Mallard Pass
Solar Farm

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Outline Water Management Plan

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1.0 Introduction

1.1. Purpose of Document

1.1.1. This document sets out the measures required during construction and operation of the Proposed Development to adequately protect water resources.

1.1.2. This oWMP covers construction and operational phases of the Proposed Development. The decommissioning phase is unlikely to involve any additional risks not covered by construction phase as the construction activities are considered to be a worst-case scenario for potential decommissioning activities. Nevertheless, the principles and measures outlined within this oWMP will be revised once details of decommissioning activities are known and feed into the ***Decommission Environmental Management Plan (DEMP)*** **[EN010127/APP/7.8]** that will be prepared on the basis of the outline DEMP produced as part of the DCO Application.

1.1.3. Detailed proposals for such measures will be documented prior to construction within a WMP which this document will inform and it will provide the same or greater protection for the environment as those described in this document. The WMP will be prepared for the Proposed Development in accordance with a Requirement of the DCO prior to construction, following the appointment of a principal construction contractor, and in accordance with this oWMP.

1.1.4. The measures are proportionate to the risk and, where greater risk is highlighted at specific locations, specific measures would be agreed with the relevant stakeholders for those locations prior to construction.

1.1.5. The appointed construction contractor will be responsible for working in accordance with the environmental controls documented in this oWMP pursuant to the DCO. The overall responsibility for implementation of the WMP will lie with the appointed contractor as a contractual responsibility to

the Applicant, as the Applicant is ultimately responsible for compliance with the Requirements of the DCO.

1.2. The Order limits

1.2.1. The Order limits are described in ***Chapter 3: Description of Order limits***, of the ES **[EN010127/APP/6.1].**

1.2.2. They comprise the Solar PV Site, Mitigation and Enhancement Areas, Highway Works Site and the Grid Connection Corridor.

1.3. The Proposed Development

1.3.1. The Proposed Development is described in ***Chapter 5: Project Description*** of the ES.

1.4. Legislation

1.4.1. This oWMP is based on and seeks to ensure the Proposed Development's compliance with the following legislation by ensuring that mitigation measures are in place to avoid adverse effects on water resources and flood risk:

a. Water Framework Directive (2000/60/EC) as implemented in England via the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;

b. The Groundwater Directive (GWD) (2006/118/EC) as implemented by the Groundwater (Water Framework Directive) (England) Direction 2016;

c. The Groundwater Daughter Directive to WFD (2006/118/EC) as implemented Environmental Permitting (England and Wales) Regulations 2016;

d. The Bathing Water Directive (2006/7/EC) as implemented by the Bathing Water Regulations 2013;

e. Flood and Water Management Act 2010; and

f. Land Drainage Act 1991.

1.5. Guidance

1.5.1. The methods set out in this oWMP are based on good practice, including measures agreed with the Environment Agency (EA) for several constructed solar farms and the following guidance:

a. The Construction Industry Research and Information Association (CIRIA), 'Environmental Good Practice on Site (C741)' (2015) **[Ref 1]**

b. CIRIA, 'Control of Water Pollution from Construction Sites (C532)' (2001) **[Ref 2]**; and

c. CIRIA, 'The Sustainable Drainage System SuDS Manual (C753)' (2015) **[Ref 3]**

1.5.2. Relevant guidance and best practice documents are subsequently provided in the relevant sections of this report.

1.6. Potential Sources of Pollution

1.6.1. The identified potential sources of pollution as a result of the construction and operational phases of the Proposed Development, are as follows:

a. Direct disturbance of banks and bed of rivers and ditches;

b. De-watering of excavations;

c. Runoff from exposed ground and material stockpiles;

d. Runoff from roads and haul routes and river crossings;

e. Runoff from plant washings / washing areas;

f. Fuel and chemical storage/ refuelling areas; and

g. Leaking / vandalised equipment.

1.7. Scoped Out Measures

1.7.1. The measures relating to the following receptors have been scoped out of the oWMP based on the findings of the Water Resources and Ground Conditions Chapter 11:

a. Statutory Designated Sites within the wider study area (5km) not hydrologically connected to the Proposed Development, as outlined in Table 11.4 of ***Chapter 11: Water Resources and Ground Conditions*** of the ES;

b. Private Water Supplies (PWS) (defined in Section 11.2 of ***Chapter 11: Water Resources and Ground Conditions*** of the ES) not hydrologically connected to the Proposed Development, as outlined in Table 11.2 of ***Chapter 11: Water Resources and Ground Conditions*** of the ES; and

c. Public water supplies which have been scoped out as the abstractions are outside the 2km buffer of the Order limits as detailed in ***Chapter 11: Water Resources and Ground Conditions*** of the ES; and

d. Anglian Water (AW) confirmed there are no abstractions in the area that may be affected by the Proposed Development.

1.8. Schedule of Mitigation

1.8.1. Embedded mitigation measures are incorporated into the assessment of significance of effects for hydrology and hydrogeology. A summary of the mitigation measures proposed in ***Chapter 11: Water Resources and Ground Conditions*** of the ES are outlined in Table 1-1.

Table 1-1 Summary of Mitigation Measures

Environmental Effect	Mitigation Measure	Type of Mitigation: Avoidance, Reduction, Compensation, Remediation, Enhancement	Delivery method
Water Resources and Ground Conditions			
Chemical Pollution during construction from spillage of contaminants	Best practice measures will include appropriate storage of chemicals and oil, regular vehicle checks and onsite speed limits. Spill kits will be located across the Order limits and in plant and vehicles with emergency procedures implemented for a spillage incident.	Avoidance Reduction Remediation	Secured by the oWMP and ***outline Construction Environmental Management Plan*** **[EN010127/APP/7.6]**.
Erosion and Sedimentation from construction site runoff	Best practice measures will include a wet weather working policy and installation of measures such as silt fencing, silt traps, check dams and settlement lagoons.	Avoidance Reduction	Secured by the oWMP and ***oCEMP***.

