Post-Hearing Submission of Dr Edmund Fordham
(**written submission subsequent to oral contributions** at ISH1 on draft DCO made 1st November 2022)

Dated: 11th November 2022

Annexes EF1 through to EF11 uploaded separately

THE PLANNING INSPECTORATE

EN010106 – Sunnica Energy Farm

APPLICATION BY SUNNICA Ltd for an Order Granting Development Consent for the Sunnica Energy Farm Project pursuant to The Planning Act 2008

To the Examining Authority (ExA)

POST-HEARING SUBMISSION of

EurIng Dr Edmund John Fordham MA PhD CPhys CEng FInstP

Interested Party – Unique Reference: 20030698

Subsequent to oral contributions made to ISH1 on dDCO 1 November 2022 being made by Deadline 2 (11 November 2022)

Please note:

1. This Post-Hearing Submission is subsequent to contributions made orally at the ISH1 on the dDCO on 1 November 2022 and submitted as required by Deadline 2 (11 November 2022) and is confined so far as possible to the legal issues raised.

2. A separate and largely disjoint Written Representation (WR) is also being submitted as required by Deadline 2 (11 November 2022) covering in detail the technical reasons why Hazardous Substances Consent (HSC) is almost certainly required for the BESS elements of the Application. This different and separate submission should be consulted for the technical and engineering issues.

3. Footnotes are used to make citations to literature elsewhere. Links to verifiable sites such as www.legislation.gov.uk are stated to be acceptable and have not been removed. Other domains presumed to be acceptable are European Commission domains ending .europa.eu and the United Nations Economic Commission for Europe domain unece.org. The DOI (Digital Object Identifier) system is not explicitly mentioned in the Guidance but such references are now a standard part of citations to scientific journals of record and are included, without the https://doi.org/ prefix. Citations to literature central to the case are included as Annexes to obviate any need to consult external documents.

SUMMARY

(*per Guidance, being less than 10% of the following text*)

[*Please refer to the Glossary following, for a list of abbreviations.*]

1. Prevention and mitigation of major-accident hazards involving hazardous substances (HS) are an exception to the general principle that Planning decisions are not usually concerned with protection schemes.

The UK has a consenting regime for HS, operated through Planning authorities, significantly pre-dating the obligations of the "Seveso III Directive" (2012). The Planning (Hazardous Substances) Act 1990 demands consents for HS above thresholds, and creates offences (S.23) where HS are present without HSC. The P(HS)Regs 2015 define HS, procedures for obtaining HSC, and Policy requirements for major-accident control, at the Planning stage.

Though a Planning control, HSC differs from development decisions in that it is an enduring obligation. Subsequent consents may be required for changes.

2. A separate Written Representation will present evidence that HSC is almost certainly required for the Battery Energy Storage Systems (BESS) in Sunnica.

Sunnica have obtained a Scoping Opinion from HSE that the presence of HS "*will probably require HSC*", and that "*Further information on HSC should be sought from the relevant Hazardous Substances Authority".* This advice is dismissed as "*a generic comment*" and "*not … relevant to this project*" which I contend is fundamentally wrong.

3. Asked at ISH1 by the Local Authorities whether HSC was being sought, the Applicant confirmed it was not. The dDCO does not mention HSC, and does not apply for any Direction for "deemed consent" under S.12(2B) P(HS)A 1990.

Though the Application cannot be reckoned compliant with National Policy requirements in R.24 P(HS)Regs 2015 without consideration of major-accident prevention and mitigation, of which the HSC regime is part, the details so far are insufficient for the question to be decided.

The Applicant declined to specify the BESS parameters on the ground that future flexibility was needed. They said that if required HSC would be sought subsequently to any DCO. Asked if this would be by seeking a Direction of "deemed HSC" or by application to the HSAs, the Applicant said they would apply to the relevant HSA(s).

NPS EN-1 confirms that application for HSC subsequent to a DCO is possible, but also says applicants "should … include details in their DCO" – which are lacking.

4. The dDCO as drafted is therefore defective in that (i) “deemed” HSC is not sought, nor (ii) has guidance been followed for seeking HSC subsequently to a DCO.

An additional clause in the dDCO is therefore proposed, to the effect that HSC where lawfully required remains to be obtained.

A draft text, with reasons, is proposed in Para. 42 below:

> “ Nothing in this Order removes any obligation to seek Hazardous Substances Consent for the Battery Energy Storage Systems in the scheme, as may be required (depending on technical specification) by The Planning (Hazardous Substances) Act 1990 and The Planning (Hazardous Substances) Regulations 2015 or related legislation for the time being in force. ”

5. Some consequences of seeking HSC subsequently to the DCO are noted, including the potential involvement of all four Local Authorities and two statutory agencies to deal with matters of overlapping technical content, viz. discharge of the Battery Fire Safety Management Plan, and the determination of a subsequent application for HSC.

6. The ExA has requested clarification of the scheme total energy storage capacity estimates quoted by myself, and by the SNTSAG from an independent expert consulted by them. These are explained in Paras. 53 – 68 below, in the context of discussion and disclosures made at ISH1.

(566 words)

GLOSSARY

Abbreviations used in the interests of brevity.

