

# Tween Bridge Solar Farm

## Environmental Statement Chapter 18: Summary

Planning Act 2008  
Infrastructure Planning (Applications: Prescribed Forms  
and Procedure) Regulations 2009

APFP Regulation 5(2)(a)

Document Reference: 6.2.18

August 2025

Revision 1

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## 18 Summary

### 18.1. Introduction

- 18.1.1. This chapter of the Environmental Statement (ES) provides a summary of the various ES Environmental Aspect Chapters and associated technical assessments which have been undertaken as part of the EIA (Environmental Impact Assessment) process.
- 18.1.2. A summary of all the likely significant effects, mitigation and residual effects assessed in the ES Environmental Aspect Chapters of this ES are presented in this chapter within relevant tables for the construction, operation and decommissioning phases. A summary of cumulative effects and in –combination effects is presented at the end of **ES Chapter Cumulative Impacts [Document Reference 6.2.17]** and is not further commented upon in this chapter.
- 18.1.3. Mitigation measures are identified and described in further detail within the individual ES Environmental Aspect Chapters (**ES Chapters 6 – 16 [Document Reference 6.2.6–6.2.16]**) of this ES. These mitigation measures have been incorporated into the Scheme and/or control documents, as agreed with the project team and stakeholders (where necessary), to control residual effects.

### 18.2. Summary of Residual Effects

- 18.2.1. The residual effects are analysed as part of the Scheme. The residual effects are defined as those effects that remain following the implementation of mitigation measures. Residual effects and mitigation measures are discussed in full in the relevant ES Environmental Aspect Chapters of this ES (**ES Chapters 6 – 16 [Document Reference 6.2.6–6.2.16]**).
- 18.2.2. Each ES Environmental Aspect Chapter contains detailed consideration of both the beneficial and adverse residual effects identified as likely to arise from the Scheme. The general criteria applied to define the significance of residual effects are outlined within **Chapter 4 Approach to EIA [Document Reference 6.1.4]** of this ES, with further detail provided within the individual ES Environmental Aspect Chapters.
- 18.2.3. The residual effects listed within the individual ES Environmental Aspect Chapters of this ES (**ES Chapters 6 – 16 [Document Reference 6.2.6–6.2.16]**) are described with reference to the scale of effect (i.e., ‘moderate’ or ‘major’) and whether this is

significant or not, and the nature of the effect (i.e., adverse or beneficial). Residual effects assigned a rating of 'major' or 'moderate' are considered in general as significant and are identified in this summary chapter.

- 18.2.4. Where ES Environmental Aspect Chapters have deviated from this standard methodology, this is explained in the respective chapters and justification for the reason provided (for example to align with industry-standard guidance for that discipline). This is pertinent to:
- **ES Chapter 6 Landscape and Visual [Document Reference 6.2.6]** whereby a 'moderate' effect could be considered to be significant, however this is subject to professional judgement.
  - **ES Chapter 8 Cultural Heritage [Document Reference 6.2.8]** whereby a 'less than substantial harm' could be considered to be significant, however this is subject to professional judgement.
  - **ES Chapter 14 Air Quality and Greenhouse Gases [Document Reference 6.2.14]** denotes any beneficial effects as significant in relation to the greenhouse gas assessment.
- 18.2.5. The design of the Scheme has been an iterative process and developed in consultation with statutory and non-statutory consultees. The design parameters as set out in **Design Approach Document Appendix A: Design Parameters Document [Document Reference 5.6.1]** have been considered in detail by the ES Environmental Aspect Chapter authors and the results of the assessments are reported in the individual ES Environmental Aspect Chapter of the ES. A number of measures have been implemented within the design of the Scheme to reduce adverse environmental effects, including landscape design to create habitat and screen views of the Scheme.
- 18.2.6. A summary of the identified significant residual effects for each ES Environmental Aspect Chapter are presented in **Table 18-1** for the construction phase, **Table 18-2** for the operational phase and **Table 18-3** for the decommissioning phase. A description of the effect on the resource or receptor, initial significance of effect, proposed mitigation measures and remaining residual effect with mitigation measures implemented is outlined in **Table 18-1** to **18-3**.
- 18.2.7. After the implementation of mitigation, significant residual effects are anticipated in relation to:

- Landscape and Visual;
- Socio Economics;
- Agricultural Circumstances; and
- Air Quality and Greenhouse Gases.