Environmental Effect	Mitigation Measure	Type of Mitigation: Avoidance, Reduction, Compensation, Remediation, Enhancement	Delivery method
Impediments to flow from watercourse crossings	Installation of bottomless arched culverts at watercourse crossings, where required.	Avoidance Reduction	Secured by the ***oWMP*** and ***oCEMP***.
Soil interflow during construction	Best practice dewatering mitigation measures. Drainage designed to maintain hydrological connectivity between areas.	Avoidance Reduction	Secured by the ***oWMP*** and ***oCEMP***.
Increase in runoff and flood risk during construction and operation	SuDS are a legal requirement. These will include pre-earthworks drainage to serve hardstanding areas e.g., cut-off ditches, swales and retention ponds. Earthworks drainage e.g. drainage ditches, sumps and culverts. Discharge of water will be controlled to a rate agreed with the Lead Local Flood Authority (LLFA).	Avoidance Reduction	Secured by the ***outline Surface Water Drainage Strategy*** in ***Appendix 11.6*** of ES **[EN010127/APP/6.3]** Appropriate training on installation of mitigation.

Environmental Effect	Mitigation Measure	Type of Mitigation: Avoidance, Reduction, Compensation, Remediation, Enhancement	Delivery method
	Dripline planting will be implemented underneath the PV Arrays to limit the potential for channelisation and riling.		
Compaction of Soil (Construction)	Measures such as avoiding tracking over soils when too wet are detailed in the ***outline Soil Management Plan (oSMP)*** **[EN010127/APP/7.12]**.	Avoidance	Secured by the ***oSMP***.
Migration of Pollutants from Contaminated Land (Construction)	Procedures and measures detailed in the ***oCEMP*** and ***oWMP*** detail how pollutant migration will be avoided.	Avoidance	Secured by the ***oCEMP*** and ***oWMP.***
Changes in quality or quantity of supply (Construction)	None.	Avoidance	Impacts on Private and Public Water Supplies is assessed as Negligible.

Environmental Effect	Mitigation Measure	Type of Mitigation: Avoidance, Reduction, Compensation, Remediation, Enhancement	Delivery method
Increased run-off rates with associated erosion and sedimentation (Operation)	The ***outline Surface Water Drainage Strategy*** sets out how surface water will be managed to limit run-off rates. This includes mitigation measures such as regular maintenance of drains.	Avoidance	Secured by the ***outline Surface Water Drainage Strategy***.
Alteration to natural flow pathways (Operation)	Planting and drip lines beneath PV Arrays will prevent channelization leading to changes in flow pathways	Avoidance	Secured by the ***oLEMP***.
Risk of a pollution event from minor spills from maintenance vehicles (Operation)	The appointed contractor will have procedures in place for spills from maintenance vehicles and plant during the operation. Procedures will be based on best practice guidance and will be similar to spill response measures	Avoidance	Secured by the ***oWMP.***

2.0 Management and Mitigation Plan

2.1. Overview

2.1.1. This section details the outline mitigation measures to be carried out during the construction and operational phase of the Proposed Development to minimise potential adverse effects on the water environment. The mitigation measures are detailed within the following topics in this section:

a. Environmental Clerk of Works;

b. The Management of Sediment and Surface Waters;

c. Management and Movement of Fresh Concrete;

d. Other Pollution Prevention Measures;

e. Management of Surface Water;

f. Handling of Mineral Soils;

g. Materials Management; and

h. Other Waste Materials.

2.2. Environmental Clerk of Works (ECoW) During Construction

2.2.1. An Environmental Clerk of Works (ECoW) will be appointed for the construction period (commencement of development to final commissioning or end of construction period). The ECoW will hold an advisory role. In relation to the water environment, the scope of the ECoW role will include:

a. Monitoring compliance with the mitigation outlined in Table 1-1 (to be detailed further in the WMP prior to construction commencing) and other relevant documentation such as the Pollution Prevention Plan (PPP) which is secured by the ***oCEMP***;

b. Routine monitoring of water pollution prevention measures, such as silt management measures, and inspection following storm events;

c. Routine visual inspection and observation of watercourses for the presence of silt, discolouration and hydrocarbons; and

d. Implementation/intervention of remedial actions where required.

2.3. The Management of Sediment and Surface Waters During Construction

2.3.1. This section addresses the management of sediment and surface water runoff generated during the construction phase of the Proposed Development, through good practice construction techniques. The WMP will provide further detail on these measures when more information on the construction activities becomes available.

2.3.2. Major construction works (e.g. large-scale earthworks) will be minimised during heavy precipitation events to avoid excessive run off of soil into watercourses. The particular construction activities and the thresholds for heavy precipitation events will be set out in the WMP.

2.3.3. Minimum buffer zone distances of 6m from drainage ditches and 10m from main watercourses will be observed for all infrastructure (with the exception of cable crossings, culverts and access tracks) and drainage ditches onsite, as secured through the ***Design Guidance*** as set out in the Design and access Statement **[EN010127/APP/7.3]**.

2.3.4. Stockpiles will be stored outside of Flood Zones 2 and 3 to avoid sedimentation of watercourses during a flood event.

2.3.5. Drainage from the Order limits will include elements of Sustainable Drainage Systems (SuDS) design where appropriate. The details on SuDs design is set out in the ***outline Surface Water Drainage Strategy***

provided in ***Appendix 11.6*** of the ES. SuDS replicate natural drainage patterns and have a number of benefits:

a. SuDS will attenuate runoff, thus reducing peak flow and any flooding issues that might arise downstream;

b. SuDS will treat runoff, which can reduce sediment and pollutant volumes in runoff before discharging back into natural drainage network; and

c. SuDS measures, such as lagoons or retention ponds, correctly implemented will produce suitable environments for wildlife.

Location of Silt Traps and Silt Matting

2.3.6. Silt traps should be utilised to trap and filter sediment-laden runoff from excavation works at the Order limits, including foundations for the proposed compounds and access tracks. Details about these traps and their locations will be set out in the WMP.