Legislation and statutory permissions:

COMAH Regs 2015	– the Control of Major Accident Hazards Regulations 2015
CQ	– Controlled Quantity (of a HS as defined in P(HS)Regs 2015)
DCO	– Development Consent Order
dDCO	– draft Development Consent Order
HS	– Hazardous Substance (as defined in the Schedule to P(HS)Regs 2015)
HSC	– Hazardous Substances Consent
PA 2008	– The Planning Act 2008
P(HS)A 1990	– The Planning (Hazardous Substances) Act 1990
P(HS)Regs 2015	– The Planning (Hazardous Substances) Regulations 2015
S or "S"	– any "substance used in processes" which on its own or in combination with others may generate HS defined in Parts 1 or 2 of the Schedule to the P(HS)Regs 2015
Seveso	– the "Seveso III Directive" 2012/18/EU of 4 July 2012

Direct quotations from legislation are shown in blue

Policy documents:

NPPF	– National Planning Policy Framework
NPS	– National Policy Statement
EN-1	– Overarching National Policy Statement for Energy (EN-1)

Direct quotations from policy documents are shown in magenta

Competent authorities:

CA	– (COMAH) Competent Authority
DHCLG	– Department for Housing Communities and Local Government
EA	– Environment Agency
ECDC	– East Cambridgeshire District Council (LPA)
ExA	– Examining Authority
HSA	– Hazardous Substances Authority
HSE	– Health and Safety Executive
LPA	– Local Planning Authority
SoS	– Secretary of State
WSC	– West Suffolk Council (LPA)

Parties:

Sunnica	– the Applicant, or the proposal under Examination
SNTSAG	– Say No To Sunnica Action Group Ltd

(continued)

GLOSSARY (cont.)

Technical:

BESS	– Battery Energy Storage System(s)
Li-ion	– Lithium-ion
MW	– megawatt, or one million watts, a unit of *power*, i.e. *rate* of transfer of *energy*
MWh	– megawatt-*hour*, or one million watt-hours, a unit of *energy* e.g. the *energy* transferred by a *power* of 1 MW acting for 1 *hour*
m^2	– square metre (area)
ha	– 1 hectare = 10,000 m^2
MWh ha^{-1}	– energy storage density in the BESS compounds, as MWh energy storage capacity, per hectare of land allocated

Personal

1. I reside in Fordham, close to land affected by Sunnica. I am a Chartered Physicist, Chartered Engineer, European Engineer and a Fellow of the Institute of Physics. I have 45 years' experience in the energy industries, largely in the oil industry, but also in nuclear reactor safety (for HM Inspectorate of Nuclear Installations) and wrote my doctoral thesis on wind energy in 1984. I retired in 2018 as Scientific Advisor to a major international company in the oil and gas sector[1].

2. I make this submission both as a local resident and as a technical expert. My family are affected immediately by the impact of Sunnica locally, and face hazards to life, health and property in the event of a major accident involving the BESS components. Having researched BESS technology and safety issues for the SNTSAG since mid-2020[2], I have grave concerns over the operational hazards presented by the grid-scale Li-ion BESS components of the scheme.

Scope of this Post-Hearing Submission

3. This Post-Hearing Submission does not rehearse the reasons for my conviction that under current legislation HSC is almost certainly required for the BESS elements of Sunnica. Those are set out in my Written Representation being submitted by Deadline 2.

4. Hence this Submission does not seek to pre-judge the question of an HSC requirement. Apart from the brief quotation from the central provision in the Regulations in Para.26 below, it is confined to the policy requirements to consider hazardous substances in the Planning process, and the omissions from the dDCO if the legal requirement of HSC is recognised.

Requirements for Hazardous Substances Consent in land-use Planning

5. Though the primary "*focus of planning policies and decisions"* is held in Para.188 of the NPPF[3] to be on land use, and not on "*control of processes or emissions*", or other protection schemes, and that "*planning issues should not be revisited through the permitting regimes operated by pollution control authorities"*, the control of major-accident hazards involving dangerous/hazardous substances is an exception to this general principle. A recent policy outline[4] explains the background.

6. In the UK implementation of the 2012 "Seveso III" Directive (*Seveso*)[5],

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[1] Further personal details in Annex EF1.

[2] A general paper on BESS safety co-authored with Professor Wade Allison DPhil and Professor Sir David Melville CBE CPhys FInstP is included in Annex EF2.

[3] P.188, p.54, National Planning Policy Framework, Ministry of Housing Communities and Local Government, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf Not separately annexed because available from a verifiable .gov.uk site.

[4] See Annex EF3. Hazardous substances (Planning): Common Framework. CP 508 August 2021, presented to Parliament by the SoS for the then DHCLG. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1012074/Hazard_substances_WEB.pdf

[5] Included as Annex EF4. Print version downloaded from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012L0018 on 25 October 2022.

> "*a distinction was made between those elements relating to on-site controls for establishments to minimise the risk of a major accident (those now covered by the Control of Major Accident Hazards (COMAH) Regulations 2015 (GB) and their Northern Ireland equivalent) and the residual off-site risk. The latter is primarily the risk of a major accident arising due to the proximity of hazardous substances to other development or sensitive environments (i.e. if there were an accident due to on-site failures, what the risks would be where certain developments or habitats are or would be close by). This latter issue was considered to be a spatial planning matter to be addressed through planning controls."*[6]

7. Moreover Article 13 of the Directive required major-accident prevention and mitigation to be considered at the Planning stage. Implementation was not a problem for the UK, because (as noted with apparent pride):

> " *… land-use planning controls on hazardous substances existed in Great Britain and Northern Ireland for around a decade before becoming an EU requirement. This is an issue on which the UK has led the way.*"[7]

8. The implementation of the Planning aspects of *Seveso* was made in the form of the P(HS)Regs 2015[8]. The Explanatory Memorandum[9] makes this explicit, and includes a Table of Transposition[10] detailing how the requirements of the Directive were implemented. Specifically, the implementation of Article 13(3) of *Seveso,* (requiring an Applicant to provide, in consultation procedures, "*sufficient information on the risks arising from an establishment*") were implemented in Rs. 5 (application requirements), 9 (validation), 10 (consultation), 26 (planning approvals and public participation) and 32 (transitional).

