EAST PARK ENERGY

East Park Energy

EN010141

Environmental Statement
Volume 2 – Technical Appendices

Appendix 2-4: Replacement Works

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Appendix 2-4: Replacement Works

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1.0 INTRODUCTION

1.1 Overview

1.1.1 This report sets out the Applicant's position in relation to replacement activities during the operational phase of the Scheme.

1.1.2 The Applicant notes that it is common practice to replace solar farm components periodically throughout the operational lifetime of the development. Parts such as PV panels, inverters, and transformers will degrade over time and may also become outdated as technology advances. Periodic replacement will ensure the Scheme continues to operate safely, efficiently, and in accordance with industry best practice and regulatory requirements, maintaining optimal performance and reliability.

1.1.3 Upgrading components allows the Scheme to benefit from technological advances, including higher panel efficiencies, improved inverter performance, and better monitoring and control systems, all of which can maintain or increase overall energy output without expanding the development footprint. This approach maximises the renewable energy generated over the 40 years authorised by the DCO, aligning with national and local policy objectives to deliver efficient, resilient, and low-carbon energy infrastructure throughout the project's lifetime, to meet the long-term challenge that is Net Zero.

1.1.4 The Applicant has previously outlined the proposed approach to replacement activities in paragraphs 2.6.6-2.6.9 of **ES Vol 1 Chapter 2: The Scheme [EN010141/DR/6.1]**. In brief, replacement activities may be required where components fail, reach the end of their operational lifespan, or where technological advances provide increased efficiencies that justify replacement. Such activities would occur periodically over the lifetime of the Scheme and would not require construction works of the same intensity as those undertaken during the main construction phase.

1.1.5 Importantly, any replacement campaign, whether for the solar panels or other associated infrastructure, would not require major ground disturbance, the

construction of new tracks, the laying of foundations, the construction of new below-ground cable runs, or the wholesale erection of new panel supports. Furthermore, the proposed landscape mitigation, including improved vegetation screening and habitat improvements, would be in place and have matured for circa 15 to 20 years before a replacement campaign is likely to be required. Accordingly, the environmental effects of a replacement campaign would be substantially less than those experienced during the construction phase, with significantly fewer vehicle movements and a much smaller workforce.

1.1.6 The **outline Operational Environmental Management Plan (oOEMP) [EN010141/DR/7.5]** sets out the principles, controls and measures to be implemented during the operational phase to avoid and reduce the potential for environmental effects from occurring, including during any replacement campaigns. It is considered that the final OEMP will provide adequate controls in relation to the environmental effects that could arise from replacement works. However, in recognition that replacement campaigns could occur many years into the future and that the environmental baseline, regulations and surrounding development context could evolve during this period, the oOEMP includes a commitment that, where more than 20% of solar panels are to be replaced in any one calendar year (referred to as a major replacement campaign), a notification must be submitted to the LPA for approval, with details of the management measures proposed to be put in place for those replacement activities, to ensure that such works do not give rise to any materially new or materially different environmental effects compared to those identified in the Environmental Statement (ES).

1.1.7 This Appendix sets out the requirement to replace various components of the Scheme and the benefits that would derive from these works. It also examines the potential environmental effects that could arise from a replacement campaign. It assesses foreseeable repair, renewal and replacement activities, including replacement campaigns involving up to 20% of the installed solar panels within a rolling 12-month period. It also includes a sensitivity

assessment of a major replacement campaign involving a worst-case scenario of a 100% replacement of the illustrative Scheme. This is considered extremely unlikely but has been considered for the purposes of presenting a robust assessment; furthermore, it should be noted that any actual major replacement campaign will remain subject to the approval process set out in the OEMP.

1.1.8 The parameters established through the assessment provided within this Appendix have been integrated into the **oOEMP [EN010141/DR/7.5].**

2.0 REPLACEMENT ACTIVITIES

2.1 Approach

2.1.1 Table 2-35 of **ES Vol 1 Chapter 2: The Scheme [EN010141/DR/6.1]** sets out the indicative operational lifespan of the Scheme's components and, in doing so, identifies the range of replacement activities expected over the life of the Scheme.

2.1.2 In practice, maintenance scheduling would mean it is highly unlikely that all components would be replaced in one campaign. However, even in the event that this were to occur, the level of impact would remain lower than that experienced during the construction phase. This is primarily because there would be no requirement to construct new tracks and accesses, or for ground disturbance. Consequently, the workforce required would be significantly less than the construction phase, as would the number of vehicle movements.

2.2 Site Operations

2.2.1 The Applicant has planned for the operational phase of the Scheme, identifying an 'Operations and Maintenance Area' in Site D which includes a storage, operations and maintenance building. The purpose of this area is the storage of site management and maintenance equipment, which will include plant and machinery not only for maintaining the infrastructure components of the Scheme, but also for maintaining the extensive habitat and landscape proposals.

2.2.2 The operational access to the Operations and Maintenance Area will use the main site access from the B645 (identified as SA16 on **ES Vol 3 Figure 2-4d [EN010141/DR/6.3]**). All deliveries to Site during the operational phase would in the first instance be to the Operations and Maintenance Area, where plant, equipment and machinery would typically be unloaded to the storage, operations and maintenance building and held ready for distribution elsewhere within the Site, as required.

2.2.3 For routine maintenance operations, including replacement campaigns, there would not be a requirement for the construction compounds used during the construction phase. These construction compounds would have been removed at the end of the construction phase and would not be re-established until the decommissioning phase. Instead, the laydown area for components would be between the rows of panels, or for other equipment, existing hardstanding areas.

2.3 Components

2.3.1 This section sets out the approach to replacement activities for each of the Scheme components identified in Table 2-35 of **ES Vol 1 Chapter 2: The Scheme [EN010141/DR/6.1]**, and listed below in **Table 1** of this report:

Table 1: Indicative Operational Lifespan of Scheme Components

Scheme Component	Indicative Operational Lifespan
Solar Panels	20 – 40 years (a single replacement per installed panel and 10% contingency is assumed)
Mounting Structures	40 years
String Inverter	20 years
Centralised Inverter	20 years
Solar Transformer	20 – 40 years
Battery Storage Unit	20 years
Battery Transformer	20 – 40 years
Auxiliary Transformer	20 – 40 years
400 kV / 33kV Transformers	40 years
Cabling	40 years (20% replacement anticipated due to defects)

Scheme Component	Indicative Operational Lifespan
Fencing	10 – 20 years
CCTV	10 – 20 years

2.3.2 The approach to replacement of each of the above components is set out under a series of sub-headings below.

Solar Panels

2.3.3 Over a 40-year operational phase it is reasonable to assume that the Applicant may need, or may choose, to replace some or all of the solar photovoltaic modules. This does not necessarily imply premature failure, rather, replacement works are a normal and foreseeable aspect of managing long-life generating assets.

2.3.4 Solar panels are designed to operate over extended periods, but their output gradually reduces over time through normal module degradation. Solar panel technology is also advancing rapidly, and it is now possible to obtain solar panels with power output warranties extending to 30 years or more. However, even where modules remain functional, their generation efficiency may reduce below the level anticipated by the Applicant for optimal operation of the Scheme. Over a 40-year period, it may therefore be appropriate to replace older modules with newer panels to maintain electricity generation, improve the efficiency of the installed infrastructure, and make best use of the grid connection.

2.3.5 Replacement may also be driven by technological improvement as solar module technology continues to develop, with newer panels typically offering improved efficiency, higher output per panel, better degradation performance, enhanced durability, and improved safety or monitoring characteristics. There may also be practical reasons for replacement works if individual panels or strings of panels are damaged by weather events, accidental impact, electrical faults, manufacturing defects, or other operational issues. In such

cases, replacement would be required as part of routine repair and maintenance. Larger replacement campaigns may also be undertaken where a particular panel model becomes obsolete, where spare parts are no longer readily available, where compatibility with inverters or monitoring systems becomes an issue, or where replacement of a wider group of panels is more efficient than repeated piecemeal interventions.

2.3.6 The need for replacement works should therefore be understood as an inherent feature of a long-duration solar development. The ability to replace panels during the operational phase helps to ensure that the Scheme remains safe, efficient and capable of delivering renewable electricity throughout its consented life.

2.3.7 The Applicant has assumed that every solar panel installed as part of the Scheme would be replaced once during the operational phase, with a further contingency of 10% to allow for occasions where more than one replacement is necessary. The Applicant considers this to represent a reasonable lifetime assumption, and it should not be taken to mean that all panels are expected to require replacement at the same time, or within a single replacement campaign.

2.3.8 There is unlikely to be a single technical or commercial trigger requiring all panels to be replaced at the same point in time. Panel degradation occurs gradually and may vary across the Site depending on age, manufacturer batch, orientation, shading, electrical configuration, weather exposure and operational history. Some panels may continue to perform satisfactorily beyond the point at which others are damaged, underperforming or obsolete. Similarly, individual panels, strings or blocks may require replacement due to faults or damage, while other parts of the Site may remain fully functional. This means that a targeted or rolling programme of replacement is more likely and more proportionate than wholesale replacement across the whole Scheme.

2.3.9 The Applicant considers it unlikely that more than 20% of the solar panels would need replacing within any single 12-month period. The replacement of 20% of the panels within a 12-month period has therefore been identified as a conservative marker for a major panel replacement campaign, rather than routine maintenance. As set out in paragraph 2.4.10 of the **oOEMP [EN010141/DR/7.5]**, in the unlikely event of a replacement campaign involving the replacement of more than 20% of the solar panels within any 12-month period, this would 'trigger' a requirement to notify the relevant LPAs, referred to as a major replacement campaign. The notification must be accompanied by a Major Replacement Campaign Method Statement and Environmental Review, the contents of which are defined within the **oOEMP [EN010141/DR/7.5].** This ensures that any major panel replacement campaign would be subject to appropriate prior notification and where necessary the adoption of additional management controls to ensure that such works do not give rise to any materially new or materially different environmental effects compared to those identified in the ES, while recognising that smaller-scale replacement works would form part of normal operational maintenance controlled by the final OEMP.

