



COBWOOD SOLAR FARM

West Grinstead

DRAINAGE CONDITIONS DISCHARGE REPORTING

Project No	25-387-70
Revision No	04
Issue date	02/09/26

Control Sheet

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1 INTRODUCTION

1.1 Background

1.1.1 This report has been prepared to support the discharge of Condition 8 as listed in the Decision Notice from Horsham District Council dated 21/05/2024 (application reference DC/23/2172).

1.1.2 Condition 8 states:

'Prior to the commencement of development, construction drawings of the surface water drainage network, associated sustainable drainage components and flow control mechanisms and a construction method statement shall be submitted and agreed in writing by the local planning authority. The scheme shall then be constructed as per the agreed drawings, method statement, FRA (07/03/24) and Response to LLFA comments dated February 2024 and Drawing Preliminary Drainage Strategy by PFA Consulting, rev A, dated 07/03.24 and remain in perpetuity for the lifetime of the development unless agreed in writing by the Local Planning Authority. No alteration to the agreed drainage scheme shall occur without prior written approval from the Local Authority.'

1.1.3 The approved drainage scheme comprises swales to capture runoff from the operation phase. These swales will be constructed prior to installation of the panels in the areas from which they will receive runoff and will therefore serve to mitigate any impacts during the construction phase.

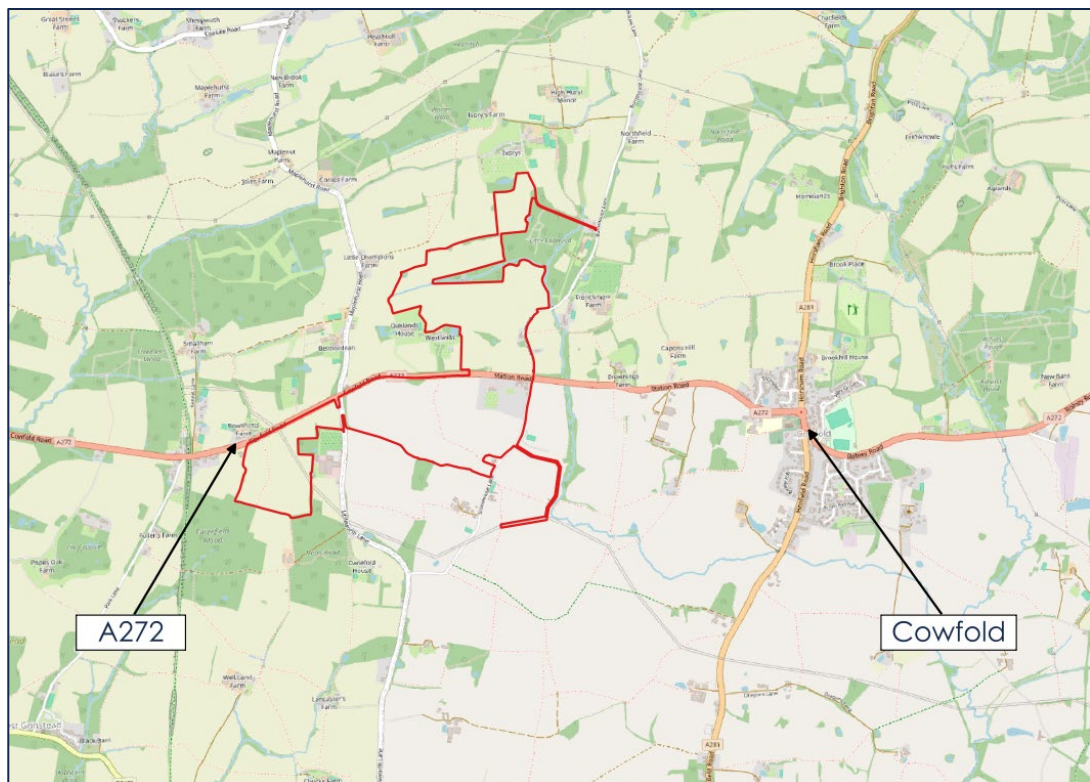
1.1.4 The condition wording refers to a construction method statement. The details of this would be confirmed once a contractor is procured. However, an outline method statement is included with the submitted condition discharge documents, reference 25-387-70-031.