9. New primary legislation was not required, because the Planning (Hazardous Substances) Act 1990[11] was already available, establishing a consenting regime for hazardous substances control which pre-dated *Seveso III*. The Schedule of designated HS in the P(HS)Regs 2015 is now aligned with that for "lower-tier" COMAH[12] in the COMAH Regs 2015[13], itself deriving from Annex I of *Seveso*.

10. The P(HS)A 1990 requires (S.4) Hazardous Substances Consent (HSC) for the "presence of a hazardous substance on, over, or under land" where such HS are present above CQs (specified (S.5) in the P(HS)Regs 2015), and makes it an offence (S.23) for HSs to be present above CQs without HSC. Persons responsible include those in control of the land, those knowingly causing HSs to be present, and those "allowing it to be so present". Seeking HSC is thus a responsibility of landowners and developers and enforcement is an obligation of Planning authorities.

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[6] Annex EF3, Page 4, Para.3
[7] Annex EF3, Page 5, Para.3
[8] Print version included as Annex EF5. Available from verifiable .gov.uk site https://www.legislation.gov.uk/uksi/2015/627/contents/made
[9] Print version included as Annex EF6. Available from verifiable .gov.uk site https://www.legislation.gov.uk/uksi/2015/627/memorandum/contents
[10] See Annex 1 of the EM (Annex EF6), 4th page of Table entries, top of page, Article 13(3)
[11] Print version included as Annex EF7. Available from verifiable .gov.uk site https://www.legislation.gov.uk/ukpga/1990/10/contents
[12] With 3 exceptions, Liquified Petroleum Gas, Hydrogen, and Natural Gas, for which more stringent CQs pre-date *Seveso* and were retained in the P(HS)Regs 2015; see Para 7.5 of the EM, Annex EF6.
[13] The language of the COMAH Regs 2015 refers to "dangerous" substances; that of P(HS)Regs 2015 and the P(HS)A 1990 to "hazardous" substances. Comparing the Schedules makes evident that the identical library of substances is referred to.

11. The Common Framework document[14] notes that "*the HSC process sits outside of the development consent process*". At least one reason is, that though part of the legal controls on land-use Planning, HSC obligations are enduring, and never discharged by time. Nothing in P(HS)A 1990 nor in P(HS)Regs 2015 currently provides any such limitation. The HSs present, and their quantities, can reasonably change over time, and should be expected to. An establishment might hold HSs only below the CQs when development consent is granted, but subsequently wish to increase the quantities above the CQ(s). HSC would become an obligation at that point. Article 5(2) of *Seveso* makes clear the enduring nature of operators' obligations in major-accident hazard controls originating with the Directive.

Requirement to consider Major-Accident Hazards in Planning Policies

12. *Seveso* survives explicitly in UK law even after EU exit, within R.24 P(HS)Regs 2015, by which it is a duty of the SoS to ensure, that any national policy designated under S.5(1) PA 2008, considers:

> R.24(1)(a) *the objectives of preventing major accidents and limiting the consequences of such accidents for human health and the environment;*

and specifically:

> R.24(1)(b) *the matters referred to in Article 13(2) of the Directive*[15] *(with the reference in sub-paragraph (c) of that paragraph of that Article to Article 5 being read as a reference to regulation 5 of the Control of Major Accident Hazards Regulations 2015).*

13. The "matters" in Article 13(2) are:

> *2. Member States shall ensure that their land-use or other relevant policies and the procedures for implementing those policies take account of the need, in the long term:*
>
> *(a) to maintain appropriate safety distances between establishments covered by this Directive and residential areas, buildings and areas of public use, recreational areas, and, as far as possible, major transport routes;*
>
> *(b) to protect areas of particular natural sensitivity or interest in the vicinity of establishments, where appropriate through appropriate safety distances or other relevant measures;*
>
> *(c) in the case of existing establishments, to take additional technical measures in accordance with Article 5 so as not to increase the risks to human health and the environment.*

In the case of Sunnica, these would include (a) appropriate safety distances between BESS compounds and other land use (e.g. the town of Red Lodge), and (b) areas of natural sensitivity (e.g. the SSSI of Chippenham Fen, and the Fordham Wood nature reserve).

14. The SoS cannot discharge his obligations under R.24 unless Policy Statements designated under S.5(1) PA 2008 are read with the above obligations understood[16]. Similarly, the Application cannot claim compliance with any designated policy (including NPS EN-1 as below) unless major accident prevention and mitigation is adequately considered.

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[14] Annex EF3, page 6, para.1

[15] Defined in R.2(1) to be a reference to the Seveso III Directive "as it had effect immediately before Exit Day"

[16] The NPS for Energy currently linked from the Inspectorate website were presented to Parliament July 2011, pre-dating the obligations imposed on the SoS by the current P(HS)Regs 2015.

Hazardous Substances requirements in National Policy Statements

15. NPS EN-1[17] (to which the ExA will have regard) contains explicit policy on Hazardous Substances in section 4.12:

> 4.12.1 All establishments wishing to hold stocks of certain hazardous substances above a threshold need Hazardous Substances consent. Applicants should consult the HSE at pre-application stage93 if the project is likely to need hazardous substances consent. Where hazardous substances consent is applied for, the IPC will consider whether to make an order directing that hazardous substances consent shall be deemed to be granted alongside making an order granting development consent94. The IPC should consult HSE about this.
>
> 4.12.2 HSE will assess the risks based on the development consent application. Where HSE does not advise against the IPC granting the consent, it will also recommend whether the consent should be granted subject to any requirements.

