Norwell Solar Farm Steering Group

Application by Elements Green Trent Limited for an Order Granting Development Consent for the Great North Road Solar and Biodiversity Park (GNR Project)– project ref. EN010162

Unique Number [redacted] (Our ref NSG/8)

Deadline 3. Written Summary of Oral Submissions ISH/3

Contents

Executive Summary

This report summarises the Norwell Solar Farm Steering Group's written submissions following Issue Specific Hearing 3 regarding the proposed Great North Road Solar and Biodiversity Park. The Group focuses primarily on water-related risks and Battery Energy Storage System (BESS) safety and design concerns.

A key local environmental issue is Pond 116, located near Kneesall Lodge. Although environmental DNA testing did not detect great crested newts, the pond has an excellent habitat suitability rating and is sustained by an underground spring-fed pipe believed to be over 100 years old. Planned pile-driven solar panel foundations and concrete-anchored fencing in field W7 may intersect or damage this pipe. If fractured, the spring supply could be lost, leading to long-term habitat degradation. The Group therefore requests precise identification and protection of the pipe, alongside a commitment to repair any damage.

The report then addresses BESS fire risk, identifying the scale of proposed battery storage as a significant potential environmental hazard. While the Applicant outlines fire management measures, the Group argues these underestimate both fire duration and water requirements, citing major international incidents involving millions of litres of water and prolonged firefighting operations. Concerns are raised about insufficient firefighting water provision, limited clarity on supply logistics, and lack of meaningful engagement with Nottinghamshire Fire and Rescue Service.

The Group further challenges assumptions that fire-water contamination is unlikely and that a maximum two-hour burn scenario are realistic. Planned drainage and storage infrastructure is considered inadequate, particularly if contaminated water must be contained, tested, and removed by licensed waste carriers. Risks of groundwater contamination, airborne toxic emissions, and impacts on nearby farmland, woodland, and settlements are also highlighted, with no comprehensive plume modelling presented.

Finally, the report identifies design shortcomings, including unclear tanker access, uncertain containment routing, and potentially insufficient spacing between battery units.

Overall, the Steering Group concludes that current plans inadequately address ecological protection, fire risk, environmental contamination, and emergency response requirements.

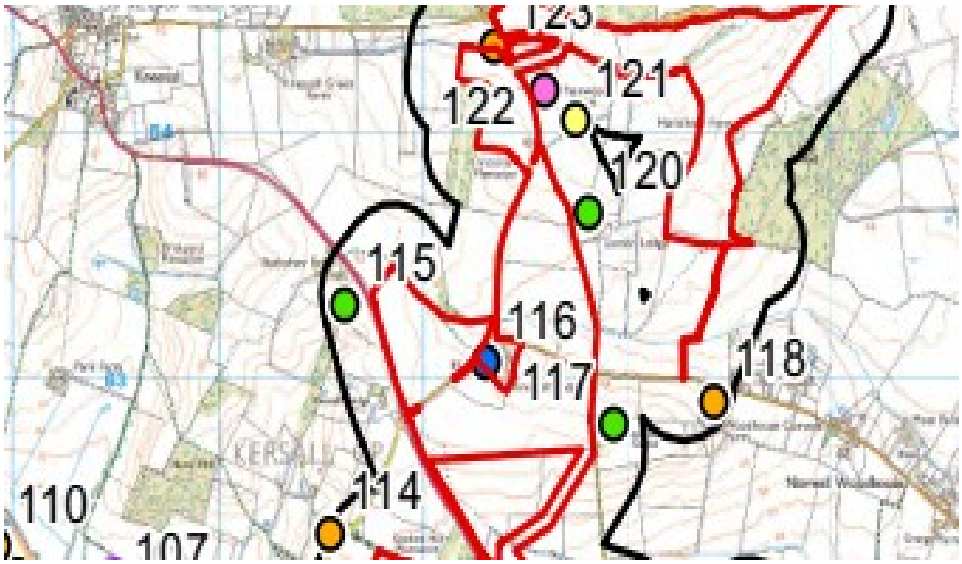
Content note: Parts of this executive summary were initially created using ChatGPT by the author who is a registered subscriber and an authorised user. Those parts were then edited manually by the author

1 Introduction

The Group addressed two subjects at the end of Issue Specific Hearing 3. Because time was pressing, there was a degree of abridging the oral submissions. Both subjects were related to water, though in different ways. However, with regard to the second issue – contaminated fire-water, the Authority gave permission for non water related design issues relating to the Battery Energy Storage System (BESS) to be be discussed in this submission. This would hopefully negate the need for a separate additional submission. Where source documents are referred to, there will be a corresponding reference number with the full details listed in the Citations and Reference Page at the end.