2 SITE DESCRIPTION

2.1 Site Location and Setting

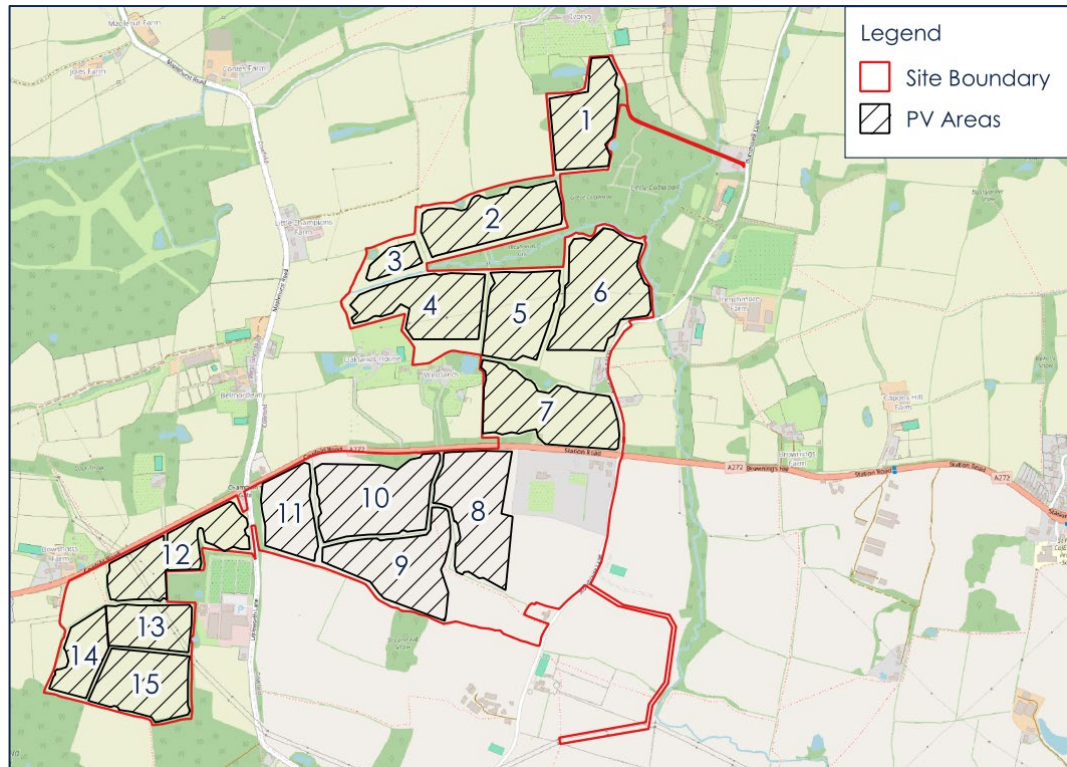
- 2.1.1 The site is approximately 79 hectares (ha) and is located approximately 1km from Cowfold and is bisected by the A272 (Cowfold Road / Station Road).
- 2.1.2 The approximate coordinates for the centre of the site are 519550, 122850. The nearest postcode is RH13 8LZ.
- 2.1.3 Figure 2-1 shows the site location.

Figure 2-1 Site Location



- 2.1.4 The existing site is greenfield, comprising almost entirely arable agricultural land. The site is separated into 15 numbered parcels. These parcels are shown in Figure 2-2 below.

Figure 2-2 Solar Parcels



2.2 Topography and Hydrology

- 2.2.1 The site is elevated above most of the surrounding land. Within the site three watercourses are shown in Ordnance Survey data and are evident in LiDAR data. Browning's Gill flows from north to the south. The other two watercourses flow into Browning's Gill from the west. The watercourses are shown along with 1m contours derived from LiDAR data in Figure 2-3.
- 2.2.2 The layout has been derived to preserve a 3m buffer from these watercourses as stated in the FRA and from field ditches.
- 2.2.3 A GIS-based drainage path analysis was carried out using LiDAR data and is presented in Figure 2-4.

