Site Boundary

Landlord's Boundary

NORTH WARWICKSHIRE BOROUGH COUNCIL
RECEIVED
22/02/2023
PLANNING & DEVELOPMENT DIVISION

N

Pond
140.5m
131.4m
Sinks
MERIDEN ROAD
Path (um)
Pond
129.5m
FB
138.1m
Track
B 4102
Path (um)
Track
135.5m
133.7m
Track
MERIDEN ROAD
Mast
M 6
Path (um)
Issues
Pond
Moat House Farm
Sinks
LB
Moor House Lodge
139.9m
Pump
The Moor House
Lower

0 20 50 100 200m

COMMENTS:

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:
Rev A		AMS		08/11/2022

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:

Scale:	Drawn by:	Checked by:	Signed by PM:	Date checked:	Page:	Sheet size:
1:1250	AMS				1 of 1	A0

SITE ADDRESS:
Nailcote Farm
Nailcote Lane
Berkswell, Coventry

CV7 7DE

PROJECT NAME:
Nailcote Farm

TITLE:
Site location plan

DRAWING No.:
P.NailcoteFarm_04_SiteLocationPlan

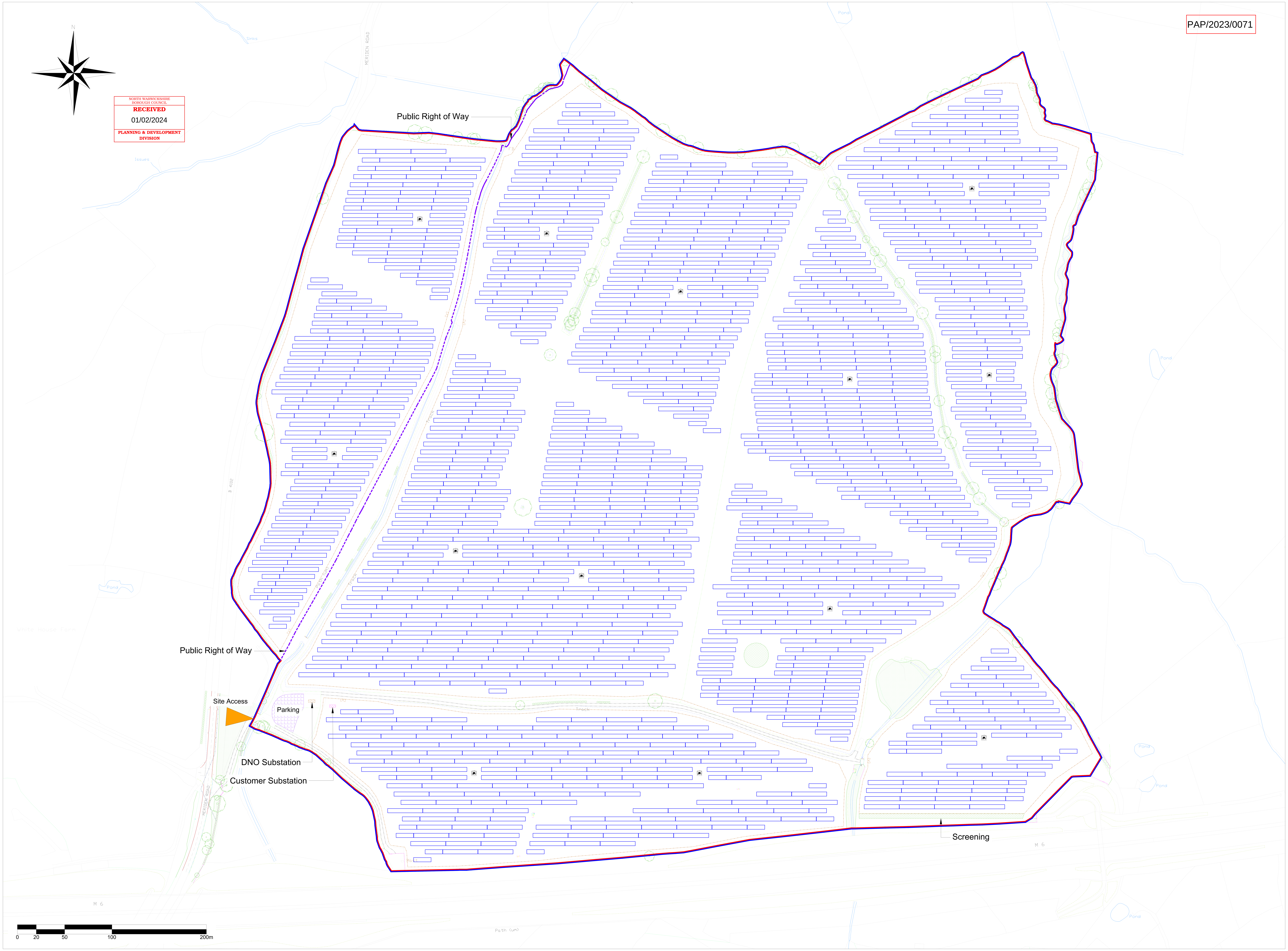
REV:
Rev A

ENVIROMENA

ADDRESS:
Enviromena Project Management UK Ltd
Tel: +44 330 107 1415
15 Diddenham Court, Grazeley
Reading, RG7 1JQ, United Kingdom

PAP/2023/0071

NORTH WARWICKSHIRE BOROUGH COUNCIL
RECEIVED
01/02/2024
PLANNING & DEVELOPMENT DIVISION



LEGEND

- Landlord Boundary
- Site Boundary
- Site Access
- Fence
- PV Array
- Transformer Station
- DNO Substation
- Customer Substation
- Public Right of Way

REV	DESCRIPTION	BY	DATE
D	Drawing created using General Layout RevP	CC	16/01/24
C	Drawing created using General Layout RevO	CC	10/01/24
B	Drawing created using General Layout RevN	AMS	06/11/23
A	Drawing created using General Layout RevM	CC	20/10/23

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
Reading, RG7 1JQ
T: +44 330 107 1415

SITE ADDRESS
Nailcote Farm
Nailcote Lane
Berkswell
Coventry
CV7 7DE

PROJECT
Fillongley Solar

TITLE
Planning Layout

NUMBER	REVISION
P.NailcoteFarm_09_PlanningLayout	D

SCALE (A0)	SHEET	DRAWN	APPROVED
1:1250	1 OF 1	CC	AMS

LEGEND

- Landlord Boundary
- Site Boundary
- Site Access
- Fence
- PV Array
- Transformer Station
- DNO Substation
- Customer Substation
- Public Right of Way

Landscaping details from FPCR Landscape Strategy reference 11370-FPCR-XX-XX-DR-L-0001 P14

- Native Shrub Mix
- Proposed Tree
- Native Hedgerow
- Meadow Grassland
- Shade Meadow
- Community Garden