18.2.8. After the implementation of the proposed mitigation measures, significant residual effects are not anticipated in relation to the following topics:

- Water Resources;
- Ecology and Nature Conservation;
- Cultural Heritage and Archaeology;
- Ground Conditions;
- Noise and Vibration;
- Transport and Access;
- Agricultural Circumstances; and
- Other Environmental Topics

Table 18-1 : Summary of Effects for the Construction Phase

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
<b>Landscape and Visual and Residential Amenity</b>			
Landscape features-ground cover	<b>ES Chapter 6 Landscape and Visual Impact [Document Reference 6.2.6]</b> methodology has considered mitigation and enhancements within the 'Assessment of Likely Effects' section of the chapter, and therefore residual effects (with mitigation in place) are the only effects identified.	Embedded design features such as vegetation retained (where possible) and appropriate standoffs in the design to sensitive landscape features. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	<b>Major-Moderate (adverse)</b>
Landscape Character of the Order Limits and Immediate Surroundings		Embedded design features such as vegetation retained (where possible) and appropriate standoffs in the design to sensitive landscape features. Implementation of the subsequent maintenance	

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
		of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan</b> [Document Reference 7.6]	
Residential Receptors		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan</b> [Document Reference 7.6]	<b>None- Moderate (adverse)</b>
Users of publicly accessible BOATs, bridleways and footpaths		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set	<b>None- Major (adverse)</b>

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
		out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	
Users of the transport network		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	<b>None-Major/Moderate (adverse)</b>
<b>Socio-Economic</b>			
Employment (increase in employment in the construction sector)	Moderate beneficial (significant)	Implementation of enhancement measures such as employment opportunities for locals and partnering with education facilities to develop local skills within	<b>Major beneficial (significant)</b>



Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
		the <b>Outline Supply Chain, Employment and Skills Plan</b> [Document Reference 7.9]	
Contribution to Economic Output	Moderate Beneficial (significant)	None Required	<b>Moderate Beneficial (significant)</b>
<b>Agricultural Circumstances</b>			
Agricultural land <sup>1</sup>	Moderate Adverse (significant)	None Requires	<b>Moderate Adverse (significant)</b>
<b>Ecology and Nature Conservation</b>			
No significant residual effects on ecology and nature conservation are predicted during construction of the Scheme.			
<b>Water Resources</b>			
No significant residual effects on the water environment or from flood risk are predicted during construction of the Scheme.			
<b>Cultural Heritage and Archaeology</b>			
No significant residual effects on cultural heritage and archaeology are predicted during construction of the Scheme.			

<sup>1</sup> Applying a worst-case assumption that none of the internal access tracks are removed, but are retained by the landowners (at their discretion). If all tracks are removed, no significant adverse effects are anticipated.

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
<b>Noise and Vibration</b>			
No significant residual effects to receptors from noise and vibration are predicted during construction of the Scheme.			
<b>Ground Conditions</b>			
No significant residual effects on ground conditions are predicted during construction of the Scheme.			
<b>Transport and Access</b>			
No significant residual effects on receptors of transport and access are predicted during construction of the Scheme.			
<b>Air Quality and Greenhouse Gases</b>			
No significant residual effects on air quality and greenhouse gas receptors are predicted during construction of the Scheme.			
<b>Other Environmental Topics</b>			
No significant residual effects from other environmental topics including vulnerability of the Scheme to risks of major accidents and disasters, waste, and electric, magnetic, and electromagnetic fields, climate change resilience and adaptation and glint and glare are predicted during the construction of the Scheme.			

Table 18–2: Summary of Effects for the Operational Phase

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
<b>Landscape and Visual and Residential Amenity</b>			
Landscape features–hedgerows (Year 1–15)	<b>ES Chapter 6 Landscape and Visual Impact [Document Reference 6.2.6]</b> methodology has considered mitigation and enhancements within the ‘Assessment of Likely Effects’ section of the chapter, and therefore residual effects (with mitigation in place) are the only effects identified.	Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	<b>Major–Moderate (beneficial)</b>
Landscape Character of the Order Limits and Immediate Surroundings (Year 1–15)		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management</b>	<b>Major–Moderate (adverse)</b>