2 Pond 116

2.1 This water feature was designated as Pond 116 in the Technical Appendix A8.7 Great Crested Newt Baseline (GCN) APP-220. Below is an edited graphic from that document showing its location. It is within the grounds of Kneesall Lodge, Northwest of Norwell Woodhouse.



2.2 The map pin is coloured blue signifying that it has a Habitat Suitability Index rating as Excellent for GCN, though on the day of the survey of the pond, it tested negative for GCN DNA.

2.3 In terms of how this location is to be affected by the development, the below graphic is taken from the Applicant's Masterplan, demonstrating its proximity to planned panelling.

2.4 The location of the pond is shown as a faint light blue circle. It is the proposed development on field W7 above that is a cause for concern. The pond is pictured below:

2.5 This pond is fed by an underground pipe which draws from a natural spring in field W7. Below is pictured the pipe discharging into the pond;

2.6 The pipe outlet end is a relatively recent replacement but the original underground pipe underneath the two fields leading to the spring is over 100 years old. The owner of this property is aware of the rough location of the underground horseshoe clay pipe underneath the fields to the south, with this information having been handed down over the generations. Below is a graphic taken from Technical Appendix A11.5: Phase 2 Geophysics Results - Part 3 of 5 APP-260

2.7 The geophysical survey identified a feature which was deemed to be an agricultural disturbance, as signified by the brown shading above, running north to south. The line roughly corresponds with where the pond landowner has always believed to be the location of the underground pipe. The geophysical results did not recognise it as a service pipe: in fact, the results failed to identify any pipe heading north to the pond. It is also worthy of note that this line, if continued through the next field in a straight line, would lead directly to the pond.

2.8 The concern is that the panel mounting structures in field W7 will be pile driven into the ground, below which is this pipe. Being as this field is one of the highest and most exposed in the development, the panels here will have to be anchored deeply.

2.9 The northern boundary of field W7 will have deer fence posts anchored in concrete buried in the ground. The clear concern here is that either of the above two ground penetrations could inadvertently fracture this pipe and cease the feed to the pond, leading to a long term deterioration in that feature, with an associated adverse impact on this wildlife habitat.

2.10 It is requested that the Applicant takes further measures to confirm the exact location of the pipe and to ensure that all pile driving and excavation takes place around it, not into it. There should also be a

requirement that if it is shown that the pipe has been fractured and the feed to the pond lost, then the Applicant should make an undertaking to repair the damage and restore the spring feed at the earliest opportunity.

3 BESS Fire-water

3.1 The part of the proposed development with the most potential for causing pollution harm to the environment and jeopardising safety for wildlife and people is the 880MWh of battery storage. The potential for Lithium Ferrophosphate (LFP) battery cells to catch fire has been long recognised and sadly such events are becoming more common, principally driven by an increase in the number of electric vehicles.

3.2 However, the country is now experiencing a sudden rush in the construction of BESS. Responsibility for dealing with a BESS fire or explosion in the County falls to Nottinghamshire Fire and Rescue Service (NFRS).

3.4 Paragraph 2.1.2 of the Applicant's Responses to Relevant Representations Report REP1-065 states:-

> *"A number of parties where SoCGs have been requested have related to bodies who had not submitted Relevant Representations, or registered as Interested Parties. The Applicant has reached out to these bodies, but a substantive response has not yet been received. These relate to:*
> • *Nottinghamshire Fire and Rescue..."*

3.5 The above is a little surprising. On 9th February 2026, the National Fire Chiefs Council (NFCC) published its latest Guidance[1] to Fire and Rescue Services on Grid Scale Energy Storage System Planning. This replaced their 2023 Guidance and updated draft guidance issued in 2024.