[Elsewhere, the NPS explains that the Infrastructure Planning Commission IPC has been abolished and replaced for present purposes by the ExA]

Footnote 94 is germane to our purposes and reads:

> 94 Hazardous substances consent can also be applied for subsequent to a DCO application. However, the guidance in 4.12.1 still applies i.e. the application should consult with HSE at the pre-application stage and include details in their DCO.

16. These policy provisions are consistent with the consenting regime for HS created by the P(HS)A 1990 and the P(HS)Regs 2015, in fulfilment of the land-use planning aspects of the "control of major-accident hazards involving dangerous/hazardous substances" required by *Seveso*.

17. The "*certain hazardous substances*" (HSs) are defined in the Schedule to the P(HS)Regs 2015, as are the "*thresholds*" (CQs). The NPS endorses the legal requirement for HSC as required by P(HS)A 1990. Where HSC is applied for in infrastructure projects, the option of making a Direction[18] that HSC is "deemed to be granted" (alongside the DCO) will be considered, subject to consultation with HSE[19], who "*will assess the risks based on the development consent application.*"

18. Footnote 94 makes explicit that HSC can also be applied for *subsequent* to a DCO application. Although the PA 2008 process is designed as a "one stop shop", it is clearly not obligatory for an Applicant to obtain *all* necessary permissions in their DCO. At least one reason for this might be that changes over time in the inventory of HS held on the site are envisaged, or become necessary, as discussed above in Sec.3. Sec.4.12.1 of NPS EN-1 makes clear that the ExA only need consider recommending a S.12(2B) Direction if HSC has been applied for. Moreover, the policy footnote 94 also requires the Applicant "*to consult with HSE at the pre-application stage*" and to "*include details in their DCO*".

19. NPS EN-1 Sect. 4.11 also has policy on safety requirements. These related issues go beyond the question of HSC alone and will be discussed in my WR.

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[17] "Overarching NPS for Energy (EN-1)" July 2011. Linked on Inspectorate website, "Legislation and advice tab", leading to https://www.gov.uk/government/publications/national-policy-statements-for-energy-infrastructure, downloaded 26 October 2022 and included as Annex 8.

[18] Under S.12(2B) of P(HS)A 1990

[19] In part to fulfil the obligations on the Secretary of State to "consult the Health and Safety Commission" created by S.12(3) P(HS)A 1990 before making any Direction under S.12(2B).

Parliamentary recognition of Major-Accident Hazards presented by grid-scale Li-ion BESS

20. That grid-scale Li-ion BESS present a major and under-researched hazard with major accident potential is now recognised in Parliament.

A 10-Minute Rule Bill presented by Dame Maria Miller MP (Basingstoke) passed its First Reading in the House of Commons of 7 September 2022. Mr Matt Hancock MP (West Suffolk, one of the two constituencies affected by Sunnica) was a co-sponsor of the Bill.

The Second Reading is scheduled for 24 March 2023.

The full text of Dame Maria's speech from *Hansard* is attached as Annex 9.

21. Important excerpts are that:

- The Bill would ensure that industrial lithium-ion battery storage facilities are correctly categorised as hazardous**.**
- We need lithium-ion battery storage facilities, but they must be seen correctly for what they are: highly complex, with the potential to create dangerous events and hazardous substances. The good news is that we do not need new regulations; we simply need to better use the regulations we have. *We already have robust legislation, the Planning (Hazardous Substances) Regulations 2015 and the Control of Major Accident Hazards Regulations 2015.* My Bill would correctly apply those regulations to battery storage sites.

22. Two matters arise.

Firstly, though the Examination is scheduled to conclude by 28 March 2023 and the Second Reading does not take place until 24 March 2023, if the Bill continues to make progress in Parliament, new legislation pertaining to Li-ion BESS, particularly with regard to consultations and major-accident controls, may be in place by the time any approved DCO is ordered, and increasingly probably by the time any third-party interest may seek to acquire the rights to it.

23. Secondly, Dame Maria recognises (correctly in my view) that "*we do not need new regulations*; *we simply need to better use the regulations we have*", citing the P(HS)Regs 2015 and the COMAH Regs 2015 discussed herein.

The *Lithium-Ion Battery Storage (Fire Safety and Environmental Permits) Bill* is likely to have multiple purposes. Whilst clarification of the law by making the P(HS)Regs 2015 and COMAH Regs 2015 explicitly and unambiguously applicable to grid-scale Li-ion BESS is to be welcomed, it is strictly speaking unnecessary.

24. The major-accident control regime inherited from *Seveso* and represented by those Regulations does, I contend, *already apply* to grid-scale Li-ion BESS, simply because there is nothing in the Regulations or law elsewhere to exclude them.

The *Seveso* regime is deliberately agnostic as to technology, and is based instead on the simple presence of designated dangerous/hazardous substances above listed thresholds. Moreover, dangerous/hazardous substances "*generated during loss of control of the processes*" are explicitly covered, see below.

Definitions of Hazardous Substances in the P(HS)Regs 2015

25. The most important aspect of the P(HS)Regs 2015 is to define in Schedule 1 what are "Hazardous Substances" HS and their Controlled Quantities CQ, for the purposes of S.5 P(HS)A 1990. Other Regulations specify procedures and requirements for applications.