2.3.10 Under normal annual / routine operational maintenance, panel replacement would be expected to occur in much smaller quantities than a major replacement campaign scenario described above. In those circumstances, replacement panels would not need to be delivered or distributed in bulk. Instead, panels would ordinarily be moved from the storage, operations and maintenance building to the relevant work area using a van or similar light vehicle, with the redundant panels returned to the Operations and Maintenance Area for onward management in accordance with the **outline Waste Management Plan [EN010141/DR/7.12]**.

2.3.11 The scale of any panel replacement campaign would depend on the number of panels to be replaced and dictate the number of crews deployed. The on-site workforce would comprise crews working collectively on defined panel areas. A typical crew would comprise up to five operatives, including:

- three panel technicians to unbolt the removed panels and position and fix the replacement panels,
- one handling or telehandler operator to bring pallets to the working zone and remove the replaced panels, and
- one quality or electrical engineer to verify connectors, torque settings and string continuity.

2.3.12 Each crew would be expected to handle approximately 420 panels per day. The illustrative design shown on **ES Vol 3 Figure 2-1 Illustrative Environmental Masterplan [EN010141/DR/6.3]** includes approximately 695,760 panels across Sites A to D. **Table 2** therefore identifies the indicative duration of replacement works for a campaign involving the replacement of 20% of the panels based on different crew numbers, assuming a productivity rate of 420 panels per crew per day and a five-day working week. A maximum of five crews would be deployed.

Table 2: Time to replace 20% of panels based on size of workforce

No. of Crews	Time to replace 20% of total panels
5 crews (25 people)	63 working days / 13 weeks
4 crews (20 people)	83 working days / 17 weeks
3 crews (15 people)	111 working days / 23 weeks
2 crews (10 people)	166 working days / 34 weeks
1 crew (5 people)	332 working days / 67 weeks

2.3.13 In the major replacement campaign sensitivity scenario of replacement of 100% of the as-built panels, it would be necessary by virtue of the controls set out in subsequent sections of the report to use a minimum of five crews,

and therefore the duration would be 65 weeks, based on a five-day working week.

2.3.14 In relation to the most likely scenario of replacement campaigns of up to 20% in any 12-month rolling period, the total on-site workforce could be scaled up or down depending on the objectives of the specific maintenance activity or replacement campaign. However, for a larger replacement campaign it is expected that there would typically be between two and five crews on Site. On that basis, the replacement of 20% of the total panels is reasonably expected to take approximately 13 to 34 weeks, assuming a five-day working week. This demonstrates that a 20% panel replacement campaign would be substantially smaller in scale, duration and intensity than the main construction phase. Similarly, even in the sensitivity scenario of a 100% replacement campaign, the duration of the works would be substantially less than the construction phase.

2.3.15 As noted in Section 1.0, the significant reduction in time, workforce and activity compared with the main construction phase arises because the principal site infrastructure would already be in place. Replacement works would not require the construction of new internal tracks, new accesses, new panel support foundations, or the original setting out and installation works associated with the construction phase. The works would instead involve the removal and replacement of panels within an already operational solar farm.

2.3.16 Replacement panels would be delivered to the storage, operations and maintenance building in Site D using standard 16.5m articulated lorries. Panels would then be distributed onwards through the Site to meet the requirements of crews working within specific panel replacement areas.

2.3.17 From Site D, pallets of panels would be loaded onto an 18-tonne rigid curtain-sided vehicle for onward distribution to the relevant work areas. An 18-tonne vehicle would be capable of transporting a minimum of 210 panels, such that each crew operating around the Site would require approximately two such deliveries per day. This would allow replacement panels to be delivered to

work areas on a phased basis, rather than requiring panels to be stored across the wider Site in advance of the works.

2.3.18 Vehicles returning to Site D from the work areas would be loaded with pallets of redundant panels. These would be deposited at the storage, operations and maintenance building before being transferred from the Site in accordance with the **oWMP [EN010141/DR/7.12]**.

2.3.19 At the work areas, pallets of panels would be laid down temporarily on existing stoned access tracks where appropriate or between panel rows. Should ground conditions require it, temporary ground protection matting would be deployed along access routes and laydown areas to prevent soil compaction and damage to grassed surfaces. All temporary ground protection matting would be removed following completion of the relevant works.

2.3.20 During replacement campaigns, works would be undertaken using a phased and sequential approach. While more than one crew may be operating at any one time, each crew would progress gradually and systematically through defined panel areas rather than working across the whole Site simultaneously. This would be a more efficient work process and would also limit the spatial extent of activity at any one time.

2.3.21 This approach ensures that the area of activity remains localised, with disturbance confined to a limited part of the Site at any given time. As crews complete works in one area, they would move on to the next, allowing previously affected areas to be reinstated and reducing the overall extent and duration of disturbance at any one time. As a result, even a larger panel replacement campaign would remain materially less intensive than the main construction phase and would be capable of being managed through the operational controls set out within the **oOEMP [EN010141/DR/7.5]** (secured by the final OEMP through the DCO requirements).

Mounting Structures

2.3.22 The mounting structures are relatively simple metal structures that would not be expected to require replacement over the 40-year operational phase during normal operation of the Scheme.

2.3.23 The Applicant has therefore assumed that the mounting structures would not require any notable replacement works during the operational phase.

String Inverters

2.3.24 String inverters may need to be replaced during the operational phase because they are active electrical components that contain power electronics, circuit boards, capacitors, cooling systems, relays, sensors and communications equipment. These components are subject to electrical loading, thermal cycling, weather exposure and general wear over time. It is therefore reasonable to assume that all string inverters will be replaced at some point during the operational phase.

2.3.25 Replacement works would usually be targeted and modular, because string inverters are distributed across the Site and associated with particular strings or groups of panels. This means that individual units or defined areas can be isolated and replaced without requiring the whole solar farm to be taken out of operation.

2.3.26 String inverters would be delivered to the Storage, Operations and Maintenance Building as required and then distributed to the relevant work area across the Site in vans. String inverters are relatively modest in size (refer to **ES Vol 3 Figure 2-2a [EN010141/DR/6.3]**) and therefore multiple inverters could be loaded into a single van for distribution around the Site. Given that these replacements would involve vans and a low number of vehicle movements (even if all string inverters were to be replaced in a single year, which is extremely unlikely) the Applicant does not consider it necessary to set a ‘trigger’ on the number of string inverters that could be replaced, as has been done in relation to the solar panels.

2.3.27 As set out in paragraphs 2.4.24-32 of **ES Vol 1 Chapter 2 [EN010141/DR/6.1]**, it should be noted that where string inverters are utilised, centralised inverters (covered below) would not be required. Conversely, in the scenario where centralised inverters are utilised, the string inverters would not be required.

Centralised Inverters

2.3.28 As with the string inverters above, it is reasonable to assume that all centralised inverters would be replaced at some point during the operational phase.

2.3.29 The centralised inverters would be delivered to the Operations and Maintenance Area where they would be temporarily held before being moved on to the relevant work area in the Site (typically on the same day). The centralised inverters would be transferred around the Site by low loader HGVs (not abnormal loads) where they would be unloaded by a small crane. There would be an estimated total of 52 no. centralised inverters distributed around the Site, based on the illustrative layout shown on **ES Vol 3 Figure 2-1 [EN010141/DR/6.3]**. The centralised inverters are likely to be replaced in a staggered campaign and delivered on a just-in-time basis for on-site installation, resulting in a negligible number of traffic movements on the road network at any one point in time.

2.3.30 The replacement of inverters would not happen as a large-scale single replacement event. Therefore, deliveries would be spread over a longer period on a demand basis, resulting in a negligible number of traffic movements on the road network at any one point in time. Given that these replacements would involve a low number of vehicle movements the Applicant does not consider it necessary to set a ‘trigger’ on the number of centralised inverters that could be replaced, as has been done in relation to the solar panels.

2.3.31 Centralised inverters would not be stored on Site and would need to be ordered in from specialist suppliers; the works to replace these components

would therefore be scheduled in advance to tie-in with delivery of the component. The Applicant has reviewed the **oOEMP [EN010141/DR/7.5]** and provided an additional commitment at Table 5.5 to notify the relevant local highway authorities in advance with details of any necessary traffic management measures ahead of work to replace this component.

Solar Transformers

2.3.32 The solar transformers would typically comprise a transformer and associated electrical equipment, protection systems, switchgear, metering, monitoring, cooling or ventilation components, cabling connections and containment. These elements are exposed to electrical loading, thermal cycling, environmental conditions, and routine operational wear over time. Over the 40 year operational phase, it is therefore reasonable to assume that some or all of the units may require replacement, either because they have reached the end of their practical service life or because individual components have failed or degraded.

2.3.33 Replacement works would usually be targeted and modular, because solar transformers would be distributed across the Site and associated with particular groups of panels. This means that individual units or defined areas can be isolated and replaced without requiring the whole solar farm to be taken out of operation.

2.3.34 The solar transformers would first arrive at the Operations and Maintenance Area, where they would be temporarily held before being moved to the relevant work area in the Site (typically on the same day). The solar transformers would be transferred around the Site by low loader HGVs (not abnormal loads) where they would be unloaded by a small crane.

2.3.35 There would be an estimated total of 52 no. solar transformers distributed around the Site, based on the illustrative layout shown on **ES Vol 3 Figure 2-1 [EN010141/DR/6.3]**. The transformers are likely to be replaced in a staggered campaign and delivered on a just-in-time basis for on-site installation, resulting in a negligible number of traffic movements on the road

network at any one point in time. Given that the replacement of transformers would not occur as a large-scale single replacement event, deliveries would be spread over a longer period on a demand basis, resulting in a negligible number of traffic movements on the road network at any one point in time. As such, the Applicant does not consider it necessary to set a 'trigger' on the number of solar transformers that could be replaced, as has been done in relation to the solar panels.

