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Solar Park

Firewater Containment and Drainage Strategy – Lime Down Substation (Tracked)

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Schedule of Changes

Revision	Section Reference	Description of Changes	Reason for Revision
2	Paragraphs 5.2.1 and 5.2.3.	Update to confirm that an outline post-incident procedure will be prepared prior to operation.	Updates made at Deadline 3 of Examination in response to Environment Agency comments (EA-068) provided at Deadline 2.

Firewater Containment and Drainage Strategy – Lime Down Substation

Prepared by: [redacted]

For: Lime Down Solar Park Ltd

Site: Lime Down Solar Park

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Appendices

1. Introduction and Purpose

1.1 Purpose of this document

1.1.1 This Standalone Firewater Containment and Drainage Strategy defines the approach to the containment, isolation, management and disposal of firefighting water, suppression fluids, transformer oil and associated incident runoff arising at substation transformer plant and other equipment capable of giving rise to polluting discharges within the Substation Areas across the Scheme. Transformers are designed to contain transformer oil within the transformer unit itself. Where this containment fails, containment is provided at source through dedicated sealed bunded enclosures around such plant, with associated isolation arrangements, rather than within the wider Substation drainage system.

1.1.2 The document has been prepared to support the Development Consent Order application and has been developed following consultation with the Environment Agency, during which it was identified that there was potential for inconsistency between the **Flood Risk Assessment and Drainage Strategy appendices [APP-211 to APP-217], the Outline Operational Environmental Management Plan [APP-277]** and the wider application documents in respect of management of firewater and potentially contaminated runoff.

1.1.3 A standalone Firewater Containment and Drainage Strategy has therefore been prepared to provide a single, definitive point of reference for the approach to containment, ensuring consistency across application documents as the Examination progresses and documents are updated.

1.1.4 This document therefore provides a clear and coherent statement of the firewater management approach for the Substations, sitting alongside and supporting the wider hydrology, flood risk, drainage and safety documentation, while allowing those documents to remain concise and avoiding duplication or divergence in approach. A corresponding standalone Firewater Containment and Drainage Strategy has also been prepared for the Battery Energy Storage System at Lime Down D, providing consistency of approach across the Scheme's principal electrical infrastructure as described in ES Volume 1, Chapter 3: The Scheme **[APP-055].**

1.1.5 This Strategy should be read alongside:

- ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage **[APP-063];**
- ES Volume 3, Appendices 11-2 to 11-8: Flood Risk Assessment and Drainage Strategies **[APP-211 to APP-217];** and
- Outline Operational Environmental Management Plan **[APP-277].**

1.1.6 **The Flood Risk Assessment and Drainage Strategy appendices [APP-211 to APP-217]** define the routine drainage design and flood risk response for the relevant Substation Areas. The **Outline Operational Environmental Management Plan [APP-277]** defines the operational and emergency response framework. This document provides the linking strategy explaining how source containment within bunded enclosures, with associated isolation arrangements, prevents firefighting water, transformer oil and associated incident fluids from entering the wider Substation drainage system.

1.2 Document status and design approach

1.2.1 This Strategy is prepared at Development Consent Order stage and is therefore principle-led. It defines the design basis, performance requirements and operational logic for firewater management, rather than the detailed engineering design of bunded enclosures, isolation devices or drainage features.

1.2.2 Detailed design will be undertaken post-consent. However, that design will be required to demonstrate compliance with the principles and requirements set out in this document, including source containment within bunded plant areas, associated isolation arrangements and provision for post-incident management.

1.2.3 At this stage, the Strategy does not prescribe a fixed configuration. The detailed design may comprise individual bunded enclosures at the level of each transformer or other discrete item of pollution-risk plant, or grouped bunded areas serving multiple items of plant, provided that the overall performance requirements set out in this Strategy are met, including source containment of the defined design scenario. The detailed design may also include localised sump and pump-out arrangements within sealed bunded areas for the controlled management of rainfall retained within those bunds during normal operation.

