Suffolk Coastal Friends of the Earth

Interested Party ID: 20025904

THE SIZEWELL C PROJECT

NNB Generation Co (SZC) Ltd

EN010012

Deadline 5: WRITTEN SUBMISSION OF ORAL CASE (ISH7) and EXPERT COMMENTS on the Applicant's response to our Written Representation

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A critical review of SZC Co.'s site characterisation, impact assessment, and proposals for impact mitigation, in relation to the risks posed to the ecohydrological integrity of Sizewell Marshes SSSI by the development of Sizewell C Nuclear Power Station, as proposed.

Authored by Dr. Rob Low (lead), Dr. David Mould and Mr. Jonathan Graham[1].

Our written representations, submitted to the Examination at Deadline 2[2] concerned the serious risks to the viability of wetland plant communities and species of interest within the Sizewell Marshes Site of Special Scientific Interest (the SSSI), leading from the proposals to develop the Sizewell C Nuclear Power Station (the Application), brought forward by NNB Generation Company (SZC) Ltd (*SZC Co.* hereafter).

This further written submission for Deadline 5 addresses the same central subject, and gives further technical comments arising from:

1. SZC Co's comments to our written representations. These are contained in Tables 15.1 and 15.2 of SZC Co's comments to the written representations (REP3-042[3]), and Appendix B to the same document (REP3-043[4]); and
2. A written note of our oral submissions made and exchanges on water level monitoring, which included a wider discussion on ecohydrological matters in relation to Sizewell Marshes SSSI, during I.S.H. 7 on 15th July 2021.

A comprehensive rebuttal of all of SZC Co's replies to our written representations is not provided. Rather, comments are provided on what we still consider to be the significant failings of SZC Co's work in characterising the ecohydrological functioning of the Sizewell Marshes SSSI, the ecohydrological impact assessment which is based on the characterisation, and the plans for ecohydrological monitoring during the development.

It is worth noting that comments are not provided on the plans to restore and/or create fen meadow habitat at three separate sites, in compensation for that to be lost at the Sizewell Marshes SSSI. These plans are at an early stage, with only desk studies and factual reporting of the results from a short period of hydrological monitoring presented in the Fen Meadow Plan Report – Baseline Report Parts 1 & 2 (REP3-051 and REP3-052[5]). Comments will be provided in response to the provision of detailed technical plans for fen meadow habitat restoration/creation.

1 SZC Co's monitoring of the wrong soil water level variable within the Sizewell Marshes SSSI

It is widely acknowledged that an important variable through which hydrological supporting conditions are defined is the water table (the phreatic soil water surface) elevation relative to the ground surface. This is best illustrated through reference to the chapter on the M22 vegetation community within the Ecohydrological Guidelines for Lowland Wetland Plant Communities (Environment Agency, 2010), a precis of which was given in Section 4.2 of our written representations (REP2-463[6]).

During I.S.H. 7 an SZC Co consultant (Mr Lee of Atkins) claimed that shallow piezometers are the standard installation type for measuring water table elevation in wetlands. It is our view that:

- Piezometers, by definition, measure piezometric groundwater pressure, i.e., groundwater pressure over a specific depth interval below the ground surface. They do not allow measurement of water table elevation, meaning that SZC Co's characterisation of a key

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1 Short professional biographies for the authors were provided in the initial written representation (REP2-463).
2 (REP2-463)
3 Comments on Written Representations (REP3-042)
4 Comments on Written Representations Appendices (REP3-043)
5 Fen Meadow Plan Report 1 Baseline Report - Part 1 of 2 (REP3-051) and Fen Meadow Plan Report 1 Baseline Report - Part 2 of 2 (REP3-052)
6 Suffolk Coastal Friends of the Earth written representation (REP2-463).

part of the ecohydrology of the site has been based on measurement and assessment of the wrong variable;