2.3.36 Solar transformers would not be stored on Site and would need to be ordered in from specialist suppliers; the works to replace these components would therefore be scheduled in advance to tie-in with delivery of the component. The Applicant has reviewed the **oOEMP [EN010141/DR/7.5]** and provided an additional commitment at Table 5.5 to notify the relevant local highway authorities in advance with details of any necessary traffic management measures ahead of work to replace this component.

Battery Storage Units

2.3.37 The battery storage units may need to be replaced during the operational phase because battery systems are active electrochemical and electrical assets that are subject to degradation through normal use. Battery performance naturally changes over time with the usable storage capacity of a battery typically reducing through repeated charge and discharge cycles. Even where a battery remains safe and functional, its ability to store and discharge electricity may decline below the level required for efficient operation of the Scheme. Replacement may therefore be necessary to maintain the intended storage capacity, response capability and operational flexibility of the battery energy storage system.

2.3.38 Over time, individual modules, racks or containers could also become unreliable, suffer faults, or require replacement following damage or abnormal operation. In addition, fire safety expectations, grid compliance requirements, communications protocols, and manufacturer support arrangements may evolve during the operational life of the Scheme.

2.3.39 There may also be a technological and commercial driver for replacement as battery technology continues to develop, with improvements in energy density, cycle life, safety systems, monitoring capability and operational efficiency. Over a long operational period, the original battery units may become obsolete or less economic to maintain, particularly where spare parts, software support or compatible replacement modules are no longer readily available. In those circumstances, replacing units may be more efficient and reliable than continuing to maintain older equipment.

2.3.40 Replacement works would not necessarily involve the whole battery energy storage system being replaced at once. Battery systems are typically modular, with individual containers, cabinets, racks or units capable of being isolated, removed and replaced in a managed way. This allows replacement to be undertaken as part of a rolling programme, targeted to particular units where capacity, reliability or safety requirements justify intervention. It is extremely unlikely that the Applicant would replace all battery storage units within the BESS at the same time, or within the same year, because the system is inherently modular and can be maintained, isolated and renewed on a unit-by-unit basis.

2.3.41 The Applicant has assumed that all battery storage units would be replaced once during the operational phase of the Scheme.

2.3.42 The Applicant has sited the BESS in Site D adjacent to the East Park Substation, and the Operations and Maintenance Area; access for works to replace battery storage units is therefore relatively straightforward requiring only the use of the B645 from the A1 to the main site access into Site D. If a battery storage unit container was to be replaced as a 'whole unit replacement' then this would be brought in on a low loader HGV (not abnormal load) where it would be unloaded by a small crane.

2.3.43 There would be an estimated total of 96 no. battery storage units, based on the illustrative layout shown on **ES Vol 3 Figure 2-1 [EN010141/DR/6.3]**. In total there would therefore be a low number of vehicle movements required

to replace these components across the operational phase. Given that these replacements would involve a low number of vehicle movements (even if all battery storage units were to be replaced in a single year, which is extremely unlikely), and the nature of the highway network required to access Site D, the Applicant does not consider it necessary to set a 'trigger' on the number of battery storage units that could be replaced, as has been done in relation to the solar panels.

2.3.44 The Applicant has reviewed the **oOEMP [EN010141/DR/7.5]** and provided an additional commitment at Table 5.5 to notify the relevant local highway authorities in advance with details of any necessary traffic management measures ahead of work to replace this component.

Battery Transformers

2.3.45 The battery transformers would typically comprise a transformer and associated electrical equipment, protection systems, switchgear, metering, monitoring, cooling or ventilation components, cabling connections and containment. These elements are exposed to electrical loading, thermal cycling, environmental conditions, and routine operational wear over time. Over the 40-year operational phase, it is therefore reasonable to assume that some or all of the units may require replacement, either because they have reached the end of their practical service life or because individual components have failed or degraded.

2.3.46 The Applicant has sited the BESS in Site D adjacent to the East Park Substation, and the Operations and Maintenance Area; access for works to replace battery transformers is therefore relatively straightforward requiring only the use of the B645 from the A1 to the main site access into Site D. A battery transformer would be brought in on a low loader HGV (not abnormal load) where it would be unloaded by a small crane.

2.3.47 There would be an estimated total of 96 no. battery transformers, based on the illustrative layout shown on **ES Vol 3 Figure 2-1 [EN010141/DR/6.3]**. In total there would therefore be a low number of vehicle movements required

to replace these components across the operational phase. Given that these replacements would involve a low number of vehicle movements (even if all battery transformers were to be replaced in a single year, which is extremely unlikely), and the nature of the highway network required to access Site D, the Applicant does not consider it necessary to set a 'trigger' on the number of battery transformers that could be replaced, as has been done in relation to the solar panels.

Auxiliary Transformer

2.3.48 The auxiliary transformer is a comparatively small component serving the on-site infrastructure and is not subject to the same sustained electrical loading, cycling, thermal stress or operational intensity as the main solar or BESS transformer units. Whilst replacement could be required in the event of a fault, damage, safety issue or change in auxiliary load requirements, it would not ordinarily be expected as a routine or repeated activity across the operational life of the Scheme. In most cases, inspection, testing, protection maintenance and targeted component repairs would be sufficient to maintain the auxiliary transformer in service. A replacement auxiliary transformer could be provided in a single vehicle delivery, and therefore, the Applicant does not consider it necessary to set a 'trigger' on replacement, as has been done in relation to the solar panels.

33kV / 400kV Transformers

2.3.49 It is unlikely that the 33 kV / 400 kV transformers would need to be replaced during the operational phase as these components are engineered for long-term operation. The Applicant would seek to maintain, refurbish or repair the transformer where practicable, rather than replace it outright. Replacement could be required in exceptional circumstances, such as major fault, fire, insulation failure, irreparable damage, material change in grid requirements or end-of-life condition, but it would not ordinarily be expected as a repeated or planned replacement activity within the operational phase of the Scheme.

2.3.50 The Applicant has assumed that the 33 kV / 400 kV transformers would not require any outright replacement during the operational phase.

Cabling

2.3.51 The cabling would be expected to last the lifetime of the Scheme and would not require routine replacement unless a specific defect, fault or damage was to occur. Any replacement need is likely to be localised and targeted, rather than site wide. For example, a section of cable may require repair or replacement if it is damaged by third-party works, affected by a manufacturing or installation defect, subject to water ingress at a joint, or identified through testing as underperforming. In those circumstances, the Applicant would isolate and repair the affected section, or replace a defined length of cable, rather than undertake wholesale replacement across the Scheme.

2.3.52 Inter-panel cabling largely runs above ground attached to panels and enters conduits at row ends and so replacement works for such cables are non-intrusive.

2.3.53 Where cables are buried below ground, they would typically be ducted such that any defective cables could be ‘pulled out’ and replaced by new cabling without significant excavation. As a result, there is unlikely to be any significant requirement for excavation once the Scheme is installed and commissioned.

2.3.54 Any works to replace cabling would be undertaken by a small team, with cabling distributed to work areas around the Site by vans. Accordingly, the Applicant does not consider it necessary to set a ‘trigger’ on replacement, as has been done in relation to the solar panels.

Fencing

2.3.55 Subject to appropriate specification, installation and routine maintenance, the fencing would be expected to remain serviceable for an extended period of time. During operation, the fencing would be inspected and maintained as

part of normal site management. This may include repairing or replacing isolated sections where damage has occurred, tightening or replacing fixings, maintaining gates and access controls, addressing localised corrosion, or reinstating sections affected by accidental impact, vandalism, weather events or vegetation pressure. Such works would be localised and responsive to condition, rather than forming part of a planned replacement campaign.

2.3.56 Any fencing parts would be delivered to the Storage, Operations and Maintenance Building in Site D before being distributed on to the relevant work area in the Site in a van or similar. Accordingly, the Applicant does not consider it necessary to set a 'trigger' on replacement, as has been done in relation to the solar panels.

CCTV

2.3.57 During operation, the CCTV system would be inspected and maintained as part of normal site security management. Although individual cameras, poles, control equipment, and cabling could require renewal over time, the system would be made up of discrete and replaceable components. It would therefore be capable of being maintained, upgraded and renewed in parts, rather than requiring wholesale replacement.

2.3.58 Any CCTV parts would be delivered to the Storage, Operations and Maintenance Building in Site D before being distributed on to the relevant work area in the Site in a van or similar. Accordingly, the Applicant does not consider it necessary to set a 'trigger' on replacement, as has been done in relation to the solar panels.

2.4 Access

2.4.1 The Operations and Maintenance Area in Site D would be used as the primary hub during the operational phase, including for the storage of components, staff welfare, and parking.

2.4.2 Site D would continue to be accessed from the A1 via the B645, using the main site access (identified as SA16 on Appendix B to the **oOEMP [EN010141/DR/7.5]**). Any replacement works in Site D would utilise this same access.

2.4.3 For routine maintenance works and replacement of inverters and transformers, Site C would be accessed from Site D using the B645 and then Moor Road to access SA13. During panel replacement campaigns, Site C would be accessed from SA12 on Great Staughton Road.

2.4.4 Site B would be accessed from Site D using the B645 then Great Staughton Road from which accesses SA03-SA10 would be used.

2.4.5 Site A would be accessed from Site D using the B645 through Great Staughton, and then onto Great Staughton Road towards Little Staughton Road to the B660, where vehicles would turn southbound towards accesses SA01 and SA02.

2.4.6 Once operational phase traffic is within the respective parts of the Site, vehicles would utilise the internal access tracks created during the construction phase. There would be no requirement for new access tracks, or for any vegetation clearance to facilitate access within and around the Site.

2.4.7 The Proposed Operational Access Strategy Plan illustrating operational access routing is set out in Appendix B to the **oOEMP [EN010141/DR/7.5]**.

2.5 Mitigation and Control Measures

2.5.1 Replacement activities during the operational phase would be managed through the framework of controls secured by the final Operational Environmental Management Plan (OEMP). The final OEMP will be submitted to and approved by the relevant LPA prior to the date of final commissioning for the relevant phase of the Scheme and would be in substantial accordance with the **oOEMP [EN010141/DR/7.5]**. The oOEMP sets out the principles, controls and measures to be implemented during the operational phase to avoid and reduce the potential for significant environmental effects from

occurring, including during operational maintenance, repair and replacement activities.