1.3 Scheme context

1.3.1 The Substations form part of the wider Scheme described in **ES Volume 1, Chapter 3: The Scheme [APP-055]** and are located within Flood Zone 1 in accordance with the sequential approach set out in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [APP-063]**. This ensures that the Substations are not subject to fluvial flood risk and that the source-containment and isolation arrangements are not required to operate under concurrent fluvial inundation conditions.

1.3.2 The Substations introduce formal drainage systems, as defined in the relevant **Flood Risk Assessment and Drainage Strategy appendices [APP-211 to APP-217]**, which provide controlled drainage environments for routine surface water runoff. The source-containment and isolation arrangements described in this Strategy will be integrated with those drainage systems at detailed design stage.

2. Policy, Guidance and Design Basis

This section sets out the policy framework and technical guidance that inform the firewater management approach, together with the basis on which the design has been defined. It explains how relevant policy requirements translate into practical containment and operational measures for the Substations.

2.1 Planning and environmental protection policy

2.1.1 This subsection summarises the key planning and environmental protection requirements relevant to firewater, potentially contaminated runoff and drainage control, and explains how they inform the need for proportionate containment and control within the design.

National Planning Policy Framework (NPPF) [1]

2.1.2 The overarching policy position is that development must be safe for its lifetime, must not increase flood risk elsewhere, and must prevent unacceptable risks to the water environment. These requirements are reflected in **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [APP-063],** which confirms that both routine drainage and emergency scenarios must be considered within the design.

2.1.3 In the context of the Substations, this requires that credible sources of potentially contaminated runoff are identified and controlled at source, and that the routine drainage design does not introduce uncontrolled pathways to surface water or groundwater.

2.2 National policy for energy infrastructure

2.2.1 This subsection outlines the specific expectations for energy infrastructure and how these translate into embedded mitigation and incident management requirements.

National Policy Statements (NPS EN-1[2] and EN-5[3])

2.2.2 National Policy Statements for energy infrastructure require that applicants identify environmental risks associated with both construction and operation and demonstrate that those risks can be avoided, reduced or managed through embedded mitigation and design.

2.2.3 For substations, transformer oil release, firefighting water and potentially contaminated runoff are recognised as key operational considerations. The Strategy therefore forms part of the embedded mitigation for the Scheme, demonstrating that firewater and potentially contaminated runoff are treated as foreseeable operational considerations that have been allowed for from the outset.

2.2.4 The approach aligns with these policy expectations by embedding source containment, isolation and

[1] National Planning Policy Framework (December 2024)
[2] Overarching National Policy Statement for Energy (NPS EN-1) (January 2024)
[3] National Policy Statement for Electricity Networks Infrastructure (NPS EN-5) (January 2024)

post-incident management within the substation design rather than relying on reactive or temporary measures, or on the wider drainage system as the primary containment volume. This ensures that the Scheme is resilient to incident conditions and that environmental protection is maintained throughout its operational life.

2.3 Technical and industry guidance

2.3.1 This subsection identifies the key industry guidance that informs the design approach and explains how it has been applied to develop a proportionate and operationally realistic containment strategy.

<u>Power Industry and Fire Guidance</u>[4]

2.3.2 The firewater design basis has been informed by current industry guidance for high-voltage substations. This guidance reflects the established understanding of transformer fire behaviour, which typically involves contained oil fires requiring targeted suppression or foam application rather than the prolonged, high-volume external boundary cooling associated with other technologies.

2.3.3 This is important as it defines the likely duration, intensity and spatial extent of firefighting fluid application, allowing the Strategy to adopt a realistic and evidence-based design scenario rather than an overly conservative assumption of full-site involvement.

<u>CIRIA C753 SuDS Manual</u> [5]

2.3.4 The wider drainage design remains aligned with CIRIA C753, which underpins the surface water management approach across the Scheme and establishes the principles of conveyance, storage and controlled discharge that form the basis of the Substation drainage systems set out in **[APP-211 to APP-217].**

<u>CIRIA C736 Containment Systems for the Prevention of Pollution</u>[6]

2.3.5 CIRIA C736 has been considered in relation to containment of firewater and potentially contaminated runoff. The guidance promotes a risk-based approach and recognises that containment strategies should be proportionate to the nature of the site and the incident.