2.3.7. Good practice will be followed prior to placement of silt traps adjacent to watercourses and land drains. Good practice measures will be in line with those detailed within industry standard guidance such as the 'CIRIA Control of water pollution from construction sites: Guidance for consultants and contractors (C532) and typically involve management of vegetation, minimising the stripping of soils and where possible establishing new vegetation on base ground at the earliest opportunity. Silt matting may be placed at the outfall of settlement lagoons to filter sediment during times of heavy rainfall.

2.3.8. The silt traps and silt matting will be monitored daily by the ECoW and replaced when the material is unfit for purpose.

2.3.9. Plates 1, 2 and 3 display typical silt fencing, silt traps and silt matting.

The Management of Sediment and Surface Waters During Operation

2.3.10. Drainage measures during the operational phase of the Proposed Development will be managed and maintained by the appointed operator through a maintenance programme set out in the WMP secured by this oWMP. Drainage maintenance measures will be conducted through an inspection process to confirm any appropriate maintenance measures which typically involve the removing of debris from attenuation and flow structures, management of vegetation and maintenance of outflow points.

Plate 1: Typical silt fencing

Plate 2: Typical silt traps

Plate 3: Typical silt mat to be placed at lagoon outfalls

Location of Check Dams

2.3.11. Check dams will be installed within drainage ditches at regular intervals, where appropriate. Check dams will facilitate the settlement of suspended solids by slowing the flow of water within the drainage ditches. Appropriately sized stone pitching will be used within the dam in order to provide a rough surface for water within the drainage ditch to pass over.

2.3.12. Plate 4 of this document displays a typical check dam.

Plate 4: Typical check dams – to be installed in drainage ditches adjacent to roads

Location of Settlement Lagoons

2.3.13. Settlement lagoons will be implemented, where appropriate, at the Primary Construction Compound as shown in ***Figure 5.12: Indicative location of Primary and Secondary Temporary Construction Compounds*** in the ES Figures **[EN010127/APP/6.3].**

2.3.14. Settlement lagoons will not be sited within Mitigation and Enhancement Areas identified on the ***Figure 3.1: Extents of the Order limits, Solar PV Site, Mitigation and Enhancement Areas and Potential Highway Works*** in the ES.

2.3.15. All settlement lagoons will be actively managed by the principal construction contractor and monitoring conducted by the ECoW to control water levels and ensure that any runoff is contained, especially during times of rainfall. In the event that the lagoons are at risk of overflowing, excess water will be pumped into temporary storage containers. If required to achieve the necessary quality of the final run-off, further measures may include the use of flocculents (chemicals used to cause fine particles clump together into a larger and heavier particles to increase the settlement rate) to further facilitate the settlement of suspended solids. The siting of the storage containers will be set out in the WMP.

2.3.16. Plate 5 of this document displays a typical settlement lagoon and flocculent station.

Plate 5: Typical lagoon and flocculent station

Outflow Monitoring from Settlement Lagoons

2.3.17. Settlement lagoon outflow will be regularly inspected by the principal contractor and monitored by the ECoW. Discharge may be pumped when required for maintenance purposes. The pumping activities and their supervision / authorisation will be set out in the CEMP and WMP.

2.3.18. Treated water will be discharged onto vegetated ground within the Solar PV Site and directed away from surface watercourses. Within all catchments, irrigation techniques, which may include the use of perforated discharge hoses, or similar, will be employed to rapidly distribute discharge across a vegetated area. This will be carried out in consultation with the ECoW.

2.3.19. 'Siltbusters' (equipment used to reduce suspended solids in water) will be used to treat pumped/surplus water from lagoons during periods of heavy or persistent rainfall.

2.3.20. Silt mats may be used at the outfalls of settlement lagoons to further aid the settlement from earthworks drainage.

2.3.21. Plate 6 of this document displays typical pumping operations.

Plate 6: Typical 'Siltbuster' and settlement lagoon

Provision for Storm Events

2.3.22. In extreme storm events there would be elevated levels of runoff from the hardstanding elements of the Proposed Development relative to greenfield flow rates, which has the potential to contribute to down-stream, offsite, flood risk. The elements of the Proposed Development which will create additional impermeable areas are limited to the Ancillary Buildings, Inverters, Onsite Substation and Transformers which accumulate to a negligible area relative to the Order limits and the wider Welland and Glens catchments (approximately less than 1%).

2.3.23. In the baseline scenario, the water table is not at the ground surface, and hence some infiltration would be expected. The Proposed Development could raise the water table (e.g. through pumping / dewatering of excavations), and therefore infiltration would reduce. Notwithstanding this, measures are proposed that would reduce runoff rates further.

2.3.24. Temporary storage volume for storm runoff from the foundations and hardstanding areas would be provided via settlement lagoons.

2.3.25. Along the access tracks, drainage channels on the down-slope would shed track runoff to adjacent rough ground approximately every 30m, to attenuate flow and allow natural filtration to remove sediments.

2.3.26. Appropriate licensing and discharge consents will be sought before commencement of the construction phase. The exact licenses required are to be confirmed during the DCO process depending on permitting requirements and will typically include the following (where applicable and where not obtained through the DCO itself):

d. Environment Agency Flood Risk Activity Permit;

e. Lead Local Flood Authority Ordinary Watercourse Consent; and

f. Internal Drainage Board Consent.

Foul Drainage

2.3.27. The Onsite Substation building may house a toilet facility and hand basin for visiting maintenance staff during the operational phase. Should this facility be required, rainwater will be collected from the roof of the building via a gutter and inlet pipe to fill a rainwater harvesting tank.

2.3.28. Effluent and waste from onsite personnel will be treated at a package sewage treatment plant or a septic tank and will be discharged into a drainage field, in accordance with Pollution Prevention Guidelines (PPG) 4 'Treatment and disposal of wastewater where there is no connection to the public foul sewer' (2017). The system shall be approved by the Environment Agency prior to construction.

