**Documents necessary for preparation of the expert report pursuant to § 9(6) of Act No. 100/2001 Coll., as amended, in relation to the statement of the Ministry of the Environment, Department of Species Protection and Implementation of International Commitments, and the statement of the Nature Conservation Agency of the Czech Republic, Regional Office Žďárské vrchy SCHKO**

# Ministry of the Environment, Department of Species Protection and Implementation of International Commitments

Ref. No.: ENV/2017/VS/3794

Date: 19/12/2017

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## 1.1.

In the context of the documentation, an impact assessment of the intent was drawn up pursuant to § 45i of Act No. 114/1992 Coll., on Nature and Landscape Conservation, as amended (hereinafter referred to as the "Nature Assessment") by an authorized person, RNDr. Vlastimil Kostkan, Ph.D. Weaknesses have been identified in the Nature Assessment in the misinterpretation of the subjects of protection in the Special Protection Area of Podyjí where the species of great bittern (Botaurus stellaris), gadwall (Anas strepera), common kingfisher (Alcedo atthis) and western marsh harrier (Circus aeruginosus) are described in the affected SPA instead of barred warbler (Sylvia nisoria) and syrian woodpecker (Dendrocopos syriacus).

***Comment:***

In Table 10 of the Nature Assessment, there was an erroneous transcription of bird species subject to protection CZ0621032 - Podyjí. Instead of the correct species, species were taken from the SPA database that belong to the SPA Poodří, which is one line below in the database.

Correct list of the subjects of protection in the SPA Podyjí:

**Bird species - subjects of protection in SPA CZ0621032 - Podyjí**

| Species | Permanent population/ Share of the population | Stopping/ conservation | Wintering/ Isolation | Nesting/ Overall assessment | Effect |
|---|---|---|---|---|---|
| barred warbler *Sylvia nisoria* | C*[1] | A*[2] | C*[4] | 30-50 pairs / A*[6] | 0 |
| syrian woodpecker . *Dendrocopos syriacus* | 10-15 pairs / C*[1] | B*[3] | B*[5] | B*[7] | 0 |

*Legend:*

*[1] *the population on the site is below 2% of the population in the Czech Republic*
*[2] *great-preserved population*
*[3] *well-preserved population*
*[4] *non-isolated population*
*[5] *the population is not isolated but is on the edge of the area of extension*
*[6] *site of high importance for the conservation of the species*
*[7] *site of importance for the conservation of the species*

Despite the error in the list of the objects of protection of the SPA CZ621032 - Podyjí, nothing will change in the final assessment of the potential impact. The SPA CZ0621032 - Podyjí is situated about 35 km from the site of the intent. With this distance and the nature of the intent, confusion between the subject of protection has no effect on the result of the assessment. The conclusion remains the same that the intent regarding the construction and operation of the NNS does not affect the SPA CZ0621032 - Podyjí and its subjects of protection.

## 1.2.

Furthermore, there are a few incorrect names of the Site of Community Importance of the Jihlava Valley indicated in the text of the Nature Assessment (pages 21, 43, 48, 49), which is confused with the "Jihlava River Valley".

***Comment:***

Yes, this is a typographical error; the correct name is the Site of Community Importance CZ0614134 - Jihlava Valley. The SCI number in the text of the Nature Assessment is indicated correctly. Despite the incorrect name, factual confusion is not possible, because there is no SCI called "Jihlava River Valley" in the Czech Republic.

## 1.3.

Another irregularity in the assessment is with regard to the SCI Rokytná River, where it is found at the end of the text in Chapter 4.2.2 that the effects of rainwater admission will not occur on the Rokytná River, the effect is subsequently not excluded in the assessment (Chapter 4.2.12) and is regarded as slightly negative (-1) in the following text of the assessment.

***Comment:***

This is a minor mistake in the formulation, where it is stated in the sentence in Chapter 4.2.2.:

"*Site of Community Importance CZ0623819 - Rokytná River, which is supplied by the Olešná River, will not be affected by the project, either*."

The effect on the Site of Community Importance CZ0623819 - Rokytná River, which is supplied by the Olešná River, is very small and ranges rather at the theoretical level; it can occur only in case of emergency. This formulation corresponds to the following assessment "slightly negative effect (-1) and the mentioned positive effect of dams and reservoirs as well as the measures proposed in the form of retention reservoirs under the site and NNS facilities.