Figure 2-3 Topography and Hydrology

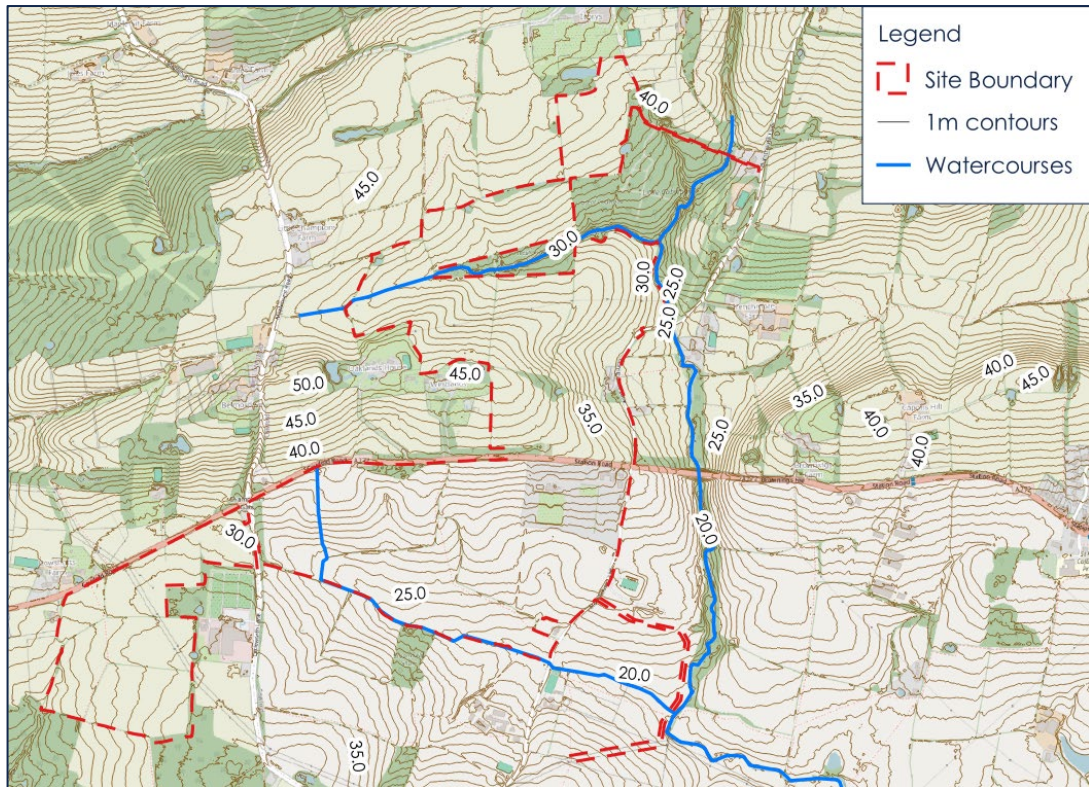
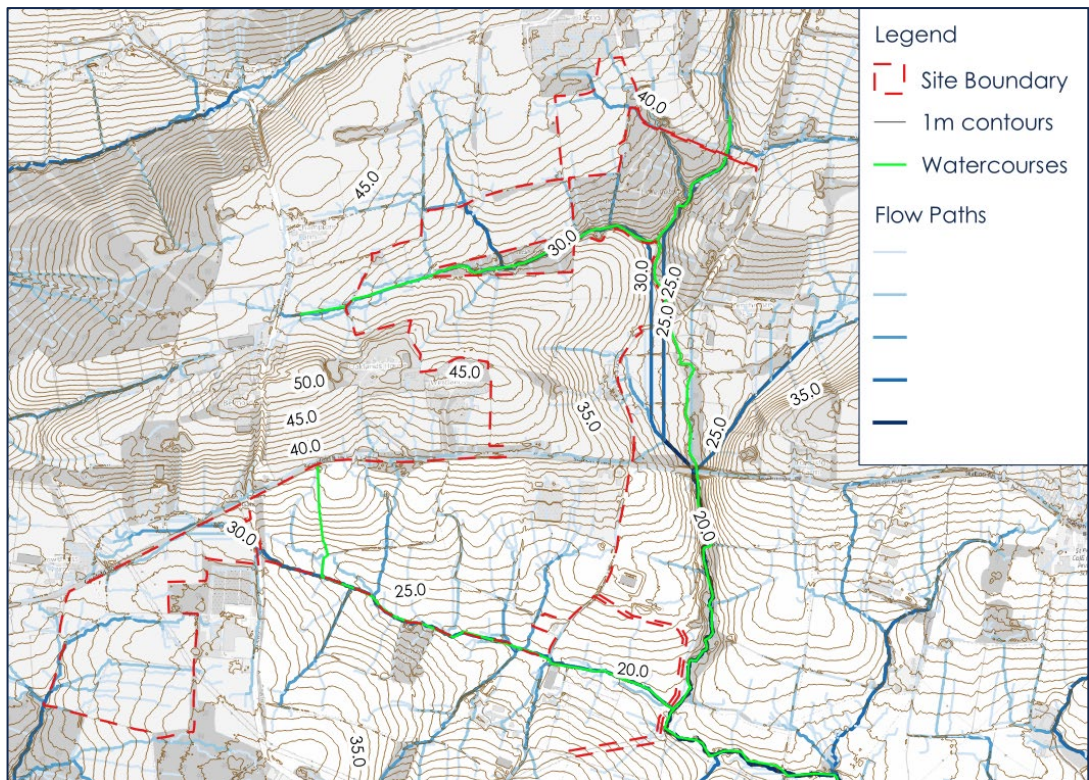


