
Summary of the SEA report

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INTRODUCTION

Objects of the strategic environmental assessment (hereinafter SEA):

- National Radiation Safety Development Plan 2018–2027 (hereinafter NRSDP);
- National Radon Action Plan;

The objectives of this SEA are:

1) explain, describe and evaluate the significant possible environmental impact of the measures and actions planned and alternatives thereof to establish the objectives of NRSDP 2018–2027, National Radon Action Plan and the National Action Plan For Radioactive Waste Management and provide the corresponding information to the compiler and approver of the strategic planning documents;
2) propose measures to mitigate and/or prevent the possible unfavourable environmental impact or amplify the favourable impact;
3) make suggestions to improve the use of environmental measures so that the justified suggestions would be considered with, if required;
4) analyse whether NRSDP, the National Radon Action Plan and the National Action Plan For Radioactive Waste Management take into account the environmental requirements of both Estonia and the European Union in the planning of the field of radioactivity and management of radioactive wastes, and make suggestions on how to that, if required;
5) evaluate how measures and planned actions could potentially help to erase the deficiencies and thereby achieve the general objectives of the NRSDP, the National Radon Action Plan and the National Action Plan For Radioactive Waste Management;
6) if possible, make suggestions on planned activities on the basis of the results of the environmental impact assessment of the planned activities;
7) examine that the NRSDP, the National Radon Action Plan and the National Action Plan for Radioactive Waste Management are logically structured, clear and consistent;
8) participation of the SEA expert group as needed in the process of compiling the NRSDP, the National Radon Action Plan and the National Action Plan for Radioactive Waste Management.

The scope of SEA covers the strategic environmental assessment of the objectives and measures (actions) of NRSDP and the actions established in the National Radon Action Plan and the National Action Plan for Radioactive Waste Management presented as its annexes.

As SEA is made for a strategic planning document, the impacts assessed with SEA are on a general strategic level. SEA is carried out pursuant to the Environmental Impact Assessment and Environmental Management System Act. In SEA, radiation is referring to ionising radiation. Ionising radiation is the direct or indirect transfer of energy in the form of particles or electromagnetic waves of a wavelength of 100 nanometres or less;
1. OBJECTS OF SEA

1.1 National Radiation Safety Development Plan 2018–2027;

Strategic sub-objectives and measures of the Development Plan (working versions in June 2019) are as follows:

**Strategic objective 1: Improved efficiency of the infrastructure for radiation safety;**

Measure:
1. Establishing and updating the legislation and reference documents needed to ensure the safety norms for ionising radiation according to international requirements.

**Strategic objective 2: Improved awareness of and competence in radiation safety.**

Measures:
1. Development of radiation-related training;
2. Improvement of the awareness of the people of the possible risks of ionising radiation and methods to reduce the risks;
3. Ensure a sufficient number of radiation specialists in Estonia.

**Strategic objective 3: Reduced hazards related to radioactive waste and the treatment thereof;**

Measures:
1. Reduction of the generation of radioactive waste and organisation of the safe intermediate storage thereof;
2. Draw up a plan to establish a final storage site of radioactive waste (incl SEA) and environmental assessment of decommissioning the reactor sections of the Paldiski nuclear site.
3. Development of the reuse and treatment of radioactive material containing natural radionuclides (NORMs) and establishment of procedures for storage.

**Strategic objective 4: Preparedness to prevent and solve radiation events.**

Measure:
1. Establishment of a radiological emergency plan (HOLP) and development of systematic preparedness.

**Strategic objective 5: Reduced risks from natural radiation sources.**

Measure:
1. Reduction of risks from natural radiation sources.

**Strategic objective 6: Justified use of medical radiation and safety thereof.**

Measures:
1. A sustainable and uniform procedure has been developed for the assessment of the justification of medical radiology procedures;
2. In the clinical use of medical radiology, radiation awareness, good practice and adherence to principles of radiation safety are being promoted, respective guiding and informational documents developed and there is monitoring in place;
3. Development of the competence needed to perform the clinical audit of medical radiology procedures;
4. Establishment of a system for the assessment of yearly dose per person per year from medical radiation.