## 1.4.

Mitigation measures are set out in Chapter 6 of the Nature Assessment, all of which cannot be regarded as proposed mitigation measures, and there are facts in some parts of the text that are obvious and are not the proposed mitigation measures that would require action by the notifier during construction.

***Comment:***

A clear list of the measures set out in the Nature Assessment that are really mitigation measures and will by implemented by the investor is as follows:

- Considering the presence of sensitive biotopes – subjects of protection in SCI CZ0614134 - Jihlava Valley at the border with development area D (right bank of the Skryjský Creek upstream of its discharge to the Mohelno Reservoir), biological surveillance will be present during construction work in this development area to ensure that the defined border of the development area is not breached.
- If there is a risk of pollution due to dust generated during construction work, the person responsible for biological surveillance should provide for measures to eliminate dust and potential pollution of areas inside SCI CZ0614134 - Jihlava Valley (e.g. spraying of the construction site and service roads with water on dry days).

- After the commissioning of NNS at the Dukovany Site, discharge from the Mohelno Reservoir on the Jihlava River will be preserved in the same regime as the operation of the existing EDU, which will ensure protection of the biotopes in the Jihlava River within SCI CZ0614134 - Jihlava Valley.
- After the commissioning of the NNS at the Dukovany Site, discharge on the Jihlava river from the Mohelno Reservoir will be monitored annually in terms of physical and chemical parameters (temperature, oxygen content, pH, amount of organic substances, nitrogen, phosphorus and other substances). The scope of water plant biotopes on the Jihlava River within SCI CZ0614134 - Jihlava Valley should be monitored at least once every 5 years as an indicator of quality of the discharged water. The results of mapping of the structure and scope of these biotopes from 2013, 2014 and 2016 can be used as reference values. In the case of deterioration of the status of such biotopes, corrective measures will be taken.
- The rain water drainage system in NNS at the Dukovany Site will employ tanks to trap any potential leaks of oil substances and sediments so that the subject of protection in SCI CZ0623819 - Rokytná River is not affected.
- The increased traffic through SCI CZ0614134 - Jihlava Valley, on road II/392, indicated in the detailed dispersion study (Bartoš 2016), does not constitute a major impact on the subjects of protection. In order to comply with this expected number of vehicles and, in case of increased traffic, in particular of heavy trucks, their number will be limited (for example with a traffic sign limiting their tonnage).
- Rain water drained from the NNS at the Dukovany Site will be regularly (at least four times a year) monitored in terms of pollution, including measurement of the level of radiation in this water, to make sure it does not affect the subjects of protection in SCI CZ0623819 - Rokytná River. The same monitoring is already in place at discharges to SCI CZ0614134 - Jihlava Valley.

## 1.5.

Although the above-mentioned weaknesses are unlikely to generate significant effects, which would mean a fundamental change in the assessment of the intent as a whole, we consider it appropriate to correct and put them straight in the present Nature Assessment so that they can be properly reflected in the EIA binding statement.

***Comment:***

See proposed corrections indicated above

# Nature Conservation Agency of the Czech Republic, Regional Office Žďárské vrchy SCHKO

Ref. No.: 04402/ZV/2017

Date: 20/12/2017

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## 2.1.

Minor comment is given on Chapter D.I.8.2.3 Shading by steam siding for cooling towers. In this respect, a certain regret can be noted over the fact that while the assessment of the effect of shading by facilities of the NNS and existing power plant (EDU1-4) is supported by detailed digital models (Chapter D.I.8.2.2), the effect of shading by steam siding is probably addressed only by the so-called expert estimate.

Given the relatively short period of parallel operation of both sources (assuming 10 years) and the relatively small affected area of the SCI Jihlava Valley, it is possible to agree with the conclusions of the documentation, which deem the effect to be of minor importance.

***Comment:***

Since it is known that the shadow of the steam siding may, under certain constellations of weather and time conditions, fall upon certain places of the SCI Jihlava Valley at time-limited intervals already in the operation of the EDU1-4, the effect of possible future shading by steam siding (Chapter D.I.8.2.3. of the documentation) from NNS cooling towers was also assessed with the use of the detailed computational model developed by the Institute of Atmospheric Physics CAS, not in the form of a mere expert estimate. The results of that model are commented in Chapter D.I.2.2. Effects on climate (see page 325 of the documentation). For this purpose, a number of detailed evaluation studies have been elaborated as a basis for preparing documentation, referred to in Chapter D.V.2.2. Internal documents (under number [I.3]), i.e.:

- Study on the Effect on Microclimate and Determination of Shading by Siding for NNS at the Dukovany Site. Institute of Atmospheric Physics CAS, v.v.i., July 2016
- Distribution of Drift Droplets from Cooling Towers and Impact Assessment of Cooling Towers on the Formation of Local Ice Coatings. Institute of Atmospheric Physics CAS, v.v.i., February 2017
- EDU1-4 impact on climatic characteristics of the area. Czech Hydrometeorological Institute, May 2016

Given the scope of the documentation, these studies are not annexed thereto, however, are fully taken into account.