3.6 The start of Section 3 of the 2026 Guidance is identical to the start of Section 5 of the 2024 draft, stating.

> *"Fire and rescue services can take measures to support the planning process. This includes facilitating timely and meaningful engagement between the fire and rescue service,*

local planners, and developers to assist operational pre-planning."

3.7 It is of course possible that NFRS were aware of the imminent publication of the latest guidance and have delayed engagement until its publication. NFRS are not a statutory consultee for projects such as these. To some this may seem a bit perverse given the inherent dangers of such infrastructure. They do have a statutory duty to obtain information which would assist in extinguishing fires in their area. Government Guidance on Renewable and Low Carbon Energy (2023) encourages applicants for utility scale BESS to engage with local fire and rescue. The Applicant here states that has been done.

3.8 In the Outline Fire Safety and Management Plan (FSMP) REP1-032, the Applicant, provides all their intended measures to be adopted to deal with the threat of a thermal runaway.

3.9 It is widely accepted that the tactic to be employed in tackling a LFP fire is to let it burn itself out whilst cooling the units nearby to prevent fire propagation. There is no difference in the on-site water requirement between the 2024 and 2026 guidelines. The Applicant has clearly noted these requirements and plans two tanks each containing 231m³ of water. The provision of 2 tanks appears to cater for the probability that one may not be safely accessible. There appears to be less detail about other sources of water for firefighting. The Guidance makes it clear that typically pumping fire appliances would carry 1,800-2,000L of water on board which can be exhausted in under 5 minutes.

3.10 This is a subject on which it would be useful to have the view of NFRS. Given its location, it has not been shown that sufficient water can be delivered or where it will be coming from.

3.11 To put this issue in some form of context, it is worth examining the likely amounts of water that may be required. Assistance is given in this regard by examining historical BESS fires.

(a) 15th September 2020 Carnegie Road Liverpool

Thought to be first major lithium-ion battery storage incident in the country, firefighters had to be deployed for 58 hours. There is no exact calculation as to how much water was needed to fight that fire but several sources state it was in the millions of litres, possibly over 5 million. A post Incident presentation[2] has been published by Merseyside Fire and Rescue Service. There was hydrogen fluoride and hydrochloric acid in the water run off and smoke plume.

(b) 15th May 2024 San Diego California

At the 250MW/250MWh lithium-ion battery installation Gateway Energy Storage, California, a fire broke out and continued to reignite, extending the incident to around two weeks. Nearby industrial facilities and schools were temporarily closed and evacuation orders were issued because of the poisonous vapours and potential explosions – evacuation orders were initially lifted then had to be reimposed after the fire reignited. It was reported that some 8 million litres of water were used in an attempt to control the fire

(c) 5th September 2024 Escondido California

The fire was confined to a single containerized battery unit out of the 24 on-site. It forced evacuations for several days due to the "immediate threat to life". Schools and around 500 local businesses were closed.

(d) 16th January 2025, Moss Landing. Monteray California.

In their suite of post incident reports[3], the US Environmental Protection Agency responders reported that they had to remove

586,300 gallons of water from the site (2.6 million litres). To put that into context, the volume of water is roughly equivalent to the amount of water in an Olympic-sized swimming pool. That fire burned for from 16th to 18th January 2025.

Source: Facebook

(e) 19th February 2025 East Tilbury Essex

On the above date, there was a BESS fire at the Statera BESS in Essex. Essex County Fire and Rescue Service state in their post incident report that they were dealing with the incident for 25 hours. It is reported that the contaminated fire-water was still on-site in June that year with problems appointing an appropriate waste carrier. This incident happened during the construction phase. The above 5 examples are just a small selection of serious battery incidents.