1.2 National Radon Action Plan

The National Radon Action Plan is presented as an annex to the NRSDP and the main objective of it is the minimisation of health risks from radon exposure in general purpose buildings and workplaces with high risk of radon.

1.3 National Action Plan For Radioactive Waste Management

The National Action Plan for Radioactive Waste Management was approved with the regulation No. 688 of the Minister of the Environment on 21.07.2015. In Estonia, matters related to radioactive waste management are organised on the basis of the action plan and the aim of the plan is to offer decision-makers and waste handlers specific solutions for the systematic management of radioactive waste and to reduce their amounts in the Republic of Estonia. The plan also offers enough information for the wider public about the radioactive waste generated and to be generated, as well as their management.

The updated National Action Plan for Radioactive Waste Management shall be submitted as an annex to the NRSDP. The purpose for updating the action plan was to renew the action plan as a result of the amendments to the Radiation Act that became effective on 01.11.2016 (e.g. the addition of the NORM residues concept) and in relation to the new developments in the treatment of NORM wastes. Also, the information related to the demolition of the reactor sections of the former nuclear site of Paldiski and to the establishment of the final storage site of the radioactive wastes has also been updated in the action plan.

2. OVERVIEW OF THE IMPACTED ENVIRONMENT

In the Overview of the Impacted Environment, the natural and socio-economic environments important with regard to radiation were described. As part of this, the results of national radiation monitoring and various surveys, analyses and audits carried out in recent years were showed.

In summary, it can be said that the national radiation monitoring of recent years has not detected any radiation contamination within the monitored parameters.

In consideration of the current situation in radiation safety, the topics of importance or that require more attention than before are:

- the radon concentration of the indoor air of buildings with high or very high risk of radon;
- high concentration of radium isotopes of natural origin used for drinking water from groundwater from the Kambrium-Vend (incl. Gdov and Voronka);
✓ the treatment of radioactive wastes (incl. NORM waste) and the requirement of final storage;
✓ the need to increase the radiation safety awareness of people (residents, people working with radiation sources, monitoring, etc.);
✓ the need to take into consideration possible radiological emergencies;
✓ the need to optimise radiation safety related activity (e.g. regulation, monitoring, etc.).
3. OBJECTIVE, METHODOLOGY, SCOPE AND DEVELOPMENT SCENARIOS OF THE STRATEGIC ENVIRONMENTAL ASSESSMENT

Surveys, analyses and monitoring were performed during the period of NRSDP 2008–2017 that are reflected both in the explanatory note to the NRSDP 2018–2027 as well as this SEA report. The respective results are important input in putting together NRSDP 2018–2027. In addition, the NRSDP team performed the analysis of the implementation of the NRSDP measures and actions of the previous period which was taken into account in the preparation of the so-called follow-up NRSDP. Radiation protection involves various fields of activity: medicine, industry, readiness to emergencies, environmental monitoring, etc. The working team to prepare the NRSDP is comprised of specialists with a long-term experience in radiation, radiation safety and related fields. As a result of the work of the NRSDP team, the current situation and needs of specific fields were mapped based on which the strategic objectives of NRSDP and corresponding measures were formulated. As part of this, various alternative options were considered if possible within specific areas of activities (e.g. possibilities for the treatment of radioactive waste (provided in the National Action Plan For Radioactive Waste Management), methods for measuring radon (provided in the National Radon Action Plan), etc).

In consideration of the aforementioned circumstances, the best development scenario is the implementation of the NRSDP 2018–2027 and the establishment of additional development scenarios or alternative solutions is not required according to the compiler of the SEA. It is also not purposeful to address as a separate development scenario the zero-alternative or a situation where NRSDP and its action plans are not carried out. This would not be a real development scenario since the obligation to establish NRSDP 2018–2027 and the related action plans has been stipulated in the NRSDP of the previous period and Radiation Act.