## 2.2.

We raise another comment on Chapter D.I.7 Impacts on Biodiversity and hence Chapter 4.1.2 of Annex 3.2 (Nature Assessment). It concerns the subject of protection SCI CZ0614134 Jihlava Valley, which is the natural habitat 3260 - lowland to mountain watercourses with the vegetation of Ranunculion fluitantis and Callitricho-Batrachion, and simultaneously the entire biocenosis of the Jihlava watercourse downstream of the barrier of the Mohelno Reservoir. Page 36 of Annex 3.2 states that "... the water flowing from the Mohelno Reservoir will have the same character after the completion of the NNS as before (temperature, chemistry) and will not affect the status of the biotope ...". This is somewhat contrary to Chapter D.I.4 Impacts on surface and ground waters, which indicates

significant changes in the parameters of the aquatic environment in the Jihlava River downstream of the Mohelno Reservoir, at least during the parallel operation of both nuclear sources and gives the impression that those data were not available or were not taken into account in preparation of the Nature Assessment.

***Comment:***

One of the conclusions of research lasting several years in the structure, quality and extent of the natural habitat 3260 - lowland to mountain watercourses with the vegetation of Ranunculion fluitantis and Callitricho-Batrachion found that the extent (length of the Jihlava River) with the occurrence of that habitat is continuously increasing. The main reason involves mainly volume and thermally balanced outflows from the Mohelno Reservoir. The freezing of the Jihlava River does not occur in winter, followed by ice-hazards, which mechanically interfere with these associations. Increased temperature of water discharged from the Mohelno Reservoir in winter (compared to normal) and decreased temperature of such water in summer create stable conditions for these associations including the effect on the oxygen content and pH.

As follows from the modelling of changes in flow rate and temperature in the Jihlava River downstream of the Mohelno Reservoir due to the operation of the NNS, while taking the anticipated climate change by 2100 into account, then the changes in the Jihlava River are caused by NNS operation from 30% and by climate change from 70%. The model is based on the current situation where the physical and chemical characteristics in the Jihlava River are mainly due to delay and circulation of water in the Mohelno - Dalesice system and the effect on the river due to lower discharge of the deep Mohelno Reservoir. The share of the effect on the character of the biotopes and the recovery in the profile of the Jihlava River from the Mohelno Reservoir up to the confluence with the Oslava River in Ivančice cannot be accurately evaluated due to the lack of reference data from the period before putting the system into operation.

The developed model of the effect of NNS operation on the discharge from the Mohelno Reservoir including short-term parallel operation of the NNS and the EDU1-4 (Annex 4 to the EIA documentation) shows that the total volume of water flowing through the profile downstream of the discharge of the Mohelno Reservoir may decrease in the future. This might reduce the annual average flow by a maximum of 0.9 $m^3s^{-1}$ compared to the current long-term state (5.178 $m^3s^{-1}$) on the given profile for maximum power alternative of the NNS 2x1200 MW (maximum water consumption demand) while taking the climate change of +2°C until 2100 into account, but the model guarantees, at the same time, compliance with the minimum residual flow rate (1.2 $m^3s^{-1}$) in the profile downstream of the discharge of the Mohelno Reservoir.

For a period of possible temporary, a maximum of ten-year, parallel operation of EDU1-4 and one unit if the NNS 1200 MW, for which the effect of climate change is not considered, decrease in the average flow rate compared to the current state would be lower approximately by 0.6 $m^3s^{-1}$ and thus its effect would be lower (decrease in long-term average flow rate in the profile downstream of the discharge of the Mohelno Reservoir from 5.178 $m^3s^{-1}$ to 4.565 $m^3s^{-1}$. Compliance with the minimum residual flow rate (1.2 $m^3s^{-1}$) in the profile downstream of the discharge of the Mohelno Reservoir is guaranteed even for this state.