Drainage details from BWB Drainage Strategy reference NFW-BWB-ZZ-XX-DR-CD-0001 P06

- Swale

REV	DESCRIPTION	BY	DATE
H	Drawing updated using General Layout RevT	CC	02/08/24
G	Drawing updated using General Layout RevS	CC	30/07/24
F	Drawing updated using General Layout RevR	CC	29/04/24
E	Drawing updated using General Layout RevQ	CC	10/04/24
D	Drawing updated using General Layout RevP	CC	16/01/24
C	Drawing updated using General Layout RevO	CC	10/01/24
B	Drawing updated using General Layout RevN	AMS	06/11/23
A	Drawing created using General Layout RevM	CC	20/10/23

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
Reading, RG7 1JQ
T: +44 330 107 1415

SITE ADDRESS
Land 800 metres South of Park House Farm
Meriden Road
Fillongley

PROJECT
Fillongley Solar

TITLE
Planning Layout

NUMBER
P007039-09-PlanningLayout

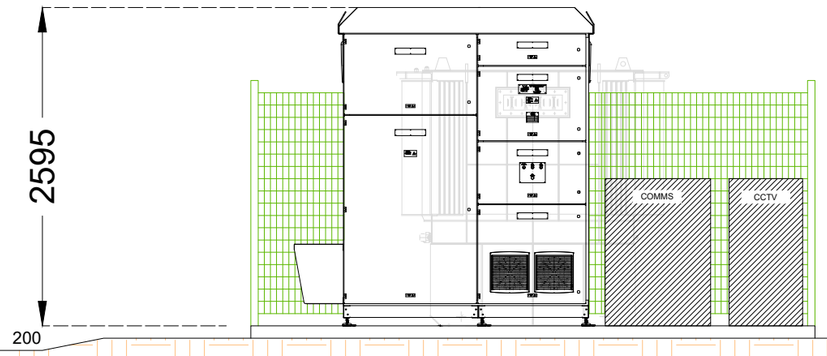
SCALE (A0)	SHEET	REVISION
1:1250	1 OF 1	H

DRAWN	CHECKED	APPROVED
CC	CC	CC

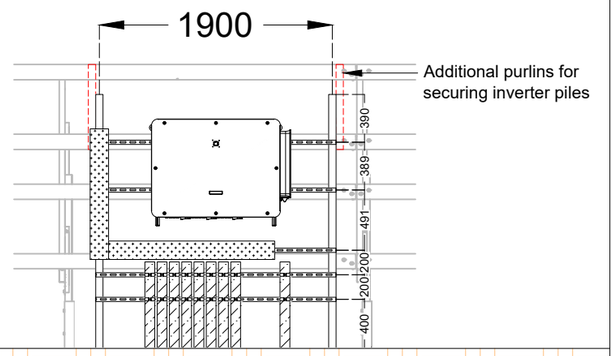
PAP/2023/0071

LEGEND

Transformer Station

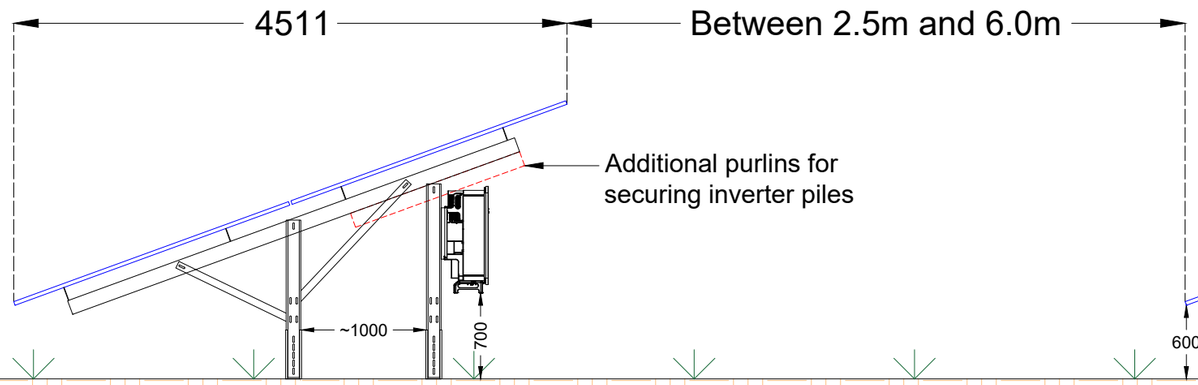


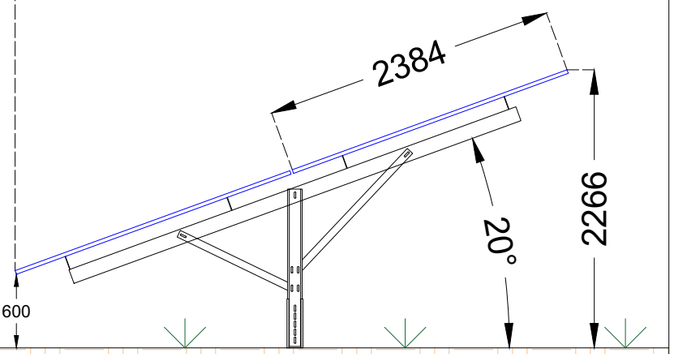
Inverter Mounting



Ground Level

Array Side View (2P/20°)





REV	DESCRIPTION	BY	DATE
B	Updated to match General Layout RevM	CC	26/10/23
A	Drawing created	AMS	05/12/22

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
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SITE ADDRESS
Nailcote Farm
Nailcote Lane
Berkswell
Coventry
CV7 7DE