2.3.29. During the construction phase, portable toilet facilities, or equivalent, will be used and emptied by a waste contractor, avoiding the need for onsite

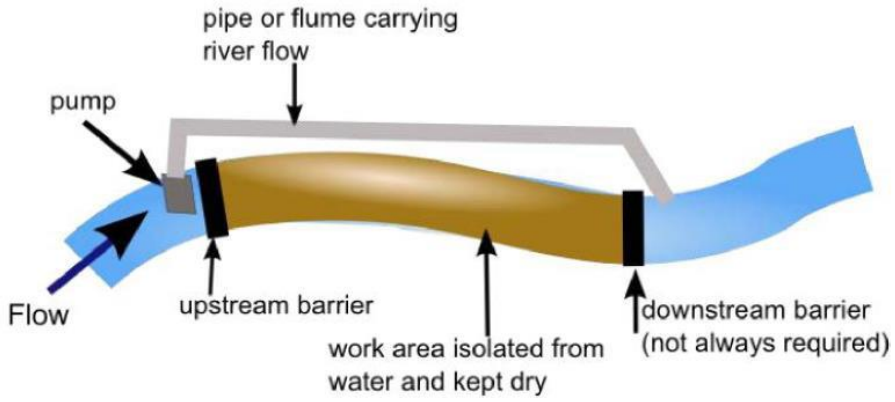
treatment and discharge, therefore minimising potential effects on drainage ditches and watercourses.

Drainage Ditch Diversion

2.3.30. Drainage ditches passing through the Order limits may require diversion to ensure hydrological continuity while culverts are installed to carry internal access roads.

2.3.31. If required, the section of the drainage ditch will be isolated using barriers that span the full width of the watercourse. This keeps a stretch of the ditch dry and the water is transferred downstream of the works area by mechanical assistance (pumping), until the works have been completed and the crossing is operational. The pump and associated pipework need not be located in the isolated area, as shown in Plate 7.

Plate 7: Typical over pumping arrangement



2.3.32. It may be necessary to pump water from upstream of the barrier to downstream of the works area, i.e., maintain 'normal' flow in the watercourse either side of the isolated reach.

2.3.33. Depending on the gradient of the watercourse, it may also be necessary to install a full width barrier downstream of the work area to prevent ingress of water, as shown in Plate 8.

Plate 8: Full isolation - over pumping/siphon

2.3.34. Pumps will be kept at least 10m from the edge of the channel and on drip trays or within bunds that have a capacity of 110% of that of the fuel tank in accordance with DEFRA Oil storage regulations **[Ref 4]** to avoid a fuel leak contaminating the ground or nearby water courses. In the event of a leak, the pump would be replaced/repaired and any fuel in the drip tray/bund would be put into an Intermediate Bulk Container and removed from the Order limits.

2.4. The Management and Movement of Fresh Concrete

2.4.1. If concrete is to be batched onsite it will be in a bunded compound and the following management measures are proposed. Methods to protect surface and groundwater from batching and transportation of concrete are considered below.

Accidental Spillage within Construction Compounds

2.4.2. The construction compounds will have a bunded area and this area will be underlain by an impermeable ground membrane layer. The bund will have a 110% capacity to attenuate stored liquids (including fresh concrete). This will reduce the potential for accidental spillages to contaminate surface water or groundwater.

2.4.3. Best practice guidance (see Section 1.5) on the prevention of spillages of chemical outlines the following measures:

a. Areas where transfer and handling of chemicals is to occur will have an impermeable surface;

b. Drainage systems onsite will be designed to enable the containment of spillages and appropriate disposal and treatment;

c. Emergency procedures are implemented for a spillage incident and leak detection measures (if appropriate);

d. Regular maintenance and inspection of chemical storage facilities to be conducted by the principal contractor (and monitored by the ECoW); and

e. Provision and training in the use of spill kits, as outlined below.

2.4.4. An appropriately sized spill kit(s) will be provided and maintained in the construction compound. This will contain materials, such as absorbent granules and pads, absorbent booms and collection bags. These are

designed to halt the spread of spillages and will deployed, as necessary, should a spillage occur elsewhere within the construction compound.

Accidental Spillage Outside Construction Compound

2.4.5. Speed limits for vehicles transporting fresh concrete will be set at a maximum of 15 miles per hour (mph) and will be continually monitored by the principal contractor. Maximum vehicle load capacities will not be exceeded and enforced by the principal contractor. Although tracks will be maintained in good condition by the principal contractor, vehicle loads and/or speeds will be reduced when a rougher surface is identified prior to track maintenance. Details of maintenance activities will be provided in the CEMP

2.4.6. Spill kits will also be located at strategic points across the Order limits where fresh concrete may be present, as displayed in Plate 9. Prior to concrete laying the ECoW will check to ensure kits are present and in an appropriate condition.

Plate 9: Spill Kits

2.4.7. All maintenance and operation of machinery, and use of chemicals and oils in the Order limits, will be conducted on suitable absorbent spill pads to minimise the potential for groundwater and surface water pollution. All machinery will be equipped with drip trays to contain minor fuel spillage or equipment leakages.

2.4.8. Appointed refuelling personnel will be trained in the correct methods of refuelling in the Order limits to ensure that pollution incidents are prevented and a quick response plan is implemented, should a spill occur, to minimise the impact of spills. Toolbox talks will be carried out by the ECoW to personnel onsite on the risks of chemical and oil spillages and the procedures in place to handle these.

2.4.9. Daily vehicle and machinery maintenance will be conducted to ensure that there is minimal potential for fuel or oil leaks / spillages to occur.

2.4.10. Concrete, cement and grouts which are batched and transported onsite will be subject to the requirements outlined in **Paragraph 2.4.21.** To comply with best practice, concrete, cement and grout mixing and washing areas should:

a. Be sited in an impermeable hardstanding or geotextile within a designated area;

b. Be sited at least 10m from any watercourse or surface water drain, rock outcrop or sinkhole;

c. Install settlement and re-circulation systems for water re-use in the batching process to minimise water use, treatment requirements and risk of pollution;

d. Designated and contained washing areas for batching plant and vehicles; and

e. Collect contaminated wash waters which cannot be reused and tanker off-site. Contaminated water should never be released to the water environment.