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
		<b>Plan [Document Reference 7.6]</b>	
Residential Receptors		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	<b>None-Moderate (adverse)</b>
Users of publicly accessible BOATs, bridleways and footpaths (Year 1 –15)		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management</b>	<b>None-Major (adverse)</b>

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
		<b>Plan [Document Reference 7.6]</b>	
Users of the transport network (Year 1–15)		Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	<b>None–Major/Moderate (adverse)</b>
<b>Socio-Economic</b>			
Business rates	Major Beneficial (significant)	None Required	<b>Major Beneficial (significant)</b>
<b>Air Quality and Greenhouse Gases</b>			
Lifecycle Emissions of GHGs	Beneficial (significant)	Additional measures not required beyond best practice measures designed into Scheme	<b>Beneficial (significant)</b>
<b>Ecology and Nature Conservation</b>			

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
No significant residual effects on ecology and nature conservation are predicted during operation of the Scheme.			
<b>Water Resources</b>			
No significant residual effects on the water environment or from flood risk are predicted during operation of the Scheme.			
<b>Cultural Heritage and Archaeology</b>			
No significant residual effects on cultural heritage and archaeology are predicted during operation of the Scheme.			
<b>Noise and Vibration</b>			
No significant residual effects to receptors from noise and vibration are predicted during the operation of the Scheme.			
<b>Ground Conditions</b>			
No significant residual effects on ground conditions are predicted during operation of the Scheme.			
<b>Transport and Access</b>			
No significant residual effects on receptors of transport and access are predicted during operation of the Scheme.			
<b>Agricultural Circumstances</b>			
No significant residual effects on land use and agriculture receptors are predicted during operation of the Scheme.			
<b>Other Environmental Topics</b>			
No significant residual effects from other environmental topics including vulnerability of the Scheme to risks of major accidents and disasters, waste, and electric, magnetic, and			

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
electromagnetic fields, climate change resilience and adaptation and glint and glare are predicted during the operation of the Scheme.			

Table 18–3: Summary of Effects for the Decommissioning Phase

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
<b>Landscape and Visual and Residential Amenity</b>			
Landscape Character of the Order Limits and Immediate Surroundings	<b>ES Chapter 6 Landscape and Visual Impact [Document Reference 6.2.6]</b> methodology has considered mitigation and enhancements within the 'Assessment of Likely Effects' section of the chapter, and therefore residual effects (with mitigation in place) are the only effects identified.	Embedded design features such as vegetation retained (where possible) and new planting. Implementation of the subsequent maintenance of the planting measures is set out within the <b>Outline Landscape and Ecological Management Plan [Document Reference 7.6]</b>	<b>Moderate (adverse)</b>
<b>Socio-Economic</b>			
Employment (increase in employment in the	Moderate beneficial (significant)	Implementation of enhancement measures such as employment opportunities for locals	<b>Major beneficial (significant)</b>



Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
decommissioning sector)		and partnering with education facilities to develop local skills within the <b>Outline Supply Chain, Employment and Skills Plan</b> [Document Reference 7.9]	
Contribution to Economic Output	Moderate Beneficial (significant)	None Required	<b>Moderate Beneficial (significant)</b>
<b>Ecology and Nature Conservation</b>			
No significant residual effects on ecological receptors are predicted during the decommissioning phase of the Scheme.			
<b>Water Resources</b>			
No significant residual effects on the water environment or from flood risk are predicted during the decommissioning phase of the Scheme.			
<b>Cultural Heritage and Archaeology</b>			
No significant residual effects on cultural heritage and archaeology are predicted during the decommissioning phase of the Scheme.			
<b>Noise and Vibration</b>			
No significant residual effects to receptors from noise and vibration are predicted during the decommissioning phase of the Scheme.			
<b>Ground Conditions</b>			

Receptor/Receiving Environment of Effect	Significance of Effect	Mitigation	Residual Effect
No significant residual effects on ground conditions are predicted during the decommissioning phase of the Scheme.			
<b>Transport and Access</b>			
No significant residual effects on receptors of transport and access are predicted during the decommissioning phase of the Scheme.			
<b>Air Quality and Greenhouse Gases</b>			
No significant residual effects on air quality and greenhouse gas receptors are predicted during the decommissioning phase of the Scheme.			
<b>Agricultural Circumstances</b>			
No significant residual effects on land use and agriculture receptors are predicted during the decommissioning phase of the Scheme.			
<b>Other Environmental Topics</b>			
No significant residual effects from other environmental topics including vulnerability of the Scheme to risks of major accidents and disasters, waste, and electric, magnetic, and electromagnetic fields, climate change resilience and adaptation and glint and glare are predicted during the decommissioning phase of the Scheme.			