PROJECT
Fillongley

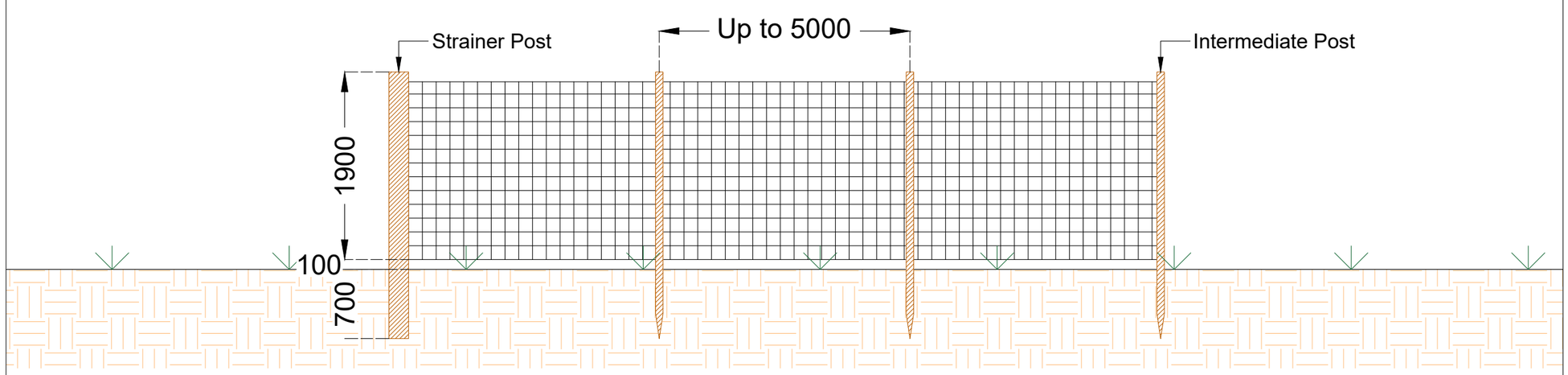
TITLE
Section Views

NUMBER	REVISION
P.NailcoteFarm_06_SectionViews	B

SCALE (A3)	SHEET	DRAWN	APPROVED
1:50	1 OF 2	AMS	CC

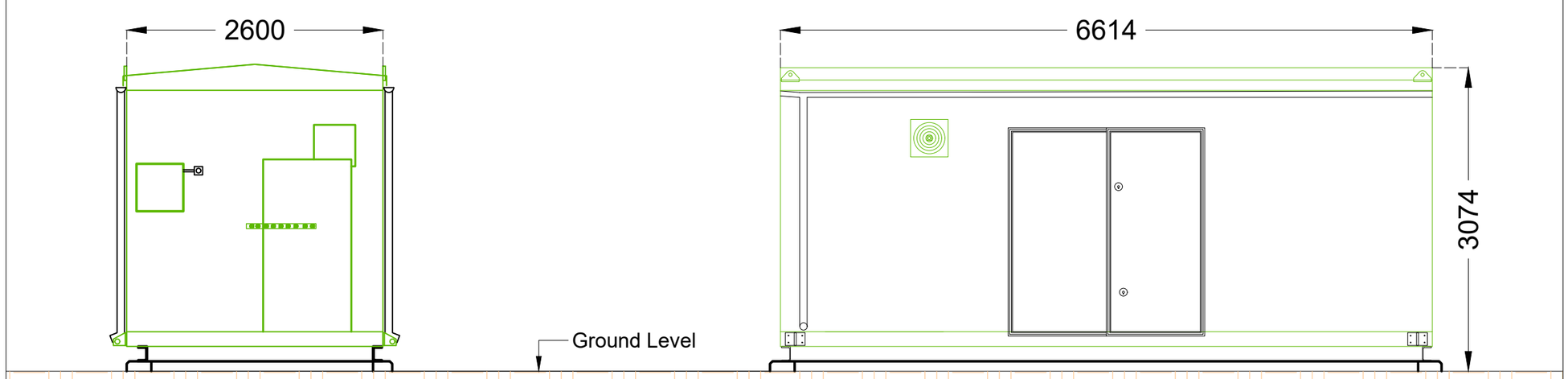
LEGEND

Deer Fencing



Customer Substation Side View

Customer Substation Front View



REV	DESCRIPTION	BY	DATE
B	Updated to match General Layout RevM	CC	26/10/23
A	Drawing created	AMS	05/12/22

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
Reading, RG7 1JQ
T: +44 330 107 1415