The scope of SEA covered the strategic environmental assessment of the objectives and measures (actions) of NRSDP and the actions established in the National Radon Action Plan and the National Action Plan for Radioactive Waste Management presented as its annexes. As SEA was prepared for a strategic planning document, the impacts assessed with SEA are on a general strategic level. Two primary methodical approaches were used in the preparation of SEA: conformance analysis (links with other strategic documents) and analysis of external influence (sectoral impact assessment). As part of this, the analysis of external influence was carried out both across the natural and socio-economic environment as well as the sub-categories thereof.

Based on the SEA programme, the implementation of NRSDP has concurrent impact in the following fields:

1. natural environment:
   - impact on surface and ground water, soil;
   - impact on air quality and climate;
   - impact on biological diversity and biota (incl. protected areas, Natura 2000 areas);
   - impact on landscape and cultural heritage.

2. socio-economic environment:

The conformance analysis performed as part of SEA identified that the measures of NRSDP and its action plans are not in disagreement with the objectives established in regional and European Union documents. No disagreements were found with objectives established in Estonian national documents as well.

4.1 Analysis of the concurrent impact of NRSDP implementation

4.1.1 Impact on the natural environment

According to SEA, most measures of NRSDP do not have a foreseeable significant adverse impact on the natural environment (incl. on achieving the objectives of protected areas and Natura 2000 areas). Beneficial impact can be foreseen primarily with the planning of the place final storage for radioactive waste and the strategical environmental assessment carried out as part of this. It can also be seen in the environmental impact assessment for the decommissioning of the formed nuclear site in Paldiski. Environmental impact assessment helps to show the possible short-term and long-term, direct and indirect impacts, hazards, etc. of and mitigatory measures needed for the establishment of the place for final storage in an environmental manner or to carry out decommissioning.

The establishment of the final storage site itself has indirect beneficial impact on the natural environment as a whole with the creation of a place to store radioactive waste that complies with present-day requirements, allowing to localise the radioactive waste generated/to be generated. The local impacts associated with the construction of the storage facility depend on the specific location. According to the preliminary assessment based on the work of UAB EKSORTUS (2015), the recommended location is Paldiski. The work of UAB EKSORTUS (2015) also suggest Rutja and Rebala as potential locations besides Paldiski. The three possible locations: Paldiski, Rutja airfield and Rebala are not near any protected or conservation areas or Natura 2000 areas. Therefore, no significant impact on the objectives of protected or conservation areas or Natura 2000 areas can be foreseen. However, this is a generalised assessment and a more detailed analysis of the impact is developed in the strategic environmental assessment of subsequent plans.

4.1.2 Impact on the socio-economic environment

As the objective of NRSDP is to increase radiation safety, the associated impacts of the implementation of the measures generally are beneficial to the socio-economic environment. The direct and indirect impacts are largely positive to human health and social needs (incl. safety). The impacts is are usually long-term. In this connection, it is important to raise the
awareness of residents about the radiation sources surrounding us. It is important for the population to receive relevant and adequate information to unnecessary over-reaction and fear that can result from radiation-related topics. Meticulous communication is certainly necessary e.g. during the planning of the final storage facility.

A national radiation monitoring system has been established in Estonia, providing important information on the radiation events taking place in our surrounding environment. Although in recent years, no significant radioactive contamination has been detected, it is still important to continue with monitoring in the same extent. The renewal of measurement instruments and protective equipment is also one of the actions of NRSDP.

*The environmental assessment of decommissioning the reactor sections of the Paldiski nuclear site* is presented as one of the measures of NRSDP. It is important to note here that in addition to the Paldiski site, the decommissioning of the Tammiku radioactive waste storage site shall be completed as well. However, the commissioning of the Tammiku radioactive waste storage site is already underway and reflected in the National Action Plan For Radioactive Waste Management.