2.3.6 The Substations apply this risk-based approach through source containment within bunded enclosures with associated isolation arrangements, as set out in Section 4. The wider Substation drainage systems set out in **[APP-211 to APP-217]** are not relied upon as the firewater containment volume.

2.3.7 The Strategy adopts an approach combining source containment and isolation during the incident with active post-incident management, which aligns with the intent of CIRIA C736 while avoiding

[4] Electricity substation fire and design guidance (established UK power industry practice for transformer fire protection and bunding design)
[5] CIRIA C753: The SuDS Manual (2015, updated 2020)
[6] CIRIA C736: Containment Systems for the Prevention of Pollution (2009)

disproportionate over-design.

2.4 Relationship to application documents

2.4.1 This Strategy is intended to sit alongside the wider application documents relevant to drainage, flood risk and safety. The documents identified below each perform a distinct role within the submission, and this standalone Strategy should be read as the document that draws those roles together in the specific context of firewater containment and post-incident water management for the Substations.

Appendices 11-2 to 11-8: Flood Risk Assessment and Drainage Strategy [APP-211 to APP-217]

2.4.2 These appendices establish the routine drainage framework for the Substations, including the use of attenuation storage, controlled discharge and the wider drainage envelope for the relevant platforms. Those documents demonstrate that the drainage systems have sufficient capacity to manage design rainfall events for the Substation Areas.

2.4.3 This standalone Strategy does not replace those documents and should not be read as redefining the routine drainage design. Instead, it explains how source containment within bunded enclosures, with associated isolation arrangements, protects those drainage systems from contamination during an incident, as set out in Section 4.

Outline Operational Environmental Management Plan [APP-277]

2.4.4 The **Outline Operational Environmental Management Plan [APP-277]** establishes the operational and emergency response framework for the Substations, including pollution prevention measures, drainage maintenance, post-incident management principles and reporting routes. It confirms that retained firewater will be subject to inspection, testing and controlled disposal.

2.4.5 This Strategy supports the **Outline Operational Environmental Management Plan [APP-277]** by providing the substation containment and drainage narrative that sits beneath those operational commitments. In particular, it explains how source containment and isolation prevent uncontrolled releases and how retained fluids are managed following an incident.

ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [APP-063]

2.4.6 **ES Volume 1, Chapter 11: Hydrology, Flood Risk and Drainage [APP-063]** provides the overarching assessment of hydrology, flood risk and drainage effects for the Scheme as a whole. It identifies the relevant receptors, the principal flood risk considerations and the wider drainage and environmental protection framework that the Scheme must satisfy.

2.4.7 This Strategy is a supporting document to that chapter and should be read as the more focused explanation of how one specific aspect of the drainage and environmental protection strategy, namely containment of firewater and potentially contaminated runoff for the Substations, will be achieved in practice. Read together, these documents provide a coherent description of both routine and incident drainage performance for the Substation Areas.

3. Fire Scenario and Firewater Design Basis

This section defines the credible incident scenario used to establish the firewater management requirements and demonstrates how the design basis has been derived in a proportionate and evidence-led manner.

3.1 Assessment approach

3.1.1 This subsection explains the methodology used to define the design scenario and to ensure that the resulting containment approach is both credible and proportionate.

3.1.2 The firewater strategy is based on defining a credible and proportionate design scenario and ensuring that the source containment and isolation arrangements are capable of managing that scenario without giving rise to uncontrolled discharge or environmental harm.

3.1.3 The approach distinguishes clearly between the design basis scenario, which is used to size and define the source containment, and extreme or hypothetical scenarios, which are not used to define drainage infrastructure but are instead managed through operational procedures and emergency response.