- It is our view that the most appropriate installation to allow measurement of water table elevation in wetlands is a dipwell. These are usually 1 m or less in length and 30-50 mm in diameter and, importantly, are screened (or perforated) over their entire length (i.e., to the ground surface), allowing monitoring of the water table. Dipwells of this generic design are recommended for monitoring of water table elevation by the UK's nature conservation regulation agencies, including Natural England and Natural Resources Wales;
- During I.S.H. 7 SZC Co noted that shallow piezometers could not be installed within all areas of the Sizewell Marshes SSSI because of the risk of damaging valued vegetation communities. Use of dipwells also reduces this risk very significantly as they are installed after access by foot using a small hand-auger; and
- An upwards hydrological gradient has been demonstrated within the Sizewell Marshes SSSI, and SZC Co have noted that the peat within the SSSI is poorly permeable. These two conditions mean that there is a significant risk that the measured water level (the piezometric level) within the shallow piezometers that SZC Co have installed is higher than the water table (at the same location). During I.S.H. 7, SZC Co could only offer that they 'believed' that the measured (piezometric) level was the same as the water table elevation; no evidence was provided.

It is our view that an investigation is required to establish whether the currently monitored shallow piezometric level is not significantly different from the water table elevation at each relevant monitoring point within the Sizewell Marshes SSSI. Until this is done there can be no confidence in the ecohydrological assessments, including plans for mitigation, provided by SZC Co.

2 SZC Co's gross underestimation of the value of ecohydrological guideline information for M22 vegetation community

In Point 3 of Table 15.1 of SZC Co's comments on our written representation[7] it notes that

'*the assessment submitted...is based on site specific monitoring of the water regime against the observed baseline conditions. The rationale for this approach is that it is more appropriate to consider the observed site conditions, in which the SSSI is currently considered to be favourable, as the basis for assessing change rather than literature values*'.

Our view is that this approach grossly underestimates the value of ecohydrological guideline information for M22 vegetation community (primarily referring to the information within Environment Agency [2010]), because:

- Comparison of the current regimes of the water table relative to the ground surface (were this to be available – see Section 1, above) with information on the characteristics and range of water levels that support M22 nationally would provide information on the relative hydrological status of M22 at the Sizewell Marshes SSSI. For example, if water tables within the protected site were at the lower end of the national range, it would indicate that the M22 is relatively vulnerable to the water table drawdown which is predicted. This important analysis has not been presented by SZC Co; and
- SZC Co apparently did not refer to the ecohydrological guideline information for M22 community when they were deciding on the magnitude of predicted (through the numerical groundwater model output) water table drawdown which might be significant in terms of ecological damage. Bullet 1 of Section 6.3 of our written representations[8] points out that the maximum predicted water table drawdowns in the Peat are 7-11 cm; this amount is c. 50% of the range in optimal summer water table depth observed in stands of M22 nationally (0.05-0.18 mbGL, Environment Agency [2010]), indicating that the predicted drawdown could easily take the water table elevation outside of the optimal range for the summer

7 (REP2-463)

8 (REP2-463)

water table. SZC Co have failed to recognise this significant vulnerability and have deemed the risk to be '*not significant*'.

In summary, it is worth noting that relatively little information is available about the hydrological supporting conditions for many wetland vegetation communities, including M22. To grossly underestimate the value of - and as a result to underuse - the information which is available, is a critical failing of SZC Co's assessment, which has markedly reduced its quality and utility.

3 SZC Co's sole plan for mitigating the predicted water table drawdown within Sizewell Marshes SSSI would draw poor quality and damaging water into the stands of M22

Section 7.2 of our written representation[9] points out that SZC Co's proposed strategy for mitigating the predicted drawdown of the water table within the Sizewell Marshes SSSI would draw surface (ditch) water with high nutrient concentrations into the stands of M22, and that this was likely to cause ecological damage.

During I.S.H. 7 an SZC Co consultant (Mr Lee of Atkins) pointed out that no extra water would be imported into the system to effect mitigation. This was not, and has never been, our understanding. To be clear, our understanding is that:

- The numerical model predicts water table drawdown within stands of M22 within the Sizewell Marsh SSSI. This is because the amount of groundwater entering the Peat from the underlying Crag aquifer will be reduced, as a result of dewatering of the construction site within the cut-off wall.
- The mitigation strategy effectively proposes to replace the lost water within the Peat, in an attempt to maintain the current water table regimes, by raising ditch water levels (using new control structures), causing more water to flow from the ditches into the Peat.
- We understand that the mitigation strategy revolves around water level manipulation, rather than provision of any extra water; for clarity, we have never inferred '*that additional surface water would be introduced into Sizewell Marshes to replace Crag groundwater*' as posited in Comment #10 of Table 15.2 of SZC Co's comments on written representations (REP3-042). Our conclusion, that the proposed mitigation strategy will result in water with damagingly high nutrient concentrations flowing into areas of M22 community, remains valid.

