



9. Flood Risk and Drainage

- 9.1. This section seeks to address the comments made by the Lead Local Flood Authority on 16 February 2024.
- 9.2. The LLFA gave raised concerns about the impact of the proposed solar panels on the volume and concentration of overland flows and how this may impact neighbouring areas of land. To minimise the risk of increased overland flows, the LLFA have requested that additional mitigation measures are considered. The enclosed letter (Appendix 8) and the revised solar infrastructure layout (Figure 4 and Figure 5) provide the necessary information requested in terms of mitigation on the site.
- 9.3. Secondly, it is acknowledged that the LLFA states that it is essential that the SuDS features, and mitigation measures are maintained throughout the development's lifetime to ensure their successful operation. The submissions at Appendix 8 includes a draft Operation and Maintenance Manual that provides general guidance and typical details for the operation and management of SuDS and mitigation features proposed on site and will need to be reviewed and revised following appointment of the site's management company. The applicant is happy to accept a suitably worded condition to secure the provision of this manual.
- 9.4. It is acknowledged that the LLFA have submitted a further response (dated 19th March) outlined that their concerns have been addressed and that the holding objection can be removed. The LLFA have included a number of conditions that the applicant is happy to be imposed to a future consent. Since the submission of this response, the layout has been updated to reflect the need for additional access works to meet the requirements of the Fire Department. This has not changed the location or number of swales proposed the drawing has been updated to reflect the new layout only.

Appendix 8

Project Name: Chimmens Solar Farm

Report Name: Response to LLFA Holding Objection

Author: Lucy Ginn

Approved by: Luke Johnson

Date: 14/05/2024

Project Number: P22-1221

Introduction

This document provides a response to the holding objection received from Kent County Council as Lead Local Flood Authority to the proposed Chimmens Solar Farm (application no: 23/03181/FUL). The holding objection was received on the 16th January 2024 from Lucy Senior (Flood Risk Officer). The LLFA's comments are enclosed at the end of this document.

This document has been split into sections identified as the key concerns raised by the LLFA within their holding objection.

Version 3 of this document has been updated to reflect the new site layout which includes the provision of a secondary access and enlarged turning heads.

Impact of Proposed Solar Panels on Surface Water Runoff

The LLFA have raised concerns about the impact of the proposed solar panels on the volume and concentration of overland flows and how this may impact neighbouring area of land. To minimise the risk of increased overland flows, the LLFA have requested that additional mitigation measures are considered.

In response to these concerns, we would like to point the LLFA to the proposed access track details. A typical access track detail is enclosed at the end of this document. The track section shows that the design has accounted for a drainage swale to be located on the downslope side to the access tracks. Many of the proposed solar panel blocks include an access track and associated drainage swale wrapping around them. These swales will help capture overland flows on site to reduce the risk of impacting neighbouring land. In addition, the proposed site layout and topographic survey have been reviewed to identify any locations at the downslope side of a proposed block of solar panels where there is not currently an access track and associated swale proposed. Here, additional swales have been added to capture any overland flows from the development and promote infiltration of this surface water. A drawing which highlights where current access track drainage swales are proposed and where additional swales will now also be proposed is enclosed at the end of this document. Stone will be placed at the end of solar table rows to allow for maintenance vehicles to turn across swales during operation of the solar farm.

In addition to raising concerns about surface water flows at the downslope side of blocks or solar arrays, the LLFA have also highlighted the risk of concentrated surface water flows between rows of solar panels, suggesting additional measures should be incorporated to mitigate this risk. In response to these concerns, we would like to direct the LLFA to the proposed Landscape Masterplan enclosed at the end of this document. The Landscape Masterplan highlights that below proposed solar panels, a "grazing mixture" will be planted to comprise "species-rich grassland". Land below the panels will not be left as bare ground. Cook and McCuen's 2013 report on the "Hydrologic Response of Solar Farms" states that "with well-maintained grass underneath the panels, the solar panels themselves do not have much effect on total volumes of the runoff". It is therefore considered that the proposed landscaping on site will offer sufficient mitigation measures against the potential for concentrated flow paths between rows of solar

panels. In addition, to ensure suitable maintenance of the grass cover below the solar panels, it is proposed to develop a grazing strategy for the site. It is requested that this grazing strategy is conditioned and developed in detail at a later stage.

Maintenance of SuDS Features and Mitigation Measures

The LLFA's holding objection details that it is essential that SuDS features, and mitigation measures are maintained throughout the development's lifetime to ensure their successful operation. As mentioned above, a grazing strategy should be implemented on site to ensure sufficient grass cover is maintained below proposed solar panels. A high-level Operation and Maintenance Manual for the other SuDS and mitigation features on site is enclose at the end of this document. It is however noted that the management company for the site has not yet been appointed and as such, the manual provides general advice which should be reviewed and revised following appointment of the management company.

Summary

Based on the above, we would request that the LLFA review the additional information provided and remove the holding objection. We would welcome your earliest consideration of this additional information.

Enclosures

Kent County Council LLFA Holding Objection

Typical Access Track Detail

Proposed Mitigation Measures – Swale Drawing

Landscape Masterplan

Operation and Maintenance Manual

Kent County Council Holding Objection



Ashley Bidwell
Sevenoaks District Council
Council Offices
Argyle Road
Sevenoaks
Kent
TN13 1HG

Flood and Water Management
Invicta House
Maidstone
Kent
ME14 1XX

Website: www.kent.gov.uk/flooding
Email: suds@kent.gov.uk
Tel: 03000 41 41 41
Our Ref: SEDC/2023/098608
Date: 16 January 2024

Application No: 23/03181/FUL

Location: Chimmens Solar Farm Land At Speedgate Farm Mussenden Lane Horton Kirby Kent

Proposal: Construction and operation of a solar farm with all associated works, equipment necessary infrastructure and biodiversity net gains. New Access Track.

Thank you for your consultation on the above referenced planning application.

Kent County Council as Lead Local Flood Authority have the following comments:

It is understood that the surface water for the newly created **impermeable areas** of the site will be managed through using filter drains and swales which we have no objection to in principle.

We expect that any rainfall upon the **solar arrays** will generally be shed between the rows of the panels onto the ground and whilst we have no objections to this in principle, given it is proposed to utilise various forms of meadow planting and to chisel plough the site in order to protect from soil mobilisation/erosion there are other concerns raised. Given the permeable nature of the soils and the gradients present there is a risk that a greater volume of overland flows could be experienced as a result of the concentrated volumes of water from the panels falling onto a smaller area of land than previously experienced. It is essential that volumes of runoff are not increased to safeguard neighbouring areas of land.