SITE ADDRESS
Nailcote Farm
Nailcote Lane
Berkswell
Coventry
CV7 7DE

PROJECT
Fillongley

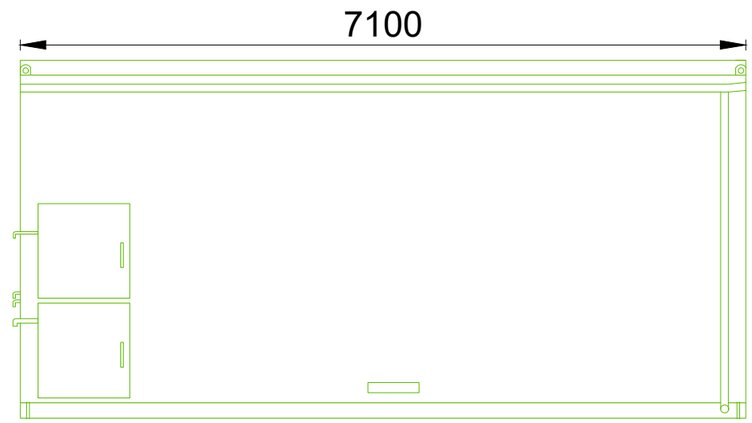
TITLE
Section Views

NUMBER	REVISION
P.NailcoteFarm_06_SectionViews	B

SCALE (A3)	SHEET	DRAWN	APPROVED
1:50	2 OF 2	AMS	CC

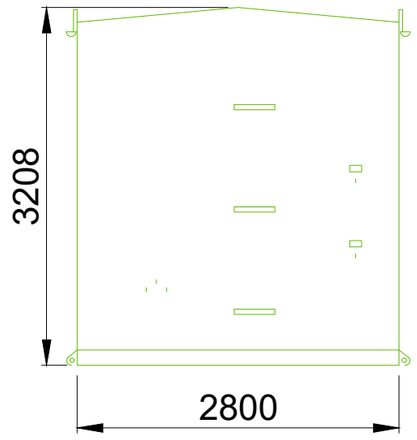
PAP/2023/0071

LEGEND

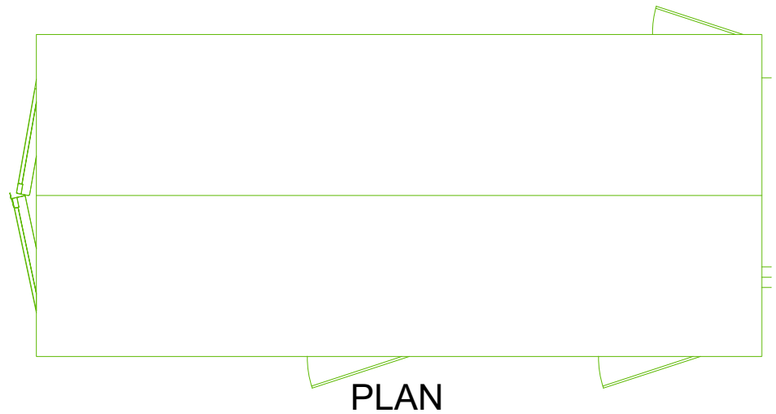


BACK ELEVATION

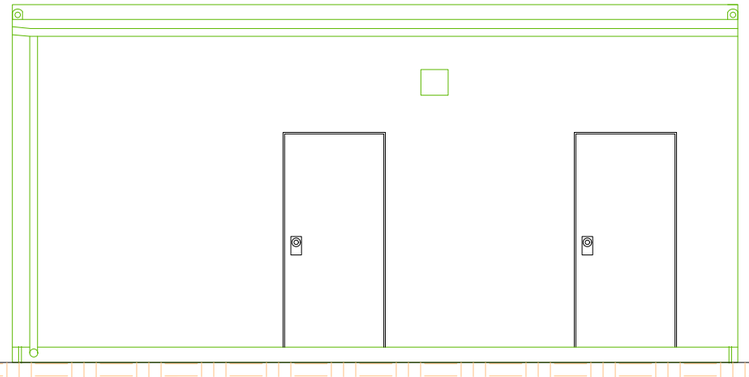
DNO Substation



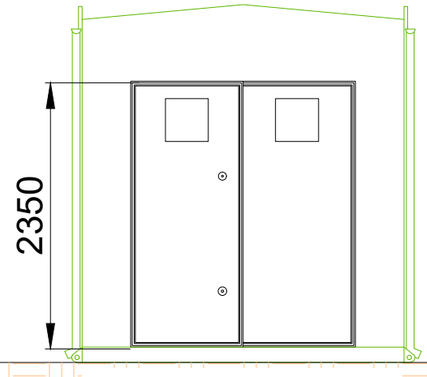
SIDE ELEVATION



PLAN



FRONT ELEVATION



SIDE ELEVATION

NORTH WARWICKSHIRE BOROUGH COUNCIL

RECEIVED

5/02/2024

PLANNING & DEVELOPMENT DIVISION

REV	DESCRIPTION	BY	DATE
A	Drawing created	CC	02/02/24

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
Reading, RG7 1JQ
T: +44 330 107 1415

SITE ADDRESS
Nailcote Farm
Nailcote Lane
Berkswell
Coventry
CV7 7DE

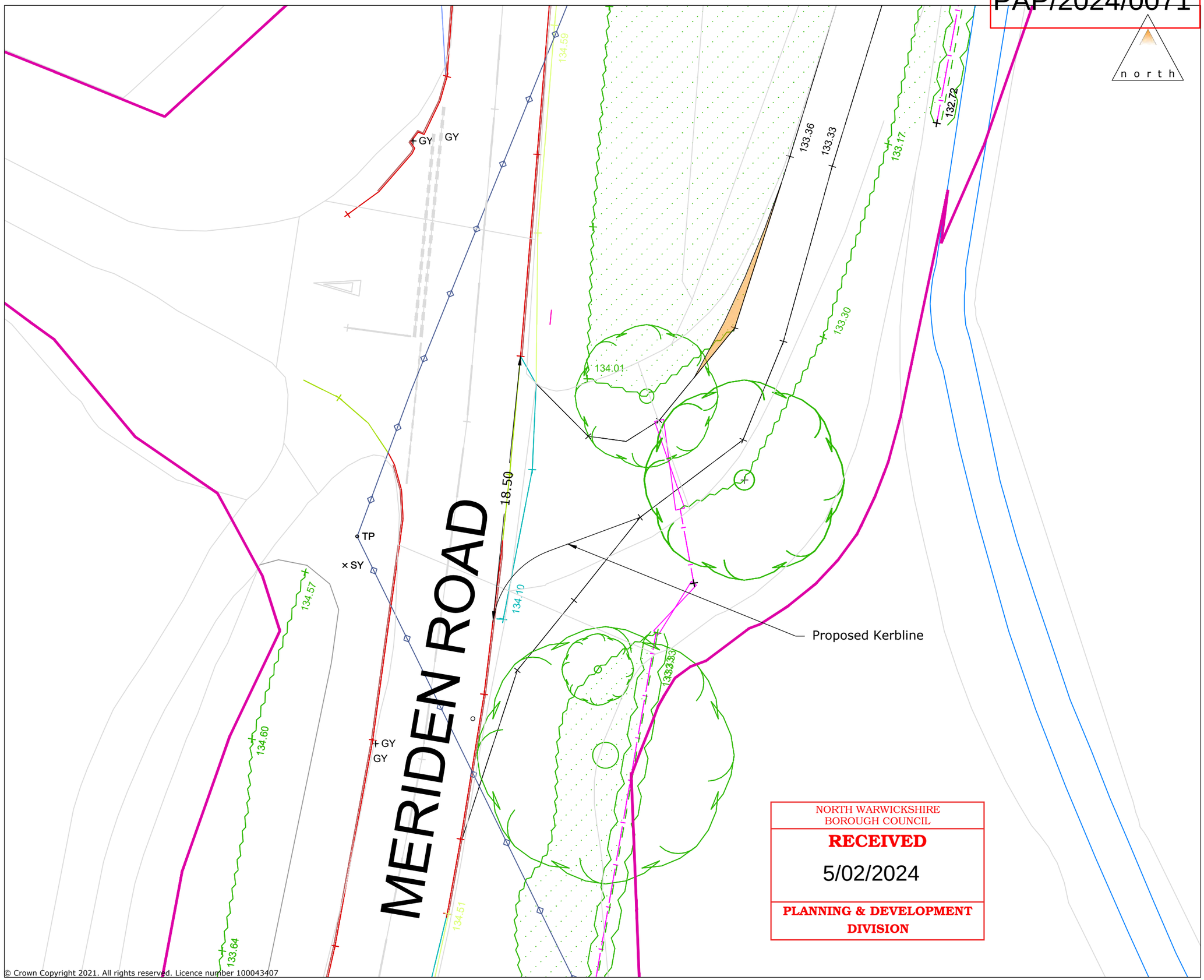
PROJECT
Fillongley Solar

TITLE
DNO Substation Section Views

NUMBER	REVISION
P007039-11-DNOSubSections	A

SCALE (A3)	SHEET	DRAWN	APPROVED
1:60	1 OF 1	CC	CC

PAP/2024/0071



NORTH WARWICKSHIRE BOROUGH COUNCIL
RECEIVED
5/02/2024
PLANNING & DEVELOPMENT DIVISION

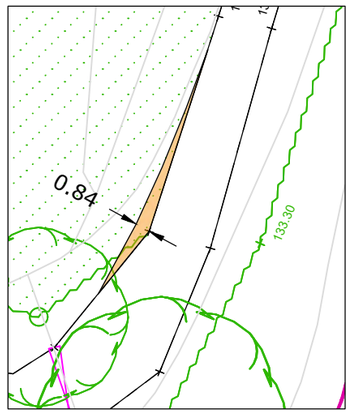
C:\Users\andrewnock\Motion\StaffSite - Epfill 2210072\2210072 - 05 Access Junction.dwg

Rev:	Description:	Date:	Rev By:	Chk'd:
A	Added Highway Boundary	09/05/23	DR	AN

KEY

Highway Boundary

Road Widening Extent



motion
Quadrant House, Broad Street, Mall, Reading
RG1 7QE
T: 01483 531 300
Guildford - London - Reading
www.motion.co.uk

Project:
Land East of Meriden Road

Title:
Access Junction

Client:
Enviromena

Drawing Status:

Scale: 1:250 (@ A3) Date:05/02/2024

Drawn: AN Checked: JNR Approved: JNR

Drawing: 2210072 - 05

Revision: -

PAP/2023/0071

Proposed Landscape Mitigation

Species listed below consider site constraints and meet the required landscape and managements strategies outlined in the relevant landscape character study. This is only an indicative list of potential species that could be used on the site.

