

## TECHNICAL NOTE

JBA Project Code: 2024s0202

Client: Ameresco Ltd

Date: July 2024

Produced by: George Williams BSc (Hons), MSc

Reviewed by: John Panesar BEng (Hons) CEng MICE

Title: C&S Energy BESS Drainage Maintenance Schedule

## 1 Introduction

This document is a stand-alone document that details the required maintenance schedule of each proposed element of the surface water drainage system designed for the C&S Energy Battery Energy Storage System (BESS) proposed for development by Ameresco Ltd. This should be read in conjunction with the proposed surface water drainage strategy. JBA were commissioned to provide this detailed surface water drainage strategy for the proposed site off Rownall Road, ST9 0BT.

The production of this document aims to detail the maintenance requirements for individual elements of the surface water drainage system and satisfy the requirements of Staffordshire County Council in their capacity as Lead Local Flood Authority (REF SMD/2022/0444).

The report is based on currently available and preliminary discussions. Proposals detailed within this report may be subject to alteration or adjustment following the completion of construction drawings and specific product specification.

## 2 Maintenance Schedule

All the drainage on site will be privately owned. Ameresco Ltd has an LTSA agreement with the client for 7 years from completion of construction of the BESS site and will be responsible for the maintenance during this time.

This document will detail the maintenance requirements for each element of the drainage system.

### 2.1 Surface Water Drainage System Maintenance Schedule

Table 1 details the following maintenance requirements are identified for the anticipated surface water drainage system.

**Table 1 Surface Water Drainage Maintenance Schedule**

| Element                                   | Activity                                                                                     | Frequency                         |
|-------------------------------------------|----------------------------------------------------------------------------------------------|-----------------------------------|
| Conveyance pipes and chambers             | Visual inspection and jetting/cleaning                                                       | Every five years or as required   |
|                                           | Visual inspection for physical damage and remediation                                        | Annually or as required           |
| Catchpits and linear drainage channels    | Visual inspection and jetting/cleaning                                                       | Annually or as required           |
|                                           | Visual inspection and replacement/re-setting covers and granting if damaged and/or dislodged | Annually or as required           |
| Outlet control chambers with flow devices | Visual inspection and remediation of any faults                                              | Annually or as required following |

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|  |  |                           |
|--|--|---------------------------|
|  |  | significant storm events. |
|--|--|---------------------------|

### 2.2 Permeable Paving Maintenance Requirements

The CIRIA SuDS Manual stipulates the following maintenance requirements for the proposed permeable paving elements which are detailed in Table 2.

In addition, the maintaining party of the drainage system should adhere to the manufacturer's recommendations in relation to the operation of specific drainage elements.

**Table 2 Permeable Paving Maintenance Schedule**

| Maintenance Schedule   | Required Action                                                                                                                     | Typical Frequency                                                                                                                                                                                                                                                                                                               |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Regular Maintenance    | Brushing and vacuuming (standard cosmetic sweep over whole surface)                                                                 | Once a year, after autumn leaf fall or reduced frequency as required based on site-specific observations of clogging or manufacturers' recommendations - pay particular attention to areas where water runs onto the pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment. |
| Occasional maintenance | Stabilise and mow contributing and adjacent areas                                                                                   | As required                                                                                                                                                                                                                                                                                                                     |
|                        | Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying               | As required - once per year on less frequently used pavements                                                                                                                                                                                                                                                                   |
| Remedial Actions       | Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving | As required                                                                                                                                                                                                                                                                                                                     |
|                        | Remedial work to any depression, rutting and cracked or broken                                                                      | As required                                                                                                                                                                                                                                                                                                                     |

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|  |                                                                                                                      |                                                                                                          |
|--|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|  | blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material. |                                                                                                          |
|  | Rehabilitation of surface and upper substructure by remedial sweeping                                                | Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging) |
|  | Initial inspection                                                                                                   | Monthly for three months after installation                                                              |
|  | Inspect for evidence of poor operation and/or weed growth - if required, take remedial action                        | Three monthly 48hr after large storms in the first six months.                                           |
|  | Inspect silt accumulation rates and establish appropriate brushing frequencies                                       | Annually                                                                                                 |
|  | Monitor inspection chambers                                                                                          | Annually                                                                                                 |

### 2.3 Swale Maintenance Requirements

The CIRIA SuDS Manual stipulates the following maintenance requirements for the proposed swales that form part of the surface water drainage strategy and is detailed in Table 3.