Whilst understanding that the chisel ploughing will help to hold back water on site; in order to minimise any potential risk of overland flows, we would seek that additional measures of runoff protection are examined further. Some of these measures may include:

- Incorporating bunds, filter drains or other measures to interrupt flows of water between rows of solar arrays to disperse water flows over the surface and promote infiltration into the soils.
- Incorporating wide grassed filter strips at the downstream side of blocks of solar arrays and maintaining the grass at a long length to interrupt water flows and promote infiltration.

- Incorporating gravel filled filter drains or swales at the downstream side of blocks of solar arrays to help infiltrate run-off (where ground conditions allow).
- Vegetated strips through a combination of wildflowers and or grass along with buffer strips around the perimeter of the fields buffer strips will be left uncut to capture any runoff leaving the site.

Whilst such measures detailed above will reduce impacts, It is essential that the vegetated buffer strips and planting around the panels are maintained throughout the lifetime of its operation. Future removal/ lack of maintenance may result in increased runoff/ erosion. As a result, a suitable maintenance regime is required to ensure erosion and runoff are controlled.

Whilst outside of our remit we would also advise that, from dealing with past applications, from a biodiversity perspective we understand that arisings from grass maintenance activities will be required to be removed from site, this should be considered so as to not be detrimental to the protection offered and also from a cost/viability aspect.

We also note that the site is in source protection zone 3. Consultation with the Environment Agency early in the planning process is recommended to identify any constraints or specific requirements in this area that may impact the proposed SuDs methods

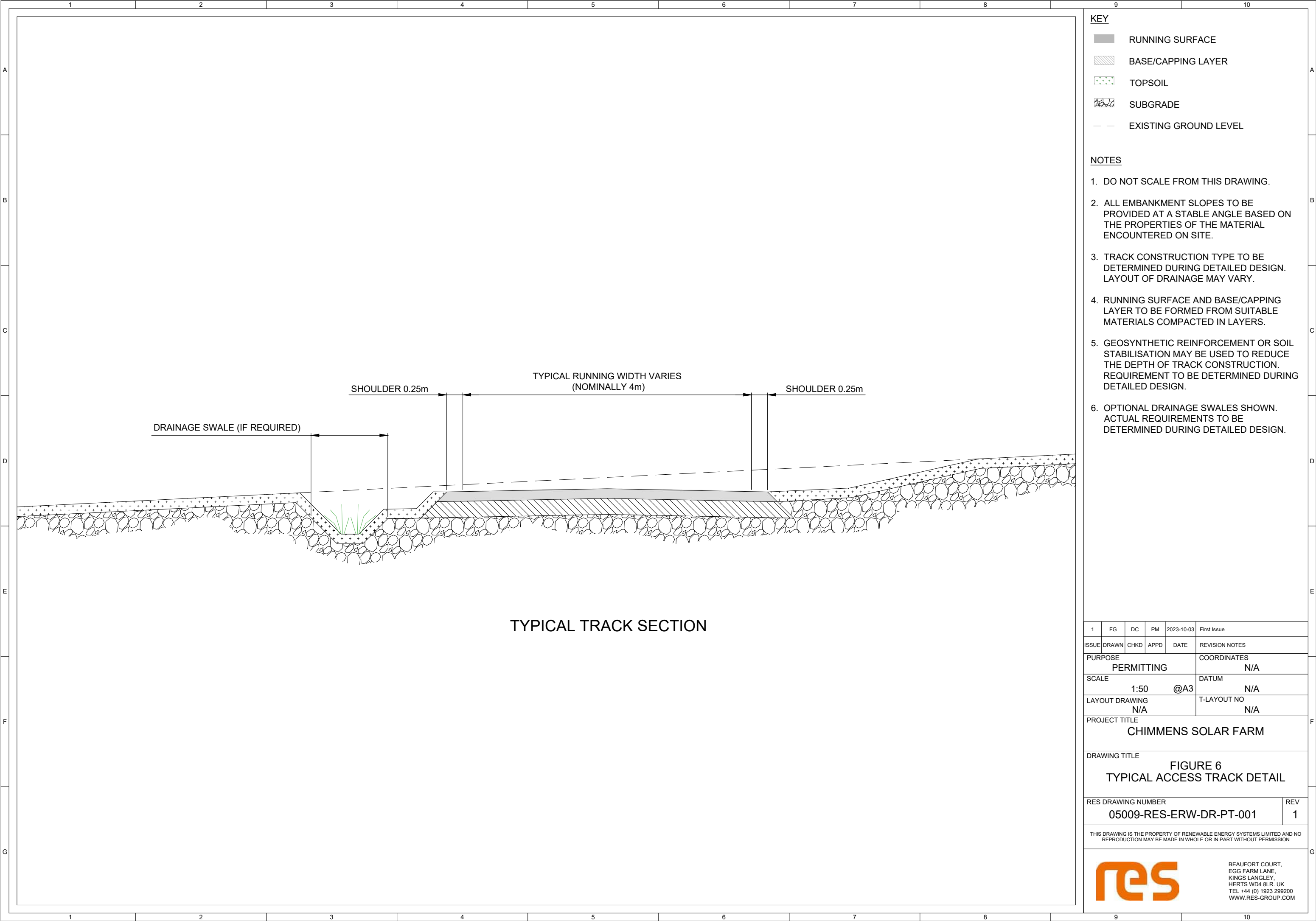
The LLFA would request a holding objection and seek that these points are looked into further and whether any of these measures can be incorporated into the design before the application is decided (A statement would be sufficient at this stage to alleviate our concerns).

This response has been provided using the best knowledge and information submitted as part of the planning application at the time of responding and is reliant on the accuracy of that information.

Yours faithfully,

pp: **Lucy Senior**
Flood Risk Officer
Flood and Water Management

Typical Access Track Detail



Proposed Mitigation Measures – Swale Drawing



N

Key:

- Proposed Access Track
- Proposed Additional Swales
- Overland Flow Path

Notes:

- This drawing has been provided for information purposes, not to be used for construction or costing.
- Do not use this drawing to scale from.
- Pegasus group take no responsibility for the misuse of this drawing.
- Swales have been designed to be 0.5 x 0.5m deep with a 1:3 embankment.