26. In the case of grid-scale Li-ion BESS, the most important part of Schedule 1 leading to a requirement for HSC will be Schedule 1, Part 3 "Substances used in Processes" containing the "loss of control" provisions of the P(HS)Regs 2015, whereby "*any substance"* S *"used in that process"* is designated a "Hazardous Substance" in Column 1 of Part 3, "*where it is reasonable to foresee that a substance falling within Part 1 or Part 2 may be generated during loss of control of the processes"*.

27. The technical issues dealing with the application of Schedule 1 Part 3 of the P(HS)Regs 2015 to "loss of control" accidents in grid-scale Li-ion BESS are detailed elsewhere in my WR being submitted by Deadline 2 and are not rehearsed further.

Procedures for obtaining HSC

28. Two means of obtaining HSC are given in S.6(1) P(HS)A 1990, namely (a) an application under that Act, or (b) "deemed consent" granted under Ss.11 or 12.

(a) An application under the Act (S.6(1a)) would be made by application to the relevant Hazardous Substances Authority (HSA), in the case of Sunnica to the relevant District Council(s), viz. ECDC and/or WSC.

(b) "Deemed consent" (S.6(1b)) may be granted by Government Authorisation under S.12 P(HS)A 1990, which is the relevant section for HSC being granted as part of a DCO under the PA 2008 process. Specifically, S.12(2B) was inserted into P(HS)A 1990 by Sch.2 P.45(2) PA 2008, so it is clear that the intention of the PA 2008 procedures is to give to the SoS the power to issue a Direction that HSC is "deemed to be granted" according to S.12(2B).

The policies in Sec. 4.12.1 NPS EN-1 are consistent with these provisions.

Application of P(HS)Regs 2015 to applications for HSC

29. R.5(1)(d)(iii) P(HS)Regs 2015 provides that applications for HSC made to the HSA under S.6(1)(a) of P(HS)A1990 must include, *inter alia*:

R.5(1)(d)(iii) *each hazardous substance for which consent is sought ("relevant substance"), including the maximum quantity of each relevant substance proposed to be present;*

R.5(1)(d)(v) *how and where each relevant substance is to be kept and used;*

R.5(1)(d)(viii) *the measures taken or proposed to be taken to limit the consequences of a major accident;*

Notices must be published a minimum of 21 days before the application (R.6), and the HSA must consult widely (R.10), including *inter alia*, the parish council(s), county council(s), other local authorities adjacent within 2 km, Natural England and any other persons and environmental NGOs having an interest in the application.

Application of P(HS)Regs 2015 to "deemed HSC"

30. In Part 6 (Policies and Public Participation), R.26(5), R.26(6)(h) and R.26(6)(f)(v) P(HS)Regs 2015 provide that making a Direction of "deemed HSC" under S.12(2B) P(HS)A 1990, or making a DCO under S.114 PA 2008, are subject to the requirements of R.26, which include consultation (R.26(2)) and publication of the reasoning behind the decision (R.26(3)).

31. Apart from R.26, the Regulations appear silent on the exact details required for an Application for HSC by Direction, under S.12(2B) P(HS)A 1990. There is however the requirement for the involvement of HSE (to satisfy S.12(3)).

32. The policy requirements in NPS EN-1 and those required by R.24 (Pars. 12–14 above) continue however to require that major-accident prevention and mitigation remain central to any valid policy.

33. Though no upper limit on storage capacity for the Sunnica BESS has been stated, it may prove to be one of the largest BESS in the world. It would be an affront to the intentions of the regime inherited from *Seveso* to determine an application for HSC by Direction, with any lesser scrutiny than is required for applications for HSC determined by LPAs – typically for much smaller establishments with much less major accident potential. Such applications require specification of hazardous substances, maximum quantities, mode of use, publication and extensive consultation, none of which have so far taken place in respect of the Sunnica BESS.

Absence of HSC from the Sunnica dDCO: disregard of advice from HSE

34. Previously to the Application Sunnica had obtained a Scoping Opinion from the HSE as recorded in the ES[20] Ch.16 Table 16-8 Page 16-24:

HSE correctly advise the applicant that the presence of hazardous substances "*will probably require HSC*", and further advise: "*Further information on HSC should be sought from the relevant Hazardous Substances Authority*".

35. Sunnica appear to have disregarded this advice. The response from the Applicant claims that the HSE advice is "*a generic comment not considered to be relevant to this project as no hazardous materials are expected*".

I contend that this claim is fundamentally and legally wrong, as set out in my WR, and asserted in my previous RR.

36. The dDCO for Sunnica[21] does not contain any reference to HSC. The disapplied legislation in Article 6 and in Schedule 3 lists no matters connected with HSC. There is no application for a Direction under S.12(2B) P(HS)A 1990 for HSC to be "deemed to be granted".

At ISH1, Counsel for CCC (Mr Kimblin) asked whether HSC was being sought.

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[20] Sunnica Volume 6, Environmental Statement Chapter 16 "Other Environmental Topics", 18 November 2021, Document Reference EN010106/APP/6.1 Table 16-8 Page 16-24 last entry.

[21] Sunnica dDCO, Document Reference EN010106/APP/3.1 https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010106/EN010106-001775-SEF_3.1_Draft%20Development%20Consent%20Order.pdf

Counsel for the Applicant (Mr Turney) answered No, and agreed that the dDCO did not seek HSC. He explained the reason was that the exact electrochemistry of the BESS remained to be decided and future flexibility was required. Moreover neither was the maximum energy storage capacity of the BESS yet determined. Hence application for HSC was not possible at the present time.