3.1.4 This distinction is important to ensure that the design remains proportionate and aligned with real-world operational conditions, while still providing a robust level of environmental protection.

3.2 Credible design scenario

3.2.1 The credible design scenarios adopted for the Substations comprise a localised fire affecting a single main transformer unit, requiring emergency service attendance and the application of targeted firefighting water or foam, occurring concurrently with a 1 in 10 year rainfall event; and failure of transformer oil containment without fire, where oil detection or equivalent alarm/control arrangements within the bunded enclosure trigger isolation so that released oil is retained at source.

3.2.2 These scenarios are considered to provide an appropriate credible design basis for the containment and firewater management strategy. The fire scenario reflects current power industry understanding of substation incidents, where fires are typically contained within individual transformer compounds and are not expected to propagate across the wider installation. The non-fire oil release scenario ensures that the Strategy also addresses failure of the transformer tank or other oil-containing equipment where firefighting water is not generated, but containment and isolation are still required. The design basis is therefore a localised, source-containable event rather than a whole-site drainage system failure.

3.2.3 The rainfall component is included to ensure that the source containment arrangements can manage the combined fluid load arising from a realistic incident occurring during wet weather conditions, comprising transformer oil release, applied firefighting fluids and concurrent rainfall falling within the bunded area, rather than considering firefighting fluid volumes in isolation.

3.2.4 The use of a 1 in 10 year rainfall event as the concurrent rainfall allowance provides a robust but proportionate basis for design. It represents a credible rainfall condition that could reasonably coincide with an incident and ensures that the source containment is not based on dry-weather assumptions. At the same time, it avoids adopting an unduly onerous approach based on highly extreme or remote combinations of fire and exceptional rainfall that would not provide a proportionate basis for this stage of design.

3.2.5 The scenarios therefore assume that the relevant fire detection, oil detection or equivalent alarm/control system activates, that the affected bunded area and any associated drainage route are isolated from the wider drainage system, and that resulting fluids are retained within the bunded enclosure pending post-incident management. In the fire scenario, this includes applied firefighting fluids. In the non-fire oil release scenario, this includes released transformer oil and any rainfall retained within the bunded area.

3.2.6 By adopting this scenario, the Strategy ensures that the source containment is designed for a realistic, defensible and examination-ready event basis, while avoiding reliance on overly conservative assumptions that would not materially improve environmental outcomes.

3.3 Firewater volume basis

3.3.1 Firefighting water demand for substations is driven by targeted suppression of a localised transformer fire rather than high-volume boundary cooling. The principal fluid volume requirement is dictated by the need to contain, within the bunded transformer enclosure, the full insulating oil capacity of the largest single transformer unit, alongside the applied firefighting medium and concurrent rainfall falling on the bunded area.

3.3.2 The approach to containment is therefore defined on the basis of the credible design scenario set out in Section 3.2. This establishes a robust and defensible basis for defining source-containment requirements at this stage, without relying on detailed design assumptions.

3.3.3 Bunds will be sized at the detailed design stage in accordance with relevant good practice, taking account of the equipment inventory, applied firefighting fluids, rainfall allowance, freeboard, inspection requirements and maintenance access.

3.3.4 The wider Substation drainage systems set out in [**APP-211 to APP-217]** continue to manage routine surface water runoff and are not relied upon as the firewater containment volume.

3.3.5 Accordingly, containment performance is governed by the integrity of the bunded enclosures, the reliability of the isolation arrangements serving those enclosures and any associated drainage outlets, and the timeliness of post-incident recovery, rather than by the storage capacity of the wider drainage network.

3.4 Rainfall during the incident

3.4.1 Rainfall occurring during a fire event is explicitly accounted for within the credible design scenario set out in Section 3.2. The bunded enclosure around the affected transformer is therefore required to accommodate the combined loading of insulating oil, firefighting fluids and rainfall falling on the bunded area, with appropriate freeboard, without reliance on discharge to the wider drainage system.

