Submission by Mallard Pass Action Group (MPAG)
– unique ID ref. 20036230

Deadline 9:

Comments on the Applicants Response (REP8-021) to ExA's Rule 17 Request for further information at Deadline 8A

Contents

Q1a Archaeology - mitigation

Rule 17	Respondent	Question	Applicant's Response
Q1a	Applicant, LCC and RCC	Paragraph 3.10.101 of the draft National Policy Statement (NPS) EN-3 (March 2023) recognises that archaeological deposits may be protected by a solar PV farm if the site is removed from regular ploughing and shoes or low-level piling is stipulated. The Design Parameters [REP7-013] state that the maximum depth of the Mounting Structure piles will be 2.5m. Table 3-3 of the outline Environmental Construction Management Plan [REP7-015] states that the Written Scheme of Investigation (WSI) will allow for identification of any areas where concrete shoes/blocks may be required, and also where preservation in situ is the preferred strategy. Further detail of this is set out in paragraphs 3.14 to 3.18 of the outline WSI [REP7-033]. The general comment of Historic England [RR-415] is also noted that sufficiency of field evaluation is vital because some features would be both of high importance and high sensitivity to the insertion of panel mounting piles. Given the above, on what basis would the use of such mitigation measures be determined for the solar PV areas in the absence of any further trial trenching for these areas?	In response matters raised across each part of Q1, the Outline Written Scheme of Investigation (OWSI) **[REP7-034]** has been updated to provide further clarification. Further brief answers are given here, however, the OWSI should be taken up for detailed response(s), in particular paragraphs 3.12 to 3.18. The Applicant's answer to Q6.0.4 at Deadline 2 **[REP2-037]** provided additional technical specifications for the likely piling techniques. This reaffirms the policy position within EN-3 regarding the 'limited' impact of solar PV developments on buried archaeological remains. No further trial trenching is proposed within the Solar PV areas, except at, and near, the specific locations for other proposed construction activities, where ground disturbance would be greater and thus the impact on potential buried archaeological remains needs to be further explored and mitigated, if necessary. Therefore, no 'additional (no-dig) mitigation measures are proposed above and beyond the extensive swathes of areas that will be preserved in situ beneath the solar arrays, protected from the recognised and accepted, repeated seasonal damage from ploughing.

In answering the Applicant States that "*no additional (no-dig) mitigation measures are proposed above and beyond the extensive swathes of areas that will be preserved in situ beneath the solar arrays, protected from the recognised and accepted, repeated seasonal damage from ploughing*." Modern arable farming practice today involves the use of minimal tillage techniques that do not turn over the soil, as is the case with ploughing, and therefore do not disturb the soil below a depth of 15cm.

Q1b Archaeology

Q1b	Applicant, LCC and RCC	Bearing in mind the wording of paragraph 3.10.101 of the draft EN-3, how would the protection it envisages be secured in this instance in the absence of the use of shoes or low-level piling?	As described within the updates within the OWSI, the proposed development specifies 'low-level piling'. The tiny fractions of a percentage of the total site area (0.06% as set out in the Applicants answer to Q6.0.4 **[REP2-037]** that would be disturbed by the insertion of piles is by its very definition 'low-level'. The proposed development, by its very nature, achieves the objective of preservation in situ and the cessation of plough damage.

The Applicant claims that "*the total (horizontal) displaced material within any given hectare of solar PV development would be at the very most approximately 6sqm or 0.06%.*" Measuring the negative impact of the piles in terms of sqm/ha (surface area) bears no relation to the way in which the piles could cause damage. Piles per unit area (volume) would be more appropriate as that is the totality of the soil that will be disturbed.