Although there are no nuclear power plants nor operational nuclear installations, Estonia is still located in a region where temporary restrictions may become necessary for the consumption of food crops and animal feed grown in certain areas. The 300 km zones of nuclear power plants in neighbouring countries extend to Estonia. What is more, the 300 km zones of three nuclear power plants overlap in Estonia, mainly in the Northwestern and Western region. According to the regulation No. 95 of the Government of the Republic “Intervention and action levels and reference levels of emergency occupational exposures in a radiological emergency” of 15.09.2016, action levels for the radioactive contamination of food and feed are specified in the Council Regulation (Euratom) 2016/52 which lays down the maximum permitted levels of radioactive contamination following a nuclear accident or any other case of radiological emergency. Therefore, the activity is regulated and there is no need for the establishment of additional measures with NRSDP.

### 4.2 Analysis of the associated impact of the implementation of the National Radon Action Plan.

Estonian land area has soils with high radon concentration (over 50 kBq/m³). At the same time, the soil gases and the indoor air of the buildings in the high radon risk areas show a positive correlation (Petersell & Täht-Kok, 2012), i.e. generally the indoor air of buildings in high radon risk areas have high concentration of radon as well. The same has been said in the Atlas of Radon Risk and Natural Radiation in Estonian Soil (Ministry of the Environment and Eesti Geoloogiakeskus OÜ, 2017).

According to the data of World Health Organisation (Saarik, 2016 based on WHO, 2009), radon is the second most prevalent cause of lung cancer. There is also a probability that radon significantly increases the risk of lung cancer in smokers. In Estonia, radon causes an estimated 90 new lung cancer cases per year and around 75 of these are smokers (Saarik, 2016 based on Pahapill et. al (2003)).

In consideration of the foregoing, human health is the main reason to decrease the exposure to radon which is also why the National Radon Action Plan is prepared.
In the main, the action plan focuses on the identification of high radon risk areas, establishment of a uniform measurement methodology, specification of the reference levels of radon concentration, reduction of radon concentration in buildings, on radon in ground water and building materials, reduction of health risks and communication.

The need to map radon risk areas arises from a requirement set out in Directive 2013/59/Euratom, stipulating that Member States shall identify areas where the radon concentration (as an annual average) in a significant number of buildings is expected to exceed the relevant national reference level. According to the requirements set out in Directive 2013/59/Euratom, the member state shall ensure that the radon concentration of basement or ground level (if there is no basement) workplaces in the high radon risk areas are measured. Upon excess of the 300 Bq/m³ reference level, the employer shall analyse the need to implement radon protection measures. In the identification of high radon risk areas, important source data originates from the results of radon concentration measurements in soil gas and indoor air of buildings performed in previous years.

Based on the data, a radon risk map of administrative units was created, in which the territory of Estonia has divided into three: administrative units with increased radon risk, administrative units with low or average radon risk, and administrative units with additional research needs. The map provides an approximate overview of the extent of high radon risk in the administrative territory of Estonia (signified as “measurement needed” on the map). The map also shows that there are still not enough data to specify radon risk for a large part of Estonia. Thus, the National Radon Action Plan specifies as a measure the additional measurement of radon concentration and analyses in areas where information is insufficient.

In order to transpose the requirements of EU Directive 2013/59/Euratom into national legislation, Regulation No. 28 of the Minister of the Environment “Reference levels for indoor radon concentration in workrooms, the procedure for radon measurements and obligations of employers at workplaces with an increased radon risk” was adopted on 30.07.2018 based on the Radiation Act.