3.4.2 Rainfall falling on the wider Substation Areas during an incident continues to be managed by the routine drainage strategy set out in **[APP-211 to APP-217]**. Rainfall falling within the bunded area, or within any associated localised drainage feature serving the affected plant, is treated as potentially contaminated water and managed in accordance with the post-incident management arrangements set out in Section 5.2.

3.4.3 This demonstrates that rainfall is fully addressed within the design while preserving the function of the wider Substation drainage system as a routine surface water network rather than a firewater containment reservoir.

3.5 Relationship to CIRIA C736

3.5.1 The containment approach set out in this Strategy has been developed to align with the principles of CIRIA C736, which promotes a risk-based and proportionate approach to pollution containment.

3.5.2 The adopted design scenario, comprising a localised transformer fire combined with a 1 in 10 year rainfall event, represents a credible and defensible basis for defining containment requirements. Within this context, the Strategy combines source containment, local isolation and active post-incident management.

3.5.3 This hybrid approach is consistent with the intent of CIRIA C736. It ensures that pollution pathways are effectively controlled at source during the incident while avoiding unnecessary over-design of whole-site storage that would not materially improve environmental protection.

3.5.4 Accordingly, the Strategy demonstrates compliance with CIRIA C736 through a proportionate and operationally realistic source-containment solution.

4. Firewater Containment and Drainage Strategy

This section sets out how the source-containment, isolation and active management arrangements operate under incident conditions to retain firewater and potentially contaminated runoff at source, including the physical features, isolation measures and operational controls that together prevent any uncontrolled release.

4.1 Overall containment philosophy

4.1.1 The containment strategy is based on oil-filled transformers containing transformer oil within the transformer unit in normal operation, with dedicated sealed bunded enclosures around transformers and other substation plant providing containment where that unit containment fails. The bunded enclosures and associated localised drainage features will retain firefighting water, transformer oil and associated incident fluids at source and will be capable of isolation from the wider Substation drainage system during an incident.

4.1.2 During normal operation, the Substation drainage systems set out in **[APP-211 to APP-217]** collect, convey and attenuate surface water runoff before controlled discharge. During an incident, the affected bunded area will be isolated from the wider drainage system through appropriate shut-off arrangements, ensuring that firewater and potentially contaminated runoff are retained within the bunded enclosure.

4.1.3 This approach embeds firewater management within the plant areas where the pollution risk arises, rather than relying on the wider drainage network as the containment volume.

4.2 Design principles

4.2.1 The firewater containment strategy is defined by the following principles:

- Oil-filled transformers will contain transformer oil within the transformer unit in normal operation. Where that containment fails, transformer oil, firefighting water and associated incident fluids will be retained at source within dedicated sealed bunded enclosures and associated localised drainage features, with no uncontrolled discharge. Oil-water interceptors, where provided, will form part of the bunded or localised drainage arrangements rather than the transformer unit itself.
- Containment is provided through dedicated transformer bunds, and equivalent bunded enclosures around other substation plant capable of giving rise to polluting discharges, designed in accordance with good industry practice and the containment principles of CIRIA C736.
- Bunded areas, and any localised drainage outlet serving those bunded areas where provided, will be capable of automatic isolation during an incident through shut-off arrangements linked to fire detection, oil detection or equivalent alarm/control systems. Isolation arrangements will be designed to operate on a fail-safe basis, with backup manual operation capability, and will be confirmed at detailed design stage. Where valves are used, they will be designed to provide reliable shut-off in accordance with BS EN 12266-1 Leakage Rate A, or equivalent.
- Isolation arrangements are targeted at the bunded plant areas rather than the whole Substation drainage system, with the final configuration confirmed at detailed design stage.