- Swales are not present in the drainage strategy; however, there is a swale currently part of the land drainage system. Following site investigation, it will be determined whether this asset will be made redundant or kept as part of the land drainage network. If the asset is to be used, the below maintenance regime should be adopted.

**Table 3 Swale Maintenance Requirements**

| Maintenance Schedule | Required Action                                                     | Typical Frequency                               |
|----------------------|---------------------------------------------------------------------|-------------------------------------------------|
| Regular Maintenance  | Remove litter and debris                                            | Monthly, or as required                         |
|                      | Cut grass- to retain grass height within the specified design range | Monthly (during growing season), or as required |
|                      | Manage other vegetation and remove nuisance plants                  | Monthly at the start, then as required          |

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|                        |                                                                                                                                      |                                                                                      |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                        | Inspect inlets, outlets and overflows for blockages, and clear them if required                                                      | Monthly                                                                              |
|                        | Inspect infiltration surfaces for ponding, compaction, and silt accumulation, and record areas where water is ponding for >48h hours | Monthly or when required                                                             |
|                        | Inspect vegetation coverage                                                                                                          | Monthly for 6 months, quarterly for 2 years, then half yearly                        |
|                        | Inspect inlets and facility surfaces for silt accumulation and establish appropriate silt removal frequencies.                       | Half yearly                                                                          |
| Occasional Maintenance | Reseed areas of poor vegetation growth, and alter plant types to better suit conditions if required                                  | As required or if bare soil is exposed over 10% or more of the swale treatment area. |
| Remedial Actions       | Repair erosion or other damage by re-turfing or reseed                                                                               | As required                                                                          |
|                        | Relevel uneven surfaces and reinstate the design level                                                                               | As required                                                                          |
|                        | Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of soil surface.  | As required                                                                          |
|                        | Remove build-up of sediment on upstream gravel trench, flow spreader or at the top of filter strip                                   | As required                                                                          |
|                        | Remove and dispose of oils or petrol residues using safe standard practices                                                          | As required                                                                          |

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### 2.4 Detention Basin Maintenance

The CIRIA SuDS Manual stipulates the following maintenance requirements for the proposed detention basin that form part of the surface water drainage strategy and are detailed in Table 4 below.

**Table 4 Detention Basin Maintenance Requirements**

| Maintenance Schedule   | Required Action                                                                                            | Typical Frequency                                      |
|------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Regular Maintenance    | Remove litter and debris                                                                                   | Monthly                                                |
|                        | Cut grass- for spillways and access routes                                                                 | Monthly (during growing season), or as required        |
|                        | Cut grass - meadow grass in and around the basin                                                           | Half yearly (spring-before nesting season, and autumn) |
|                        | Manage other vegetation and remove nuisance plants                                                         | Monthly (at start, then as required)                   |
|                        | Inspect inlets, outlets and overflows for blockages, and clear if required                                 | Monthly                                                |
|                        | Inspect bankside, structures, pipework etc for evidence of physical damage                                 | Monthly                                                |
|                        | Inspect inlets and facility surfaces for silt accumulation. Establish appropriate silt removal frequencies | Monthly (for first year) then annually or as required  |
|                        | Check any penstocks and other mechanical devices                                                           | Annually                                               |
|                        | Tidy all dead growth before the start of the growing season                                                | Annually                                               |
|                        | Remove sediment from inlets, outlet and forebay                                                            | Annually (or as required)                              |
|                        | Manage wetland plants in outlet pool- where provided.                                                      | Annually                                               |
| Occasional maintenance | Reseed areas of poor vegetation growth                                                                     | As required                                            |