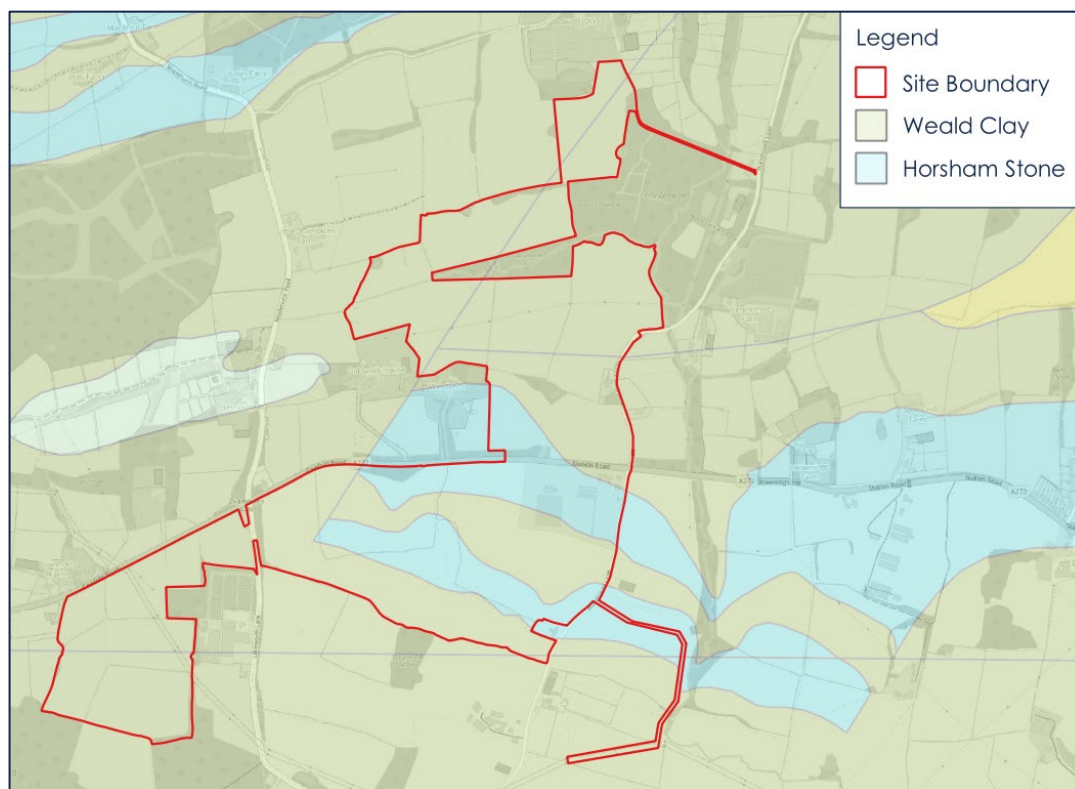
Figure 2-4 Overland Flow Paths



2.3 Geology and Soils

- 2.3.1 British Geological Survey (BGS) data shows the majority of the site to be underlain by 'Weald Clay Formation-Mudstone' which is essentially impermeable. There are also two bands of 'Horsham Stone Member-Sandstone' which is also essentially impermeable. BGS bedrock deposits are shown in Figure 2-5.

Figure 2-5 BGS Bedrock Deposits



- 2.3.2 The BGS hydrogeology dataset records the entire site as being underlain by 'Rocks with essentially no groundwater'.
- 2.3.3 Soils mapping shows the site to be underlain by 'Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils' with 'impeded drainage'.
- 2.3.4 There is one published borehole¹ within the vicinity of the site, located to the north of the A272 and the westernmost part of the site. This borehole corroborates the BGS data in that the upper horizons are clay dominated. The interbedded sandstone and mudstone bedrock was encountered approximately 46mbgl (below) ground.
- 2.3.5 The borehole struck water at 45m below ground level (bgl). This shows that there is a significant unsaturated zone between the site and the groundwater. The

¹ <https://api.bgs.ac.uk/sobi-scans/v1/borehole/scans/items/21565186>

groundwater rose to 8m bgl before test pumping commenced. This demonstrates the groundwater is confined by impermeable upper strata.

3 DRAINAGE PROPOSALS

3.1 Consented Strategy

- 3.1.1 The planning application was supported by the Proposed Solar Farm, Land at Burnthouse Lane, Cowfold, Flood Risk Assessment (ref: L517-DOC01-FRA-Issue 1). This document sets out the approach to surface water betterment which comprises creating interception swales to capture runoff from the solar farm. The FRA states:

"Swales will be formed by creating shallow depressions a minimum of 0.3m deep, with 1 in 3 side slopes, and a base width of 0.5m along the lower boundaries of the site. The storage volume of the interception swales has been calculated on the basis that the swales will be 2/3 full (incorporating a 0.1m freeboard)" (para 4.46)

- 3.1.2 *"The interception swales provide a total storage volume of approximately 225.5m³. This is greater than the volume of additional runoff generated as a result of the 24 hour, 100 year plus climate change rainfall event (59.33m³). It is therefore considered that the interception swales would adequately mitigate any increase in runoff volume generated as a result of the minor increase in impermeable area created by the discrete control equipment and would be beneficial in reducing the potential run off for the site in the more extreme storm event."* (para 4.47)

- 3.1.3 The proposed swale layout as shown in the Preliminary Drainage Strategy drawing (ref: L517/04) comprises 46 swales with a combined length of 1025.9m. At a depth of 0.2m these swales provide 225.5m³. The Preliminary Drainage Strategy is shown reproduced in Appendix A.

3.2 Design Refinement

- 3.2.1 As part of the design works the total length of swales and their form has been preserved. All swales have a minimum depth of 0.3m a base width of 0.5m and 1 in 3 side slopes. All swales have a level base to ensure that the swales' storage will be effectively mobilised.
- 3.2.2 The precise location of the swales has been modified to reflect a detailed consideration of topography, overland flow routes, constraints (e.g. root protection areas, watercourse and hedgerow buffers, utilities easements, 15m buffer to designated Ancient Woodland) and operational considerations (e.g. offsets from fences and panels to not unduly impinge access).
- 3.2.3 The design process has, like the preceding FRA, been a desktop exercise. Therefore, it is likely that additional constraints are identified during site setting out that may impact the locations and dimensions of the swales. Given the swales are included to provide betterment as well as mitigation, deviation from the lengths designed as part of this report would be acceptable.

- 3.2.4 The modifications within each of the fields are described in the subsections below. Each subsection includes a table showing the length and volumes of swales for both the Preliminary Drainage Strategy and the revised proposals.
- 3.2.5 It should be noted that for consistency with the FRA which supported the planning application, the volumes have been calculated assuming a storage depth of 0.2m. This equates to a cross-sectional area of 0.22m² and this value has been multiplied by the length of the base of the swale to give the storage volume. This approach does not include any water stored within the end of the swales where the land is graded up from the end of the base to surrounding ground levels.
- 3.2.6 Drawings showing the location of the swale works along with invert levels are also included in Appendix B.