Until 2018, the radon concentration was regulated by the Estonian legislation only for schools and pre-school children institutions (source: regulation No. 84 of the Government of the Republic “Health protection requirements for schools” of 30.05.2013 and regulation No. 131 of the Government of the Republic “Health protection requirements for the land area, buildings, rooms, furniture, indoor climate and maintenance of pre-school facilities” of 06.10.2011), where the average radon concentration must be less than 200 Bq/m³. Council Directive 2013/59/Euratom provides the guideline that the average radon concentration of indoor air shall not exceed 300 Bq/m³. According to Petersell (2008), radon in the indoor air of residential houses is the most significant radiation source and it shall not exceed a concentration of 150-200 Bq/m³; according to WHO (ch 2.2.1), the air radon concentration of living space and households shall be below 100 Bq/m³.

Ministry of Economic Affairs and Communications is preparing a draft for a regulation titled “Requirements for the indoor climate of buildings” with which it is planned to, inter alia, regulate the reference level of indoor radon concentration of dwellings. Until the establishment of the indoor climate regulation, the regulation No. 19 “Reference level of radon concentration in indoor air and of effective dose from gamma radiation emitted from building materials to indoor spaces” of 28.02.2019 is effective, stipulating that the reference level of radon concentration of indoor air is 300 Bq/m³ if legislation governing the area has not said otherwise.
4.2.1 Impact on the natural environment

Radon is a natural gas that is present in the soil and depending on the surface coating, escapes into the surrounding air to a degree. At the same time, this is a natural process. The National Radon Action Plan prescribes actions for the protection of human health. This has also no significant impact on the natural environment. Possible short-term impacts are related with the measurement of soil radon concentration (drilling holes, etc.) but these are local and insignificant.

4.2.2 Impact on the socio-economic environment

The National Radon Action Plan issues from the need to improve human health and wellbeing. Therefore, it primarily has a long-term beneficial impact both on the health of residents as well as to the social environment as a whole. The comprehensive approach to the topic of radon in the action plan can be considered beneficial: from the development of measurement methodology and identification of radon risk areas to the planning of measures necessary for the reduction of radon risk and communication with the public. In this connection it is important to note that from the perspective of health, the action plan focuses on the development of prevention measures (e.g. campaigns communicating the dangers of smoking, etc.) to reduce the combined effects of radon and smoking (higher risk of lung cancer).

The obligation to measure radon concentration of the indoor air of basement or ground level (if there is no basement) workplaces in the high radon risk areas can be considered as an adverse impact on the economic environment. Although the aforementioned obligation arises directly from the directive, the corresponding obligation concerns the majority of companies operating in Estonia (the majority of workplaces are located in high radon risk areas; figure 5.1). Therefore it is likely that on the basis of the measurement results, radon concentration reduction measures shall also be implemented, and this constitutes an additional cost. However, the mitigation of health risks for the employees has priority in this case.

Monitoring is needed to perform corresponding measurements and effective implementation of measures to reduce radon concentration. At the same time, it is important to identify the institution(s) carrying out the monitoring and develop a set of procedural rules for monitoring. The topic of monitoring has been addressed in the regulation No. 28 of the Minister of the Environment of 30.07.2018.

4.3 Analysis of the associated impacts from the implementation of the National Action Plan for Radioactive Waste Management

The National Action Plan for Radioactive Waste Management was approved with the regulation No. 688 of the Minister of the Environment on 21.07.2015. The purpose for updating the action plan was to renew the action plan as a result of the amendments to the Radiation Act that became effective on 01.11.2016 (e.g. the addition of the NORM residues concept) and in relation to the new developments in the treatment of NORM wastes. Also, the information related to the demolition of the reactor sections of the former nuclear site of Paldiski and to the establishment of the final storage site of the radioactive wastes has also been updated in the action plan.
The National Action Plan For Radioactive Waste Management is a comprehensive document which provides an overview of the policy of radioactive waste treatment, existing and future radioactive waste quantities, technical solutions for treatment, obligations of executioners, financial means, etc. Considering the detailed nature of the document and the fact that the preparation of the action plan was preceded by a long period of studies and analyses, the compiler of this SEA deems the propositions of the action plan generally applicable for the present-day.