3.12 The Applicant takes the view in the Technical Appendix TA A9 Flood Risk Assessment and Outline Drainage Strategy REP1-039 (FRA, page 54) that it is unlikely that there will be contaminated fire-water:

> 211 *"As water will not be directly applied to affected BESS container, there is limited potential for suppression water to become contaminated."*

3.13 The Group would suggest that this is a highly optimistic view to take and dangerous to rely on as a plan. In their following paragraph, the Applicant states their plan is based on the assumption that the burn time will be 2 hours, implying there will be no need for further cooling with water after that time. Given the experiences of other fire and rescue services at BESS fires, this seems totally over optimistic and unrealistic. This may be even more unlikely with this project as there has to be a strong likelihood that when the choice of cells is finally made, they are more likely to be larger more recently designed MWh units which would have the potential to burn even longer. The assumption by the Applicant in the Staythorpe BESS Outline FSMP on page 9 was that fire-water would have to be *"removed by tankers and taken to a licenced facility"*.

3.14 The unrealistic 2 hour burn assumption does explain another impracticable design feature – that the "*SuDS structures serving each catchment of the BESS compound will be sized to accommodate the 1 % AEP + 40 % CC or 228 m³, and this will be sufficient for storing the full fire suppressant volume."* (paragraph 214 of the FRA). It is argued strongly here that the planned size of the SuDS will be totally inadequate. They would be able accommodate the on-site water but that is all.

3.15 The contaminated fire-water holding pond will be large enough if the Applicant has an immediate response authorised hazardous waste carrier with enough tankers and an acceptable and willing authorised hazardous waste facility to receive the liquid.

3.16 Removal by tanker would only be necessary when testing identified what the contaminants were. This would be necessary as it is a legal requirement to provide the correct classification code and description of the chemicals in the required hazardous waste consignment note.

3.17 Being as the Statera incident occurred in the construction phase, best practice for other developers would suggest having the above arrangements in place for when installation of the cells commences. The Applicant is nearing that stage at the Staythorpe BESS. Should they have identified all such waste related parties for that project, that would provide some comfort that immediate response waste removal can be achieved for the larger BESS.

3.18 If it is not achievable to organise chemical testing, tanker attendance, loading and delivery slots at a waste facility all within the first two hours of an incident, then there is a high likelihood that contaminated fire-water will overwhelm the holding facilities. And what could realistically be achieved at weekends or if the incident happened at night?

3.19 The Applicant states the main holding pond will be lined to prevent chemicals permeating towards the water table. There has to be a strong possibility that any fire will be nowhere near the pond on the site. Between the pond and fire, presumably all the ground is permeable.

3.20 The Outline FSMP for the Staythorpe BESS stated on page 9 there would be an impermeable membrane installed 300mm below ground to prevent table contamination. The Group have been told that Staythorpe residents have been informed by on site contractors that is now not going to happen. This is perhaps corroborated by the fact that that section of the Staythorpe FSMP was not copy pasted into the Averham one.

4 Airborne Pollution from a BESS Fire.

4.1 Ground permeation is one route for hazardous chemicals to escape the site. What is far more difficult to control would be airborne pollution.

4.2 The chemicals most associated with a LFP fire are:

a) Hydrogen Fluoride (HF- extremely toxic and corrosive)

b) Phosphoryl fluoride (POF_3- highly toxic)

c) Carcinogenic hydrocarbons and volatile organic compounds (eg Ethylene carbonate)

d) Carbon Monoxide (C- colourless, odourless and lethal)

e) Particulates and metal aerosols (eg Iron, copper, aluminium compounds. Fine particulates can penetrate deep into lungs).

4.3 A detailed study of the pollutants released during firefighting a LFP battery fire with water can be found in *"Assessment of Run-Off Waters Resulting from Lithium-Ion Battery Fire-Fighting Operations", Bordes et al (2024)*[4].

4.4 With the probability of such chemicals being present in any smoke plume, it is important to have risk assessments and modelling. These should include different weather conditions including rain and fog. The potential affects need assessing of chemical deposition or absorption on the arable land and the wood immediately beyond the order limits, and the nearby farm close by, especially if there is a strong north easterly wind.

4.5 Similarly, should there be a strong westerly or south westerly wind, it must be important to assess any risks to the village of Kelham including the hotel.