Contradictions in the Applicant's position

37. These responses create a divergence between statements made by the Applicant's legal advisors.

Mr Griffiths at one point asserted that "*the DCO wraps up all necessary consents"* in one document. This is indeed the broad intention of the PA 2008 procedures.

However Mr Turney then acknowledged that HSC was *not* being applied for in the DCO but would be sought later if it were an additional required consent. Obviously in that case the DCO would *not* have "wrapped up" all necessary consents.

Subsequent application for HSC

38. The Applicant would appear to have two options, either:

a) extend the Application to include application for a S.12(2B) Direction; or

b) apply for HSC for the BESS elements subsequently to any DCO.

39(a) ***Application for a S.12(2B) Direction:*** Guidance in NPS EN-1 Sec.4.12 says: "*Where HSC is applied for, the IPC will consider whether to make an order …"*

Mr Turney confirmed at ISH1 that HSC was *not* being sought through the dDCO, so presumably the issue will not be further Examined.

To Examine this issue properly would require a much more complete technical specification than so far provided. As a minimum the details in R.5(1)(d)(iii, v, viii) (Para. 29 above) would be needed.

Moreover Sunnica have not consulted on Hazardous Substances, as would be required by R.10 of the P(HS)Regs 2015, in applications for HSC made to HSA(s).

39(b) ***Application for HSC subsequent to any DCO:*** Guidance in NPS EN-1 Sec.4.12 note 94 confirms that this is possible, but says that HSE should be consulted. Whilst the Applicant has obtained a Scoping Opinion from HSE, the further advice to consult "*the relevant Hazardous Substances Authority*" appears to have been disregarded, and the NPS Note 94 guidance to "*include details in their DCO*" has not been observed.

The guidance does not say whether a subsequent application for HSC should be made to the relevant HSAs, or whether a supplementary Direction should be sought from the SoS through the NSIP process.

40. Asked whether the Applicant would seek HSC via a supplementary Direction for "deemed HSC", Mr Turney answered No, the Applicant would most probably revert to the HSAs.

Proposed resolution for absence of HSC from the dDCO

41. If the Examination does *not* consider the question of HSC (though required by policy to consider major-accident prevention and mitigation pursuant to R.24(1) of P(HS)Regs 2015), then I propose a precautionary clause be added to the dDCO:

42. *Proposed additional clause:*

> " Nothing in this Order removes any obligation to seek Hazardous Substances Consent for the Battery Energy Storage Systems in the scheme, as may be required (depending on technical specification) by The Planning (Hazardous Substances) Act 1990 and The Planning (Hazardous Substances) Regulations 2015 or related legislation for the time being in force. "

43. The proposed additional clause is merely declaratory. It seeks no powers, removes no freedoms or options, and leaves open the question of whether HSC is required or not. It simply asserts the default obligations where HSC has not been sought within the DCO.

44. The need for such a clause is exemplified by the divergence between the Applicants own legal advisors noted in Para. 35. It would not necessarily be evident to the reader of the DCO whether "all necessary consents" were in fact granted by the DCO. If HSC is not sought in the DCO, but in fact proves to be required, then "all necessary consents" are *not* contained in the DCO. For avoidance of doubt, the potential need for a remaining consent should be declared.

45. Silence on the matter of HSC could potentially create difficulties through misunderstanding. For example, a third party might acquire the rights to any DCO and casually assume that "all necessary consents" had been obtained, commencing installation of systems requiring HSC. This would then force the LPAs into burdensome enforcement action, possibly including prosecutions under S.23 P(HS)A 1990. Such misunderstandings are pre-empted by the declaratory clause proposed.

46. Moreover the Guidance in note 94 of Sec. 4.12 of NPS EN-1 says that the Application should nevertheless "*include details in the DCO*". Saying nothing at all about HSC fails to observe this NPS guidance. It would however be fulfilled at least in part by the proposed additional clause.

Other consequences of subsequent application for HSC to the HSAs

47. Other consequences of a subsequent application for HSC made to the HSAs should be noted. The relevant HSAs are in this case the LPAs of ECDC and WSC. Probably both would be required to be involved because of the proximity requirements in R.10(1)(i) P(HS)Regs 2015.

48. An application for HSC made to a LPA acting as the HSA would trigger a formal Notice to the "COMAH Competent Authority" under R.9(1)(b) P(HS)Regs 2015, and consultation with it under R.10(1)(a). The "COMAH Competent Authority" is defined in R.2(1) as the Health and Safety Executive and the Environment Agency acting jointly.

Hence both regulatory agencies (HSE and the EA) would become involved.

49. At the ISH1, the local authorities (both County and District Councils) agreed that the County Councils would act as the discharging authorities for the (revised) Battery Fire Safety Management plan. Moreover the Applicant agreed that they had no objection to the involvement of the HSE in the discharge of the fire safety plan.

50. Hence one consequence of a reversion to the LPAs in a subsequent application for HSC to the LPAs is that both County and District Councils would then become involved in applications.

These would be, for discharge of fire safety conditions, the County Councils, with the agreed involvement of HSE; and for HSC, the District Councils (as the relevant HSAs), with a formal Notice to the COMAH Competent Authority, being HSE plus the EA acting jointly.

51. These dual applications would almost certainly overlap technically because the principal reason likely to require HSC in Li-ion BESS are the "loss of control" provisions in Part 3 of Schedule 1 to the P(HS)Regs 2015. These require consideration of battery accidents, typically "thermal runaway" accidents popularly called "battery fires". The same issues of behaviour in thermal runaway, or fire, and the hazardous substances generated in such accidents would arise.

Both would involve the HSE, and HSC would involve the EA in addition. After the ISH1, all four Councils would continue to be involved in overlapping decisions.