In general, it can be said that Estonian radioactive waste streams are small and the choice of suitable management methods relatively restricted. Estonia does not have many options for reducing the volume of the waste generated, because all existing technologies are very expensive, have a powerful treatment volume, and the investment into the waste management technologies is likely to be significantly greater than constructing a ground-level final storage site.

One of the most important improvements in the action plan are the updates on the information regarding the planned final storage site. At the present moment, a decision has been approved at the level of the government to construct the final storage site to Estonia. For this, planning is needed to be initiated together with the strategic assessment of environmental impact which is also one of the measures of the NRSDP. As part of the planning, topographical, engineering geological and hydrogeological surveys shall be performed. The results of the aforementioned surveys are important input data for the strategic assessment of environmental impact.

The second important amendment concerns the NORM wastes and the treatment thereof. In the explanatory note to the draft to amend the Radiation Act (20.10.2017) it is said that the treatment of filter materials of drinking water treatment plants has been quite problematic since the necessity to do so due to the lack of alternatives. Thus the state in parallel to the water treatment companies has started to look for ways for the treatment of such material, incl. for the reuse thereof. Ways to store at least part of such wastes in the landfill of household wastes are being developed, and it has also been studied how to treat the filter materials in such a manner that they would not need special treatment. The first results on the removal of radionuclides accumulated in the materials are positive and these measures are not very expensive. Therefore one of the most important activities in the following years would be the search for technical opportunities to prevent the generation of NORM wastes as well as remove them.

In the explanatory note to the draft to amend the Radiation Act (20.10.2017) also recognises that NORM wastes are also generated in the production of rare earth metals. As these materials generally contain radionuclides with a long half-time and in large quantities, the main focus should be on the ways to reuse or process these materials. The common practice in the world suggest a tendency that opportunities for re-use are sought after before the final storage of NORM wastes. Therefore, before considering these materials NORM wastes, they should be considered as a resource to be used.

4.3.1 Impact on the natural environment

The activities established in the National Action Plan For Radioactive Waste Management are usually accompanied by beneficial impacts related with the improvement of efficiency of radioactive waste treatment and increase in awareness for the people involved. Monitoring (e.g. monitoring the radioactivity of drinking water filter materials, construction materials, Sillamäe
tailings pond) can also be considered beneficial, by helping to detect and prevent possible risks of environmental contamination. Direct impacts are mainly related with the construction of the final storage site. At the same time, the activity may have both a beneficial and an adverse impact on the natural environment. The fact that as part of the planning of the final storage site, the environmental impacts are also assessed. In consideration of the foregoing, the activities planned in the action plan have mostly beneficial impacts on the natural environment in the long-term.

4.3.2 Impact on the socio-economic environment

Taking into account that the action plan is based on the principle of increasing radiation safety, the impacts on the social-economic environment (incl. human health) can also be considered beneficial, primarily in the long-term. Adverse impacts are mainly related with the increase of costs associated with the implementation of various activities. The costs can be one-time (e.g. construction of the final storage site) as well as periodical (e.g. campaigns for the collection of radioactive materials) costs. However, the action plan has presented the cost for each action of significant cost and tried to find an optimal balance between efficiency and cost. The latter is also important to find solutions to prevent and remove NORM wastes.

4.4 Cumulative impacts

The natural environment is primarily affected by indirect cumulative impacts that arise from the measures of NRSDP and its actions plans to increase the awareness of people. This a long-term beneficial impact as with the increase of awareness the probability of radiation sources causing radiation risk ending up in the natural environment presumably decreases as well. The construction of a final storage site in compliance with present-day requirements, making it possible to concentrate or localise radioactive wastes from previous times (former nuclear site in Paldiski) as well as nuclear wastes that could be generated in the future. The cumulative impacts associated with the specific location of the final storage site shall be ascertained in planning and this SEA.