Historic England, in the publication produced in 2019[1] (see Appendix 4) explains: *"When considering the likely level of impact from displacement piles, it is suggested that an area of impact equal to twice the width of the pile (ie one pile width either side of the pile centreline) is assumed, which equates to a fourfold increase in the area of pile impact; it is this value that must be factored in when assessing the harm to the significance of archaeological remains on site. Furthermore, where three or more piles are placed within a cluster, the area within this cluster will be very hard to interpret in the future. For the purposes of assessing harm to the significance of archaeological remains on site, the impact to this area is usually considered to be high."* MPAG would be interested to know if the Applicant has taken this into account in the calculations.

Now that there is a time limit of 60 years it is highly probably the piles will have to be replaced. This is a major concern in terms of potential damage not just to the soil but also to any archaeological remains. What parameters will the Applicant set to identify the best time and approach to replacing the piles? Leaving it too late risks the piles corroding and snapping leaving 2 options as identified by an ADAS report produced on behalf of the Welsh Government[2]. "Most standard steel products corrode, particularly in the upper part of the pile and this may adversely affect the ability to extract the piles after 40 years. (Non-corrosive materials could be used but have cost implications). It may be that piles fracture and are difficult to extract without additional digging."

[1] Piling and Archaeology - Guidance and Good practice 2019

[2] ADAS: The Impact of solar photovoltaic (PV) sites on agricultural soils and land, work package 3, March 2023.

The Applicant in REP2-037 outlines there will be approximately 1200 piles per hectare. Accepting the piles will have to be replaced once over the 60 years means there could be in the region of over 1m pile insertions i.e. (1200 x 420 x 2) and the same amount of removals. If a proportion of piles snap off on removal (or before) they will either have to be buried to a level of 1-1.2m to allow cultivations and drainage or they will have to be dug out as outlined in the report. Either way there is a huge risk of disturbance to buried remains.

The report points out “there is no known reported experience of pile pull out within the solar industry in the UK”, so it does beg the question whether permitting the development to go through 2 panel life cycles (up to 60 years) is worth the risk of damage and disturbance to archaeological assets,

Q2 Land Use and Soils

There is a review in **Appendix 1** from Landscope of the comments the Applicant has made at deadline 8 (REP8-019) to their report. To reaffirm, the point of the report was to understand, using an independent expert, whether the ALC testing conducted at stage 1 and stage 2 was robust in the context of the methodology and results, and where possible to access the Order Limits to verify any further information required. There was never the expectation that Landscope would conclude that the majority of the site was BMV, however any further increase from the stated 41% in the ES is important given the importance of protecting BMV land as outlined in all national and local policy documents.

The Applicant's interpretation of EN -3 paragraphs 3.10.8 may or may not be correct, we would dispute as it states "along with associated infrastructure, a solar farm requires between 2 to 4 acres for each MW of output". Whether you use the Order limits or solar PV area/MW, the Proposed Development has a higher land take than all the NSIPs in the table below (provided by the Applicant in Appendix A of REP4-042). Developments of this scale taking up valuable agricultural land producing food should not use land inefficiently and without full justification, especially where high levels of BMV land are involved. The high level of land take/MW and high levels of BMV may be an indication that the scheme is not suitable in the location the developer has chosen.

Project	Installed Solar DC Capacity (MW)	Order Limits (ha)	Works Number 1[1] Area (Ha)	Land area to Installed MW Ratio Ha / MW Acres / MW	Mitigation and Enhancement Areas (Ha)
Mallard Pass	350	852	420	1.2 Ha / 1 MW 2.9 acres / 1MW	**395ha**
Longfield	371	453	275	0.74 Ha / 1MW 1.8 acres /1MW	Habitat Management Areas: a minimum of 55.8ha. In addition Work area no.6 which totals 370.09ha includes among other components, '*landscaping and biodiversity mitigation and enhancement measures including planting*', however the percentage for landscape is not specified.
Little Crow	150 - 200	225	153.4	0.77 – 1.02 Ha/ 1 MW 1.90 – 2.5 acres / 1 MW	59.826 Ha ecological corridor
Cleve Hill	350	491.2	176.3	0.50 Ha / 1MW 1.23 acres / 1MW	50.1 ha of functional habitat management land
Sunnica	627	981	621	0.99 Ha / 1 MW 2.44 acres / 1 MW	
Cottam	871[2]	1451.23	879.39	1.0 Ha / 1 MW 2.47 acres / 1 MW	Works No 10 – 80.93 ha
Heckington Fen	500	542	417.07	0.83 Ha / 1 MW 2.05 acres / 1 MW	Work No 9A – 16.5ha (Biodiversity Net Gain Areas)