The same minimum residual flow rate (1.2 $m^3s^{-1}$) was ensured even during previous operation of the EDU1-4. The minimum flow rate was observed even in the driest periods in 2015 and 2016, and thus the flow rate in the profile downstream of the Mohelno Reservoir often exceeded the flow rates upstream of the Dalešice - Mohelno system (Jihlava - Ptáčov profile, i.e. at the inflow to the Dalešice - Mohelno system where the long-term annual average flow rate is 5.4 $m^3s^{-1}$).

Modelling the effect of the operation of the NNS on temperature shows that the increase in average temperature of the water downstream of the Mohelno Reservoir ranges from 0°C at a power output of 2000 MW without climate change to +2.2°C at a power alternative of 2 x 1200 MW and taking into account the climate change of +2°C to the year 2100. The temperature increase will mainly become evident downstream of the Mohelno Reservoir because watercourse temperature will be further mainly affected by ambient air temperature and the character of riparian vegetation and coincident vegetation of water-crowfoot, potamogeton and bryophytes of the predominant biotope. Generally, the vegetation of higher water plants reflects part of the falling solar radiation, thus preventing water from overheating, but the specific quantitative data on the effect of running water are not available. It may thus be assumed that extending the length of river, covered with plants of Ranunculion fluitantis and

Callitricho-Batrachion will rather prevent further increase in water temperature of the Jihlava River downstream of the Mohelno Reservoir.

It may thus be assumed that balancing the flow rate and temperature downstream of the lower discharge downstream of the Mohelno Reservoir will, as until now, rather contribute to the stability of the natural habitat 3260 - lowland to mountain watercourses with the vegetation of Ranunculion fluitantis and Callitricho-Batrachion - particularly with regard to the expected climate change and severe seasonal flow rate decreases and transient increase in maximum summer temperatures in the afternoon. If the average flow rate drops (while maintaining the minimum flow rates), the number of days per year with constant flow would increase. If, at the same time, water temperatures increase (which are now too low for the above habitats in the first hundreds of meters downstream of the Mohelno Reservoir), conditions for the expansion of the association further upstream would improve. This is the trend we have already noted in surveys between 2014 and 2016. Since for those years, the EDU1-4 was in normal operation (discharges of heated water were rather lower than the average due to outages, as illustrated by graphs in the impact assessment for the Skryjský Creek), this shift is rather a sign of climate trends in recent years.

## 2.3.

Our last comment relates to the fact that the selected profiles to monitor the physico-chemical and biological parameters of the aquatic environment in Annex 3.1 (Biological Assessment), Chapter 5.5 Hydrobiology did not include the profile in the Jihlava River downstream of the dam of the Mohelno Reservoir, important for assessing the impact of operation of the NNS on natural habitat 3260. This natural habitat cannot be reduced only to the stands of aquatic macrophytes but should be considered as a complex ecosystem.

***Comment:***

Physical - chemical parameters (DIS, sulphates, $N\text{-}NH_4$, $COD_{Cr}$, $BOD_5$, $N\text{-}NO_3$, $N_{total}$, $P_{total}$, chlorides) of the Jihlava River downstream of the discharge of the Mohelno Reservoir were regularly monitored by staff of the Water Research Institute between 2005 and 2015. The results of the Water Research Institute are shown in Tables 6 and 7 (pages 26 - 30) in Annex 4 to the EIA documentation (Surface Water and Groundwater Impact Assessment). These data show that the physical and chemical parameters of the water are affected, in particular, by the system of Dalešice - Mohelno reservoirs. The effects are diverse, from changes in water temperature (high temperatures in winter, low temperatures in summer) through organic content (strong decrease in $BOD_5$ and total phosphorus downstream of the Mohelno Reservoir). The system therefore largely acts as a trap for organic sediments and phosphorus, and significantly improves the water quality downstream of the system.

The overall ecological status of the Mohelno Reservoir and the Jihlava River for the profile of Řeznovice is then assessed as moderate or good by the Water Research Institute in Table 43, page 86 of Annex 4 to the EIA documentation, which is the best state in the entire water body of the Jihlava River from Brtnice to Nové Mlýny II Reservoir.

Given the above data collected on a long-term basis, hydro-biological survey was not conducted on profiles of the Jihlava River and hydro-biological surveys focused on small watercourses around the Dukovany NPP, which could be affected by the construction and operation of the NNS.