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|                  |                                                                            |                                                                                                                       |
|------------------|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
|                  | Prune and trim any trees and remove cuttings                               | Every 2 years, or as required                                                                                         |
|                  | Remove sediment from inlets, outlets, forebay and main basin when required | Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided) |
| Remedial actions | Repair erosion or other damage by reseedling or re-turfing                 | As required                                                                                                           |
|                  | Realignment of rip-rap                                                     | As required                                                                                                           |
|                  | Repair/rehabilitation of inlets, outlets and overflows                     | As required                                                                                                           |
|                  | Relevel uneven surfaces and reinstate design levels                        | As required                                                                                                           |

### 2.5 Transformer Sump Pumps

- Where private pumping stations or pumps in tanks form part of the drainage system, Ameresco are responsible for the management and maintenance of the system, and it is recommended they enter into a maintenance agreement with a pump maintenance company. Ameresco are also responsible for the creation and implementation of any emergency requirements should the pump fail.
- The pumping facility on this site will include 2No. sump pumps, individually serving the 2No. transformer bays and these should be serviced at a minimum annually (once every 12 months).
- Maintenance shall involve removing the pumps and carrying out any routine maintenance or repairs to the pumps.
- Control system including any alarms shall be checked to ensure they are in fully working order.
- The wet wells shall be visually inspected from ground level to assess if any repairs are necessary. If repairs to the benching or the chamber are required, this should be carried out as soon as possible.  
All pumping stations should be connected to a monitoring/telemetry system which activates an alarm upon failure.
- The pumped system alarm will vary to suit the development and how this is maintained overall. Ideally, the alarm would be located on-site in a facilities manager's office or in a staffed office (this could be a gatehouse for example that is staffed 24 hours a day). If there is to be no on-site facilities management then a remote type of alarm should be installed connected to the landlord's offices/premises, or to the facilities management company, or appointed pump maintenance company.

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- For the transformer sump pumps, the sump shall be emptied of any silt that may have accumulated in the sump. The sump shall be inspected every six months. Any silt removed shall be disposed of offsite at a licenced facility.
- The transformer sump pumps are to be monitored on the Supervisory Control and Data Acquisition (SCADA) system.
- Oil and water separators have been proposed in the bunded transformer areas. As the facility will be visited relatively infrequently by a small number of maintenance vehicles spill kits should be sufficient and used in the event of petrol spills from the maintenance vehicles in other areas of the site. The responsible parties outlined in Section 1 will be liable for maintaining these on the site
- An emergency back-up pumping plan should be documented, covering access, operation, storage and maintenance of the assets. The enactment of the emergency pumping plan should be "dry run" and disseminated and practiced through the operational lifetime. Portable submersible pumps will be used in an emergency event and is pertinent to the transformer sump bays only.
- Adequacy of pump rate and system alarm freeboard shall be incorporated and documented to provide a sufficient period to enact emergency pumping. Pertinent to the transformer sump bays only.

## Document Information

|                    |                                                                 |
|--------------------|-----------------------------------------------------------------|
| Project            | C&S Energy BESS                                                 |
| BIM Reference      | MJF-JBA-XX-XX-RP-D-0003-InfoDrainage_Modelling_Outputs_Option_2 |
| Status             | A2                                                              |
| Revision           | P04                                                             |
| Calculation Title  | InfoDrainage Modelling Outputs                                  |
| No. of Calc Sheets | 30                                                              |

## Purpose of Calculations

This report is an export of the InfoDrainage modelling. InfoDrainage is a drainage system design software program that was used to both design and audit the proposed network for the C&S Energy BESS.

Included in the report are:

- Summary of Pipes in the Critical Storm
- Half Drain Down Times for Stormwater Controls
- Summary of Inflows in Critical Storm
- Pond Flow Graphs in Critical Storm
- Rainfall Analysis Criteria
- Junctions Details
- Stormwater Control Details
- Connections Summary