Vehicle Washing

2.4.11. There will be a wash-out facility within the Primary Construction Compound identified on the ***Figure 5.12: Indicative location of Primary and Secondary Temporary Construction Compounds*** in the ES, consisting of a sump overlain with an impermeable geosynthetic membrane. The geosynthetic membrane will filter out the concrete fines leaving liquid water to pass through to the sump. The sump water will be pumped to a licenced carrier and taken offsite for approved disposal.

2.4.12. No washing of concrete-associated vehicles will be undertaken outside the wash-out facilities, and the area will be signposted, with all contractors informed of the locations.

2.4.13. The frequency of concrete plant wash-out may also be reduced through the use of retarders. Plate 10 displays a typical concrete wash-out facility.

Plate 10: Typical concrete wash-out facility

2.4.14. Dry wheel wash facilities, as shown in Plate 11, and road sweepers will be provided at the Accesses to the Solar PV Site to prevent, as far as is practicable, mud and debris being carried from within the Order limits onto the public road.

2.4.15. Signage will be put in place to direct all vehicles to use wheel wash facilities. The track section between the wash facility and the public road will be surfaced with tarmac or clean hardcore and the area surrounding the facilities will be kept clean and in good condition.

2.4.16. The wheel wash facility, which will work on a closed cycle, shall be operated throughout the construction period. Wheel wash facilities will be located within a designated area of hardstanding at least 50m from the nearest watercourse or 20m from the nearest surface drain. It is expected that these facilities shall be sited adjacent to the Primary Construction Compound.

2.4.17. The principal contractor will check if debris has spread onto the Accesses to the Solar PV Site or adjacent public road, then road sweepers will be quickly utilised to clean affected areas. The ECoW will monitor to ensure this is managed in a timely manner. Loose debris will also be periodically removed from onsite tracks by the principal contractor. All heavy goods vehicles (HGVs) taking construction materials to and from the Order limits will be sheeted to prevent the spillage or deposit of material on the highway.

Plate 11: Example of a dry ramp wheel wash facility

Concrete Pouring for Foundations

2.4.18. Methods to protect surface and groundwater from the batching and transportation of concrete have already been above.

2.4.19. To prevent pollution, concrete pours will be planned and that specific procedures are adopted where there may be a risk of surface water or groundwater contamination, in accordance with CIRIA C532 'Control of water pollution from construction sites' (2001). These procedures will include:

a. Ensuring that all excavations are sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. However, construction good practice will be followed to ensure that fresh concrete is isolated from the dewatering system; and

b. Ensuring that covers are available for freshly placed concrete to avoid the surface of the concrete washing away during heavy precipitation.

2.4.20. The excavated area will be back-filled with compacted layers of graded material from the original excavation, where this is suitable, and capped with soil. Locally, around the foundations, the finished surface will be capped with crushed aggregate to allow for safe personnel access. The management of runoff from these areas is described in Section: The Management of Sediment and Surface Waters of this oWMP.

Concrete Batching

2.4.21. If required, concrete will be batched onsite and will be located at the Primary Construction Compound. The plant will be located 50m away from surface water drainage features and will be in a contained area with a separate drainage system. A settlement and recirculation system for water reuse will be implemented and the washing out of mixing plant will be carried out in a contained area.

2.4.22. Wash water and surface runoff from this area will be adequately treated to deal with suspended solids and high alkalinity before discharge. Lined settlement ponds will be used to prevent infiltration of alkaline runoff in the soils and watercourses. Consultation will be carried out with the EA to ensure any licensing requirements for discharge consents are secured prior to construction as per the ***oCEMP***.

Other Pollution Prevention Measures

Vehicle Maintenance

Potential Hydrocarbon Contamination

2.4.23. During construction, machinery will be regularly maintained to ensure that there is minimal potential for fuel or oil leaks / spillages to occur. All maintenance will be conducted on suitable absorbent spill pads to minimise the potential for groundwater and surface water pollution. All machinery will be equipped with drip pans to contain minor fuel spillage or equipment leakages.

2.4.24. Appointed refuelling personnel will be trained in the correct methods of refuelling onsite to ensure that pollution incidents are prevented and a quick response plan is implemented should a spill occur, to minimise the impact of spills.

2.4.25. Fuel delivery vehicles servicing the Proposed Development will only be allowed as far as the Primary Construction Compound. The Primary Construction Compound will include a bunded refuelling area, and operations will only be permitted where they comply with the Contractor's method statement/ requirements.

2.4.26. Fuel pipes on plant, outlets at fuel tanks, etc., will be checked daily and maintained to ensure that no drips or leaks to ground occur. The following precautions will also be installed on fuel delivery pipes:

a. Any flexible pipe, tap or valve must be fitted with a lock where it leaves the container and be locked when not in use;

b. Flexible delivery pipes must be fitted with manually operated pumps or a valve at the delivery end that closes automatically when not in use;

c. The pump or valve must have a lock and be locked when not in use;

d. Warning notices including "*No smoking*" and "*Close valves when not in use*" shall also be displayed; and

e. Spill kits will be available within each plant/vehicle and also be located close to identified pollution sources or sensitive receptors (fuel storage areas, water course crossings, etc).

2.4.27. Irrespective of the buffer distances to watercourses and location of refuelling points, interceptor drip trays or similar (open metal drip trays are not acceptable) will be available in accordance with standard good practice across the construction industry. Interceptor drip trays will be positioned under any stationary mobile plant to prevent oil contamination of the ground surface or water. Plant and onsite vehicles are to be well maintained such that they are not leaking fluids. Where leaks are identified they must be repaired or removed from Order limits immediately. Any servicing operations shall take place over drip trays.