Field 1

- 3.2.7 Swale 1a is in location constrained by utility easements and hedgerow buffers and has been shifted south. The location of proposed Swale 1b is constrained by a 15 buffer from land designated as Ancient Woodland. It has been removed and the storage has been replaced by expanding Swales 1a and 1c.

Table 3-1 Field 1 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
1A	16.2	3.6	27.9	6.1
1B	18.8	4.1	-	10.3
1C	39.2	8.6	46.7	10.7
Total	74.2	16.3	74.6	16.4

3.3 Field 2

- 3.3.1 One large swale is proposed rather than two small swales. The expanded swale is in a flow accumulation area and will therefore be more effective.

Table 3-2 Field 2 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
2A	28.1	6.2	48.9	10.8
2B	18.1	4.0	-	0.0
Total	46.2	10.2	48.9	10.8

3.4 Field 3

- 3.4.1 Swale 3A has been relocated from an area constrained by access and fences to a flow path to increase its effectiveness.

Table 3-3 Field 3 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
3A	9.5	2.1	9.6	2.1

3.5 Field 4

- 3.5.1 No significant change.

Table 3-4 Field 4 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
4A	42.5	9.4	48.9	10.8
4B	13.9	3.1	13.6	3.0
Total	56.4	12.4	62.5	13.8

3.6 Field 5

- 3.6.1 Three swales were consolidated into two swales.

Table 3-5 Field 5 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
5A	49.4	10.9	64.6	14.2
5B	23.0	5.1	-	0.0
5C	68.1	15.0	76.1	16.7
Total	140.5	30.9	140.7	31.0

3.7 Field 6

- 3.7.1 The swales were consolidated and arranged to maximise capture of overland flow paths. Two small swales in the south have been removed because the upslope land no longer contains panels. An additional swale (6x) has been placed to capture runoff to the north.

Table 3-6 Field 6 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
6A	45.8	10.1	66.9	14.7
6B	38.4	8.4	48.5	10.7
6C	13.9	3.1	-	-
6D	10.4	2.3	-	-
6E	5.2	1.1	-	-
6F	13.6	3.0	-	-
6G	13.6	3.0	22.6	5.0
6H	19.0	4.2	-	-
6I	9.6	2.1	-	-
6J	19.3	4.2	-	-

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m³)	Revised Strategy Length (m)	Revised Strategy Volume (m³)
6X	-	-	51.4	11.3
Total	188.8	41.5	189.4	41.7

3.8 Field 7

- 3.8.1 A large swale (7x) will be constructed on the southern edge of the generation area crossing a flow accumulation area. This replaces concept swale 7b which is constrained by a buried cable and swales 7c and 7d which are small (6.2m and 11.4m) and likely to be bypassed by runoff that will be captured by swale 7x.

Table 3-7 Field 7 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m³)	Revised Strategy Length (m)	Revised Strategy Volume (m³)
7A	14.9	3.3	19.4	4.3
7B	19.2	4.2	-	-
7C	11.4	2.5	-	-
7D	6.2	1.4	-	-
7X	-	-	32.3	7.1
Total	51.7	11.4	51.7	11.4

3.9 Field 8

Swale 8b was located downslope of swale 8a and in a less favourable location for capturing overland flow. Its capacity is replaced by realignment and extension of Swales 8a and 8c.

Table 3-8 Field 8 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
8A	13.5	3.0	36.5	8.0
8B	26.9	5.9	-	-
8C	18.0	4.0	21.9	4.8
Total	58.4	12.8	58.4	12.9

3.10 Fields 9 & 10

- 3.10.1 In field 10 three swales were consolidated into one large swale, located to intercept the flow path from fields 9, 10 and 11. This replaces the three proposed swales for field 9 and the short swale proposed in field 10.

Table 3-9 Fields 9 & 10 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
9A	15.1	3.3	50.4	11.1
9B	14.0	3.1	-	-
9C	13.0	2.9	-	-
10A	8.3	1.8	-	-
Total	50.4	11.1	50.4	11.1

3.11 Field 11

- 3.11.1 No significant change.

Table 3-10 Field 11 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
9A	24.9	5.5	24.9	5.5

3.12 Field 12

- 3.12.1 Three swales from the planning application have been consolidated into two. Swale 12a has been relocated to a low spot through which overland flows would pass. Location of swale 12c retained within in an area of flow accumulation.

Table 3-11 Field 12 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
12A	10.3	2.3	33.4	7.4
12B	56.6	12.5	-	-
12C	30.8	6.8	65.6	14.4
Total	10.3	2.3	33.4	7.4

3.13 Field 13

- 3.13.1 Swales in the preliminary design were proposed downslope in an area constrained by hedgerows. These were consolidated into one large swale replacing the total length.

Table 3-12 Field 13 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
13A	8.9	2.0	26.5	5.8
13B	8.9	2.0	-	0.0
13C	8.9	2.0	-	0.0
Total	26.7	5.9	26.5	5.8

3.14 Field 14

- 3.14.1 The capacity provided by swale 14b has been replaced by extending swales 14a and 14c which are located to intercept overland flow paths.

Table 3-13 Field 14 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
14A	43.5	9.6	67.9	14.9
14B	35.2	7.7	-	0.0
14C	32.0	7.0	42.8	9.4
Total	110.7	24.4	110.7	24.4

3.15 Field 15

Minor adjustments to the location of the swales have been made to reflect topography and runoff paths.