In the socio-economic environment, the majority of measures and actions established with the NRSDP and its action plans have direct beneficial impact on the health and safety of people. Here, both the anthropogenic (e.g. medical radiation) as well as natural radiation (radon) are important. As there are many areas of activity where there is contact with various radiation sources, raising awareness for the sake of the health employees is a very important measure. At the same time it is important to approach the question depending on the area of activity, as the NRSDP mentions.

The implementation of the measures and actions of NRSDP and its action plans requires financial resources. However, the cost is dependent on the specific measure/activity and may be one-time or recurrent. Finding an optimal balance between the result and cost of a measure is important in the implementation of measures and activities.

4.5 Transboundary impact

Estonia has joined the Convention on Early Notification of a Nuclear Accident and Convention on Nuclear Safety and assesses the risks of a nuclear accident with transboundary effects and has the warning and response capability set out in the safety standards of the International Atomic Energy Agency (IAEA). The Environmental Board is the official contact point in the
databases of both the International Atomic Energy Agency and European Commission. Estonia also takes part in the information exchange programme on radioactivity within the Council of Baltic Sea States. In this regard, the NRSDP does not prescribe any changes (measures, actions) that could have a transboundary impact.


The strategical objectives 1, 2, 3, 4, 5 and 6 of the development plan and the measures to achieve the objectives (see cl. 1.1) do not have transboundary impacts.

The measure No. 2 of the strategic objective No. 3 of the development plan prescribes the need to establish a final storage site for radioactive waste and perform the preliminary works needed for this (planning and strategic assessment of environmental impact) and carry out the environmental impact assessment needed for the decommissioning of the nuclear site in Paldiski. The final storage site is designed for the storage of radioactive wastes from Estonia.

The measure is needed for the establishment of the final storage site which is in turn needed for the decommissioning of the nuclear site in Paldiski, and the measure has both a direct and indirect beneficial associated impact. The impact is related to the mitigation and localisation of hazards from sources of radiation contamination.

The Ministry of the Environment submits a request to the Lääne-Harju Rural Municipality to initiate a specific development plan of the local government in order to plan the final storage site for radioactive waste. Long-term safe storage is mostly needed for the radioactive wastes generated in dismantling the former training centre for Soviet nuclear submarine sailors in Paldiski and from industrial, medical and research institutions (so-called historical radioactive waste). Currently the waste is temporarily stored in the intermediate storage site of the former training centre for nuclear submarine sailors in Paldiski. The conserved reactor sections of submarines are also stored there. The nuclear fuel in the reactors was removed and transported to Russia in 1995. This is not a feasible final storage option for the reactor sections since the sections contain radioactive water that could leak into the environment due to corrosion. This is why the decommissioning of the reactor sections shall start in 2040 and the waste generated, which is an estimated 1000 m$^3$, shall be stored together with other wastes in the final storage site established by that time. In total, at least 3000 m$^3$ of wastes are sent for final storage.

Based on the current knowledge, the territory of the former training centre for nuclear submarine sailors in Paldiski could be suitable as a potential location for the final storage site, but this needs a specific development plan of the local government and strategic environmental assessment thereof to be carried out which would give more detailed information on all possible impacts and allows for a comparison of alternative options. The final storage site shall comply with all international environmental and radiation safety requirements.

The decommissioning of the Paldiski reactor sections and establishment of the final storage site for radioactive waste could potentially have transboundary impact. The possibility of transboundary impact is assessed in more detail in the SEA of the specific development plan and environmental assessment of decommissioning the reactor sections of the Paldiski nuclear site. The specific development plan of the local government for the final storage of radioactive waste and the SEA thereof and the environmental assessment
of decommissioning the reactor sections of the Paldiski nuclear site shall be carried out as a cross-border procedure.