Proposed Meadow Grassland

SPECIAL Solar Park Diverse Low Maintenance Mix (Cotswold Seeds Ltd) Management/maintenance details provided by the supplier/manufacturer. Basic sowing rate 10kg/acre.

1.40 kg	(1.4)	certified Toddington perennial ryegrass
0.50 kg	(0.5)	certified Teno smaller catstail
0.65 kg	(0.65)	certified Winnetou timothy
1.50 kg	(1.5)	certified Evora smooth stalked meadow grass
1.25 kg	(1.25)	certified Maxima creeping red fescue
0.50 kg	(0.5)	certified Archibal slender creeping red fescue
1.85 kg	(1.85)	certified Caracter red/chewings fescue
0.40 kg	(0.4)	certified Senu meadow fescue
0.20 kg	(0.2)	certified Merwi white clover
0.20 kg	(0.2)	certified S184 wild white clover
0.40 kg	(0.4)	certified Leo birdsfoot trefoil
0.05 kg	(0.05)	certified Virgo Pajbjerg yellow trefoil
0.70 kg	(0.7)	Burnet forage herb
0.25 kg	(0.25)	certified Altaswede late flowering red clover
0.15 kg	(0.15)	certified Aurora alsike clover

Proposed Shade/Semi-Shade Tolerant Meadow

Hedgerow mixture (Emorsgate EH1) or similar approved product. Management/maintenance detail provided by the supplier/manufacturer. Basic sowing rate of 4g/m2.

Achillea millefolium	*Yarrow*	*0.10%*
Alliara petiolata	*Garlic Mustard*	*1.00%*
Anthriscus sylvestris	*Cow Parsley*	*0.50%*
Carex divulsa spp.divulsa	*Grey Sedge*	*1.50%*
Centaura nigra	*Common Knapweed*	*2.00%*
Chaerophyllum temulum	*Rough Chervil*	*3.00%*
Cruciata laevipes	*Crosswort*	*2.00%*
Dipacus fullonum	*Wild Teasel*	*0.20%*
Galium album	*Hedge Bedstraw*	*0.50%*
Geranium pratense	*Meadow Crane's-bill*	*0.10%*
Geranium pyreniacum	*Hedge Crane's-bill*	*1.00%*
Geum urbanum	*Wood Avens*	*0.30%*
Knautica arvensis	*Field Scabious*	*0.20%*
Leucanthemum vulgare	*Moon Daisy*	*1.00%*
Malva moschata	*Musk Mallow*	*1.00%*
Plantago lanceolata	*Ribwort Plantain*	*2.00%*
Silene dioca	*Red Campion*	*3.00%*
Silene flos-cuculi	*Ragged Robin*	*0.50%*
Torilis japonica	*Upright Hedge-parsley*	*0.10%*
Agrostis capillaris	*Common Bent*	*1.00%*
Anthoxanthum odoratum	*Sweet Vernal-Grass*	*2.00%*
Brachypodium sylvaticum	*False Brome*	*1.00%*
Cynosurus cristatus	*Crested Dogstail*	*50.00%*
Deschampsia cespitosa	*Tufted Hair-grass*	*2.00%*
Festuca rubra	*Red Fescue*	*20.00%*
Poa nemoralis	*Wood Meadow-grass*	*4.00%*

Proposed Trees

(Exact species will depend on location of tree, proximity to PV's and Ultimate Height)

Quercus robur	*English Oak*	*10-12cm*
Prunus avium	*Bird Cherry*	*10-12cm*
Alnus glutinosa	*Alder*	*10-12cm*
Betula pendula	*Birch*	*10-12cm*
Salix caprea	*Goat Willow*	*10-12cm*
Crataegus monogyna	*Hawthorn*	*10-12cm*
Malus sylvestris	*Crab Apple*	*8-10cm*
Acer campestre	*Maple*	*10-12cm*

Proposed Native Hedgerow

(Hedgerow to be maintained at a height of 2.5m)

Cornus sanguinea	*Common Dogwood*	*10.00%*
Corylus avellana	*Hazel*	*10.00%*
Crataegus monogyna	*Hawthorn*	*40.00%*
Salix alba	*White willow*	*10.00%*
Prunus padus	*Bird Cherry*	*10.00%*
Malus sylvestris	*Crab Apple*	*10.00%*
Ilex aquifolium	*Holly*	*10.00%*

Proposed Native Screening Shrub Mix

Mixture of whips and Feathered Tree Species (F).

Crateagus monogyna	*Hawthorn*	*60-80cm*
Corylus avellana	*Hazel*	*60-80cm*
Viburnum opulus	*Guelder Rose*	*60-80cm*
Prunus avium	*Bird Cherry*	*125-150cm(F)*
Quercus robur	*English Oak*	*125-150cm(F)*
Acer campestre	*Field Maple*	*60-80cm*
Salix caprea	*Goat Willow*	*60-80cm*
Betula pendula	*Silver Birch*	*125-150cm(F)*

0 50 100 150 200m

N

KEY

Site Boundary

Existing Public Right of Way

Proposed Fenceline

EXISTING LANDSCAPE FRAMEWORK

Existing Tree (For details see Tree Survey Plan)

Existing Vegetation (Trees & Hedgerow) (For details see Tree Survey Plan)

For any tree removals see Arboricultural Assessment

LANDSCAPE MITIGATION

Proposed Meadow Grassland

Proposed Shade/Semi Shade Tolerant Meadow

Proposed Tree

Proposed Native Hedgerow

Proposed Native Shrub Mix

Proposed Community Garden Area
(to incorporate seating, information boards & addtional planting)

11370
Land at Nailcote Farm
Enviromena

Landscape Strategy Plan

S3 1:2000@A1
29 January 2024 SJL / SLS
11370-FPCR-XX-XX-DR-L-0001 issue P14
Project Code · Originator · Zone · Level · Type · Role · Drawing Number

masterplanning
environmental assessment
landscape design
urban design
ecology
architecture
arboriculture

FPCR Environment and Design Ltd
Lockington Hall
Lockington
Derby
DE74 2RH

t: 01509 672772
e: mail@fpcr.co.uk
w: www.fpcr.co.uk

File: L:\11300\11370\LANDS\Drawings\11370-FPCR-ZZ-XX-DR-L-0001-P14-Landscape Strategy Plan.vwx

N 0 50 100 m

Proposed Landscape Mitigation

Species listed below consider site constraints and meet the required landscape and managements strategies outlined in the relevant landscape character study. This is only an indicative list of potential species that could be used on the site.