P2	13.05.24	UPDATED SITE LAYOUT	DK	LG
P1	21.02.24	FIRST ISSUE	SB	LAJ
REV	DATE	DESCRIPTION	REVISED BY	APPROVED BY

PROPOSED SWALE ADDITIONS
SHEET 1

CHIMMENS SOLAR

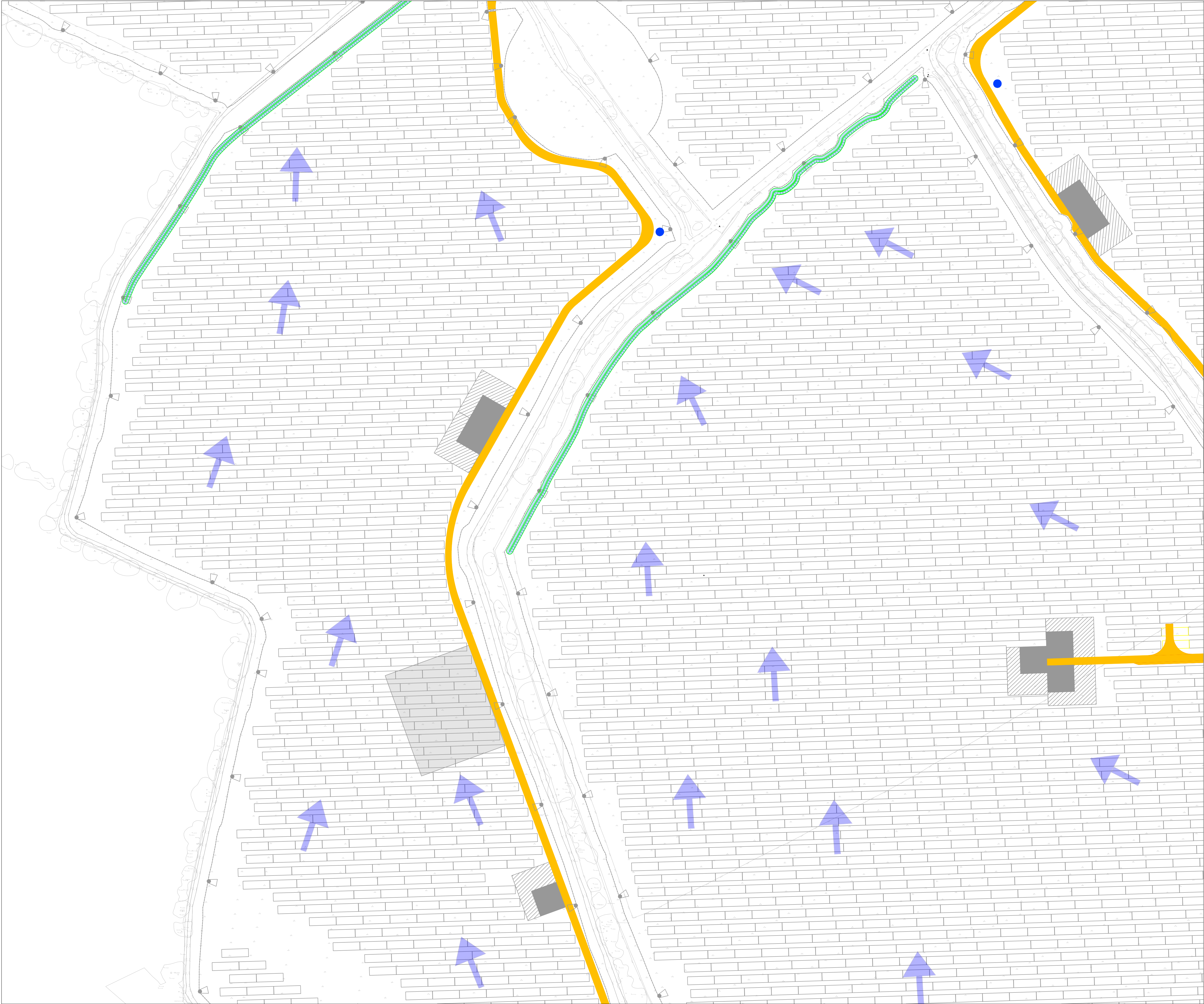
CLIENT:
RES Ltd

DATE: 21.02.2024	SCALE: 1:1000	TEAM/DRAWN BY: SB	APPROVED BY: LAJ
---------------------	------------------	----------------------	---------------------

DRAWING NUMBER:
P22-1221 - PEG-XX-XX-DR-C-0200-P2

PEGASUS REF No: P22-1221	DRAWING STATUS SO	
-----------------------------	----------------------	--

© Pegasus Planning Group Limited. © Crown copyright and database rights OS 100042093. Promap. Licence number 100020449. EmapSite Licence number 0100031673. Terms & Conditions @ pegasusgroup.co.uk



N

Key:

- Proposed Access Track
- Proposed Additional Swales
- Overland Flow Path

Notes:

- This drawing has been provided for information purposes, not to be used for construction or costing.
- Do not use this drawing to scale from.
- Pegasus group take no responsibility for the misuse of this drawing.
- Swales have been designed to be 0.5 x 0.5m deep with a 1:3 embankment.