2.5.2 The **oOEMP [EN010141/DR/7.5]** includes a suite of site-wide controls relevant to replacement activities. These include controls relating to working hours, site security, protection of the public, public rights of way, deliveries and collections, health and safety, contamination and pollution prevention, welfare provision, lighting, waste management, surface water management, flood risk, liaison with the public, monitoring, ecology, heritage, air quality, noise and record keeping. In addition, the final OEMP will operate alongside other secured management plans where relevant, including the final Landscape and Ecological Management Plan (LEMP), Public Rights of Way Management Plan (PRoWMP), Surface Water Management Plan (SWMP), Soil Management Plan (SMP), Waste Management Plan (WMP) and Battery Safety Management Plan (BSMP). Accordingly, replacement activities would not take place in an uncontrolled manner but would be undertaken within the operational management framework secured by the DCO.

2.5.3 The scale of replacement activity is expected to vary over the operational life of the Scheme. Routine inspection, maintenance and small-scale replacement would be managed through the standing controls in the OEMP. Such works would generally be limited, localised and low intensity, and would ordinarily involve a small workforce, light vehicles and the use of the existing operations and maintenance infrastructure.

2.5.4 For larger replacement campaigns, the Applicant recognises that such activity may take place many years after construction, and that the environmental baseline, regulatory standards and surrounding development context may have changed by that time. It would not therefore be proportionate or reliable to prescribe detailed method statements for every potential future replacement campaign at this stage. Instead, the appropriate approach is to secure the operational management principles through the OEMP and to require additional details to be provided where a replacement campaign reaches a scale that may require more specific management measures.

2.5.5 The **oOEMP [EN010141/DR/7.5]** therefore includes an additional notification mechanism for the component most likely to give rise to environmental effects as a result of a major replacement campaign, namely the solar panels. Prior to any replacement activity involving the replacement of more than 20% of the solar panels within the Scheme within any 12-month period, a notification must be submitted to the relevant LPA for approval. This threshold has been identified as a conservative marker for a major solar panel replacement campaign, rather than routine maintenance. It reflects the substantially greater number of individual solar panels across the Scheme, and the potential for a major panel replacement campaign to generate workforce, vehicle movement, and waste considerations when compared with other operational components.

2.5.6 The notification would be accompanied by a Major Replacement Campaign Method Statement and Environmental Review which would identify, insofar as relevant to the replacement activity proposed, the nature and scale of the works, the components to be replaced, the parts of the Site affected, the anticipated timing and duration of the works, the proposed phasing, working hours, workforce, plant and equipment, vehicle movements, HGV routing, access arrangements, temporary laydown or storage areas, welfare arrangements, waste management arrangements, and any measures required to manage effects on public rights of way, ecology, soils, drainage, noise, air quality, lighting, landscape and visual amenity, and local residents. The notification would also identify any pre-works surveys, environmental checks, stakeholder liaison, community communication, monitoring or reporting proposed for the relevant replacement activity. The method statement submitted with the notification includes details of any other replacement or maintenance works anticipated during the period of panel replacement to ensure that the cumulative effects of all replacement and maintenance works are considered.

2.5.7 The management measures submitted with the notification would need to be consistent with the principles of the approved CEMP, CTMP, PRoWMP and

OEMP, but would also need to be proportionate to the scale, duration and location of the replacement activity proposed. This ensures that any major solar panel replacement campaign (over 20%) would be subject to further approval at the appropriate time, having regard to the prevailing baseline and any relevant operational experience from the Scheme, while avoiding the unnecessary submission of detailed management plans for routine maintenance and smaller-scale replacement works. The Major Replacement Campaign Method Statement and Environmental Review would form part of the OEMP and would therefore be enforced pursuant to Requirement 9 of the DCO.

2.5.8 Equivalent percentage-based triggers are not considered necessary for any of the other Scheme components. This is because those components are materially fewer in number, are generally modular or discrete in nature, and would generate substantially fewer vehicle movements and a smaller workforce requirement, even in the very unlikely event that all such components required replacement within a single year. Replacement of inverters, transformers, BESS units, cabling, fencing and CCTV would still be controlled through the measures set out in the final OEMP and, where relevant, the other approved operational management plans. Where replacement of larger electrical plant requires HGVs, low loaders, cranes or traffic management, those movements would be managed through the approved operational access arrangements and the controls in the OEMP, with advance notification to the relevant highway authority where relevant.

2.5.9 This approach provides a proportionate and enforceable control framework. Routine maintenance and smaller-scale replacement activities would be managed through the final OEMP and associated management plans, while a major solar panel replacement campaign would require an additional notification to, and approval by, the relevant LPA before the relevant works proceed. On that basis, the Applicant considers that the mitigation and control measures secured through the DCO and the oOEMP **[EN010141/DR/7.5]** are

sufficient to ensure that replacement activities would not give rise to likely significant effects beyond those assessed in the ES.

3.0 ENVIRONMENTAL IMPACTS AND EFFECTS

3.1 Introduction

3.1.1 As set out in Section 2.0 above, the replacement of panels or existing equipment would not necessitate an extension of the Order Limits, an increase in permanent land take, an extension of the operational period, or an expansion of the generating station beyond the parameters that are assessed in the ES. All replacement activities would be undertaken within the assessed design envelope and controlled through the relevant operational management plans. Furthermore, the baseline for any assessment of a replacement is the Scheme as built and operational, not the original pre-construction agricultural baseline. Accordingly, the main consideration for a replacement campaign is not what the effects of a new solar farm are on the Site. Rather, what additional temporary effects would arise from a replacement exercise within an already operational solar farm with an established set of management plans and mitigation measures in place.

3.1.2 The Scheme would be fully operational at the time of any replacement campaign and based upon the manufacturers' guarantees for solar panels and other associated equipment, this is unlikely to occur until at least 15-20 years into the operational phase. As such, it would most likely occur at a point where the landscape screening has matured, solar development is an established land use, the drainage regime is in place and fully functioning, site access arrangements are established, on-site access tracks are built, and any habitat management regimes are also well established. Hence, the environmental effects from the replacement works are likely to be of lower magnitude than those assessed during the construction phase, as the mitigation measures put in place to mitigate the operational effects will also help reduce the magnitude of the effects associated with the replacement works.

3.1.3 The principal effects of any replacement campaign would be temporary and typically construction-like in nature and could result from additional traffic,

noise, temporary visual effects, the management of waste, ecological disturbance, ground and soil disturbance and pollution prevention. However, as set out in Section 2.0 above, they would be materially less than the effects / extent of work that are expected in the main construction phase particularly as effects would be short term, limited in their geographical scope, much less operationally significant than the original construction phase, and controlled by various operational phase management plans

3.1.4 Notwithstanding the above, in recognition of the concerns that have been raised during the examination process, the Applicant has elected to give further consideration / clarity as to the nature and magnitude of the environmental effects arising from a replacement campaign, and the adequacy of the mitigation that has been identified within the **oOEMP [EN010141/DR/7.5]**. In doing so, the following sections take into account the description of replacement activities in Section 2.0 above, the assessment outcomes / planned mitigation measures set out within the ES, the operational site baseline and the operational phase provisions proposed in the management plans. For ease and clarity, the response follows the same environmental topic-based chapter headings as Vol 1 of the ES.

3.1.5 The following sections consider foreseeable repair, renewal and replacement activities, including the most likely scenario involving replacement of less than 20% of the solar panels within a rolling 12-month period and the sensitivity scenario involving replacement of 100% of the as-built solar panel total within a single Major Replacement Campaign. The sensitivity scenario would increase the total number of panels replaced, the spatial extent of the campaign and its overall duration. However, it would not increase the maximum number of crews, simultaneous work areas, peak daily panel-distribution movements, working hours, plant requirements, temporary laydown, ground disturbance or vegetation clearance beyond the parameters described in Section 2.0. The works would progress sequentially through defined work areas, such that the duration of activity at any individual environmental receptor would be materially shorter than the overall Scheme-

wide programme. Route-specific traffic effects are assessed in Section 3.6. For the other environmental topics, the sensitivity scenario would not introduce any new impact pathway and, subject to the controls described below, would not alter the conclusions reported in the ES.

3.2 Landscape and Visual

3.2.1 After an extended period of operation (circa 15-20 years), the planting and habitats proposed in the **outline Landscape and Ecological Management Plan (oLEMP) [EN010141/DR/7.7]** will have matured and will remain actively maintained, providing more effective visual filtering than the landscape features present during the initial construction phase. The oLEMP sets out the long-term management regime for landscaping works across the Site to deliver the project's design principles which include the retention and enhancement of existing vegetation, introduction of new hedgerows and belts of native trees, which would all contribute to improved screening of any replacement activities. The oLEMP also establishes development-free buffers along PRoW, hedgerows and watercourses which would help to mitigate effects from any replacement campaign, not only in relation to landscape and visual effects but also in relation to other environmental topics. The oLEMP's management of established planting, hedgerows and belts (including inspections and remedial works) and the oOEMP's operational landscape controls would also be retained during replacement campaigns, so that any short-term activity is filtered by established screening.

3.2.2 As noted above, a replacement campaign would not require new internal tracks or earthworks and there would also be no requirement for construction compounds or any significant laydown areas around the site. The main operations / spares building and compound would be used to provide a central hub for temporary storage of components. Operational site access would be via the existing public highway using accesses created and retained at construction, with no requirement for vegetation clearance to facilitate replacements or maintenance of the Scheme. As such, the magnitude of

landscape change would be low and there would be no change in landscape character.