Proposed Meadow Grassland
SPECIAL Solar Park Diverse Low Maintenance Mix (Cotswold Seeds Ltd) Management/maintenance details provided by the supplier/manufacturer. Basic sowing rate 10kg/acre.

1.40 kg	(1.4)	certified Toddington perennial ryegrass
0.50 kg	(0.5)	certified Teno smaller catstail
0.65 kg	(0.65)	certified Winnetou timothy
1.50 kg	(1.5)	certified Evora smooth stalked meadow grass
1.25 kg	(1.25)	certified Maxima creeping red fescue
0.50 kg	(0.5)	certified Archibal slender creeping red fescue
1.85 kg	(1.85)	certified Caracter red/chewings fescue
0.40 kg	(0.4)	certified Senu meadow fescue
0.20 kg	(0.2)	certified Merwi white clover
0.20 kg	(0.2)	certified S184 wild white clover
0.40 kg	(0.4)	certified Leo birdsfoot trefoil
0.05 kg	(0.05)	certified Virgo Pajbjerg yellow trefoil
0.70 kg	(0.7)	Burnet forage herb
0.25 kg	(0.25)	certified Altaswede late flowering red clover
0.15 kg	(0.15)	certified Aurora alsike clover

Proposed Shade/Semi-Shade Tolerant Meadow
Hedgerow mixture (Emorsgate EH1) or similar approved product. Management/maintenance detail provided by the supplier/manufacturer. Basic sowing rate of 4g/m2.

Achillea millefolium	*Yarrow*	*0.10%*
Alliara petiolata	*Garlic Mustard*	*1.00%*
Anthriscus sylvestris	*Cow Parsley*	*0.50%*
Carex divulsa spp.divulsa	*Grey Sedge*	*1.50%*
Centaura nigra	*Common Knapweed*	*2.00%*
Chaerophyllum temulum	*Rough Chervil*	*3.00%*
Cruciata laevipes	*Crosswort*	*2.00%*
Dipacus fullonum	*Wild Teasel*	*0.20%*
Galium album	*Hedge Bedstraw*	*0.50%*
Geranium pratense	*Meadow Crane's-bill*	*0.10%*
Geranium pyreniacum	*Hedge Crane's-bill*	*1.00%*
Geum urbanum	*Wood Avens*	*0.30%*
Knautica arvensis	*Field Scabious*	*0.20%*
Leucanthemum vulgare	*Moon Daisy*	*1.00%*
Malva moschata	*Musk Mallow*	*1.00%*
Plantago lanceolata	*Ribwort Plantain*	*2.00%*
Silene dioca	*Red Campion*	*3.00%*
Silene flos-cuculi	*Ragged Robin*	*0.50%*
Torilis japonica	*Upright Hedge-parsley*	*0.10%*
Agrostis capillaris	*Common Bent*	*1.00%*
Anthoxanthum odoratum	*Sweet Vernal-Grass*	*2.00%*
Brachypodium sylvaticum	*False Brome*	*1.00%*
Cynosurus cristatus	*Crested Dogstail*	*50.00%*
Deschampsia cespitosa	*Tufted Hair-grass*	*2.00%*
Festuca rubra	*Red Fescue*	*20.00%*
Poa nemoralis	*Wood Meadow-grass*	*4.00%*

Proposed Trees
(Exact species will depend on location of tree, proximity to PV's and Ultimate Height)

Quercus robur	*English Oak*	*10-12cm*
Prunus avium	*Bird Cherry*	*10-12cm*
Alnus glutinosa	*Alder*	*10-12cm*
Betula pendula	*Birch*	*10-12cm*
Salix caprea	*Goat Willow*	*10-12cm*
Crataegus monogyna	*Hawthorn*	*10-12cm*
Malus sylvestris	*Crab Apple*	*8-10cm*
Acer campestre	*Maple*	*10-12cm*

Proposed Native Hedgerow
(Hedgerow to be maintained at a height of 2.5m)

Cornus sanguinea	*Common Dogwood*	*10.00%*
Corylus avellana	*Hazel*	*10.00%*
Crataegus monogyna	*Hawthorn*	*40.00%*
Salix alba	*White willow*	*10.00%*
Prunus padus	*Bird Cherry*	*10.00%*
Malus sylvestris	*Crab Apple*	*10.00%*
Ilex aquifolium	*Holly*	*10.00%*

Proposed Native Screening Shrub Mix
Mixture of whips and Feathered Tree Species (F).

Crateagus monogyna	*Hawthorn*	*60-80cm*
Corylus avellana	*Hazel*	*60-80cm*
Viburnum opulus	*Guelder Rose*	*60-80cm*
Prunus avium	*Bird Cherry*	*125-150cm(F)*
Quercus robur	*English Oak*	*125-150cm(F)*
Acer campestre	*Field Maple*	*60-80cm*
Salix caprea	*Goat Willow*	*60-80cm*
Betula pendula	*Silver Birch*	*125-150cm(F)*

Proposed Wet-tolerant Grass Seed Mix for Attenuation Basins
Wetland mixture (Emorsgate EM8) or similar approved product. Management/maintenance detail provided by the supplier/manufacturer. Basic sowing rate of 4g/m2.

Achillea millefolium	*Yarrow*	*2.00%*
Agrimonia eupatoria	*Agrimony*	*0.60%*
Centaurea nigra	*Common Knapweed*	*3.60%*
Filipendula ularia	*Meadowsweet*	*1.00%*
Galium verum	*Lady's Bedstraw*	*2.00%*
Geum rivale	*Water Avens*	*0.20%*
Lathyrus pratensis	*Meadow Vetchling*	*0.50%*
Leontodon hispidus	*Rough Hawkbit*	*0.10%*
Leucanthemum vulgare	*Oxeye Daisy (Moon Daisy)*	*1.20%*
Lotus corniculatus	*Birdsfoot Trefoil*	*0.10%*
Lotus pedunculatus	*Greater Birdsfoot Trefoil*	*0.40%*
Plantago lancelata	*Ribwort Plantain*	*3.20%*
Primula veris	*Cowslip*	*0.20%*
Prunella vulgaris	*Selfheal*	*0.10%*
Ranunculus acris	*Meadow Buttercup*	*0.40%*
Rhinanthus minor	*Yellow Rattle*	*1.40%*
Rumex acetosa	*Common Sorrel*	*1.20%*
Sanguisorba officinalis	*Great Burnet*	*1.00%*
Silene flos-cuculi	*Ragged Robin*	*0.30%*
Succisa pratensis	*Devil's-bit Scabious*	*0.10%*
Vicia cracca	*Tufted Vetch*	*0.40%*
Agrostis capillaris	*Common Bent (w)*	*4.00%*
Anthoxanthum odoratum	*Sweet Vernal-grass (w)*	*4.00%*
Carex divulsa subsp. divulsa	*Grey Sedge (w)*	*1.60%*
Cynosurus cristatus	*Crested Dogstail*	*34.40%*
Deschampsia cespitosa	*Tufted Hair-grass (w)*	*1.60%*
Festuca rubra	*Red Fescue*	*20.00%*
Hordeum secalinum	*Meadow Barley (w)*	*4.00%*
Poa trivialis	*Rough-stalked Meadow-grass*	*8.00%*
Schedonorus arundinaceus	*Tall Fescue*	*2.40%*