P2	18.05.24	UPDATED SITE LAYOUT	DK	LG
P1	21.02.24	First Issue	SB	LAJ
REV	DATE	DESCRIPTION	REVISED BY	APPROVED BY

PROPOSED SWALE ADDITIONS
SHEET 2

CHIMMENS SOLAR

CLIENT:
RES Ltd

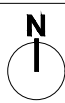
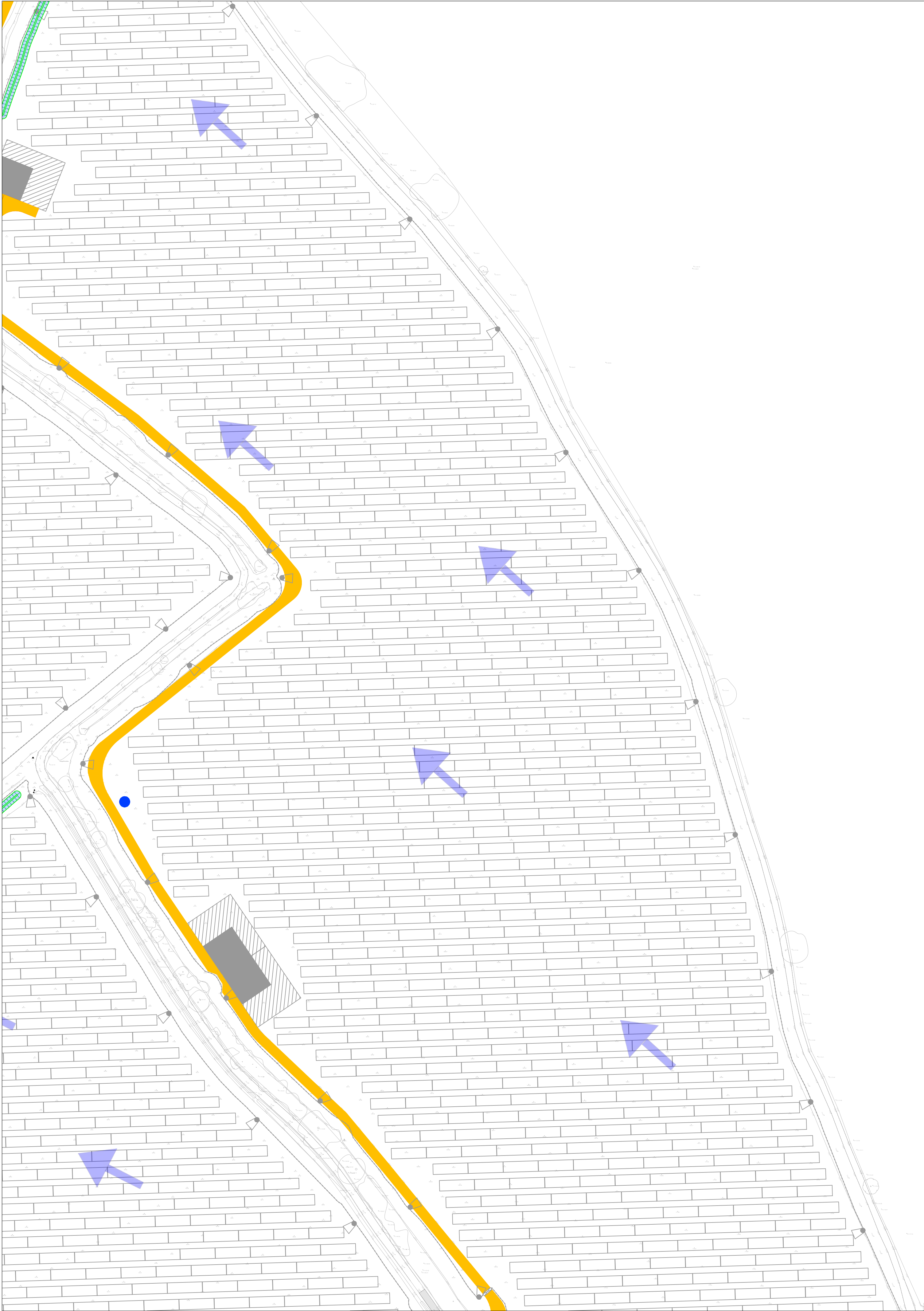
DATE: 21.02.2024
SCALE: 1:1000
TEAM/DRAWN BY: SB
APPROVED BY: LAJ

DRAWING NUMBER:
P22-1221 - PEG - XX - XX - DR - C - 0201 - P2

PEGASUS REF No: P22-1221
DRAWING STATUS: SO

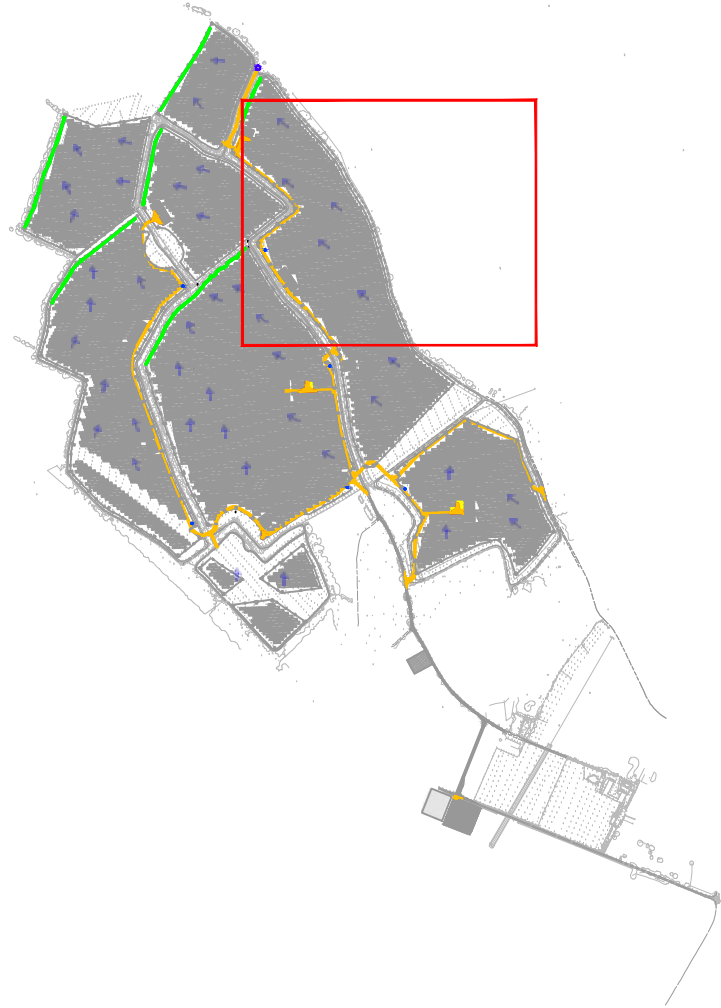


© Pegasus Planning Group Limited. © Crown copyright and database rights OS 100042093. Promap. Licence number 100020449. EmapSite Licence number 0100031673. Terms & Conditions @ pegasusgroup.co.uk



- Key:
- Proposed Access Track
 - Proposed Additional Swales
 - Overland Flow Path

- Notes:
- This drawing has been provided for information purposes, not to be used for construction or costing.
 - Do not use this drawing to scale from.
 - Pegasus group take no responsibility for the misuse of this drawing.
 - Swales have been designed to be 0.5 x 0.5m deep with a 1:3 embankment.