3.2.3 Adverse visual effects were predicted for a limited number of sections of the public rights of way network, located within or in close proximity to the Site during the operational phase, with such effects remaining after 10 years of the landscaping being put in place. Due to the enhanced screening which would have developed since the scheme became operational, the visual effects of replacement activities, which would be temporary and short term, would not alter the conclusions of the Landscape and Visual assessment. Even where replacement works may be visible from public rights of way or permissive paths, the replacement activities would not remain within the view for more than a week or two, with replacement works progressing sequentially through defined work areas. Moreover, any views from receptors looking towards the Site from more distant viewpoints would also include an operational solar farm, as well as being filtered by the landscape planting. In the sensitivity scenario, the overall programme of works would extend but activity visible from an individual receptor would be temporary and materially shorter than the overall programme. In the sensitivity scenario, there would also be no further large-scale replacement campaigns required over the remaining life of the project.

3.2.4 As such, the magnitude of effects from replacement activities are considered to be small and short term, and therefore no new or likely significant adverse visual effects would arise from the replacement activities.

3.3 Cultural Heritage and Archaeology

3.3.1 As no new array foundations, cable routes or significant ground excavation are anticipated, archaeological receptors would not be directly affected. In the unlikely event that below ground works are required in a replacement phase (or indeed any Scheme maintenance work), the Areas of Archaeological Constraint identified in the **outline Archaeological Mitigation Strategy**

[EN010141/DR/7.15] would continue to apply, and it would be necessary for the operator to adhere to the relevant mitigation measures.

3.3.2 As set out above, the landscape measures set out in the **oLEMP [EN010141/DR/7.7]** would have matured by the time a replacement campaign is required, and therefore heritage assets would benefit from enhanced screening from the replacement works in comparison to the construction phase works. Also, as noted above, the overall duration and the presence of replacement activities within any part of the Site would be of a lower magnitude than anything experienced during the construction period. As such any potential setting effects on heritage assets would be restricted to a temporary, small-scale presence of maintenance crews and equipment seen within the context of an already operational site. They would not be significant in their own right, and due to their limited scale and duration would not result in materially different conclusions to the operational phase assessment.

3.3.3 Based on the above, no new or materially different likely significant adverse effects on buried archaeology or the setting of heritage assets would occur during a replacement campaign.

3.4 Ecology and Nature Conservation

3.4.1 In considering the potential effects from a replacement phase on ecology and nature conservation, it is relevant to note the following:

- Replacement activities for the solar panels would be limited to the panel rows, which would be located in areas of neutral grassland and existing access tracks.
- The BESS and substation compound is hard surfaced and would not result in the loss of any habitats during replacement works.
- Power Conversion Units (PCUs) and other built infrastructure can all be removed and replaced from established access roads.

- Hedgerows, ditches, trees and wetland habitats are protected from damage via the established buffers, as set out in section 4.4.2 of the **oLEMP [EN010141/DR/7.7].**
- The replacement phase would use existing site access roads.
- There would be no need for satellite construction compounds.
- There would be no need for vegetation removal / habitat loss.

3.4.2 Whilst the potential for likely significant effects would be limited by the abovementioned factors, the Applicant recognises that the works could still have the potential to give rise to temporary disturbance to habitats and wildlife. Accordingly, Table 5.3 of the **oOEMP [EN010141/DR/7.5]** provides specific operational controls for maintenance and periodic replacements. Prior to works commencing within each relevant work area during a Major Replacement Campaign, an ecological review will be undertaken and any necessary pre-work surveys will be completed for protected species, including otters, water vole, badgers, roosting bats, great crested newts, and breeding birds. As referred to in Section 2.0 of the **oOEMP [EN010141/DR/7.5]**, should any protected species be identified, appropriate mitigation measures would be implemented in accordance with relevant legislation and best practice guidelines and any relevant management plans, ensuring their protection throughout operational activities.

3.4.3 In the sensitivity scenario, the works are likely to extend across all seasons. The required ecological review, pre-work surveys and timing or species-protection measures would therefore be applied to each work area before works commence.

3.4.4 The ES concluded that the Scheme would not give rise to significant adverse effects on species or habitats during the construction phase and that it would generate significant beneficial effects during the operational phase. Based on the reasoning provided above, effects on habitats and species during replacement activities would be mitigated or avoided to such an extent that it

is reasonable to conclude that any replacement campaign would not cause likely significant adverse effects on ecological receptors or undermine the significant beneficial effects expected during the operational phase.

3.5 Flood Risk, Drainage, and Surface Water

3.5.1 A replacement campaign would not materially alter flood risk because the Site layout, extent of permanent hardstanding and overall quantum and extent of development would remain unchanged from the parameters assessed in the ES. Furthermore, there would be no additional earthworks, access tracks or ditch crossings required to facilitate a replacement campaign. The **Flood Risk Assessment (FRA) [AS-018]** concluded that there would be no increase in off-site flood risk following adoption of the measures set out in the **outline Surface Water Management Plan (oSWMP) [EN010141/DR/7.13]**. Accordingly, the replacement activities would not increase off-site flood risk because no additional development would be added to the Site and there would be no works that could alter either surface water drainage capacity or flows. The development of a final SWMP would be secured through DCO Requirement 9. The final SWMP would need to be prepared in substantial accordance with the details set out in the oSWMP.

3.5.2 The ES also confirms that during operation, the final OEMP will integrate pollution prevention measures via the implementation of the Environmental Incident Management and Pollution Prevention Plan that will set out a structured response framework for any fuel or chemical spills, unexpected contamination events, and pollution control measures to prevent impacts on watercourses and groundwater, including risks that may arise during replacement activities.

3.5.3 The ES concluded that, once embedded and additional mitigation is accounted for, there would be no significant effects to flood risk during either construction or operational stages of the Scheme. A replacement campaign would not alter those conclusions.

3.6 Traffic and Transport

Solar Panel Replacement Activity

3.6.1 As described in Section 2.0, the majority of vehicle movements generated during the operational phase would be associated with the replacement of solar panels.

3.6.2 It is anticipated that replacement solar panels would be delivered to the storage, operations and maintenance building in Site D using standard 16.5m articulated lorries, using the B645 between the A1 and the main Site access (SA16). A 16.5m articulated lorry is capable of transporting 630 panels. To replace up to 20% of panels within a single 12-month period would therefore generate a maximum of 220 HGV deliveries (440 two-way movements).

3.6.3 As per the estimated duration of replacement activity identified in **Table 2** above, if a single crew were deployed to undertake solar panel replacement, the work would last for a total of 332 days, or 67 weeks, based on a 5-day working week. Realistically, therefore, in order to be able to replace up to 20% of panels within a single 12-month period, it would be necessary to deploy at least 2 work crews.

3.6.4 As such, based on the indicative timescales set out in **Table 2**, if two crews were used to undertake the replacement works this would result in an additional 3 two-way HGV movements per day for the estimated 166 working-day replacement programme. In the most intensive activity scenario, with 5 work crews deployed, there would be an additional 7 two-way HGV movements per day for the identified duration of 63 working days. This level of additional traffic movements would be imperceptible when set against general background traffic flows of approximately 8,000 two-way vehicles per day on the B645 between the A1 and the main Site access.

3.6.5 From Site D, panels would be distributed around the Site using 18t rigid curtain-sided vehicles. These vehicles are classified as medium goods

vehicles. Each of these vehicles is capable of transporting 210 panels, and each work crew capable of replacing 420 panels in a single working day.

3.6.6 Based on these assumptions, **Table 3** provides a breakdown of the forecast number of vehicle trips that would be required to replace up to 20% of the solar panels in the areas of the Site which would be served by each individual Site Access.

Table 3: Forecast Total Trip Generation for Solar Panel Replacement by Site Access

Site Area	Site Access	Total No. of Solar Panels Through Access	No. Vehicles to replace 20% of solar panels
A	SA01	134,280	128
B	SA02	19,920	20
	SA03	9,300	9
	SA04	6,120	6
	SA05	1,680	2
	SA06	34,050	33
	SA07	188,850	180
	SA08	58,890	57
	SA09	39,690	38
	SA10	8,940	9
C	SA12	96,720	93

3.6.7 In addition to the figures presented in **Table 3** above, there would also be a total of 92,700 solar panels within Site D. To replace 20% of these panels would require approximately 90 delivery trips. However, these movements would be internal to Site D and would therefore not be required to use the public highway network.

3.6.8 The resultant forecast daily number of delivery vehicle movements and the duration of the works would be dependent on the number of work crews deployed to undertake the replacement works, as set out in **Table 4**.

Table 4: Forecast Daily Delivery Trip Generation / Duration for Solar Panel Replacement

Site Area	Site Access	No. Vehicles to replace 20% of solar panels	No. of Crews							
			2 Crew (10 People)		3 Crew (15 People)		4 Crew (20 People)		5 Crew (25 People)	
			Duration of Works (Days)	No. Deliveries per day	Duration of Works (Days)	No. Deliveries per day	Duration of Works (Days)	No. Deliveries per day	Duration of Works (Days)	No. Deliveries per day
A	SA01	128	32	4	21.5	6	16	8	13	10
B	SA02	20	5	4	3.5	6	2.5	8	2	10
	SA03	9	2.5	4	1.5	6	1.25	8	1	9
	SA04	6	1.5	4	1	6	0.75	6	0.6	6
	SA05	2	0.5	2	0.3	2	0.2	2	0.2	2
	SA06	33	8.5	4	5.5	6	4.5	8	3.5	10
	SA07	180	45	4	30	6	22.5	8	18	10
	SA08	57	14.5	4	9.5	6	7.25	8	6	10
	SA09	38	9.5	4	6.5	6	5	8	4	10
	SA10	9	2.5	4	1.5	6	1.25	8	1	9
C	SA13	93	23.5	4	15.5	6	12	8	9.5	10

3.6.9 The approximate duration of works within each Site Access is calculated based on 20% of the total number of solar panels within each Site area, as set out in **Table 3**, and the assumption that a single work crew can replace 420 panels in a single day, as described above. It should be noted that the total estimated duration of works set out in **Table** 2 includes the replacement activity within Site D. However, the figures included within Table 3 only include the replacement works which would impact the local highway network, i.e. excluding Site D.

3.6.10 This demonstrates that if 2 work crews were used, there would be a requirement for a maximum of 4 delivery vehicles per day. In the worst-case traffic generation scenario, a team of 5 work crews would generate a total of 10 deliveries per day, albeit over a much shorter period.