4 Brief comments in relation to SZC Co's reply to our initial written representation; hydro(geo)logy

These comments refer to SZC Co's numbered comments contained in Table 15.1 (REP3-042):

- Comment #11 notes that water level data are routinely viewed relative to a common datum elevation, Ordnance Datum in this case, so that aspects of the groundwater system such as hydraulic gradients can be characterised. We acknowledge that this is standard practice, and have not suggested that it should not be an important part of data analysis. However, we also maintain that inspection of water level data relative to the ground surface usually yields different information about the behaviour of the ecohydrological system; this type of analysis is standard practice in ecohydrology, and SZC Co's failure to acknowledge this reflects their apparent lack of specialist knowledge on ecohydrology.
- Comment #30 notes that we suggested an alternative range for hydraulic conductivity of the cut-off wall for use in sensitivity analysis, but notes that we did not provide any evidential basis. The latter is true, but it is important to note that SZC Co failed originally to provide any evidential basis for the value range that they used in the sensitivity analysis.

And in relation to Table 15.2 (REP3-042):

- Comment #9 suggests that our comments on the proposed monitoring strategy

[9] (REP2-463)

'*proceed on the basis that the assessment of change...based on the numerical* [groundwater] *model...can be discounted*'.

On the contrary, our approach proceeds on the basis that there is significant uncertainty in the model predictions (as demonstrated implicitly throughout our submissions), which should be tested on an ongoing basis through regular analysis of monitoring data.

5 Brief comments in relation to SZC Co's comments on our written representations; ecology

These comments refer to SZC Co's numbered comments contained in Table 15.1 (REP3-042):

- Comment #2 challenges our assertion that the SZC Co have '*underestimated the importance of the SSSI*' but then attempts to downplay the importance of Red List vascular plant species (Stroh et al. 2014) stating that "*many of the species*" (Table 1) "*remain relatively common*" and then provides a link to a UK distribution map for Lesser Spearwort *Ranunculus flammula* (an England Red List Vulnerable species occurring within the SSSI) as an example of a "common" species. This entirely misses the point. Many of the wetland Red List species occurring at the Sizewell Marshes SSSI qualify on the basis of national declines (based on a strong data set) and as characteristic wetland species many have declined as a result of drainage and loss of traditional wetland habitats. The proposed development has potential to affect water supply mechanism widely across the SSSI and so impact on these notable species.
- Regarding Comment #22, it is our view that microtopographic surveying should have been undertaken, with the results compared against the known ecology of low-growing species we listed in our initial written representation. These species and the relatively close proximity of stands of vegetation with different hydrochemical requirements (demonstrated in SZC Co's vegetation survey quadrat data) are the justification for why a more detailed assessment is required, and should have been undertaken by SZC Co.

6 Summary and conclusions

Our central view remains unchanged. SZC Co.'s understanding of the hydro-environmental processes which support M22 and associated communities within the Sizewell Marshes SSSI is flawed, because up-to-date ecohydrological knowledge and techniques have simply not been applied. This has led to ill-informed impact prediction, which has resulted in the likelihood, magnitude and significance of potential impacts being significantly underestimated. These problems have been compounded by SZC Co.'s proposal of a mitigation technique which would actually cause further damage to the SSSI, rather than mitigating any unexpectedly large impacts.

Further, it is our view that the most significant flaws in SZC Co's work, as described here, should urgently be addressed before any determination on effects of the development on valued wetland plant communities within Sizewell Marshes SSSI can be made.

References

Environment Agency, 2010. *Ecohydrological guidelines for lowland wetland plant communities. Fens and mires update*, March 2010.

Stroh, P. *et al*. 2014. *A Vascular Plant Red List for England*. Botanical Society of the British Isles.