- The bunded enclosure accommodates the full oil inventory, applied firefighting fluids and concurrent rainfall falling within the bunded area, with appropriate freeboard.
- The wider Substation drainage systems set out in **[APP-211 to APP-217]** continue to manage routine surface water runoff and are protected from contamination through the source-containment and isolation arrangements; they are not relied upon as the firewater containment volume.
- The design does not rely on infiltration or uncontrolled overflow during incident conditions.
- Sealed bunded areas may include localised low-point sump and pump-out arrangements for routine management of rainfall retained within the bund, with the detailed arrangement confirmed at detailed design stage.
- Retained fluids within bunded areas are subject to inspection and testing prior to disposal.
- Provision is made for active management of retained fluids, including tanker removal where required.

4.2.2 These principles define the functional requirements of the firewater containment strategy and provide a clear framework for detailed design.

4.3 Isolation and shut-off arrangements

4.3.1 Isolation of the affected bunded area, and any drainage outlet serving that bunded area, will be achieved through automatic shut-off arrangements linked to the fire detection oil detection or equivalent alarm system, as confirmed at detailed design stage and supported by the operational procedures set out in the **Outline Operational Environmental Management Plan [APP-277].**

4.3.2 These arrangements ensure that the transition from normal operation to a contained state occurs automatically and reliably at the onset of an incident, with backup manual operation capability retained for resilience and operational control. Isolation is targeted at the relevant bunded area rather than the whole Substation drainage system, preventing uncontrolled discharge of polluting fluids to the wider drainage network or the receiving environment, and ensuring that all incident fluids are retained at source.

4.3.3 Detailed design will specify isolation arrangements appropriate to the relevant bunded area and drainage interface. Where valves or shut-off devices are used, they will be designed to provide reliable shut-off under incident conditions, with seat tightness demonstrated in accordance with BS EN 12266-1 Leakage Rate A, or equivalent, such that no visually detectable leakage occurs. This requirement supports the overall containment objective of preventing any uncontrolled release of firewater or potentially contaminated runoff from the bunded area.

4.3.4 Isolation valves will be designed to operate on a fail-safe basis, such that in the event of power loss, system fault or damage during an incident, the default position is closed to maintain containment. Backup manual operation capability will be provided so that the system can be operated manually where required. Detailed design will confirm the control philosophy, power supply requirements, backup manual operation arrangements and testing regime.

4.3.5 Detailed design will also ensure that any isolation systems are robust, maintainable and capable of being tested regularly to confirm their functionality.

4.4 Containment within bunded areas and associated localised drainage features

4.4.1 Oil-filled transformers are designed to contain transformer oil within the transformer unit itself. Where this containment fails, containment is achieved within the dedicated sealed bunded enclosures serving the transformers and other plant capable of giving rise to polluting discharges, together with any associated localised drainage features, which provide a controlled pathway for the collection, retention and management of incident fluids.

4.4.2 The bunded enclosure functions as the secondary contained volume where containment within the transformer unit or other oil-containing plant fails. It will be isolated from the wider drainage system through the shut-off arrangements described in Section 4.3.

4.4.3 The relevant drainage strategies set out in **[APP-211 to APP-217]** demonstrate that workable and robust drainage systems are available at this stage of design for routine surface water management within the Substation Areas. This Strategy does not redefine those drainage systems as the firewater containment volume. Instead, it confirms that detailed design will integrate source containment within bunded areas with the wider drainage design, so that uncontrolled pollution pathways from the bunded plant areas to the wider drainage system or the receiving environment are avoided.

4.4.4 Bund volumes, freeboard and any associated localised drainage controls will be confirmed at detailed design stage in accordance with CIRIA C736 and relevant good practice, taking account of the credible design scenario set out in Section 3.2.

4.4.5 Detailed design will incorporate appropriate containment measures within the bunded areas to prevent the migration, leakage or infiltration of potential contaminants to ground. Measures will include designed impermeability through structural bund construction and may include use of impermeable lining, sealed joints, inspection access and localised sump and pump-out arrangements for routine management of rainfall retained within sealed bunds. The Strategy does not prescribe specific materials or configurations at this stage, allowing flexibility in detailed design while maintaining the requirement for a controlled and contained system.

4.5 Active management and recovery

4.5.1 This Strategy incorporates provision for active management of retained fluids following an incident. This includes the ability to remove fluids from the bunded enclosure and any associated localised drainage features using tanker extraction.