3.6.11 It should be noted that the forecast number of daily delivery trips are not cumulative. Since replacement crews would only ever be working within a single area of the Site out of a single Site Access at any one time, irrespective of the number of crews as set out at 2.3.19 – 2.3.20.

3.6.12 As described in Section 2.4, and as illustrated in the Proposed Operational Access Strategy Plan set out in Appendix B to the **oOEMP [EN010141/DR/7.5]**, delivery vehicle movements during the operational phase, including replacement activities, would be required to route along

sections of the public highway network which were not used during the construction phase, specifically Moor Road; B645 The Highway through Staughton Highway; Causeway / The Town through Great Staughton; and Little Staughton Road and B660 Kimbolton Road through Pertenhall.

3.6.13 **Table 5** below identifies the maximum daily trip generation of delivery vehicles to replace up to 20% of panels and the total duration of replacement activity along each of the affected sections of highway based on the number of Site Accesses that would be accessed along each section of the highway network as described in Section 2.4 above, and the realistic minimum and maximum number of work crews that would be deployed.

Table 5: Forecast Impact of Solar Panel Replacement on Local Highway Network

Area	Highway Link	Site Access	2 Work Crews (10 people)		5 Work Crews (25 people)	
			Max. Daily Trips (One-Way)	Total Duration of Replacement Works (Days / Weeks)	Max. Daily Trips (One-Way)	Total Duration of Replacement Works (Days / Weeks)
East of Staughton Highway	B645 between Main Site Access & Moor Road	All	4	145 / 29	10	59 / 12
Staughton Highway	B645 The Highway	All	4	145 / 29.5	10	59 / 12
Staughton Highway / Great Staughton	Causeway					
Great Staughton	The Town					
West of Great Staughton	Great Staughton Road between Great Staughton & Spring Hill					
	Spring Hill	SA10	4	2.5 / 0.5	9	1 / 0.2

North of Green End	Great Staughton Road between Spring Hill & Green End	All except SA13, SA10	4	119 / 24	10	48.5 / 9.8
	Green End	SA07, SA08, SA09	4	69 / 14	10	28 / 5.6
	Great Staughton Road west of Green End	SA03, SA04	4	4 / 1	9	2 / 0.4
Pertenhall	Little Staughton Road	SA01, SA02	4	37 / 7.5	10	15 / 3
	B660 Kimbolton Road					

3.6.14 This indicates that the maximum daily delivery vehicle trip generation associated with 20% solar panel replacement (i.e. with five crews) along any given section of the public highway would be 10 delivery trips (20 two-way movements). Again, it should be reiterated that these movements would not be cumulative, since work crews would only ever be working out of a single Site Access on any given day. In this scenario, the additional vehicle movements through Pertenhall would last for a total of 3 weeks, based on a forecast 5-day working week. Through Great Staughton, the total duration of trip generation associated with solar panel replacement in this scenario would be 12 weeks.

3.6.15 The minimum daily delivery vehicle trip generation associated with solar panel replacement (i.e. with 2 crews) would be 4 deliveries (8 two-way movements). However, in this scenario the duration of vehicle movements through Pertenhall and Great Staughton would be 7.5 weeks and 29.5 weeks, respectively.

3.6.16 The baseline traffic data obtained to inform the ES for the Site indicates approximately 16 two-way medium and heavy goods vehicle movements on

weekdays along the B660 Kimbolton Road through Pertenhall, with approximately 2,100 weekday two-way total vehicle movements.

3.6.17 Along Great Staughton Road through Great Staughton the baseline traffic data indicated approximately 10 two-way medium and heavy goods vehicle movements on weekdays, with approximately 3,000 two-way total vehicle movements.

3.6.18 On this basis, with the minimum number of work crews an additional 4 movements per day in each direction through Great Staughton and Pertenhall would represent a material relative increase compared to the existing background medium / heavy goods vehicle movements, but the impacts would be imperceptible in relation to the total traffic flow through each settlement.

3.6.19 In the event that a greater number of work crews are deployed, the resultant additional number of vehicle trips would represent a larger increase in medium goods vehicles compared to the observed baseline flows, albeit over a much-reduced period. However, even an additional 20 two-way delivery vehicle movements per day would still only represent an increase of approximately 1% on the total number of vehicle movements along the B660 through Pertenhall, and approximately 0.7% on the total number of vehicle movements along Great Staughton Road through Great Staughton.

3.6.20 In addition to the total number of panel delivery trips referenced in Table 5, it is assumed that, as a worst-case, each work crew would also travel on a daily basis between the main compound in Site D and the work site using one van per crew. With five crews, this would therefore equate to a total of 10 daily two-way trips. This would represent an additional percentage increase in daily traffic flows of approximately 0.5%. However, this level of trips could be further reduced by transporting crews in a single large minibus.

3.6.21 In EIA terms, this is therefore considered to represent a low magnitude of impact. Across the majority of the affected highway network, which is of low or medium sensitivity, the effects of solar panel replacement traffic would

therefore be of negligible or minor adverse significance, which is considered to be not significant in EIA terms.

3.6.22 Due to the presence of Great Staughton Primary School on Causeway Road, delivery movements will be scheduled to occur outside of highway peak hours and school pick-up and drop-off times. This is secured within the **oOEMP [EN010141/DR/7.5].** This will ensure that the deliveries would not result in a likely significant effect in EIA terms.

3.6.23 Furthermore, as noted, the duration of the impacts in this scenario would be commensurately reduced, with effects through Great Staughton limited to a 12-week period. It is considered that this level of additional movement would therefore be imperceptible when set against general background traffic.

Other Replacement Activities

3.6.24 As described in Section 2.0, a number of replacement activities, specifically replacement of transformer and battery units, would require components to be delivered directly to each area of the Site using 16.5m articulated vehicles.

3.6.25 All battery components would be located within Site D. There would be a total of 96no. battery storage units and 96no. battery transformers. On the assumption that each of these components would require a single HGV delivery, this would only generate a maximum of 2 two-way movements per day if every component was replaced within a single year. These vehicle movements would only occur on the B645 between the A1 and the main Site access.

3.6.26 There would also be a total of 52no. centralised inverters and 52no. solar transformers distributed across the Site, each of which would also require a single HGV delivery to replace. Based on the illustrative layout shown on **ES Vol 3 Figure 2-1 [EN010141/DR/6.3]**, there would be a total of 11no. inverters and transformers within Site A, 27no. within Site B, of which 1 would be located within the parcel of land accessed via access SA02, 8no. within Site C and 6no. within Site D.

3.6.27 On this basis, the replacement of each of these components would generate a total of 48 two-way HGV movements along Little Staughton Road and the B660 Kimbolton Road through Pertenhall. There would also be a maximum of 152 two-way HGV movements along Great Staughton Road related to replacement of centralised inverters and solar transformers. However, as set out at 2.3.29 centralised inverters and solar transformers would be replaced in a staggered campaign and delivered on a just-in-time basis for on-site installation and therefore it is highly likely that there would only ever be one delivery per day of this type, and therefore a maximum of 1 HGV movement per day in each direction.

3.6.28 Furthermore, as described in paragraph 2.4.3, all these movements would be routed via Moor Road through Site C to join Great Staughton Road via access SA12. As such, no HGV movements would pass through Great Staughton.

3.6.29 As described in Section 2.5, movements of HGVs would be managed in accordance with the approved operational access arrangements and the controls in the final OEMP. The **oOEMP [EN010141/DR/7.5]** sets out in Table 5.5 that prior to any planned replacement of a centralised inverter or solar transformer within Site A, Site B or Site C, the Site Operator must notify the relevant local highway authority or authorities not less than 28 days in advance. The notification must include the proposed replacement programme, the proposed route from Site D to the relevant work area, and any traffic management measures proposed to be implemented as part of the delivery and replacement works.

3.6.30 In the unlikely event of transformer / inverter replacements occurring concurrently with solar panel replacement activity, there would be a cumulative maximum of 22 two-way delivery trips per day along Little Staughton Road and the B660 Kimbolton Road through Pertenhall, but there would be no additional impact on the B645 through Staughton Highway and Great Staughton.

3.6.31 There would be a potential cumulative maximum of approximately 5.5 HGV deliveries (11 two-way HGV movements) per day along the B645 between the A1 and the Main Site Access in the event that replacement of battery components and transformers / inverters occurred concurrently with solar panel replacement. There would be no overlap between HGV deliveries to the Main Site Access and internal distribution trips from the storage, operations and maintenance building, since these movements would be travelling in opposite directions to and from the Main Site Access along the B645.

Sensitivity Scenario

3.6.32 As set out in the introduction, a sensitivity scenario involving the replacement of 100% of the panels within a single major replacement campaign has been assessed to provide a robust worst-case assessment. As explained in Section 2.0, although this scenario is considered very unlikely, it is appropriate to consider the effects of such a scenario on the local highway.

3.6.33 Based on the assumption that there would only be a maximum of five work crews deployed, in the event that 100% of panels were replaced within a single major replacement campaign the maximum number of panel delivery trips, using 18t rigid curtain-sided vehicles to distribute panels around the site from Site D as described above, would remain at 10 delivery trips per day (20 two-way movements), in addition to 5 staff trips (10 two-way movements) using vans/minibuses, assuming the use of a single vehicle per crew, to transport staff between the main site compound and the work site. The main impact would be an increase in the duration of the replacement activities.

3.6.34 Using five crews, the replacement of 100% of panels within Site A, accessed through Site Access SA01, would last for a total duration of 64 days. The replacement of 100% of panels within the western extent of Site B, accessed through Site Access SA02, would last for a total duration of 10 days. On this basis, the maximum percentage impact resulting from panel replacement delivery vehicles along Little Staughton Road and the B660 Kimbolton Road

through Pertenhall would therefore remain at 1%, as described in paragraph 3.6.19, with this level of impact extending for a maximum of 74 days.