### 18.3. Residual Effects Conclusions

- 18.3.1. The residual effects (i.e., those that remain following implementation of mitigation measures), which are generally categorised as 'moderate' or 'major' and therefore considered to be 'likely significant environmental effects' are summarised below.
- 18.3.2. A number of environmental impact avoidance, design and mitigation measures have been identified to mitigate and control environmental effects during construction, operation and decommissioning of the Scheme. It is proposed that these are secured through requirements within the DCO application.

#### Construction Phase

- 18.3.3. For the construction phase, significant effects relating to landscape and visual and residential amenity receptors, agricultural receptors and socio-economic receptors are identified.
- 18.3.4. In terms of landscape and visual amenity effects on landscape features (ground cover), landscape character of the Order Limits and immediate surroundings, some residential receptors and users of some sections of the local PRow and transport network, these residual adverse significant effects during the construction phase will be temporary, due to the transient nature of the construction works. The construction phase residual effects are due to the changes in surface landform, landcover, presence of construction machinery and the associated activity which is required to implement the Scheme.
- 18.3.5. In terms of agricultural effects, if the worst case scenario is delivered whereby the internal access tracks are left in situ (at the landowners discretion), this could lead to a permanent loss of 9.1ha of best and most versatile land, resulting in a moderate adverse effect, which is significant. In farming terms, the implications are minimal, as the tracks mostly follow field edges and will be of operational benefit.
- 18.3.6. In terms of socio-economic residual construction effects, it is anticipated that significant beneficial effects are expected through increase in local employment from the construction phase of the Scheme, and in turn increase in economic output to the local economy from increased employment.

#### Operational Phase

- 18.3.7. For the operational phase, significant effects relating to landscape and visual receptors, climate change (greenhouse gas effects) and socio-economic receptors are identified.
- 18.3.8. In terms of landscape and visual amenity effects on landscape features (hedgerows), a beneficial residual effect is anticipated by year 15 with the design features of retention of hedgerows (where possible) and additional hedgerows as illustrated on **ES Figure 6.4 Landscape and Visual Mitigation Strategy, (Landscape Masterplan) [Document Reference 6.4.6.4]**. In total over 50km of new hedgerow is proposed across the Order Limits. Landscape character at the Order Limits and surrounding area would change from the baseline conditions of a predominantly agricultural landscape influenced in part by the nearby energy generation infrastructure at the Tween Bridge Wind Farm to that of solar farm infrastructure. Effects would reduce from Major-Moderate adverse (significant) in Year 1 of operation to Moderate adverse (significant) in Year 15 of operation as retained and created vegetation matures. The majority of residential receptors in the settlements of Thorne and Moorends to the west and Crowle to the east are highly limited in potential views of the Scheme. Some users of some sections of the local PRow and transport network will experience views of the Scheme, however as created and retained vegetation matures by Year 15 the visual effects are reduced.
- 18.3.9. During the operational phase of the Scheme, a beneficial effect on the global climate is anticipated through the net GHG emission savings due to the nature of the Scheme producing renewable energy and therefore displacing the need for other forms of conventional energy generation that would emit greenhouse gas emissions.
- 18.3.10. During the operational phase of the Scheme, a significant beneficial effect is anticipated on the increased business rates revenue as an important economic contributor to the area. It is anticipated for the intended 40-year lifespan of the Scheme, business rates generated could total around £19.8 million (present value).

### **Decommissioning Phase**

- 18.3.11. For the decommissioning phase, significant effects relating to landscape and visual receptors and socio-economic receptors are identified.
- 18.3.12. Similar to the construction phase, the presence of site plant and machinery during the decommissioning phase will have significant adverse effects on the landscape

character of the Order Limits and immediate surroundings, albeit this phase is expected to be broadly similar if not slightly quicker than the construction phase, and therefore temporary.

- 18.3.13. The decommissioning of the Scheme is expected to result in similar socio-economic residual effects. An increase in local employment and in turn increase in economic output to the local economy is expected during the decommissioning phase of the Scheme.