2.4.28. Plate 12 displays examples of drip pans and bunds.

Plate 12: Examples of drip trays and bunds

Non-Road Mobile Machinery

2.4.29. Recommended mitigation measures in relation to Non-Road Mobile Machinery (NRMM) are detailed below:

a. All NRMM should use fuel equivalent to ultra-low sulphur diesel (fuel meeting the specification within EN590:2004 'Automotive fuels. Diesel. Requirements and test methods');

b. All NRMM should comply with either the current or previous EU Directive Staged Emission Standards (97/68/EC, 2002/88/EC, 2004/26/EC). As new emission standards are introduced the acceptable standards will be updated to the most current standard;

c. All NRMM should be fitted with Diesel Particulate Filters conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting).

d. The on-going conformity of plant retrofitted with Diesel Particulate Filters, to a defined performance standard, should be ensured through a programme of onsite checks;

e. Implementation of energy conservation measures including instructions to throttle down or switch off idle construction equipment; switch off the engines of trucks while they are waiting to access the Order limits and while they are being loaded or unloaded; and ensure equipment is properly maintained to ensure efficient energy consumption.

Chemical Storage

2.4.30. Potentially contaminating chemicals stored in the Order limits will be kept within a secure bunded area to prevent any accidental spills from affecting hydrological resources. The bunded area will be within the Primary Construction Compound will be underlain by an impermeable ground

membrane layer to reduce the potential pathways for contaminants to enter watercourses and groundwater.

2.4.31. Oil storage areas will be covered in order to prevent rainwater collecting within the bunded area.

2.4.32. Further detail is presented in Section: Accidental Spillage within Construction Compounds of this WMP.

2.4.33. The chemicals and oil storage area would be kept secure to prevent theft or vandalism. A safe system for accessing the storage area would be implemented by the principal contractor.

Management of Drainage from Surplus Materials

2.4.34. Careful consideration will be given to the location of topsoil and subsoil storage areas for all areas of the Order limits during construction. Storage areas will be either in a flat dry area away from watercourses, or be protected by the addition of cut off drains above the storage areas to minimise the ingress of water.

2.4.35. Mineral soils will not be allowed to dry out and silt fences and mats will be employed to minimise sediment levels in runoff.

2.4.36. All stockpiled material will be stored at least 50m from drainage ditches in order to reduce the potential from sediment to be transferred into the wider surface water system and will be regularly inspected to ensure that erosion of the material is not taking place.

Dust Suppression and Control

2.4.37. Water needed for dust suppression on the haul roads during periods of dry weather and the compound vehicle wash will be clean water. Clean water may be obtained from re-circulated clean or treated drainage waters.

2.4.38. Where required, water may be extracted from local watercourses or groundwater. In these instances, the principal contractor will liaise with the EA beforehand to agree abstraction locations, rates and licencing requirements as per the oCEMP.

2.4.39. Good practice measures secured through the oCEMP will be adopted during construction to control the generation and dispersion of dust such that significant impacts on neighbouring habitats will not occur (see Table 3-6 in the ***oCEMP***). The hierarchy for mitigation will be prevention, suppression then containment.

2.4.40. The following mitigation measures will be implemented to control the movement of dust within the Order limits:

a. Excavation and earthworks areas will be stripped as required in order to minimise exposed areas;

b. During excavation works, drop heights from buckets will be minimised to control the fall of materials reducing dust escape;

c. Completed earthworks and other exposed areas will be covered with topsoil and revegetated as soon as it is practical in order to stabilise surfaces;

d. During stockpiling of loose materials, stockpiles shall exist for the shortest practicable time;

e. Material stockpiles will be low mounds without steep sides or sharp changes in shape;

f. Material stockpiles will be located 50m away from sensitive receptors, watercourses and surface drains;

g. Material stockpiles will be sited to account for the predominant wind direction and the location of sensitive receptors;

h. Water bowsers will be available onsite and utilised for dust suppression during roadworks/ vehicle movements when and where required;

i. Daily visual inspections will be undertaken to assess need for use of water bowsers, with increased frequency when activities with high potential to generate dust are carried out during prolonged dry or windy conditions;

j. Shielding of dust-generating activities;

k. Use of enclosed chutes, conveyors and covered skips;

l. Covering vehicles carrying dry spoil and other wastes to prevent escape of materials;

m. Provision of wheel washing and wet suppression during loading of wagons/vehicles; and

n. Daily visual inspections will be undertaken to assess the condition of the junction of the Order limits track and its approaches.

Access Track Construction

2.4.41. Prior to access track construction in the Order limits operatives will identify flush areas, depressions or zones which may concentrate water flow. These sections may be spanned with plastic pipes if required to ensure hydraulic conductivity under the road, and reduce water flow over the road surface during heavy precipitation. Drainage design will be produced in advance of construction.

2.5. Management of Surface Water

2.5.1. Access Tracks will be designed to have adequate cross fall to avoid ponding of rainwater and surface runoff. Runoff from the Access Tracks will be directed into swales that will be designed to intercept, filtrate and convey the runoff.

2.5.2. Check dams will be installed within the swales in order to increase the attenuation of runoff.

2.5.3. Permanent swales and drainage ditches adjacent to Access Tracks will have outlets at specified intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion. Further measures include the use of settlement ponds or possibly flocculent to further facilitate the settlement of suspended solids, if required.

2.5.4. The contractor would be responsible for the management of all surface water runoff, including the detailed design and management of a drainage scheme compliant with SuDS principles. This may include settlement lagoons and retention ponds, incorporating natural or assisted attenuation.

Loose Track Material

2.5.5. Loose material from the use of the Access Track will be prevented from entering watercourses by utilising the following measures:

a. Silt fences will be erected between areas at risk of erosion and drainage ditches;

b. Silt fences and swales will be inspected daily and cleaned out as required to ensure their continued effectiveness;

c. Silt matting if required will be checked daily and replaced as required;

d. Excess silt will be disposed of in designated areas at least 50m away from any watercourses or drainage ditches;

e. Swales and drains will be checked after periods of heavy precipitation;

f. The inlets and outlets of settlement lagoons, retention basins and extended detention basins will be checked on a daily basis for blockages; and

g. The access tracks will be inspected on a daily basis for areas where water collects and ponds.