P2	18.05.24	UPDATED SITE LAYOUT	DK	LG
P1	21.02.24	First Issue	SB	LAJ
REV	DATE	DESCRIPTION	REVISED BY	APPROVED BY

PROPOSED SWALE ADDITIONS SHEET 3

CHIMMENS SOLAR

CLIENT:
RES Ltd

DATE:	SCALE:	TEAM/DRAWN BY:	APPROVED BY:
21.02.2024	1:1000	SB	LAJ

DRAWING NUMBER:
P22-1221 - PEG - XX - XX - DR - C - 0202 - P2

PEGASUS REF No:	DRAWING STATUS
P22-1221	SO



© Pegasus Planning Group Limited. © Crown copyright and database rights OS 100042093. Promap. Licence number 100020449. EmapSite Licence number 0100031673. Terms & Conditions @ pegasusgroup.co.uk



N

Key:

Proposed Access Track

Proposed Additional Swales

Overland Flow Path

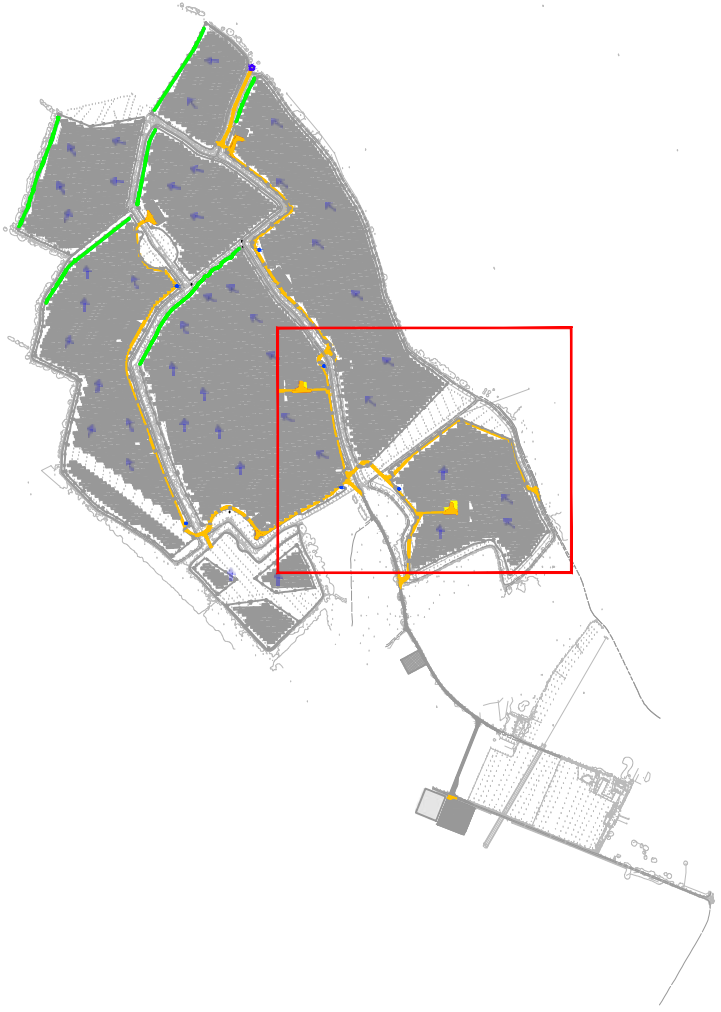
Notes:

1. This drawing has been provided for information purposes, not to be used for construction or costing.

2. Do not use this drawing to scale from.

3. Pegasus group take no responsibility for the misuse of this drawing.

4. Swales have been designed to be 0.5 x 0.5m deep with a 1:3 embankment.



P2	18.05.24	UPDATED SITE LAYOUT	DK	LG
P1	21.02.24	First Issue	SB	LAJ
REV	DATE	DESCRIPTION	REVISED BY	APPROVED BY

PROPOSED SWALE ADDITIONS

SHEET 4

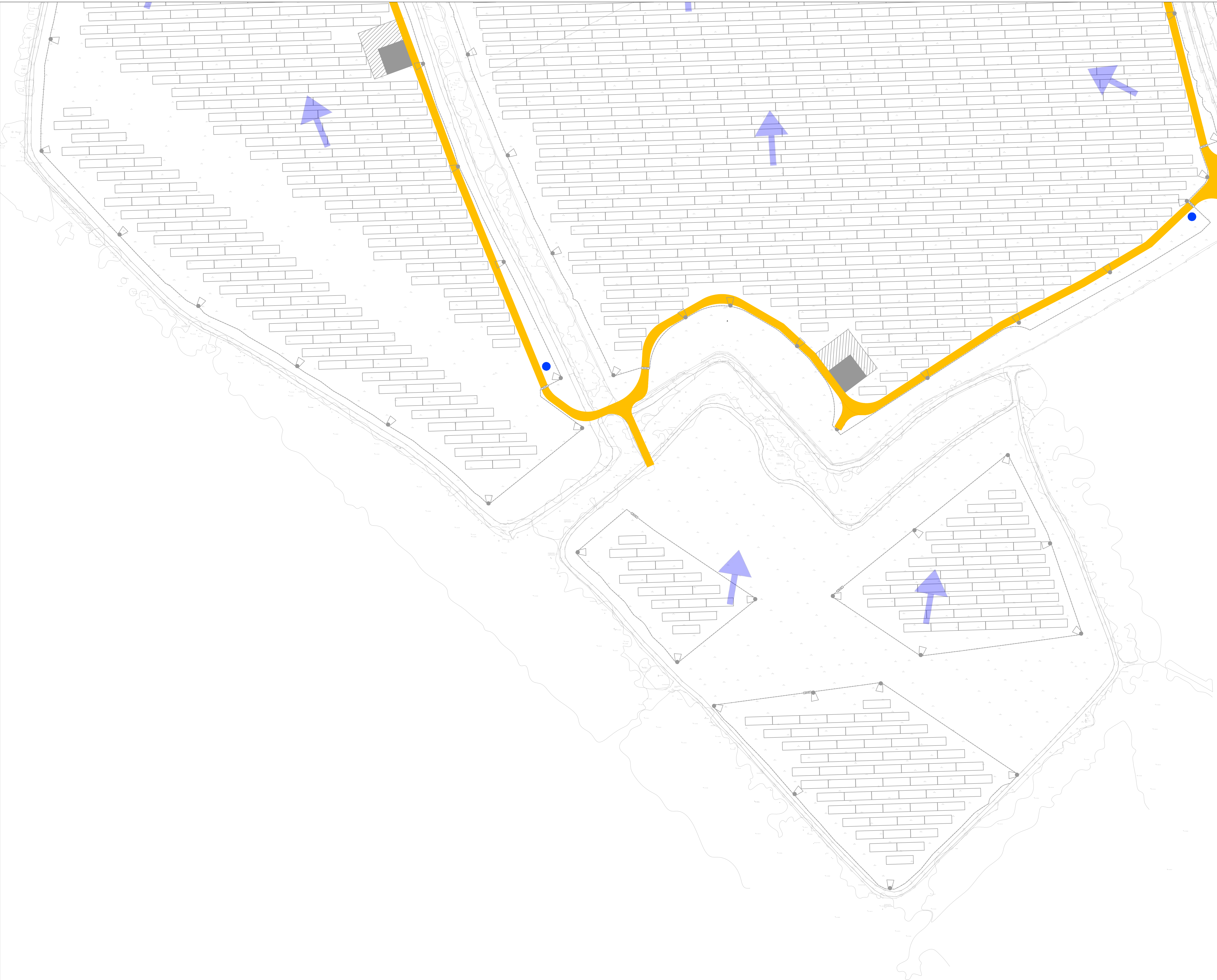
CHIMMENS SOLAR

CLIENT:
RES Ltd

DATE:	SCALE:	TEAM/DRAWN BY:	APPROVED BY:
21.02.2024	1:1000	SB	LAJ

DRAWING NUMBER:
P22-1221 – PEG – XX – XX – DR – C – 0203 – P2

PEGASUS REF No:	DRAWING STATUS	<div>PEGASUS GROUP</div>
P22-1221	SO	



N

Key:

Proposed Access Track

Proposed Additional Swales

Overland Flow Path

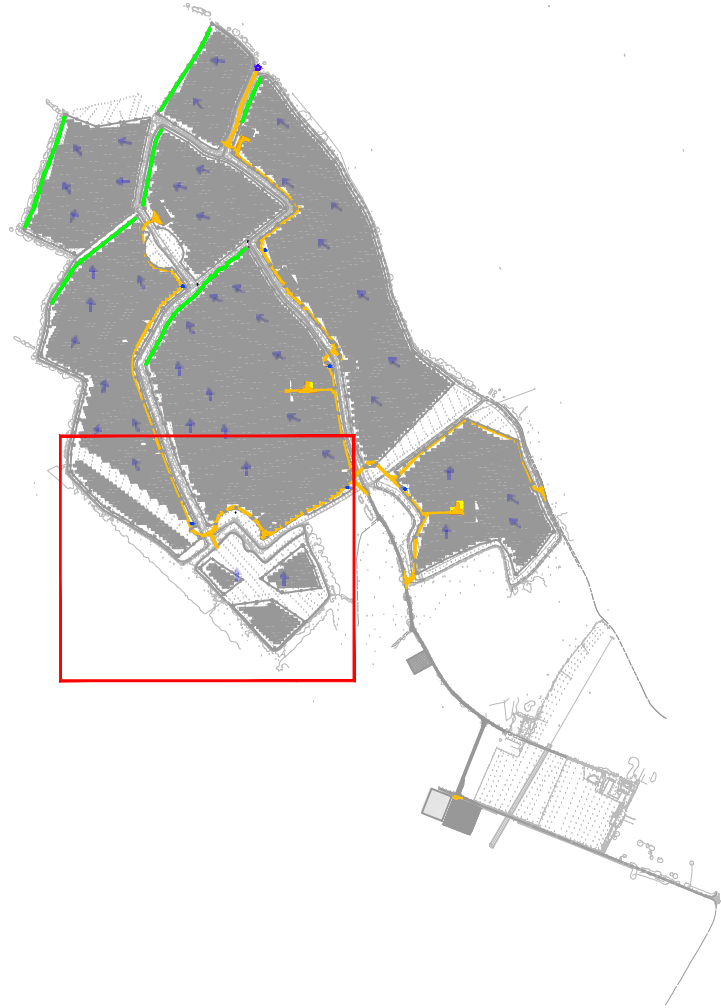
Notes:

1. This drawing has been provided for information purposes, not to be used for construction or costing.

2. Do not use this drawing to scale from.

3. Pegasus group take no responsibility for the misuse of this drawing.

4. Swales have been designed to be 0.5 x 0.5m deep with a 1:3 embankment.



P2	13.05.24	UPDATED SITE LAYOUT	DK	LG
P1	20.02.24	First Issue	SB	LAJ
REV	DATE	DESCRIPTION	REVISED BY	APPROVED BY

PROPOSED SWALE ADDITIONS

SHEET 5

CHIMMENS SOLAR

CLIENT:
RES Ltd

DATE:	SCALE:	TEAM/DRAWN BY:	APPROVED BY:
21.02.24	1:1000	SB	LAJ

DRAWING NUMBER:
P22-1221 – PEG – XX – XX – DR – C – 0204 – P2

PEGASUS REF No:	DRAWING STATUS	<div>PEGASUS GROUP</div>
P22-1221	SO	



N

I

Key:

Proposed Access Track

Proposed Additional Swales

Overland Flow Path

Notes:

1.

This drawing has been provided for information purposes, not to be used for construction or costing.

2.

Do not use this drawing to scale from.

3.

Pegasus group take no responsibility for the misuse of this drawing.

4.

Swales have been designed to be 0.5 x 0.5m deep with a 1:3 embankment.