KEY

SITE CONSTRAINTS

- **Site boundary**
- **Public right of way**
- **Existing vegetation retained** – As per tree survey plan
- **Existing vegetation retained** – As per aerial photography, topographical survey and site observation – not recorded by tree survey
- **Existing watercourse**
- **Existing easement**
- **Existing hard-surface**

SOFT LANDSCAPE PROPOSALS

- **Meadow grassland mix**
- **Shade / semi-shade tolderant grassland mix**
- **Native tree**
- **Native hedgerow**
- **Native screening shrub mix**

HARD LANDSCAPE PROPOSALS

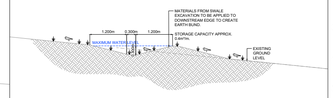
- **Stock-proof fence**
- **Hard-surfacing**
- **Solar panel**
- **Transformer station**
- **DNO substation**
- **Customer substation**
- **Community garden area** to include seating, information boards & additional planting

LAND AT NAILCOTE FARM, FILLONGLEY – LANDSCAPE STRATEGY PLAN

PEGASUS GROUP

| PEGASUSGROUP.CO.UK | TEAM/DRAWN BY: IBD | APPROVED BY: CR | DATE: 25/11/2024 | SCALE: 1:2000@A1 | DRWG: P24-1827_EN_013 | CLIENT: ENVIROMENA |

Section of Swale
Scale 1:100



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. Enclosed topographical survey based on BWB Consulting drawing (Dwg No:NFW-BWB-00-ZZ-M2-G-0001) dated 15.12.22
6. Enclosed masterplan based on Enviromena Project Management UK Limited (Dwg No. "P.NailcoteFarm_01_GeneralLayout_RevN")
7. This report should be read in conjunction with BWB Consulting Drainage Strategy 'NFW-BWB-ZZ-XX-RP-CD-0001'.
8. This drawing is a proof of concept only, do not consider costing or constructing from this drawing.

Legend

- Site Boundary
- Measured Impermeable Area
- Swales
- Indicative Infiltration Trench
- General Direction of Overland Flow

Measured Impermeable Area: 387m^3 (0.04ha)

Public Right of Way

Cathodic Protection Post

Public Right of Way

Parking area to remain as existing. If parking area if to formalised, permeable surfacing types (such as type 1 aggregate / plastic reinforced crushed stone) should be used, or a formal drainage system may be required.

Site Access

Parking

DNO Substation

Customer Substation

Cathodic Protection Post

Stop Valve / Inspection Covers

Inspection Cover

Inspection Cover

Stop Tap / Wash Out / Gas Valves / Inspection Covers

P06	22.11.23	Updated based on latest Masterplan	MB	LR
P05	07.03.23	Update of Masterplan	WJ	MB
P04	17.02.23	Removal of Easement shown.	WJ	MB
P03	16.02.23	Masterplan update and repositioning of swales	MB	KA
P02	09.02.23	Masterplan update and reduction in swales	WJ	MB
P01	27.01.23	Preliminary Issue	WJ	MB
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

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- Birmingham | 0121 233 3322
- Leeds | 0113 233 8000
- London | 020 7407 3879
- Manchester | 0161 233 4260
- Nottingham | 0115 924 1100

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Conceptual Drainage Strategy

Drawn:	W. James		Reviewed:	M. Bailey	
BWB Ref:	221748	Date:	27.01.23	Scale@A1:	1:2000

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-ZZ-XX-DR-CD-0001	S2	P06

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PAP/2023/0071

ENVIRONMENT

Enviromena Project Management UK Limited
Nailcote Farm
Warwickshire
Drainage Strategy

November 2023

Notice

Document Number:	NFW-BWB-ZZ-XX-RP-CD-0001_DS
BWB Reference:	221748_DS

Revision	Date of Issue	Status	Author:	Checked:	Approved:
P01	27/01/23	S2	William James BEng (Hons), MSc	Matthew Bailey BSc (Hons)	Keith Alger BSc (Hons) MSc
P02	10/02/23	S2	William James BEng (Hons), MSc	Matthew Bailey BSc (Hons)	Keith Alger BSc (Hons) MSc
P03	16/02/23	S2	William James BEng (Hons), MSc	Matthew Bailey BSc (Hons)	Keith Alger BSc (Hons) MSc
P04	17/02/23	S2	William James BEng (Hons), MSc	Matthew Bailey BSc (Hons)	Keith Alger BSc (Hons) MSc
P05	07/03/23	S2	William James BEng (Hons), MSc	Matthew Bailey BSc (Hons)	Keith Alger BSc (Hons) MSc
P06	22/11/23	S2	Matthew Bailey BSc (Hons)	Lucy Reeves BSc (Hons)	Keith Alger BSc (Hons) MSc

Notice

All comments and proposals contained in this report, including any conclusions, are based on information available to BWB Consulting during investigations. The conclusions drawn by BWB Consulting could therefore differ if the information is found to be inaccurate or misleading. BWB Consulting accepts no liability should this be the case, nor if additional information exists or becomes available with respect to this scheme.

Except as otherwise requested by the client, BWB Consulting is not obliged to and disclaims any obligation to update the report for events taking place after: -

(i) The date on which this assessment was undertaken, and
(ii) The date on which the final report is delivered

BWB Consulting makes no representation whatsoever concerning the legal significance of its findings or the legal matters referred to in the following report.

All Environment Agency mapping data used under special license. Data is current as of November 2023 and is subject to change.

The information presented, and conclusions drawn, are based on statistical data and are for guidance purposes only. The study provides no guarantee against flooding of the study site or elsewhere, nor of the absolute accuracy of water levels, flow rates and associated probabilities.

1. INTRODUCTION

1.1 This Drainage Strategy (DS) has been produced by BWB Consulting on behalf of Enviromena Project Management UK Limited in respect of a planning application for a proposed temporary solar farm at Nailcote Farm, Warwickshire.