4.5.2 This approach ensures that retained water and potentially contaminated runoff can be managed in a timely manner and do not need to be stored on site for extended periods. It also allows flexibility in response, enabling retained water to be removed where contamination is present, or released in a controlled manner where inspection and testing confirm this is appropriate.

4.5.3 The inclusion of active management is a key component of the overall containment strategy and ensures alignment with both operational practice and regulatory expectations.

5. Operational Management, Residual Risk and Conclusions

This section describes how the systems are operated during and after an incident, how retained fluids are managed, and how residual risks are controlled, before setting out the overall conclusions of the Strategy. These measures will be secured through the **Outline Operational Environmental Management Plan [APP-277]**.

5.1 Operational behaviour

5.1.1 This subsection sets out how the systems behave during normal operation and how they respond when an incident occurs, providing the basis for the subsequent management steps.

5.1.2 During normal operation, the Substation drainage systems function as part of the wider surface water management system set out in **[APP-211 to APP-217]**, conveying and attenuating routine runoff before controlled discharge. Rainfall retained within sealed bunded areas may be managed through localised sump and pump-out arrangements, where included at detailed design stage.

5.1.3 During an incident, the affected bunded area and any associated drainage outlet will be isolated in accordance with the detailed design and the procedures set out in the **Outline Operational Environmental Management Plan [APP-277].** The wider Substation drainage system continues to manage routine surface water runoff falling outside the affected bunded area.

5.1.4 Following the incident, the bunded area remains isolated from the wider drainage system until retained fluids have been assessed and an appropriate management route has been implemented.

5.2 Post-incident management

5.2.1 ~~Retained water within the bunded area following an incident will be subject to inspection and, where required, testing to determine its suitability for discharge, including appropriate sampling and analysis in accordance with an agreed~~An outline post-incident management procedure~~.~~ for retained firewater and potentially contaminated runoff will be prepared prior to operation and secured through the detailed Operational Environmental Management Plan (OEMP). The procedure will address inspection, sampling, testing, temporary storage, treatment where required, tankering or controlled disposal, and any permitting or regulatory approval requirements for retained firewater and associated incident fluids. Retained fluids will remain contained within the affected bunded area, associated localised drainage feature, or other suitable temporary storage until the appropriate management route has been confirmed. Where water quality is acceptable, retained water may be released in a controlled manner subject to the relevant environmental permit, regulatory approval or agreement with the relevant regulator, including the Environment Agency where ~~a~~ discharge to the water environment is proposed, or the sewerage undertaker where discharge to foul sewer is considered~~, with further~~. Further operational detail will be set out in the detailed ~~Operational Environmental Management Plan~~OEMP, which will be prepared in accordance with the **Outline ~~Operational Environmental Management Plan~~OEMP [~~APP-277~~REP2-021]** and secured under Requirement 14 of the **Draft DCO [REP1-007]**.

5.2.2 Given the substation context, contamination from transformer oil is a credible pollution risk. Where contamination is identified, retained water will be classified and removed from site by tanker in accordance with the duty of care requirements, for treatment or disposal at an appropriately permitted facility. The management route will be agreed with the relevant regulator as necessary, based on the nature and extent of contamination.

5.2.3 This approach ensures that no contaminated water is discharged uncontrolled, that regulatory oversight is embedded within the decision-making process, and that a clear and practical pathway is provided for managing retained volumes following an incident. The post-incident management procedure will be maintained as an operational control and reviewed as required following any incident, exercise, regulatory feedback or material change to the substation containment or drainage design.

5.3 Residual risk

5.3.1 Residual risks include the occurrence of a fire event itself, non-fire release of transformer oil, failure of isolation mechanisms, breach of the bunded enclosure, blockage within drainage pathways, or events exceeding the adopted design scenario. The credible design scenario adopted within this Strategy, namely a localised transformer fire occurring concurrently with a 1 in 10 year rainfall event, is itself a residual risk scenario in the sense that it represents a foreseeable but abnormal incident condition for which the source-containment and isolation arrangements must be resilient.