P2	18.05.24	UPDATED SITE LAYOUT	DK	LG
P1	21.02.24	First Issue	SB	LAJ
REV	DATE	DESCRIPTION	REVISED BY	APPROVED BY

PROPOSED SWALE ADDITIONS

SHEET 6

CHIMMENS SOLAR

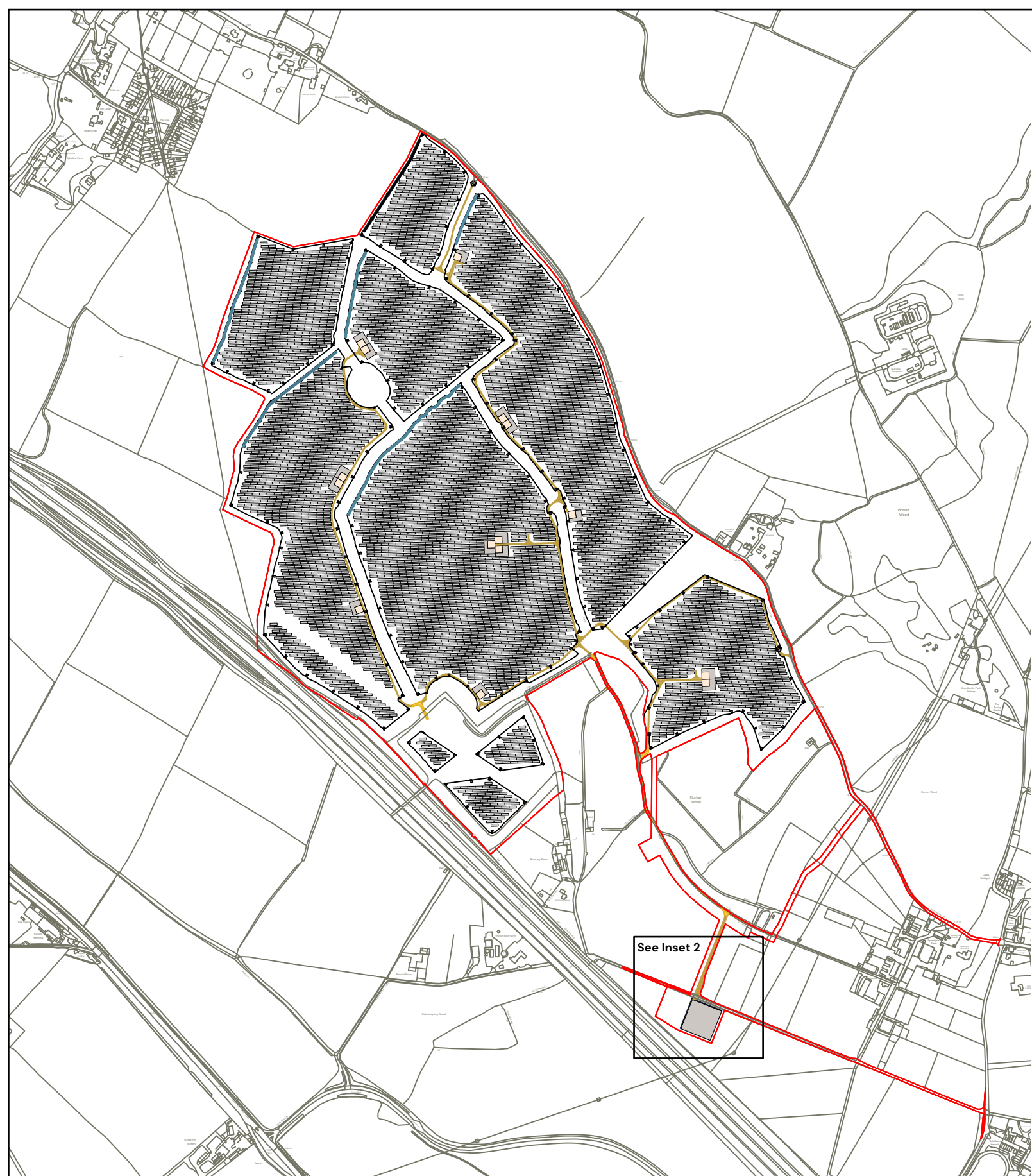
CLIENT:
RES Ltd

DATE:	SCALE:	TEAM/DRAWN BY:	APPROVED BY:
21.02.2024	1:1000	SB	LAJ

DRAWING NUMBER:
P22-1221 – PEG – XX – XX – DR – C – 0205 – P2

PEGASUS REF No:	DRAWING STATUS	<div>PEGASUS GROUP</div>
P22-1221	SO	

Landscape Masterplan



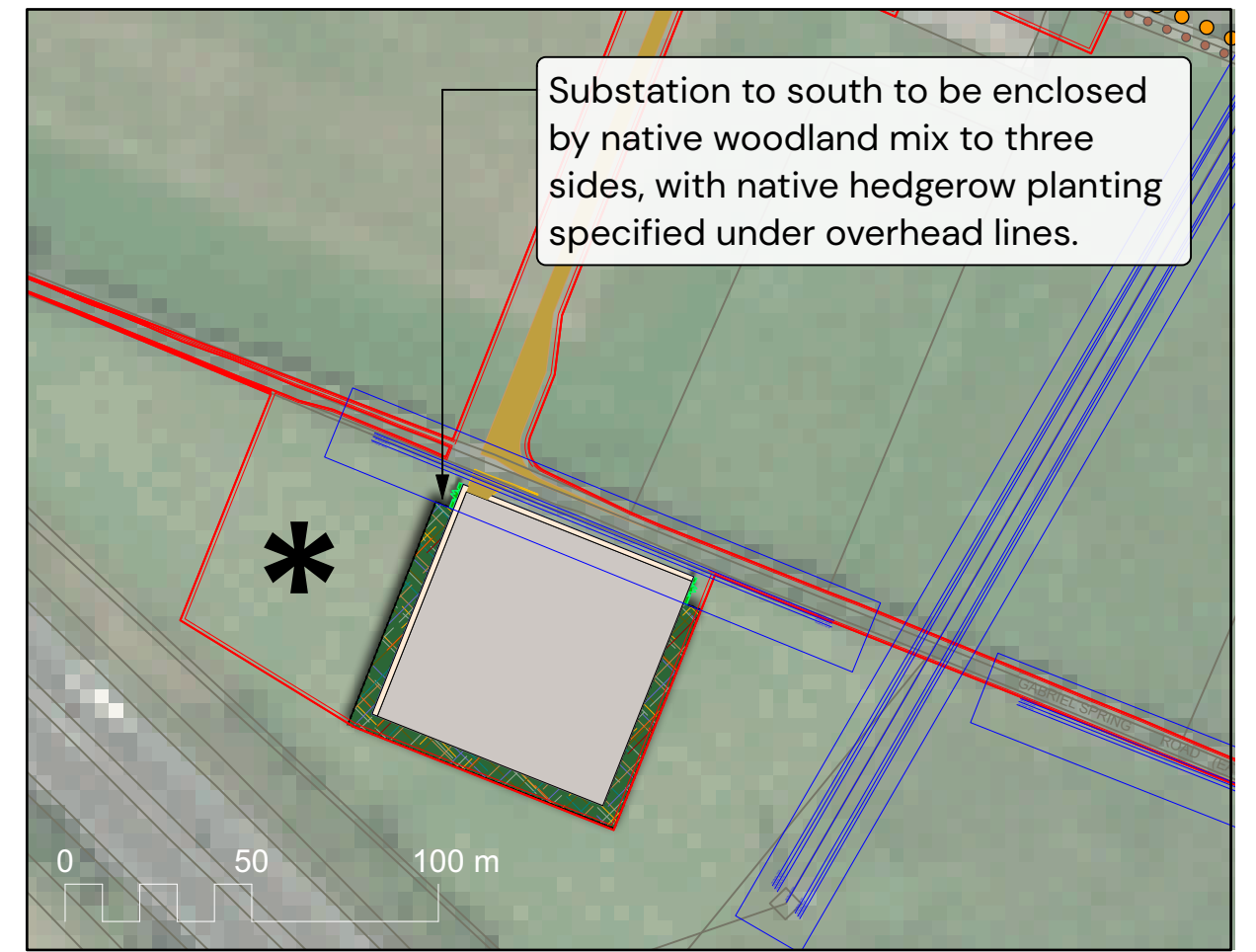
Indicative Planting List

Native Tree Planting			
ID	Plant Species	Size	%
A.c	Alnus glutinosa	10-12cm, 300-350cm ht, B, 2x, Feathered, 7 breaks	10
B.p	Betula pendula	10-12cm, 300-350cm ht, B, 2x, Feathered, 7 breaks	10
F.s	Fagus sylvatica	10-12cm, 300-350cm ht, B, 2x, Feathered, 7 breaks	10
P.a	Prunus avium	10-12cm, 300-350cm ht, B, 2x, selected standard, c.s. 175-200cm, 4 breaks	5
Q.r	Quercus robur	10-12cm, 300-350cm ht, B, 2x, Feathered, 7 breaks	50
S.au	Sorbus aucuparia	10-12cm, 300-350cm ht, B, 2x, selected standard, c.s. 175-200cm, 4 breaks	15