Table 3-14 Field 15 – Swale Summary

Swale	Preliminary Strategy Length (m)	Preliminary Strategy Volume (m ³)	Revised Strategy Length (m)	Revised Strategy Volume (m ³)
15A	19.7	4.3	16.8	3.7
15B	31.0	6.8	32.1	7.1
15C	31.0	6.8	32.9	7.2
Total	26.7	5.9	26.5	5.8

3.16 Swale Summary

- 3.16.1 The revisions to the swale proposals presented in the Preliminary Drainage Strategy drawing result in a minor increase in total swale length from 1025.9m to 1031.0m. When filled to 0.2m deep they will provide more than 226m³ of storage which is several times larger than the increased runoff volume of 59.33m³ calculated in the FRA.
- 3.16.2 The location of the swales has been optimised as far as possible to capture the predominant flow paths predicted by a GIS assessment of ground levels as defined by LiDAR data and therefore represent an improvement over the approved proposals.

3.16.3 Drawings 25-387-70-101 to 104 in Appendix B show the location, length and invert of the swales.

3.16.4 A summary table of the swale lengths and storage volumes at 0.2m deep is included in Appendix C.

3.17 Site Operation

3.17.1 General site operation will have a negligible impact on the site's drainage regime. Maintenance of solar arrays and other infrastructure would be undertaken by light plant or machinery. Such plant would utilise proposed access tracks for the majority of movements, which would minimise the risk of compaction.

3.18 Maintenance

3.18.1 Maintenance responsibility for all drainage infrastructure will rest with the site operator which ensures consistency with the wider site maintenance.

3.18.2 The swales will be maintained in accordance with the recommendations in the CIRIA Suds Manual (C753) for the duration of the development. Maintenance actions are summarised in Table 3-15.

3.18.3 The drainage infrastructure has been carefully considered to ensure that they can be accessed by maintenance vehicles.

3.18.4 The swales will be constructed prior to installation of the panels in the areas from which they will receive runoff and will therefore serve to mitigate any impacts during the construction phase. In the unlikely event that significant sediment is captured in the swales during the construction phase, this material should be removed to preserve the storage volumes presented in this document to manage runoff during the operation phase.

Table 3- Swale Maintenance

Maintenance Schedule	Action	Frequency
Regular maintenance	Remove litter and debris	As required
	Cut grass to retain height to owner's specification	As required, likely to be twice yearly
	Manage other vegetation and remove nuisance plants	Monthly, then as required
Occasional maintenance	Re-seed areas of poor growth.	Annually
	Repair erosion or other damage by re-turfing/reseeding as appropriate	As required
Remedial actions	Re-level uneven surfaces to reinstate design levels	As required Annual inspections, or as required
	Scarify and spike topsoil to improve performance, break up silt deposits and prevent compaction	
	Remove sediment build-up	