4.6 The above assessments are not optional. The Department for Energy and Net Zero published " *Health and Safety Guidance for Grid Scale Electrical Energy Storage Systems"* in March 2024. Within that document and referring to these types of BESS is the following:

> 3.3.1 "*There should be a full consideration of site/project risks including, but not limited to, accidental or intentional damage and natural phenomena such as fire, weather (including snow and ice and access during severe weather), flooding, land subsidence, flora, and fauna (including birds and mammals), and security. Note that risk assessments should be bidirectional – i.e. include both risks to the facility and from the facility. The planning process should assess the following risks and describe how the credible worst case has been mitigated"*

… and on the following page

> *"Studies and risk assessments for the local ecosystems must be considered in site proposals, as the release of potentially harmful gases and chemicals could cause irreparable damage to the nearby environment."*

4.7 The FSMP states that an emergency response plan will be developed following consultation with NFRS. This may even be post determination. It is argued that the environmental risk assessment can and should be completed pre-determination.

4.8 In the article "*Preventing the Next Battery Incident: Rethinking Battery Energy Storage Safety*", Close and Bulan 2025 Institution of Chemical Engineers[5], the authors state:

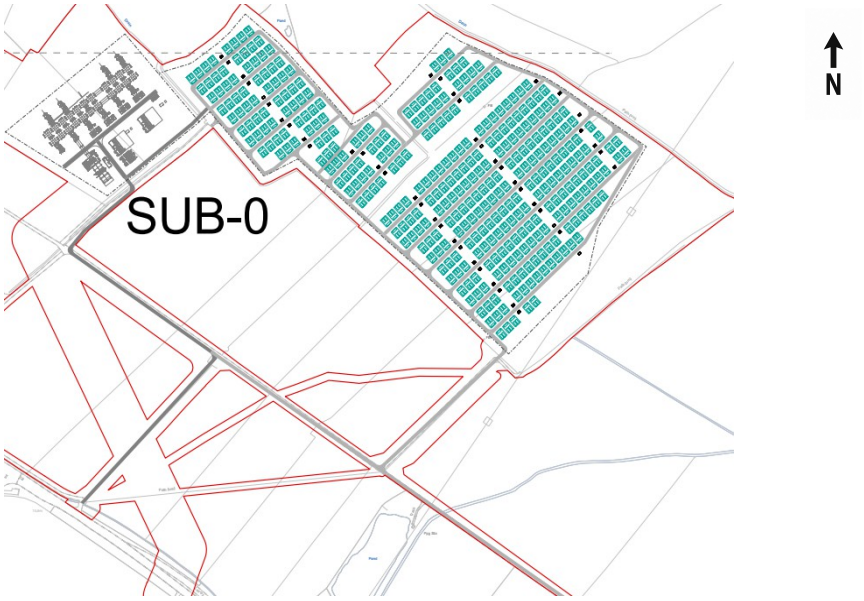
> *"Compliance is not equal to safety: many failures occurred in systems that met current standards, highlighting the urgent need for regulations to incorporate consequence-based design and holistic risk management, particularly as systems scale and move closer to populated areas"*

4.9 During the webinar "*Best practice for energy storage system safety around the globe*", on 29 October 2020 , a senior manager at DNV – a global assurance and risk management services provider stated:

> *"Over the life of a [grid-scale] BESS at least one failure will occur.It is unrealistic to eliminate all chance of failure."*

5. Design and Layout.

5.1 The following graphic has been taken from 2.10 Illustrative Design APP-029:



5.2 It is clear that revised plans must show the location of any holding pond. More importantly, it will hopefully demonstrate the access plans for tankers which are often articulated HGVs. At the moment, the only tarmac access to the site is in the west.

5.3 Ordnance Survey maps tend to suggest that the main part of the BESS area is quite flat with a gentle rise in the area of the substation and towards the wood to the north. If the incident is still live, tanker drivers would very much be at the mercy of the winds. Given the potential toxicity of smoke, it seems unlikely that NFRS would be comfortable with anyone entering a site of this design whilst the fire is still going.