2.5.6. An example of semi-permeable geotextile layer is shown in Plate 13.

Plate 13: Semi-permeable geotextile layer

Material Excavated During Access Track Construction

2.5.7. Material excavated during Access Track construction will be either be stored adjacent to the track or within agreed spoil deposition areas and compacted in order to limit instability and erosion potential (see ***outline Excavation Material Management Plan*** **[EN010127/APP/7.12]).** Silt fences will be employed if required to minimise sediment levels in run-off.

2.5.8. Material will be stored at least 50m from watercourses and drainage ditches in order to reduce the potential from sediment to be transferred into the wider hydrological system.

2.5.9. Typical overburden stockpile measures are shown in Plate 14.

Plate 14: Typical overburden stockpile measures

Watercourse/Drainage Ditch Crossings

2.5.10. The use of in-situ fresh concrete in the construction of watercourse crossings will be avoided by the use of pre-cast elements. Existing culverts may be upgraded and are anticipated to be replaced with suitable pre-cast culvert designs. Ready-made concrete 'box style' culverts will be used. Existing culverts requiring an upgrade will be replaced using ready-made culverts.

2.5.11. Culverts will be designed based on best practice in order to minimise effects of construction on the natural integrity and continuity of watercourses. The design will incorporate the following criteria, as appropriate:

a. Culverts will be well bedded to avoid settlement and protected by an adequate cover of road material;

b. The substrate and side/ head walls will be reinforced in order to prevent erosion;

c. The culverts will be designed such that they do not cause a barrier to movement of fish or other aquatic fauna;

d. Culvert floors will have the same gradient (not exceeding a slope of 3 %) and level, and carry similar bed material and flow, as the original stream;

e. There shall be no hydraulic drop at the culvert inlet or outlet;

f. The width of the culvert will be greater than the active channel width of the watercourse;

g. Culverts will be used to conduct water under the Access Tracks;

h. Any fences or screens fitted on the inlet or outlet of the culvert will be designed to allow at least 230mm of space between the bars of the screen of fence, up to the high water level;

i. There is a preference to avoid construction in watercourses altogether through the use box culverts or bridges structures appropriately designed not to impede the flow of water and allow safe passage for wildlife. However, short and long-term impact of designs should be considered;

j. When installing culverts, care will be taken to ensure that the construction does not pose a permanent obstruction to migrating species of fish, or riparian mammals (i.e. the crossings will make provision for fish and wildlife migration);

k. Culverts should be sized so that they do not interfere with the bed of the stream post construction, (i.e. the crossings will leave the watercourse in as natural condition as possible or permit reestablishment of substrate post construction);

l. Single culverts will be used in preference to a series of smaller culverts that may be more likely to become blocked with flotsam and create erosion (i.e. the crossings will not constrict the channel);

m. If any fish are found during the construction of any culverts they will be removed from the immediate construction site to a place of safety if deemed necessary after consultation with the relevant fisheries interest;

n. To minimise impacts on breeding of any fish found, then any in-stream works in these areas will be, where possible, conducted during months which have less impact on their breeding and development;

o. Ease and speed of construction are important to minimise disruption to the watercourse and surrounding habitat;

p. Culverts and headwalls should be designed for the life of the Proposed Development;

q. Box culverts on watercourses where such structures are considered appropriate will likely be concrete. Inverts will be located below bed level reflecting ecological requirements;

r. A natural stone headwall will be provided upstream and downstream of culverts to protect the road embankment. Further protection will be provided to the banks using soft engineering techniques as much as possible;

s. Where there is risk of bed erosion upstream or downstream of culverts, natural stone riprap will be provided;

t. Designs should be low maintenance and where possible self-cleaning; and

u. Structures should be visually in keeping with the surroundings.

2.5.12. Each watercourse crossing shall be designed by the principal contractor on a case by case basis to be appropriate for the width of watercourse being crossed, and the prevailing ecological and hydrological situation (i.e., the sensitivity of the watercourse). The details will be set out in the WMP.

2.5.13. A number of factors, both environmental and engineering will influence the selection of structure type and the design of the crossing.

2.5.14. If the diversion of a minor section of drainage ditch is considered necessary (in proximity to the compound) the Internal Drainage Board (IDB), the Environment Agency and the ECoW would be consulted.

Structural Design

2.5.15. The structural design of watercourse crossings will take into account:

a. Design loading (taking into account different delivery vehicles);

b. Bearing capacity;

c. Potential for short and long-term settlement;

d. Environmental conditions; and

e. Flood risk.

2.5.16. All structures will be designed in accordance with the Design Manual for Roads and Bridges (DMRB).

2.5.17. Box culverts on watercourses where such structures are considered appropriate as they will likely be concrete. Inverts will be located below bed level reflecting ecological requirements.

2.5.18. A natural stone headwall will be provided upstream and downstream of culverts to protect the road embankment. Further protection will be provided to the banks using soft engineering techniques as much as possible.

2.5.19. Where there is risk of bed erosion upstream or downstream of culverts, natural stone riprap will be provided.

Temporary Trackways

2.5.20. The predominant purpose of temporary roadways (track matting) is to provide a transport route for the construction of the heaviest items such as transformers and their foundations.

2.5.21. The mats provide a much larger surface area for the tracks of the transport vehicles, reducing the risk of rutting that could lead to soil erosion and runoff, particularly during wet weather. Other, lighter items such as PV Modules, Inverters and Mounting Structures have a reduced risk of causing rutting during transportation, with similar impacts to those caused by agricultural vehicles in the existing arable baseline.

2.5.22. If, at any time during construction, the ECoW identifies that heavily trafficked areas of the Order limits are at risk of rutting within 10m of a watercourse, then they will instruct that temporary track matting is deployed in that area to prevent rutting before it occurs.

2.6. Handling of Mineral Soils

General Good Practice Measures

2.6.1. The excavation of foundations will generate excess material, the majority of which will typically be topsoil and subsoil.