3.6.35 To replace 100% of panels within the remainder of Site B, i.e. those parcels accessed through Site Accesses SA03 to SA10, would require a total duration of 166 days using five crews. The maximum percentage impact of panel replacement delivery vehicles along the B645 and Great Staughton Road through Great Staughton would therefore remain at 0.7%, as described in paragraph 3.6.19, with this level of impact lasting for a total of 240 days.

3.6.36 The replacement of 100% of panels within Site C would take a maximum of 46 days.

3.6.37 The total duration required to replace 100% of panels within Sites A, B and C using five crews would therefore be 286 days.

3.6.38 In addition to the above activity, a total of 44 days would be required to replace 100% of panels within Site D, although vehicle movements associated with these replacements would be internal to Site D, and would not impact on the public highway.

3.6.39 As described in paragraph 3.6.26, in addition to panel replacement works there would also be a need to replace centralised inverters and solar transformers within each of the site areas. As set out at 2.3.29 centralised inverters and solar transformers would be replaced in a staggered campaign and delivered on a just-in-time basis for on-site installation and therefore it is highly likely that there would only ever be one delivery per day of this type, and therefore a maximum of 1 HGV movement per day in each direction.

3.6.40 In the event that these replacements occurred concurrently with panel replacements, there would therefore be a cumulative maximum of 32 two-way vehicle movements per day. This level of cumulative impact would not change the forecast percentage impacts described above, and the additional trips associated with transformer / inverter replacements would only last for a maximum of 24 days along Little Staughton Road and the B660 Kimbolton

Road through Pertenhall, and for 76 days along Great Staughton Road east of the Zantra business park. All transformer / inverter replacement deliveries would be directed through Site C via Moor Road and would therefore not impact on Great Staughton.

3.6.41 A 100% replacement campaign would require a total of 1,098 bulk panel deliveries to the main site compound in Site D, using 16.5m articulated HGVs. When distributed across the total duration of the replacement campaign, this would result in approximately 3.5 delivery trips per day, on average (7 two-way movements), along the B645 between the A1 and Site Access SA16.

3.6.42 In the event that panel replacements occurred concurrently with replacements of solar transformers / inverters and battery storage units / battery transformers, this would result in a cumulative maximum trip generation of approximately 5.5 HGV deliveries (11 two-way HGV movements) per day, on average, along the B645.

3.6.43 Assuming that each member of the work crews for replacement activities would travel in individual vehicles to the main site compound in Site D, a 100% panel replacement campaign would therefore result in a total maximum daily trip generation of approximately 61 two-way vehicle movements per day along the B645. This level of traffic generation is significantly lower than the maximum level of construction traffic assessed in the ES and TA.

3.6.44 Other potential sources of traffic generation during replacement activities are considered briefly as follows:

- Delivery and removal of temporary plant / welfare equipment – plant or welfare equipment required to facilitate replacement activities would be delivered to each work site prior to the commencement of replacement activity, then relocated to the next work site as works proceed through the various site areas. This would only require a maximum of 1 or 2 vehicle movements per Site Area and would not therefore generate regular trips throughout the replacement programme.

- Return of redundant panels to Site D – All panels removed from site would be backloaded into the vehicles used to deliver new panels. As such, there would be no additional trips required to remove redundant panels.

- Onward collection from Site D for reuse, recycling or recovery – As with removing redundant panels from each individual site parcel, redundant panels would be collected and backloaded into the HGVs used to transport new panels to the storage area in Site D. As such, there would be no additional trips required to transport redundant panels for reuse, recycling or recovery.

- Additional supervisory or welfare staff – The supervision of work crews and provision of welfare support would be undertaken by the regular on-site maintenance staff. There would be no additional staff movements associated with these activities over and above the minimal level of traffic associated with day-to-day activities during the Operational Phase.

3.6.45 As such, additional traffic generation associated with these ancillary activities would be minimal and would not change the conclusions of the sensitivity test scenario presented above.

3.6.46 The sensitivity scenario would increase the total number of replacement movements and the period over which they could occur but would not increase the peak daily number of replacement crews or panel-distribution movements above the five-crew scenario assessed above. The increase in total traffic on the affected routes would remain low, and the works would be temporary, sequential and subject to the routing, timing, public-rights-of-way and traffic-management controls in the OEMP. The resulting traffic and transport effects would remain negligible or minor adverse and would not be significant in EIA terms.

3.6.47 As noted above, the sensitivity scenario of a 100% replacement campaign is not considered a likely scenario. Furthermore, notification to the relevant LPA of a major replacement campaign must be supported by a Major Replacement Campaign Method Statement and Environmental Review, which must assess

the effects of the campaign based on the prevailing conditions at the time of the replacement works and, where necessary, introduce additional controls and mitigation to ensure the works do not give rise to any materially new or materially different environmental effects compared to those identified in the ES. This could, for example, include a reduction or an increase in the number of crews operating within specific work areas.

3.7 Noise and Vibration

3.7.1 Noise impacts during the replacement phase are most likely to occur as a result of vehicle movements, the use of forklifts, telehandlers, hand tools, and general noise from removal/installation works. However, any noise impact would be significantly less than during the construction phase on account of the following factors:

- Activities with the highest noise levels, such as piling or excavation works, would not be necessary in a replacement phase.
- Works would be temporary and intermittent, and would quickly move around the site, preventing a continuous noise source occurring for an extended period of time in any part of the site.
- All works would be carried out on weekdays and during daytime working hours (other than in emergencies).

3.7.2 In addition to the above, and as set out within Table 5.6 of the **oOEMP [EN010141/DR/7.5],** the proposed management measures for maintenance and repair activities at the Site include the adoption of best practical measures that would be employed to control noise generation in accordance with BS5228 1:2009+A1:2014 (e.g. using equipment that is regularly maintained, where practicable use equipment fitted with silencers or acoustic hoods).

3.7.3 The Noise Assessment within ES Vol 1 Chapter 10 **[EN010141/DR/6.1]** concludes that the levels of noise, during the construction and operational phases would only result in a negligible to minor effect at all receptors and would not be significant. Given the absence of the most significant noise

generating activities in the replacement phase, the temporary and transient nature of the works and the implementation of appropriate mitigation measures, the effects would be much less than those assessed and on that basis, it is, therefore, not considered that likely significant noise effects would occur during a replacement phase.

3.7.4 There is potential for noise impacts associated with transport movements in a replacement phase which would use the public highway and travel through existing settlements. In this regard it has been established in Section 3.6 of this report (traffic and transport) and in Section 2.0 above that:

- In the assessed five-crew replacement scenario, including the major replacement campaign sensitivity scenario, there would only be a maximum of 20 two-way HGV movements per day.
- All works would and associated deliveries would be carried out in the daytime period and during weekdays.
- The roads in question are already used by large goods vehicles and large agricultural vehicles.
- The additional movements associated with the assessed five-crew replacement scenario, including the major replacement campaign sensitivity scenario, would represent only a negligible increase in traffic when set against existing movements, would be well within the limits of deviation that could reasonably be expected each day, well below any thresholds where significant adverse effects are likely to occur and would be temporary in nature.

3.7.5 In the 100% sensitivity scenario, the overall campaign would extend for a longer period than a campaign that involved the replacement of 20% or less panels, but the daily workforce, mobile plant and panel-distribution activity would remain limited by the assessed crew deployment i.e. a maximum of five crews. Works within the panel areas would progress sequentially, and therefore would not represent a continuous Scheme wide noise source at any

individual noise-sensitive receptor. Traffic noise on routes serving the Sites would remain within the assessed replacement parameters. No likely significant noise or vibration effects would therefore arise.

3.7.6 Whilst the Noise Assessment did not explicitly assess a replacement campaign within the operational phase, it did include a construction phase assessment of the additional noise effects that would occur on local routes were construction traffic to travel along them. It is based upon the worst-case assumption regarding construction traffic and assumes:

- Maximum HGV - Maximum HGV movements during a single month.
- Maximum Staff – Maximum staff movements during a single month.
- Average - The total number of construction traffic movements (HGV and staff) averaged over a 30-month construction period.

3.7.7 The assessment concluded that based upon each of these scenarios no significant adverse effects would occur due to the additional traffic on the local road network. As set out in Section 3.6 above, even assuming the worst-case vehicle movements in a 100% solar panel replacement phase they would fall well below those required in the main construction phase. As such, it can be concluded that the vehicle movements associated with a replacement campaign would not result in likely significant effects.

3.8 Air Quality

3.8.1 There would be limited potential for emissions from vehicles during a replacement phase, with the number of additional daily vehicle movements within a replacement phase expected to be 61 two-way movements under the maximum assessment scenario (see Section 3.6 above).

3.8.2 The Institute of Air Quality Management (IAQM) has set out screening criterion to determine if the change in vehicle movements necessitate more detailed air quality assessment. The IAQM thresholds for roads that are not within an Air Quality Management Area (AQMA) are +100 HGVs and +500

LDVs per day on the local highway network. The predicted movements for a 20% panel replacement are therefore well below the indicative IAQM thresholds for assessment. Thus, no further assessment of vehicle emissions is deemed necessary and the additional traffic that would be temporarily generated in a replacement campaign would not result in likely significant adverse impacts on local air quality.

3.8.3 The 100% sensitivity scenario would increase the total period over which replacement-related vehicle and plant emissions may occur but would not increase the assessed maximum daily emissions profile beyond the relevant crew and traffic parameters. As such the applicable IAQM screening criteria would not be exceeded.

3.8.4 In addition to the above, it is also not predicted that there is potential for significant fugitive release of dust. This is on account of the lack of any earthworks in the replacement phase, the use of existing / established access tracks and adherence to the mitigation measures set out within **the oOEMP [EN010141/DR/7.5].** The latter sets out best practice air quality controls for operational maintenance and periodic replacements, including dust suppression, internal speed limits, highway cleanliness and load securing.

3.9 Ground Conditions and Soil Quality

3.9.1 No piling, excavation for cable routes, earthworks, laying of foundations or track construction would be required during a replacement campaign. If any intrusive works were required, then focused ground investigation would be undertaken. The **oOEMP [EN010141/DR/7.5]** includes an Environmental Incident Management and Pollution Prevention Plan and an Unexpected Contamination Protocol to ensure appropriate response should contamination be encountered, this would also apply to any replacement campaign.