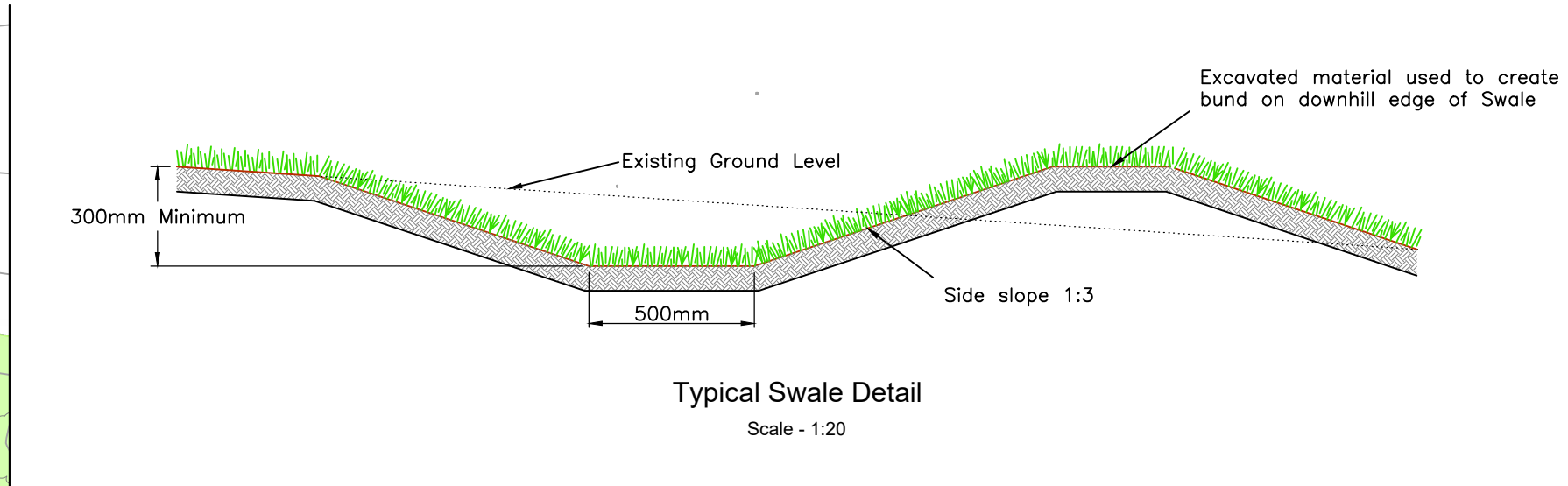
4 SUMMARY

- 4.1.1 This report has been produced to discharge Condition 8 as listed in the Decision Notice from Horsham District Council dated 21/05/2024 (application reference DC/23/2172).
- 4.1.2 The planning application was supported by a Flood Risk Assessment (PFA, 2023) with an associated preliminary drainage strategy. This strategy utilised 46 swales to provide approximately 225m³ of storage and betterment in terms of runoff generated from the site. The location and length of these swales is shown in the Preliminary Drainage Strategy drawing a copy of which is included in Appendix A.
- 4.1.3 The location of the swales was reviewed with respect to the topography, overland flow pathways and the latest environmental and operational constraints. The location of the swales was revised to improve the effectiveness of the storage of the proposed swales.
- 4.1.4 The refined proposals result in a minor (approximately 5m³) increase in swale storage. The proposals are presented in Drawings 25-387-70-100-01 through to 25-387-70-100-04 contained in Appendix B. A summary table of the swale lengths and storage volumes at 0.2m water depth is included in Appendix C.
- 4.1.5 The swales will be constructed prior to installation of the panels in the areas from which they will receive runoff and will therefore serve to mitigate any impacts during the construction phase as well as the operation phase.

APPENDICES

APPENDIX A

Preliminary Drainage Strategy



Stratton Park House, Wanborough Road
Swindon, SN3 4HG

Telephone
01793 828000

Website
www.pfapl.com

For Planning
This drawing is produced for the purposes of supporting a planning application and should not be relied upon for tender, pricing, or construction purposes.

KEY

- Site Boundary
- Security Fence
- Indicative Compound Area
- Underground Cable Route
- Proposed Interception Swale
- Indicative Overland Flow Route
- Root Protection Zone

Flood Risk Constraints

- Flood Zone 2
- Low Risk of Surface Water Flooding (Extent 1 in 1000)
- 3m Watercourse Buffer

NOTES

- Drawing based on the Site Layout, produced by Low Carbon, Drawing No. LC5049-MASTER XREF [AutoCAD drawing] (Dated: 03.11.23)
- Drawing based on Topographical Survey, produced by Aerial Inspection and Mapping Surveys Ltd, Drawing No. WG/DWD/HV/001 (Dated: 13/07/2023).
- Drawing based on Arboricultural Impact Assessment, Tree Heritage, Drawing No. THL-1180-4.
- Surface water flood risk zones based on extract from the Environmental Agency assessment. Attribution statement: © Environment Agency copyright and/or database right 2015. All rights reserved.
- Some features of this information are based on digital spatial data licensed from the Centre for Ecology & Hydrology © NERC (CDE), Defra, Met Office and DARD Rivers Agency © Crown copyright, © Cranfield University, © James Hutton Institute. Contains OS data © Crown copyright and database right 2015. Land & Property Services © Crown copyright and database right.
- Contains public sector information licensed under the Open Government Licence V3.0.
- Total length of swales provided for the entire site = 1025m. Per metre length of interception swale, of 2/3 full, 0.22m³ of storage is available. Therefore the total available storage provided, within the swales, is 225.5m³.
- Drawing to be read in conjunction with Flood Risk Assessment and drainage strategy (Document reference: L517-00001-issue 1, September 2023).

Rev	Date	Description	Drawn	Check
T	15.09.23	First Issue	SJC	BP
A	07.03.24	Swale amendments to reflect tree survey	SJC	BF

Status

FOR PLANNING

Client

Low Carbon

Project

**Proposed Solar Farm, Land
at Burnthouse Lane,
Cowfold**

Drawing Title

**Preliminary Drainage
Strategy**

Drawing No.