52. I submit that involvement of all four Councils plus two statutory agencies is scarcely an efficient or effective means of resolving the central industrial health and safety issues arising from the deployment of giant BESS systems.

Requests from the ExA to clarify BESS capacity estimates made

53. At the ISH1 the Chair of the ExA Mr Kean requested clarification of the BESS capacity estimates made in submissions from the SNTSAG.

54. I should like to make clear I was *not* the author of the estimate of 3000 MWh capacity made in submissions from the SNTSAG which were made by a different technical expert who is not personally affected. Disclosure of these I leave to the SNTSAG. My own estimates and rationale are discussed below.

55. As explained at ISH1, a very simple scoping estimate can be made from declared allocation of land for the BESS compounds, plus site planning guidance from the Energy Institute[22]. This is to answer the question "what energy storage capacity is it credible to accommodate on a given land area". The Energy Institute quotes a footprint of 10,000 m^2 (1 hectare or 1 ha) for a 100 MWh Li-ion project[23]. Equivalently, this represents an "energy density on the land" of 100 MWh per hectare (100 MWh ha^{-1}). A 100 MWh project would inevitably involve multiple cabins. Sunnica have stated areas[24] for the three BESS compounds totalling[25] 31.1 ha.

[22] Battery storage guidance note 1: Battery storage planning. Energy Institute, August 2019. Annexed as EF10.
[23] Sec. 4.2, page 16 of Annex EF10.
[24] Environmental Statement Ch. 3 Scheme Description Table 3-2 page 3-9 EN010106/APP/6.1 https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010106/EN010106-001797-SEF_ES_6.1_Chapter_3_Scheme%20Description.pdf

On the basis of the Energy Institute guidance for a multi-cabin project achieving an energy density of 100 MWh ha^{-1}, a land allocation of 31.1 ha would allow for a scheme total energy storage capacity of 3110 MWh.

This what I meant by "a very simple calculation": it is simple arithmetic, but based on guidance from the relevant chartered engineering institution regarding BESS site planning for multi-cabin projects, and the declared area of the BESS compounds.

Thus even without Sunnica ever declaring their plans for the BESS storage capacity in MWh, it was possible to form a scoping estimate of the energy storage capacity of a fully populated installation. A more granular estimate, based on estimated energy per cabin, plus density of cabins on the ground, is given below.

The result of 3110 MWh is closely aligned with 3000 MWh quoted by SNTSAG.

56. Mr Turney for the Applicant said that they "did not recognise" this figure and gave a series of estimates of BESS capacity based on the concept of a "charging rate" starting from a design *power* of 500 MW. This is of course completely different from the energy storage capacity in MWh, as Mr Turney correctly pointed out.

For a charging time of 2 hours at full power of 500 MW would require energy storage capacity of 1000 MWh. Adding a 20% "capacity margin" to allow for losses (recall this is Mr Turney's figure) increases the required capacity to 1200 MWh.

For a charging time of 4 hours, these figures would be doubled, so the actual energy storage capacity required would be 2400 MWh.

Mr Turney anticipated that a "charge time capability" of 4 hours would probably become the design objective but that details were not fixed.

57. I should like to record that this is the very first occasion in two and a half years that the Applicant has declared any quantitative projection of the likely design capacity for energy storage in the BESS.

It was my very first question to Sunnica at the non-statutory consultations made in 2019, was repeated in subsequent correspondence, and no quantitative answer has been forthcoming until the ISH1. The "500 MW" power rating of the scheme quoted to me as the only answer fails completely to answer the question of energy storage capacity, a different concept, as Mr Turney clearly now recognises.

Yet in my view energy storage in MWh is central design parameter for considering the likely scale of major-accident hazard presented by the scheme.

58. Although the Applicant "did not recognise" the figure of 3000 MWh estimated by SNTSAG, it should be obvious that a further "capacity upgrade" by a mere 25% would bring the Applicant's projection of 2400 MWh into congruence with the independent estimate of 3000 MWh provided by SNTSAG from quite different considerations, and the similar estimate of 3110 MWh implied by the site area and the Energy Institute guidance.

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[25] This represents a slight shift from the original areas quoted in the PEIR, when the BESS compounds had somewhat different areas, but the scheme total at that time was 31.48 ha, which is not a significant change from the current scheme total of 31.1 ha for the BESS compounds.

59. At an early stage I made estimates based on the very limited information provided in the Sunnica PEIR. These were set out in Appendix 1[26] of my paper with Professor Wade Allison of Keble College, Oxford, and Professor Sir David Melville CBE included as Annex EF2 and based on information available at that time. Although the individual BESS compound areas have since changed[25], the scheme total is closely similar (31.48 ha *vs.* 31.1 ha). As "scoping estimates" they therefore remain reasonable. Depending on assumptions regarding energy storage in MWh per cabin, and density of cabins on the ground, a total scheme capacity (in round numbers) between 1500 MWh ("base case") and 3000 MWh ("high case") was estimated. I have continued to regard 3000 MWh as a credible "high" estimate, in agreement with the Energy Institute approach in Para. 55 yielding 3110 MWh, and have employed the 3000 MWh figure as a "rule of thumb".

60. I am gratified that Mr Turney's "probable design target" of 2400 MWh reported at the ISH1 falls squarely within the range 1500 – 3000 MWh estimated by us in May 2021 from other considerations.

61. Mr Turney's approach (based on charging time) is different from ours. The scheme storage capacity could become arbitrarily large if charging times larger than 4 hours were sought as a design target. It does not answer the question of what energy storage capacity it is credible to accommodate safely on the land area allocated, in the present state of BESS technology. Hence we (myself and my co-authors Professor Allison and Sir David Melville) took a different approach.