3.9.2 Controls for ground conditions and soil quality during the operational phase are secured by the **oOEMP [EN010141/DR/7.5]** and the **outline Soil Management Plan (oSMP) [EN010141/DR/7.9]**. As there is not expected to be any excavations, it is not anticipated there will be any impact on soil quality.

Nevertheless, the oSMP includes measures to be adopted during the operational phase in Section 5.2, implemented as part of the oOEMP. This includes measures to address any soil compaction from the use of machinery on site, specifically appropriate loosening of the soil using a winged tine subsoiler or deep ripper, and the area re-seeded.

3.9.3 Implementation of the measures set out in the oOEMP, in combination with the limited potential for ground disturbance during a replacement campaign, would ensure that replacement activities would not have the potential give rise to likely significant effects in relation to ground conditions and soil quality.

3.10 Socio Economics, Land Use and Tourism

3.10.1 The Applicant has set out in **Environmental Statement Volume 1 Chapter 14: Socio Economics, Land Use and Tourism [EN010141/DR/6.1]** the expectation that the Scheme would support approximately 20 gross direct full-time equivalent roles during the operational phase. These operational roles would include personnel involved in the routine inspection, maintenance, repair and replacement of Scheme components and would therefore provide part of the workforce required during a replacement campaign.

3.10.2 The number of personnel required for a replacement campaign would depend on its scale, duration and delivery programme. The sensitivity assessment considers the deployment of up to five replacement crews, comprising up to approximately 25 operatives, together with a limited number of supervisory, welfare, logistics and other support personnel where required. It is anticipated that the permanent operational workforce would support the delivery and management of the campaign, but that specialist replacement personnel may also be required temporarily in addition to the approximately 20 gross direct full-time equivalent operational roles assessed in the ES.

3.10.3 The temporary additional workforce associated with the 100% sensitivity scenario may generate a limited increase in demand for local accommodation, food, fuel and other services over the duration of the campaign. Given the relatively modest size of the workforce in the context of

the wider area, this would not be expected to result in any significant adverse socio-economic effect and may give rise to a small temporary beneficial effect through local employment and expenditure.

3.10.4 The outline **Public Rights of Way Management Plan (oPRoWMP) [EN010141/DR/7.8]** provides that any temporary closures or diversions of public rights of way required during the operational phase for maintenance or replacement activities would be agreed in advance with the relevant local authority. Where necessary to protect members of the public and site operatives, temporary signage, managed crossings, localised closures or diversions may be implemented along public rights of way and permissive paths.

3.10.5 Although the 100% sensitivity scenario would extend the overall duration of replacement activity across the Scheme, the works would progress sequentially through defined and localised work areas. Any temporary effect on an individual public right of way, permissive path, recreational receptor or nearby land use would therefore be materially shorter than the overall campaign programme.

3.10.6 **Environmental Statement Volume 1 Chapter 14: Socio Economics, Land Use and Tourism [EN010141/DR/6.1]** concluded that significant effects on tourism, recreation and public rights of way during the operational phase would be unlikely. Taking account of the temporary and sequential nature of the works, the limited workforce, the use of established access and operational infrastructure, and the controls secured through the OEMP and oPRoWMP, replacement activities, including the 100% sensitivity scenario, would not give rise to any new or materially different likely significant adverse effects in relation to socio-economics, land use or tourism.

3.11 Climate Change

3.11.1 The embodied carbon and carbon arising from logistics during a panel replacement campaign would be materially lower than during the initial

construction phase, because works would be limited to removing and refitting modules using the existing site infrastructure.

3.11.2 **ES: Volume 1 Chapter 15: Climate Change [EN010141/DR/6.1]** considers the greenhouse gas emissions from the operational phase, including the replacement of components. In this regard, Paragraph 15.5.4 states:

"The GHG emissions associated with the equipment (solar modules, transformers, inverters, batteries and fencing) has been factored into the replacement calculations within the operational stage of the GHG assessment. The emissions associated with replacement include those associated with the manufacture of the equipment, transport to the Scheme, and disposal and transport of waste materials (i.e. the swapped equipment). The replacement emissions due to the equipment life expectancy have been allocated to the year that each piece of equipment would be replaced based on the assumed life expectancy. The life expectancy of the equipment applied is conservative and is expected to be longer than applied. Therefore, the calculated GHG emissions associated with the replacement of equipment are conservative."

3.11.3 Further detail on how replacement activities have been assessed in relation to emissions is provided in the **ES Volume 2 Appendix 15-1 Greenhouse Gas Emissions Assessment [EN010141/DR/6.2]**.

3.11.4 The climate-related management measures set out in Table 5.11 of the **oOEMP [EN010141/DR/7.5]**, as well as the implementation of the waste hierarchy and the recycling provisions for panels, transformers and BESS components in Table 5.12 of the oOEMP would ensure that any carbon arising from a replacement campaign is minimised and materials are recovered as far as practically feasible.

3.11.5 For clarity, taking into account the need for replacement of panels, the **ES Volume 1 Chapter 15 [EN010141/DR/6.1]** concludes that the Scheme would have a significant beneficial effect on climate change.

3.11.6 The 100% sensitivity scenario would change the timing and concentration of panel-replacement emissions but would not increase the total quantity of panel-replacement equipment assumed within the lifetime GHG assessment, which includes a single replacement of each installed panel together with the stated contingency. Concentrating the works within a single campaign would therefore not alter the conclusion that the Scheme would have a significant beneficial effect in relation to climate change.

3.12 Waste

3.12.1 The replacement activities would give rise to waste PV modules, packaging, BESS units and other ancillary / associated elements of the Scheme. **The outline Waste Management Plan (oWMP) [EN010141/DR/7.12]** sets out the measures that are to manage waste during the operational phase and periodic replacements, including applying the waste hierarchy and segregation of streams of waste. End of life PV modules and BESS units would be dismantled and sent to specialist PV recycling facilities. This will be developed into a final WMP as secured by the **oOEMP [EN010141/DR/7.5]**.

3.12.2 In the Major Replacement Campaign sensitivity scenario, the works would result in a substantial quantity of replacement material within the campaign period. This would change the timing and annual concentration, but not the total lifetime quantity of panel replacement assessed in the ES. Removed panels would be returned progressively to the Operations and Maintenance Area and managed in accordance with the approved WMP.

3.12.3 The Major Replacement Campaign Method Statement and Environmental Review would identify the anticipated quantity and rate of waste generation, temporary storage capacity, collection frequency, vehicle movements and the arrangements for reuse, repair, refurbishment, recycling, recovery and, only where no practicable alternative is available, disposal. Replacement works would be undertaken in accordance with the approved WMP and the waste hierarchy.

3.12.4 Subject to these controls, the concentration of replacement waste within the sensitivity campaign would not result in a likely significant environmental effect.

3.13 Cumulative and In-Combination Effects

3.13.1 The potential for cumulative effects with other maintenance, repair, renewal or replacement activities undertaken within the Scheme during the same period has been considered in the assessments above. The maximum daily replacement parameters are not assumed to operate in isolation from other concurrent Scheme activities, and the Major Replacement Campaign Method Statement must identify any other maintenance or replacement works anticipated during the campaign.

3.13.2 The replacement scenarios considered in this Appendix, including the 100% sensitivity scenario, would not alter the inter-project cumulative-effect conclusions reported in ES Vol 1 Chapter 17. The works would take place within the operational Scheme, use established accesses and infrastructure and progress sequentially through localised work areas. Any actual Major Replacement Campaign would also be reviewed against material changes in the surrounding development context and relevant concurrent developments through the Environmental Review.

3.13.3 Subject to the OEMP controls and any additional measures identified through the Environmental Review, no likely significant cumulative or in-combination effects would arise.

4.0 CONCLUSION

4.1.1 Periodic repair, renewal and replacement of Scheme components are necessary to maintain the safe and efficient operation of the Scheme throughout its operational lifetime and to maximise the renewable energy that can be generated. Whilst replacement works, particularly Major Replacement Campaigns, have the potential to give rise to temporary environmental effects, this Appendix demonstrates that such activities can be undertaken within defined environmental parameters and appropriate management controls.

4.1.2 The appraisal provided in this Appendix establishes that replacement works, including a Major Replacement Campaign, would give rise only to temporary and reversible effects which would be localised at any one time as the works progress sequentially through the Scheme. It is concluded that the replacement works would therefore not result in any new or materially different likely significant environmental effects beyond those assessed in the ES. The sensitivity assessment of a Major Replacement Campaign involving replacement of 100% of the Scheme's solar panels demonstrates that, although the overall duration of replacement activities would increase, the maximum local and daily intensity of the works would remain within the assessed operational parameters.

4.1.3 The Applicant nevertheless recognises that any Major Replacement Campaign may occur many years after the Scheme becomes operational, during which time the environmental baseline, regulatory framework and surrounding development context may evolve. Accordingly, the oOEMP requires that, before any Major Replacement Campaign involving replacement of more than 20% of the Scheme's solar panels within a rolling 12-month period commences, a Major Replacement Campaign Method Statement and Environmental Review must be submitted to the relevant planning authority for approval. That submission will identify the management measures to be implemented, consistent with the principles of the approved construction environmental management, traffic management and public

rights of way management plans, and will demonstrate that the proposed campaign remains within the replacement parameters and environmental effects assessed in the ES, taking account of the prevailing baseline and any concurrent operational activities.

4.1.4 On this basis, the Applicant considers that the ES provides sufficient information to identify and assess the likely significant environmental effects of replacement works, including a Major Replacement Campaign involving replacement of up to 100% of the Scheme's solar panels. The controls secured through the DCO, including implementation of the OEMP pursuant to Requirement 9 and the other relevant DCO Requirements, ensure that replacement activities would remain within the environmental parameters assessed in the ES and would not give rise to any new or materially different likely significant environmental effects beyond those reported in the ES.