Project	Installed Solar DC Capacity (MW)	Order Limits (ha)	Works Number 1[1] Area (Ha)	Land area to Installed MW Ratio Ha / MW Acres / MW	Mitigation and Enhancement Areas (Ha)
West Burton	661[3]	886.4	733.99	1.1 ha / 1 MW 2.71 acres / 1 MW	Works No. 9 – 98.81 ha

[1] Being the area of the solar generating station for each project. The other projects also had battery development taking up agricultural land that would add to these figures, but have not been included to provide a 'clean' like for like comparison.
[2] The installed DC MWp has been based upon 1,320,624 PV Modules, as referenced within the Cottam Climate Change chapter (paragraph 7.8.15) and an assumption of a 660w panel to enable a comparison with Mallard Pass.

The Applicant believes MPAG are only concerned about land use with respect to BMV, this is not the case. Since submitting the Landscope report, the ADAS report mentioned earlier - "The impact of PV sites on agricultural soils and land quality 2023" – also draws attention to many issues with respect to the effects of compaction, soil mixing, soil disturbance, the potential impacts on ALC grading and the reversibility (or not) of soil compaction. MPAG has drawn some extracts from the report and made comments in Appendix 2 (the full ADAS report is in Appendix 3).

Q4 Water and Flood Risk

The ExA's questions in blue italics:

"In terms of the overall implications for the conclusions of the Flood Risk Assessment [APP-086] and Chapter 11 of the Environmental Statement [APP-041], the Applicant states they "remain unchanged with the introduction of a 60 year time limit on operation i.e. no displacement of flood waters and no significant effects."

a) Please can the Environment Agency provide comments on the flood risk modeling submitted by the Applicant at Deadline 7, including confirmation of whether the conclusions and suggested approach to mitigation are satisfactory?

b) Can the Environment Agency, Lincolnshire County Council, Rutland County Council and South Kesteven District Council confirm if they agree with the Applicant's position that the conclusions of the Flood Risk Assessment and Chapter 11 of the Environmental Statement remain unchanged with the introduction of a 60 year time limit?

c) Do Lincolnshire County Council, Rutland County Council and South Kesteven District Council have any further comments on the Applicant's updated consideration of flood risk?"

MPAG are still deeply concerned that there seems no acknowledgement in particular by the Environment Agency of the off-site fluvial flood risk for villages adjacent to the Proposed Development. The EA does acknowledge that water levels are likely to rise over the 60 years but accepts that position as there are mitigation strategies in place that will protect the solar panels. What they have not explained is whether the defenses in place today further down river (off-site), are capable of processing the higher levels of water and increased speed of flow so as not to result in flooding in Greatford and other areas off-site i.e. Essendine church, Banthorpe Lodge.

Whilst MPAG understand desk based modeling has to take place when looking well into the future, so should the reality of what happens at a local level be captured. The flood warden at Greatford has 10 years on-the-job experience and has lived in the village for 40 years, so is well placed to understand the local dynamics. The pictures shared in REP2-090 Written Representation show the extent of flooding in and adjacent to the Order Limits. The recent drone pictures of flooding from storm Babette (REP8-030) highlight how susceptible the river is to flooding. This time we were lucky as the ground was relatively dry being early winter and there was less fluvial flooding, but a repeat performance of rainfall levels will almost certainly deliver a different outcome next time, with the full effect from both fluvial and pluvial flooding. Both Essendine church and Banthorpe lodge, important heritage assets, are already on the edge of their limits.