As the development plan prescribes a measure to initiate the specific development plan for the final storage site of radioactive waste and the strategic environmental assessment thereof, the Ministry of the Environment shall notify the corresponding authorities of the states of the Baltic Sea region (Finland, Sweden, Denmark, Germany, Poland, Lithuania, Latvia and Russia) of this SEA process. The notification takes place at the same time as the publication of the SEA report and the notification involves the summary of the project of the SEA to be presented to the respective authorities of the aforementioned foreign states for assessment.

4.6 Conclusions

As this SEA did not identify significant adverse impacts, it also does not suggest traditional mitigatory measures. However, in the following, the most important conclusions are provided together with suggestions by the compiler of the SEA (underlined) which help to increase the beneficial impacts:

1. NRSDP:

- A national radiation monitoring system has been established in Estonia. It is important to continue with monitoring in the same extent. The renewal of measurement instruments and protective equipment is also one of the actions of NRSDP;
- The environmental assessment of decommissioning the reactor sections of the Paldiski nuclear site is presented as one of the measures of NRSDP. It is important to note here that in addition to the Paldiski site, the decommissioning of the Tammiku radioactive waste storage site shall be completed as well (it is set out as an action in the National Action Plan for Radioactive Waste Management).

2. National Radon Action Plan:

- There are still not enough data to specify radon risk for a large part of Estonia. Thus, the National Radon Action Plan specifies as a measure the additional measurement of radon concentration and analyses in areas where information is insufficient;
- Until 2018, the radon concentration was regulated by the Estonian legislation only for schools and pre-school children institutions. Ministry of Economic Affairs and Communications is preparing a draft for a regulation titled “Requirements for the indoor climate of buildings” with which it is planned to, inter alia, regulate the reference level of indoor radon concentration of dwellings. Until the establishment of the indoor climate regulation, the regulation No. 19 “Reference level of radon concentration in indoor air and of effective dose from gamma radiation emitted from building materials to indoor spaces” of 28.02.2019 is effective, stipulating that the reference level of radon concentration of indoor air is 300 Bq/m³ if legislation governing the area has not said otherwise;
- Monitoring is needed to perform radon measurements and effective implementation of measures to reduce radon concentration. At the same time, it is important to identify the institution(s) carrying out the monitoring and develop a set of procedural rules for monitoring.

At the present moment, a decision has been approved at the level of the government to construct the final storage site to Estonia. For this, planning is needed to be initiated together with the strategic assessment of environmental impact which is also one of the measures of the NRSDP. As part of the planning, topographical, engineering geological and hydrogeological surveys shall be performed. The results of the aforementioned surveys are important input data for the strategic assessment of environmental impact.

5. DESCRIPTION OF MONITORING AND EX-POST EVALUATION

Environmental monitoring is the continuous monitoring of the environmental status and the factors that impact it and this covers surveys and analyses of the environment and processing of the data. With higher order strategic document, the fulfilment of objectives can also be monitored. In view of the object of SEA, two types of monitoring can be differentiated: environmental monitoring and monitoring of the effectiveness of development documents.

In Estonia, radiation related environmental monitoring is performed regularly as part of the national radiation monitoring. At the same time, the following parts of the environment are monitored for radiation as part of Monitoring of the Ionising Radiation of the Environment:

- atmosphere;
- surface water;
- drinking water;
- milk;
- food;
- surrounding areas of radiation-related activities;
- marine environment;
- soil.

Although the results of radiation monitoring have not shown significant incidence of radiation contamination, it is important to continue with the radiation monitoring in the following years. The monitoring is performed by the Environmental Board.

The effectiveness of the development documents is monitored through the fulfilment of activities prescribed in the corresponding action plans. The fulfilment of each activity is characterised by a specific measure with the deadline for the planned target level and completion. The fulfilment of all activities shall be assessed at least before the preparation of the action plan of the next period. Interim reports are created after every two years for the fulfilment of activities of the action plan. The monitoring is performed by the Ministry of the Environment.