5.4 The Applicant should have to satisfy NFRS and the LPA that more refined plans satisfy the requirements of the NFCC 2026 design guidelines. The current level of detail does not clearly demonstrate compliance with the broad principles covering access for appliances. Some of this can be completed post determination. However, it is argued here that the general location of any holding pond should be indicated during the examination. The Applicant should also state whether they intend to copy the Staythorpe BESS plan and not intend that fire-water will be recycled for second use by the NFRS.

5.5 Perhaps more importantly, there is a need at this stage for the Applicant to explain how contaminated fire-water from, for example, the most northern battery area in the above plan will make its way to any pond, as opposed to soak into the ground and eventually the water table. There is mention of pumping but how and by whom is not

clear. It seems unlikely that NFRS will allow personnel onto site whilst the fire is in progress and equally unlikely that NFRS will allow their own pumps to move the corrosive contaminated water around.

5.6 The final point on design is the intended spacing between units. Page 26 of the FSMP states:

> *"Pending acceptance of the UL 9540A test report by the LPA / NFRS, The Applicant has allowed for a spacing of 3.0 m between BESS enclosures on all sides"*

5.7 In the FSMP for the Staythorpe BESS, the Applicant's consultant states (on page 16):

> *"The UL 9540A certification demonstrates that the fire will not spread".*

5.8 On 28th March 2025, a LFP battery unit went into thermal runaway at the Cirencester Hybrid Solar Farm 2 years after being commissioned. This fire propagated to a second unit (approximately 5m away) and these fires threatened to propagate to a third. This was prevented by Fire and Rescue personnel. These units had been analysed using UL9540A and received certification. Firefighters from 6 appliances attended and it took them five and a half hours to deal with the fire. It is recommended that the 3m gap be re-evaluated as it appears that UL9540A is not a guarantee against propagation.

6. Conclusions.

6.1 The issues surrounding the water supply to Pond 116 are relatively straightforward. All efforts should be made by the Applicant to locate and avoid the feed pipe from the spring. Fracturing this pipe by pile driving will lead to the deterioration of the habitat.

6.2 The current FSMP underestimates the burn time should a thermal runaway occur. It further underestimates the volume of water that will be required by firefighters. This will most likely cause the site including the planned holding pond to be overwhelmed by water which is potentially contaminated by toxic or corrosive chemicals.

6.3 The Applicant has failed to explain how fire-water will reach the holding pond as opposed to soaking into the ground and potentially the water table. The impermeable membrane promised in the Staythorpe FSMP is not included in this plan.

6.4 There has been no risk assessment covering the effects of the smoke plume in differing weather conditions. There are potential risks to contiguous woodland and crop fields as well as population centres.

6.5 As it stands, the FSMP does not comply with NFCC Guidance for appliance access. It is also totally unclear how and when waste tankers would access the holding pond. In the Staythorpe BESS FSMP, the assumption was that fire-water will have to be tankered away. The Applicant has now incorrectly shifted position, assuming that fire-water will probably not be contaminated.

6.6 Engagement by Nottinghamshire Fire and Rescue Service in this planning process would inevitably clarify what needs to change or be added to render this design more compliant with their firefighting requirements.

References and URL's

Reference Number	Citation or URL
1	https://nfcc.org.uk/our-services/building-safety/grid-scale-energy-storage-system-planning-guidance-for-fire-and-rescue-services/
2	https://ife.ie/wp-content/uploads/2024/03/Merseyside-Fire-Rescue-Service-Irish-IFE-and-Dublin-Fire-Senior-Team-October-2023-1.pdf
3	https://www.epa.gov/ca/moss-landing-vistra-battery-fire#water
4	Bordes, A.; Papin, A.; Marlair, G.; Claude, T.; El-Masri, A.; Durussel, T.; Bertrand, J.-P.; Truchot, B.; Lecocq, A. Assessment of Run-Off Waters Resulting from Lithium-Ion Battery Fire-Fighting Operations. Batteries 2024, 10, 118. https:// doi.org/10.3390/batteries10040118
5	https://www.thechemicalengineer.com/features/preventing-the-next-battery-incident-rethinking-battery-energy-storage-safety