The EA recognize in Greatford today that the river can breach its banks but are not prepared to invest in shoring up the banks to prevent it entering the back of Greatford.

Q5a Panel replacement

Rule 17	Respondent	Question	Applicant's Response
Q5a	The Applicant	The Applicant is requested to provide further commentary on the implications of the 60 year time limit for the findings of Chapter 13 of the Environmental Statement.	The assessment within Chapter 13 of the ES comprises three parts, as set out below, within which the different receptors are applicable: 1. The vulnerability of the Proposed Development to the effects of climate change; 2. The effect of GHG emissions associated with the Proposed Development on the global climate; 3. Effects of Climate Change on environmental receptors potentially affected by the Proposed Development. Commentary is provided below regarding each of the matters with regards to the implications of the 60 year time limit. The vulnerability of the Proposed Development to the effects of climate change The assessment identifies the following considerations: • Changes to maximum force of wind speed – The conclusions of the chapter remain unchanged as the Design Guidance (C2.2) will ensure that the Proposed Development will be resilient to the changing climate, whilst remaining within the Design parameters set out in Appendix 5.1 of the ES **[REP7-013]**. • Changes to flood extents – The Applicant has demonstrated within their Statement on 60 Year Time Limit **[REP7-038]**, that the Proposed Development is not vulnerable to increases in rainfall intensities and the associated increases in flood extent and depths from the West Glen River for the 60 year operational lifespan. • Changes in maximum and average temperatures: The detailed design and specification of the Proposed Development will ensure electrical infrastructure is resilient to climate change (Design Guidance C2.2), whilst also operating within the parameters and controls set out within the DCO **[REP7-009]** and the oOEMP **[REP7-017]**.

Rule 17	Respondent	Question	Applicant's Response
			• Change in Cloud Cover – Cloud cover may also further decrease over the 60 year period relative to the baseline, which would improve the performance of the panels. N.B this is not accounted for the carbon benefit calculations presented in the answer to 5(b) or (c). Therefore, the overall conclusions remain unchanged that the receptor (being the Proposed Development) which has a very low sensitivity would continue to be subject to a potential impact of High Magnitude which would result in a Negligible Significance of Effect which is not significant. The effect of GHG emissions associated with the Proposed Development on the global climate The effect of the Proposed Development over a 60 year lifespan remains unchanged as it is considered to be a material beneficial change to the UK's emissions of climate changing GHG and therefore continues to have a moderate beneficial effect that is significant. Please refer to the answer to question 5(b) for further details. Effects of Climate Change on environmental receptors potentially affected by the Proposed Development A 60-year time limit will not alter the conclusions regarding the potential effects on receptors as set out in Table 13.7 of the ES. As set out in the Applicants Statement on 60 Year Time Limit **[REP7-038]**, the assessment, mitigation and enhancement measures as set out in the LVIA and Ecology assessments were based upon a permanent operational lifespan, therefore the commitment to a 60 year lifespan will not affect the proposed habitats in such a way (given that they assumed that the mitigation would be in place for even longer than 60 years) that would alter these assessments and therefore the conclusions remain unchanged. The effect on the potential change in precipitation has been addressed within the Applicants Statement on 60 Year Time Limit which concluded that the Flood Risk Assessment **[APP-086]** and Chapter 11: Water Resources and Ground Conditions of the Environmental Statement **[APP-041]** remain unchanged.
			Section 2.3 of the Outline Surface Water Drainage Strategy **[APP-87]** outlines that where infrastructure has a lifetime between 2061 and 2100 the Central Allowance for 2070's should be applied and therefore the 25 % 2070's Central Allowance was applied to drainage calculations in accordance with the EA Flood Risk and Coastal Change Guidance for peak rainfall. As such, they do not require altering following the confirmation of a 60-year time limit.

The Applicant continues to ignore the necessity of replacing all panels and associated equipment and the reality of these being replaced at more or less the same time.

