in the 2005 environmental report of Tallinna Vesi.

It has been initially verified on June 11, 2005 and reverified on May 26, 2006 that both the environmental management system and the environmental report fulfil the demands of EU Council Regulation 7612001 of Eco Management and Audit Scheme EMAS: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The environmental report is also available on our website at **www.tallinnavesi.ee**