Native Mixed Hedgerows			
ID	Plant Species	Height/Pot Size	%
A.c	Acer campestre	40-60cm ht, B, 1+0, seedling	10
C.a	Corylus avellana	40-60cm ht, B, 1+1, transplant, seed-raised, branched, 2 breaks	25
C.m	Crataegus monogyna	40-60cm ht, B, 1+1, transplant, seed-raised	35
I.a	Ilex aquifolium	40-60cm ht, 2L, leader with laterals	5
P.s	Prunus spinosa	40-60cm ht, B, 1+1, transplant, seed-raised, branched, 2 breaks	10
R.c	Rosa canina	40-60cm ht, 2L, branched, 3 breaks	5
S.c	Salix caprea	40-60cm ht, 2L, cutting, branched, 3 breaks	5
V.o	Viburnum opulus	40-60cm ht, B, 1+1, transplant, seed-raised, branched, 2 breaks	5

Native Woodland Mix			
ID	Plant Species	Height	%
A.c	Acer campestre	60-80cm ht, B, 1+1, transplant, seed-raised	5
B.p	Betula pendula	125-150cm ht, B, 2x, feathered, 3 breaks	10
C.a	Corylus avellana	60-80cm ht, B, 1+2, transplant, seed-raised, branched, 3 breaks	15
C.m	Crataegus monogyna	125-150cm ht, B, 1+2, transplant, seed-raised	15
F.s	Fagus sylvatica	150-175 cm ht, B, 2x, feathered 3 breaks	10
I.a	Ilex aquifolium	60-80cm ht, 5L, leader with laterals	5
P.a	Prunus avium	125-150cm ht, B, 2x, feathered 3 breaks	5
Q.r	Quercus robur	150-175 cm ht, B, 2x, feathered 3 breaks	20
S.c	Salix caprea	60-80cm ht, B, 0/1 cutting, branched, 2 breaks	5
S.a	Sorbus aucuparia	125-150cm ht, B, 2x, feathered 3 breaks	10

* Temporary construction areas to be re-instated to grassland



D	10.05.24	KCH	Amends in line with new layout
C	26.04.24	KCH	Minor amends
B	26.04.24	VR	Amends in line with new layout
A	18.10.23	VR	Amends in line with comments
Rev	Date	By	Note

Landscape Masterplan Speedgate Solar Farm

Client: RES
REV: D
DRWG No: P22-1221_EN_0012
Drawn by: VR
Approved by: DT
Date: 13/10/2023
Scale: as shown @ AO
PEGASUS GROUP

Operation and Maintenance Manual

DRAINAGE OPERATION & MAINTENANCE MANUAL

CHIMMENS SOLAR FARM

On behalf of RES Ltd

Date: 21/02/2024 | Pegasus Ref: P22-1221 – Author: Lucy Ginn





Document Management

Version	Date	Author	Checked/ by:	Approved	Reason for revision
Revision 1	21/02/2024	Lucy Ginn	Luke Johnson		First Issue



Contents

1. INTRODUCTION 1

2. SWALE 1

Figures & Tables

TABLE 2.1:	SWALE MAINTENANCE REQUIREMENTS
------------	--------------------------------

1. INTRODUCTION

- 1.1. This high-level Operation and Maintenance Manual has been produced following a holding objection received from Kent County Council as Lead Local Flood Authority to the proposed Chimmens Solar Farm (application no: 23/O3181/FUL). The holding objection and was received on the 16th January 2024 from Lucy Senior (Flood Risk Officer) and details the need for maintenance of SuDS and mitigation features over the developments lifetime.
- 1.2. This manual provides general guidance and typical details for the operation and management of SuDS and mitigation features proposed on site and will need to be reviewed and revised following appointment of the site's management company.
- 1.3. Where proprietary products are specified the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 1.4. The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

2. SWALE

- 2.1. Swales proposed on site will require regular maintenance to ensure they continue to operate to design performance standards. Those responsible for detailed design at the site should provide detailed specifications and frequencies for the required maintenance activities along with likely machinery requirements and typical annual costs. The treatment performance of swale is dependent on the maintenance, and robust management plans will be required to ensure maintenance is carried out in the long term. Different designs will have different operation and maintenance requirements.
- 2.2. Maintenance of swales is relatively straightforward for landscape contractors, and typically there should only be a small amount of extra work (if any) required for a swale over and above what is required for standard public open space. Provided that landscape management is already required at site, swale maintenance should have marginal cost implications.
- 2.3. Adequate access should be provided to the swale areas for inspection and maintenance, including for appropriate equipment and vehicles. Litter and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task.
- 2.4. The major maintenance requirement for a swale is mowing. Mowing should ideally retain grass lengths of 75–100mm across the main treatment surface, to assist in filtering pollutants and retaining sediments and to reduce the risk of flattening during runoff events. However, longer vegetation lengths, where appropriate, are not considered to pose a significant risk to functionality.

- 2.5. Occasionally sediment will need to be removed (once exceeding 25mm in depth) although this can be minimised by ensuring that upstream areas are stabilised and by incorporating effective pre-treatment devices.
- 2.6. The suggested swale maintenance requirements are included in Table 2.1.

Table 2.1 – 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 specified design range	Monthly (during growing season), or as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surface for ponding, compaction, silt accumulation, record areas where water is ponding for >48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, 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 reseeded	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up soil deposits and prevent compaction of the soil surface	As required
	Remove build-up of Sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues	As required



	using safe standard practices	
--	-------------------------------	--

Expertly Done.

DESIGN | ECONOMICS | ENVIRONMENT | HERITAGE | LAND & PROPERTY | PLANNING | TRANSPORT & INFRASTRUCTURE



All paper sources from sustainably managed forests

Pegasus Group is a trading name of Pegasus Planning Group Limited (07277000) registered in England and Wales.

Registered office: Querns Business Centre, Whitworth Road, Cirencester, Gloucestershire, GL7 1RT
We are ISO certified 9001, 14001, 45001



Pegasus_Group



pegasusgroup



Pegasus_Group

PEGASUSGROUP.CO.UK