The work involved would have a considerable impact damaging habitats, bio-diversity, grassland under panels, soil structure etc, all of which would take years to recover.

It would also mean that during period of replacement of panels the level of power would decease and the contribution of the Proposed Development will be impacted. The Applicant has not factored in these in their calculations.

Q5b Carbon benefit

<table>
<tr>
<td>Q5b</td>
<td>The Applicant</td>
<td>Can the Applicant please provide a direct comparison of the carbon cost, carbon benefit and net carbon benefit between the 40 and 60 year time frames assessed?
The Applicant stated at Deadline 4 [REP4-022] that "the 40-year average annual generation from the Proposed Development is approximately 315,000MWh, which is equivalent to the annual average consumption of approximately 85,000 homes over a period of 40 years, which is of the same order of magnitude of the number of households in the Local Authority areas of South Kesteven and Rutland combined". Paragraph 1.1.48 of the 60 Year Time Limit Statement provides an updated average annual generation figure of 300,777MWh per year but it is unclear how many homes this would support.</td>
<td>Table 1 below presents a direct comparison of the estimated carbon costs, gross carbon benefits and net carbon benefits for the Proposed Development, for 40 and 60 year design lifetimes.

The assumptions applied to these calculations are described in the Applicant's Statement on 60 Year Time Limit [REP7-038], but it is useful to discuss some of the key assumptions in more detail to show how the net carbon benefit assessment has been carried out in an inherently cautious and conservative manner.

For the purposes of the comparison shown Table 1 above, it can be seen that the lifetime generation figures used to estimate the lifetime carbon cost of the Proposed Development are higher than the corresponding figures used to estimate the gross lifetime carbon benefit, particularly for the 60 year design life.

This is because:
• The figures used to estimate carbon cost do not take account of PV module degradation, while those used to estimate carbon benefit do. Degradation is assumed to be 2% in first year, and 0.45% per year thereafter.
• For the 60 year design life, lifetime generation used to estimate carbon cost is simply double that for the 40 year design life. Figures used to estimate gross carbon benefit apply the actual design lifetimes of 40 and 60 years.

So the carbon costs for the 60 year lifetime are double those of the 40 year lifetime, assuming a total replacement of all PV modules on a rolling basis over the design life. The carbon benefit, however, does not take account of this replacement but applies the PV module degradation rates described above over the entire 60 years.

Table 1: Direct comparison of carbon costs and benefits for 40 and 60 year project lifetimes

<table>
<tr><th colspan="2">Project Lifetime</th><th>Years</th><th>40</th><th>60</th></tr>
<tr><td rowspan="3">Carbon cost</td><td>Lifetime generation</td><td>GWh</td><td>13,981</td><td>27,962</td></tr>
<tr><td>Carbon intensity of PV</td><td>tCO_2e/GWh</td><td>48</td><td>48</td></tr>
<tr><td>Lifetime carbon cost</td><td>tCO_2e</td><td>671,086</td><td>1,342,172</td></tr>
<tr><td rowspan="3">Gross carbon benefit</td><td>Lifetime generation</td><td>GWh</td><td>12,565</td><td>18,047</td></tr>
<tr><td>Carbon intensity of grid</td><td>tCO_2e/GWh</td><td>182</td><td>182</td></tr>
<tr><td>Lifetime carbon benefit (gross)</td><td>tCO_2e</td><td>2,286,797</td><td>3,284,483</td></tr>
<tr><td>Net carbon benefit</td><td>Lifetime carbon benefit (net)</td><td>tCO_2e</td><td>1,615,710</td><td>1,942,310</td></tr>
</table>
All of the assumptions applied to the calculations used to show the net carbon benefit, whether over 40 or 60 years, have been selected in order to present an inherently conservative net carbon benefit, i.e. they maximise the carbon cost, and minimise the gross carbon benefit.

The net carbon benefit figures shown above, therefore, can be seen as the absolute lower limit of the lifetime carbon benefit the Proposed Development can be expected to deliver.