2.6.2. For excavations, topsoil will be stripped separately to sub soils, where possible aiming to keep the top layer of turf intact. This material will be stored adjacent to the base working area and will be limited in height to 2m to minimise the risk of overheating. Subsoil will then be stripped and stored, keeping this material separate from the topsoil in accordance with guidance by the Environment Agency.

2.6.3. In accordance with BS 3882 ‘Specification for Topsoil and Requirements for Use’, any long term (temporary) stockpiling of topsoil should not exceed 2m in height with a maximum side slope of 1 in 2. In its dry non

plastic state, topsoil can be stockpiled in a ‘loose tipped’ manner and tracked using a compactive method reducing water ingress. Wetter soils can be stored in windrows for drying and later stockpiled for re-use. Further information can be found within the ***oSMP***.

2.7. Materials Management

2.7.1. An ***Outline Excavated Material Management Plan (oEMMP)*** has been produced as part of the DCO Application to support the ***Outline Soil Management Plan (oSMP)***. The ***oEMMP*** sets out the outline measures to manage the import, export and reuse of material generated onsite in accordance with the Contaminated Land: Applications in Real Environments (CL:AIRE) Definition of Waste: Development Industry Code of Practice (version 2) **[Ref 5]**.

2.8. Other Waste Materials

2.8.1. Waste timber, metal, general waste, etc, will be segregated in the Order limits and then disposed offsite in a licenced waste facility.

3.0 Monitoring and Reporting

3.1. Monitoring Programme

3.1.1. As the Order limits are likely drained by a network of subsurface agricultural drains, there will be a watching brief during the installation of the PV Arrays. An as-built inspection of the Order limits will occur within two months of construction being completed to ensure drainage is functioning adequately and rectify areas deemed to have been damaged where drainage is impaired and causes obvious pooling of water at surface.

3.1.2. A surface water and groundwater monitoring programme will be established prior to the construction phase of the Proposed Development. An indicative monitoring programme is set out below.

3.2. Surface Water Monitoring

3.2.1. Surface water monitoring would be undertaken at locations on the West Glen River downstream of the Proposed Development and upstream of other non-natural influences, where possible. The methodology and approach will be agreed in principle with the Environment Agency (EA) prior to completing monitoring works.

3.2.2. Regular visual inspections of surface watercourses are proposed, especially during major excavation works, as these allow rapid identification of changes in levels of suspended solids that could indicate construction related effects are occurring upstream. Potential effects can then be investigated and remedial action taken to prevent further effects, if necessary.

3.2.3. To supplement the visual inspections, it is anticipated that there would surface water monitoring points for extractive sampling and analysis. Details will be agreed in advance of construction with the EA.

3.2.4. A sampling frequency of once a month for six months prior to the construction phase is proposed in order to establish baseline hydro chemical conditions of surface water constituents.

3.2.5. The following sampling frequencies are proposed in order to monitor surface water conditions against baseline conditions:

a. twice a month during earthworks and concrete works, e.g., access track construction, foundations; and

b. once a month, for six months after the construction phase.

3.2.6. Establishing baseline conditions for surface waters will enable any trends in levels of critical parameters to be assessed and deviations from the norm identified and rectified through water management measures. Monitoring will not take place within catchments or sub-catchments where no construction activity has occurred for a period of two weeks or more, during the on-going construction phase.

3.3. Groundwater Monitoring

3.3.1. A groundwater monitoring program will be established prior to the construction phase of the Proposed Development and the WMP. The principles and methodology of the groundwater monitoring plan will be agreed with the EA prior to any monitoring works.

3.4. Monitoring Reporting

3.4.1. The results of laboratory analysis of water samples will be tabulated and recorded.

3.5. Operational Phase Monitoring

3.5.1. Sampling and testing will be carried out during the operational phase when any major maintenance works are undertaken that may give rise to pollution to surface or ground water.

3.6. Monitoring Programme Summary

3.6.1. Any activity proving detrimental to water quality will be detected at the earliest opportunity during the construction and operational phases of the Proposed Development. This will allow action to be taken to prevent any further effect on water quality.

4.0 Decommissioning

4.1.1. The DEMP would be informed by the ***outline DEMP*** which forms part of the DCO Application. Decommissioning activities will be undertaken in accordance with good practice at the time, and agreed with the relevant consultees in advance of the works commencing.

5.0 Conclusions and Recommendations

5.1.1. The purpose of this oWMP is to detail appropriate water management measures to control surface water runoff, and drain infrastructure during the construction, operation and decommissioning of the Proposed Development. The measures detailed throughout this report would ensure that risks to the surface and groundwater environment are appropriately managed to avoid adverse effects.

5.1.2. A WMP will be produced for the Proposed Development prior to commencing construction, following the appointment of a principal contractor and in accordance with this oWMP.

5.1.3. The oWMP is considered to be a live document, such that modifications can be made following additional information and advice from consultees.

6.0 References

Ref 1 The Construction Industry Research and Information Association (The Construction Industry Research and Information Association (CIRIA) (2015). Environmental Good Practice on Site Guide (C741) [online]. Available at: [redacted] [Accessed: 02/03/2022].

Ref 2 The Construction Industry Research and Information Association (CIRIA) (2001). Control of Water Pollution from Construction Sites (C532) [online]. Available at: [redacted] [Accessed: 02/03/2022].

Ref 3 The Construction Industry Research and Information Association (CIRIA) (20015). The Sustainable Drainage System SuDS Manual (C753) [online]. Available at: [redacted] [Accessed: 02/03/2022].

Ref 4 Department for environment, Food and Rural Affairs (2020)). Oil Storage Regulations for Businesses [online]. Available at: https://www.gov.uk/guidance/storing-oil-at-a-home-or-business [Accessed 01/04/2022].

Ref 5 Contaminated Land: Application in Real Environments (2011). The Definition of Waste: Development industry Code of Practice Version 2 [online]. Available at [redacted] [Accessed: 02/03/2022].