62. First we estimated an energy storage capacity per cabin based on Sunnica's stated cabin dimensions which are exceptionally large. In particular the height of 6 metres is more than double that of a standard shipping container (2.59 metres), the typical qualitative description of a BESS cabin, e.g. as made by the Energy Institute[27]: "*container-based projects are usually housed within standard (8 ft 6 in high), high cube (9ft 6 in high) or modified ISO containers*".

An actual single cabin BESS of 2 MWh capacity was taken as a reference case. This was the BESS at McMicken, Arizona which suffered a major explosion incident in April 2019 and was subsequently the subject of a forensic failure analysis published in July 2020[28] from which much technical data is available.

Scaling by volume from the Arizona BESS to a cabin of the Sunnica volume yields an estimate (in round numbers) of 5 MWh per cabin.

However the Arizona BESS was not fully populated with racks and had significant expansion capability. Hence we considered that up to 10 MWh per cabin might be feasible if the interior space of the Sunnica cabins were fully populated.

It would significantly assist the Examination if Sunnica were to declare a design energy storage capacity in MWh per cabin, of the cabin size proposed.

63. The density of cabins on the ground remains unstated by Sunnica. We took an initial assumption that 7.5% of the land would be occupied by cabins themselves,

[26] Please see pages 24-25 of Annex EF2

[27] See Energy Institute note, Annex EF10, Sec. 41., page 16.

[28] Annexed as EF11.

allowing for safety separations, fire access routes, Battery Management Systems and other electrical plant. The figure of 7.5% was a “starting guess”, based on the capacity and land area reported for the Cleve Hill (Kent) solar farm and battery storage plant[29].

64. Our “base case” estimate of 1500 MWh (in round numbers) follows from this density and the reference case energy storage of 5 MWh per cabin. The “high case” of 3000 MWh follows from the credible assumption of a “fully-populated” cabin storage of 10 MWh per cabin.

65. Our estimates are equivalent to 50 MWh ha^{-1} for cabins of 5 MWh per cabin, doubling to 100 MWh ha^{-1} for cabins of 10 MWh per cabin (equivalent to the Energy Institute guidance). The equivalent figure at Cleve Hill is 69.2 MWh ha^{-1}, which suggested our “starting guess” of 7.5% of land occupied by cabins.

66. As we have seen our May 2021 estimates for the scheme total (1500 – 3000 MWh) bracket convincingly the target figure of 2400 MWh now disclosed at ISH1 by the Applicant, and the “high case” figure of 3000 MWh is consistent with Energy Institute guidance.

67. None of these estimates depend on the “charging time” sought as a design objective. They seek to answer a different question, namely what is the maximum energy storage that can credibly be accommodated on the land allocated. For the reasons cited I believe that future upgrades to 3000 MWh storage capacity are entirely credible. Even higher capacities could result if the storage per cabin were increased beyond 10 MWh, or the density of cabins on the ground were increased by in-filling, which would have major implications for site safety.

68. Because the Applicant has consistently declined to answer questions regarding energy storage capacity or total number of BESS cabins, our estimates were necessarily based on external considerations (implied density at Cleve Hill, Energy Institute guidance, actual BESS data from detailed technical reports etc). They were however feasible, based on those quantities implied elsewhere, even in the absence of explicit disclosures by the Applicant.

Further scoping estimates based on these considerations, requiring no more than simple arithmetic, are obviously possible.

However the real issue for the Examination is to make specific the very fluid and under-specified parameters of the BESS actually proposed, regarding energy storage capacities. I would suggest as a minimum: energy storage per cabin, density of cabins on the ground, total number of cabins, and a realistic scheme total energy storage capacity.

These are obviously questions only the Applicant can answer.

5794 words

EJF, 11/11/22

List of Annexes follows, Annexes uploaded separately

[29] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010085/EN010085-001957-200528%20EN010085%20CHSP%20Development%20Consent%20Order.pdf

List of Annexes referred to: – Post-Hearing Submission of Dr Edmund Fordham
(dated 11th November 2022)

EF1 – Personal details

EF2 – "Safety of Grid Scale Lithium-ion Battery Energy Storage Systems"
by E J Fordham (Interested Party), with
Professor Wade Allison DPhil and
Professor Sir David Melville CBE CPhys FInstP

EF3 – "Hazardous substances (Planning) Common Framework"
CP 508 Presented to Parliament by the SoS for DHCLG August 2021

EF4 – Directive 2012/18/EU of the European Parliament and of the Council
on the Control of Major-Accident Hazards involving dangerous substances
commonly known as the "Seveso III Directive"

EF5 – The Planning (Hazardous Substances) Regulations 2015

EF6 – Explanatory Memorandum to the P(HS)Regs 2015

EF7 – The Planning (Hazardous Substances) Act 1990

EF8 – Overarching National Policy Statement for Energy (NPS EN-1)

EF9 – Speech of Dame Maria Miller MP, House of Commons, 7 September 2022
Hansard, (House of Commons) Volume 719, Columns 275-277

EF10 – Battery Storage Guidance Note 1: Battery Storage Planning. Energy
Institute, August 2019, ISBN 978 1 78725 122 9

EF11 – D. Hill (2020).
"McMicken BESS event: Technical Analysis and Recommendations"
Technical support for APS related to McMicken thermal runaway and
explosion.
Arizona Public Service. Document 10209302-HOU-R-01
Report by DNV-GL to Arizona Public Service, 18 July 2020.