This is considered to be a material beneficial change to the UK's emissions of climate-changing GHG and is therefore a beneficial effect that is significant, as per the conclusion within Chapter 13 of the ES [APP-043].</td>
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</table>

The Applicant has taken an unusual approach to the calculations in that we would have expected them to start again with 30+30 years calculation, rather than building from the 40 year baseline. Having only received the calculations in Excel the same day as deadline 8A we were unable to check the figures any earlier. The arithmetic appears to be correct, however the end result is the **net carbon benefit** saving for 60 years now is **no greater** than the original amount claimed in Chapter 13 of the ES para 13.4.18 which equaled 1.9 million tonnes of CO2 and was calculated over 40 years.

Please note a **separate submission** providing a specific response to the Applicant's submission (REP8a-010) on carbon.

Q5c Homes

<table>
<tr><td>Q5c</td><td>The Applicant</td><td>Can the Applicant please provide an updated estimate of the number of homes that the Proposed Development is likely to power over the 60 year time frame?</td><td>The reduction in average annual generation figures over a 60 year design life is due to the assumed degradation in the generating capacity of PV modules described in the response to question 5(b) above. The average annual output over 40 years is around 315,000 MWh/year, while over a 60 year period the average falls to just over 300,000 MWh/year. The 60 year figure does not take account of any replacement of PV modules, so is inherently cautious as discussed above.

Given a representative annual household electricity consumption figure of 3,760 kWh/year[1], this would suggest that over a 60 year period, the number of households supplied would be just under 80,000 on a whole-life basis.

But it is equally valid to consider the 60 year design life as the original 40 year period, with a 20 year extension. Applying this approach, the number of households supplied during years 1 to 40 remains the same at around 85,000. But for the years 41 to 60, degradation of PV modules means that the average annual generation figure is anticipated to have fallen to just under 275,000 MWh per year, with the number of average households supplied for this additional period at just under 73,000.

Table 2 below shows the comparison in number of households supplied over 40 or 60 years applying both the whole-life average approach, and the 40 + 20 year approach.

Table 2: Comparison of average households supplied over 40 or 60 years

<table>
<tr><th colspan="2">Project Lifetime</th><th>Years</th><th>40</th><th>60</th></tr>
<tr><td rowspan="3">Average annual generation</td><td>Whole life</td><td rowspan="3">MWh/year</td><td>314,120</td><td>300,777</td></tr>
<tr><td>Years 1 - 40</td><td>314,120</td><td>314,120</td></tr>
<tr><td>Years 41 - 60</td><td>0</td><td>274,090</td></tr>
<tr><td colspan="2">Average household consumption</td><td>kWh/year</td><td>3,760</td><td>3,760</td></tr>
<tr><td rowspan="3">Average households supplied</td><td>Whole life</td><td rowspan="3">Households</td><td>83,543</td><td>79,994</td></tr>
<tr><td>Years 1 - 40</td><td>83,543</td><td>83,543</td></tr>
<tr><td>Years 41 - 60</td><td>0</td><td>72,896</td></tr>
</table>

Extending the life of the Proposed Development from 40 to 60 years, therefore, means that the average number of households supplied over the first 40 years remains constant at c. 85,000, with an additional 73,000 households supplied for the next 20 years that would otherwise require to be supplied from an alternative source of generation.</td></tr>
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As noted in Q5b above the arithmetic is correct however the methodology is slightly strange when they talk about 0-40 years and 41-60 years. The important point to draw out is that the number of homes quoted in the original documentation and marketing materials was 92,000 homes. That was reduced to 85,000 homes at REP5-012 and now is just under 80,000 homes. Whilst the Applicant will argue they are being prudent, this is probably offset by times when the solar farm (or parts of it) will not be producing any energy e.g. breakdowns and when the economic replacement takes place, especially if new piles have to be inserted when the Proposed Development would experience greater downtime.