## Calculation Control & Revisions

| Revision | Date       | Description                     | Originator | Checker | Approver |
|----------|------------|---------------------------------|------------|---------|----------|
| P01      | 06.08.2024 | Calculation Export              | SC         | WD      | JP       |
| P02      | 14.08.2024 | Additional Information Provided | SC         | WD      | JP       |
| P03      | 27.09.2024 | Updated Following Layout Change | SC         | WD      | JP       |
| P04      | 17.04.2025 | Updated Following Layout Change | LF         | WD      | JP       |

|                                                                      |                             |             |              |
|----------------------------------------------------------------------|-----------------------------|-------------|--------------|
| Project:                                                             | Date:<br>26/03/2024         |             |              |
|                                                                      | Designed by:<br>LukeFalgate | Checked by: | Approved By: |
| Report Details:<br>Type: Stormwater Controls<br>Storm Phase: Gravity | Company Address:            |             |              |



Pond

Type : Pond

Dimensions

|                      |         |
|----------------------|---------|
| Exceedance Level (m) | 237.750 |
| Depth (m)            | 1.200   |
| Base Level (m)       | 236.550 |
| Freeboard (mm)       | 300     |
| Initial Depth (m)    | 0.000   |
| Porosity (%)         | 100     |
| Average Slope (1:X)  | 8.41    |
| Total Volume (m³)    | 830.776 |

| Depth (m) | Area (m²) | Volume (m³) |
|-----------|-----------|-------------|
| 0.000     | 500.00    | 0.000       |
| 0.500     | 1000.00   | 367.851     |
| 1.100     | 1500.00   | 1112.800    |
| 1.500     | 2000.00   | 1810.407    |

Inlets

Road

|                    |                |
|--------------------|----------------|
| Inlet Type         | Point Inflow   |
| Incoming Item(s)   | P1.02          |
| Bypass Destination | (None)         |
| Capacity Type      | No Restriction |

Pond Rainfall

|                    |                |
|--------------------|----------------|
| Inlet Type         | Lateral Inflow |
| Incoming Item(s)   | Option 1 Pond  |
| Bypass Destination | (None)         |
| Capacity Type      | No Restriction |

BESS

|                    |                |
|--------------------|----------------|
| Inlet Type         | Point Inflow   |
| Incoming Item(s)   | Pipe (11)      |
| Bypass Destination | (None)         |
| Capacity Type      | No Restriction |

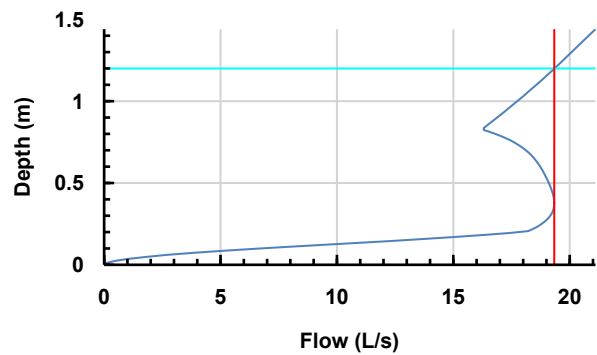
|                                                   |                             |             |              |                                                                                     |
|---------------------------------------------------|-----------------------------|-------------|--------------|-------------------------------------------------------------------------------------|
| Project:                                          | Date:<br>26/03/2024         |             |              |  |
|                                                   | Designed by:<br>LukeFalgate | Checked by: | Approved By: |                                                                                     |
| Report Details:                                   | Company Address:            |             |              |                                                                                     |
| Type: Stormwater Controls<br>Storm Phase: Gravity |                             |             |              |                                                                                     |

Outlets

Outlet

|                     |                                        |
|---------------------|----------------------------------------|
| Outgoing Connection | Outlet                                 |
| Outlet Type         | Hydro-Brake®                           |
| Invert Level (m)    | 236.600                                |
| Design Depth (m)    | 1.200                                  |
| Design Flow (L/s)   | 19.351                                 |
| Objective           | Minimise Upstream Storage Requirements |
| Application         | Surface Water Only                     |
| Sump Available      | <input checked="" type="checkbox"/>    |

|                |                         |
|----------------|-------------------------|
| Unit Reference | SHE-0193-1935-1200-1935 |
|----------------|-------------------------|



Advanced

|                 |             |
|-----------------|-------------|
| Perimeter       | Circular    |
| Length (m)      | 69.757      |
| Friction Scheme | Manning's n |
| n               | 0.033       |