L517/04

REV A

Date: August 2023

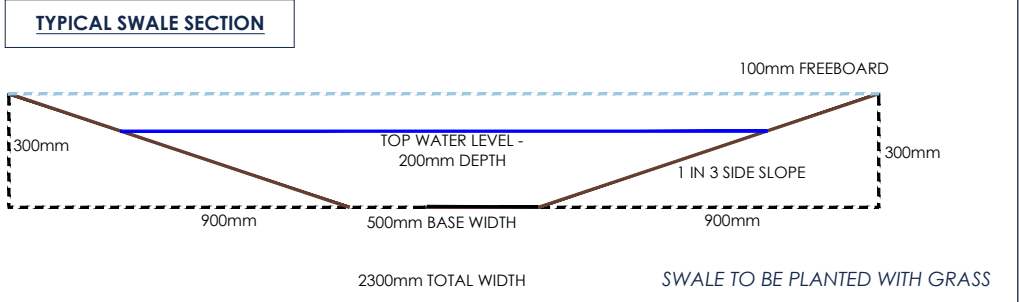
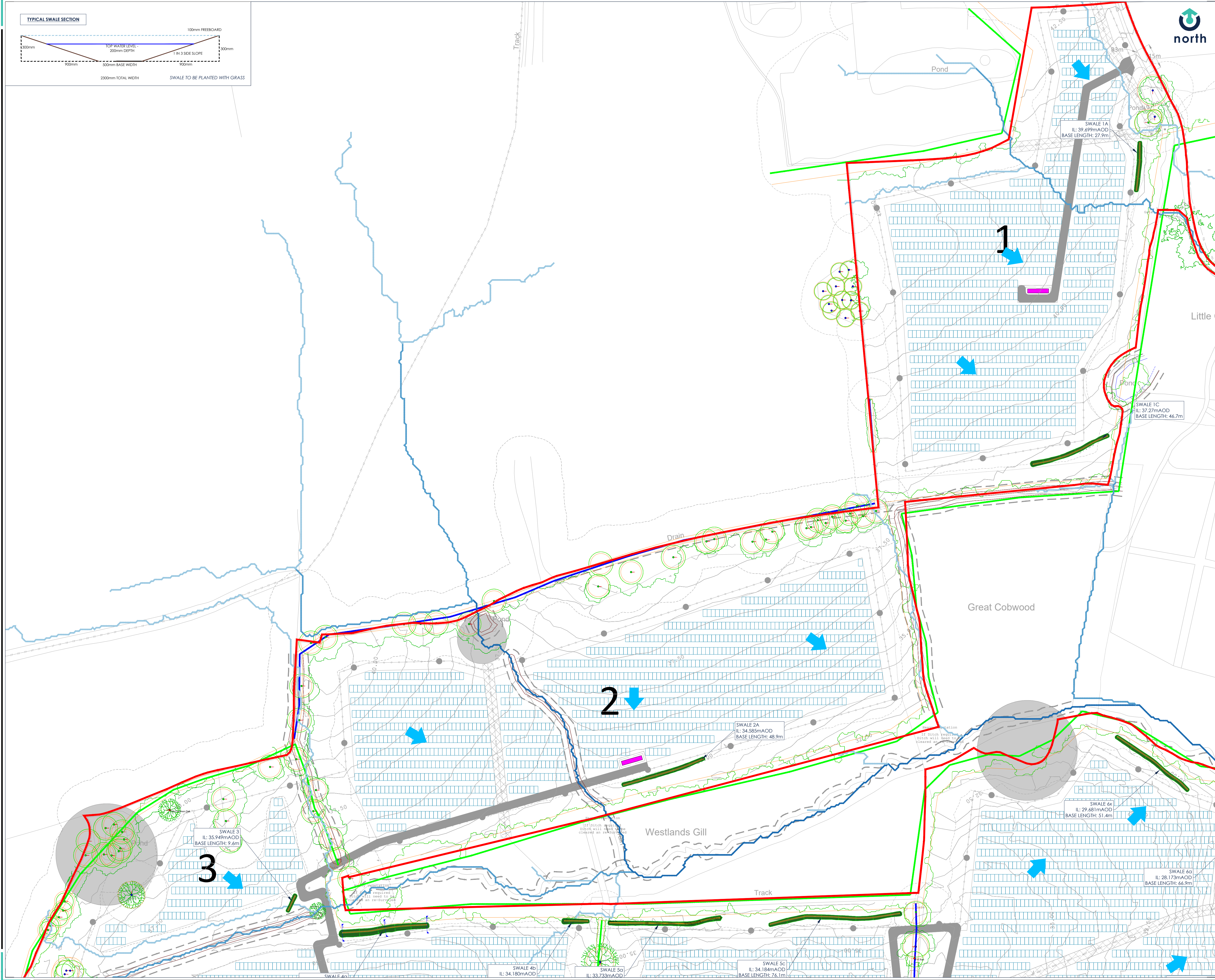
Scale: 1:2000 @ A0

E-Mail: scogrove@pfapl.com

On
Scale 1:2000

APPENDIX B

Swale Drawings



Base drawing provided by:
LOW CARBON
Drawing No:
LCS049 - PLE-02 (LCS049-MASTER XREF.DWG)
Dated:
07/05/2024
Received:
05/01/2026

LEGEND

- SITE BOUNDARY
- PROPOSED SWALES
- OVERLAND FLOWPATHS

NOTES

- PRECISE LOCATIONS AND DIMENSIONS OF SWALES SUBJECT TO SITE LEVELS AND SITE SETTING OUT
- THE SWALE OUTLINES SHOW THE EDGE OF GRADING WORKS TO TIE-IN TO EXISTING GROUND LEVELS AS DEFINED BY LIDAR DATA.
- FOR A FULL LEGEND OF UNDERLYING LAYERS REFER TO DRAWING LCS049 - PLE-02

02	FOR CONSTRUCTION	AB	PG	02/09/26
01	SWALES AMENDED	AB	PG	24/02/26
00	FIRST ISSUE	AB	PG	04/02/26
REV:	DESCRIPTION:	BY:	CHK:	DATE:

STATUS: FOR CONSTRUCTION

CLIENT: DALTON WARNER
DAVIS LLP

SITE: COBWOOD SOLAR FARM

TITLE: SWALES PLAN SHEET 1



SCALE:	DATE:	DRAWN:	CHECKED:
1:1,000 @ A1	02/09/2026	AB	PG
PROJECT:	COMPANY:	TYPE:	DRAWING NO:
25-387	CAL	DR	70-100
SHEET NO:	REVISION:		
01	02		