5.3.2 However, the Strategy significantly reduces the consequences of that residual risk through the use of source containment within bunded enclosures, isolation arrangements, available containment capacity within the bunded area, and active post-incident management procedures. The location of the Substations in Flood Zone 1 further reduces the likelihood of compound risk arising from concurrent fluvial flooding, such that the principal residual risk requiring management is the combined fire and rainfall scenario for which this Strategy has been specifically developed.

5.3.3 Overall, while the occurrence of a fire incident remains a residual risk, the associated firewater and potentially contaminated runoff risk is considered capable of being managed appropriately through detailed design and operational controls.

5.4 Maintenance, inspection and management

5.4.1 The performance of the firewater containment system is dependent on the ongoing integrity and operability of the bunded enclosures, isolation devices and associated control systems. A maintenance and inspection regime will therefore be implemented to ensure that the system remains fully functional throughout the operational life of the Substations. This regime will be integrated with the wider maintenance of the Substation drainage systems so that the firewater containment function is maintained as part of the overall drainage performance over their lifetime, in accordance with the **Outline Operational Environmental Management Plan [APP-277].**

5.4.2 Maintenance requirements will be defined at detailed design stage in accordance with the specific components selected, including bunds, isolation valves, control systems and any associated localised drainage features. These requirements will be aligned with manufacturer specifications and industry best practice, ensuring that all elements of the system are maintained in accordance with their intended performance criteria.

5.4.3 The maintenance regime is expected to include routine inspection of bunded enclosures and any associated localised drainage features to confirm integrity and that they remain free from blockage, together with periodic testing of any isolation valves or control systems specified at detailed design stage. Inspection frequencies and testing procedures will be proportionate to the criticality of each component and informed by manufacturer guidance.

5.4.4 Records of inspection, maintenance and testing will be maintained as part of the operational management system for the Substations, providing a clear audit trail demonstrating that the containment system remains operational and capable of performing its intended function.

5.4.5 The maintenance strategy will be treated as a live document, implemented through the **Outline Operational Environmental Management Plan [APP-277]**, and will be reviewed and updated as necessary throughout the operational life of the Scheme, reflecting operational experience, updates to guidance, and any changes to system components or configuration. In this way, firewater containment performance will be maintained through the same long-term management framework that governs the wider drainage systems.

5.5 Conclusions

5.5.1 This Strategy demonstrates that the management of firewater and potentially contaminated runoff for the Lime Down Substations has been considered in a robust and proportionate manner. A credible design scenario has been defined, and source containment within bunded enclosures, supported by isolation arrangements and active post-incident management, will be designed to retain firewater and potentially contaminated runoff without uncontrolled discharge to the wider Substation drainage system or the receiving environment.

5.5.2 The approach integrates with the **Flood Risk Assessment and Drainage Strategy appendices [APP-211 to APP-217]** and the **Outline Operational Environmental Management Plan [APP-277]**, ensuring a consistent and coordinated response to fire incidents.

5.5.3 The Strategy avoids unnecessary over-design while ensuring protection of surface water and groundwater receptors and provides a clear framework for detailed design.

5.5.4 Accordingly, the containment of firewater and potentially contaminated runoff strategy is considered appropriate for the Development Consent Order stage and capable of being secured through detailed design.

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- Established UK power industry guidance for high-voltage substation transformer fire protection and bunding design.

Appendices

Appendix A- Limitations

Limitations

This report contains recommendations from Arthian, which are based on the information listed in the report and reflect the professional opinions of an experienced Environmental Consultant. Arthian obtained, reviewed, and evaluated information from the Client and others to prepare this report. The conclusions, opinions, and recommendations presented in this report are based on this information. However, Arthian does not guarantee the accuracy of the information provided and will not be held responsible for any opinions or conclusions reached based on information that is later proven to be inaccurate.

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