1.2 A Flood Risk Assessment (FRA) has been developed for the Site (reference NFW-BWB-ZZ-XX-RP-YE-0001_FRA) and this DS accompanies this overarching document.

1.3 This DS is intended to support a full planning application (PAP/2023/0071) and as such the level of detail included is relevant for the type of application and type of development proposed.

1.4 It is understood that this SDS (dated November 2023) will be resubmitted to the live planning application "PAP/2023/0071". Therefore, the drainage guidance at the time of the planning application validation (24/02/2023) will be used for the latest drainage strategy.

1.5 The Lead Local Flood Authority (LLFA) initially raised an objection to the proposed drainage strategy, outlined within the DS (reference: NFW-BWB-ZZ-XX-RP-CD-0001_DS_S2-P05), which was previously submitted as part of the planning application (PAP/2023/0071). BWB provided a response outlining further information following consultation with the LLFA (reference: NFW-BWB-ZZ-XX-RP-CD-0002_LLFA Letter_S2-P01, dated 26/10/2023), which resulted in the LLFA removing their objection, with conditions. The letter produced by BWB has been provided as **Appendix 1**.

1.6 The Site is bound to the north by agricultural fields, to the east by agricultural fields and an unnamed ordinary watercourse (UOW). The south boundary of the Site is bound by the M6 motorway and Fillongley Shooting Club, the west of the Site is bound by Meriden Road (B4102).

1.7 The Proposed Development is for the construction of a temporary Solar Farm, to include the installation of ground-mounted solar panels together with associated works, equipment, and necessary infrastructure. The existing Site access is via a dirt track off Meriden Road (B4102) and is proposed to be retained as part of the development. A proposed Site development plan and sections of the associated structures are included as **Appendix 2**.

1.8 The location of the Site is illustrated within **Figure 1.1**, with contextual information provided within **Table 1.1**.

Table 1.1: Site Details

Site Name	Nailcote Farm
Location	Warwickshire
NGR (approx.)	SP 276 860
Application Site Area (ha)	62.2 (Approx.)
Development Type	Solar Farm
Anticipated Lifespan	40 years
Lead Local Flood Authority	Warwickshire County Council
Local Planning Authority	North Warwickshire Borough Council
Environment Agency Area	West Midlands
Planning Application	PAP/2023/0071

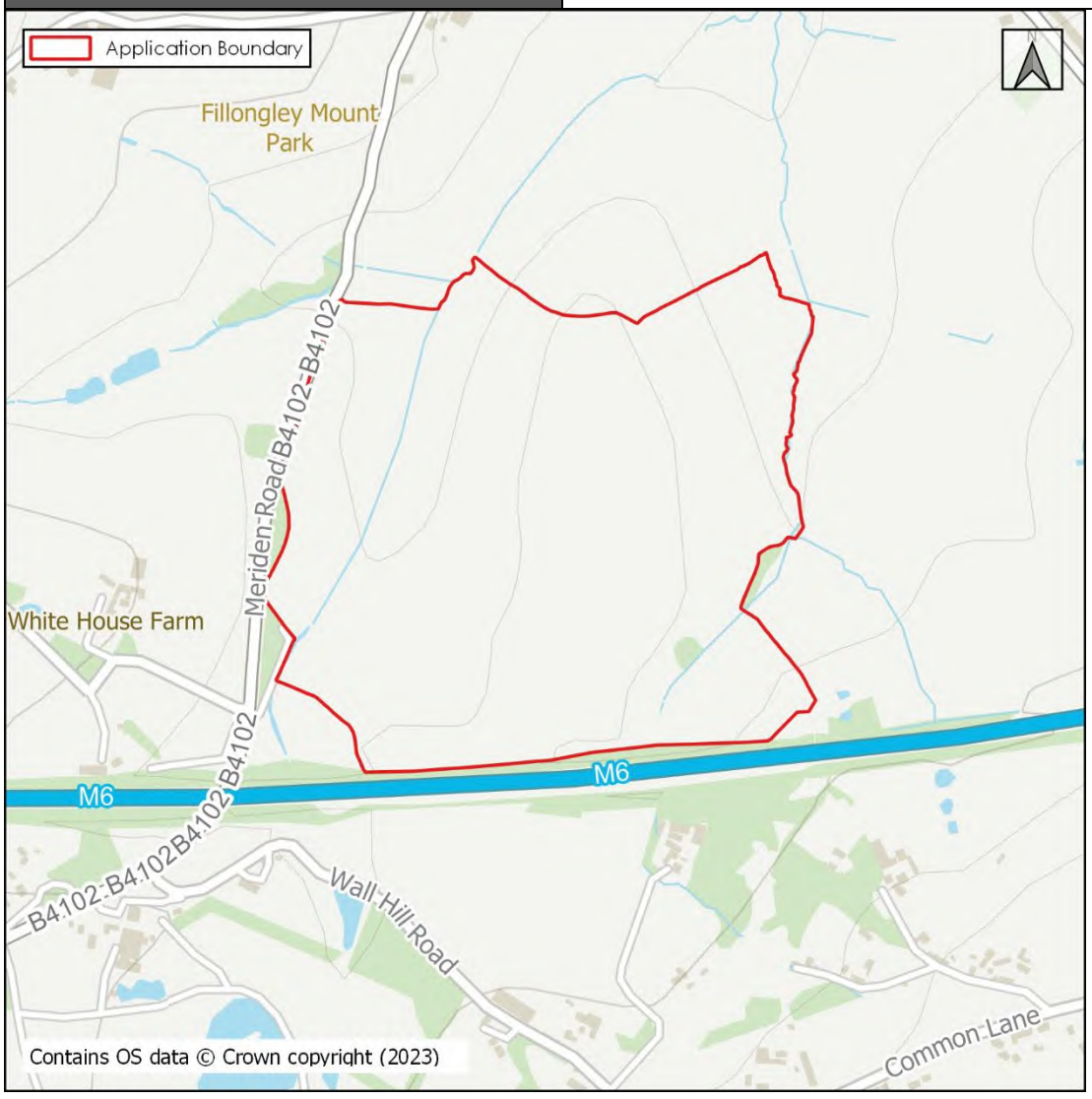

Figure 1.1: Site Location

Relevant Drainage Guidance

'Flood Risk & Sustainable Drainage Local guidance for developers'[1]

1.9 Warwickshire County Council's 'Flood Risk & Sustainable Drainage Local guidance for developers' has been reviewed in the development of this report. The key points from this document are as follows:

i. Restrict vehicular movements on Site to designated access tracks. In doing so, the risk of soil compaction is minimised and limited to specific locations. The applicant is to design the vehicular access tracks to be permeable.

ii. Specify what type of vegetation will be planted across the Site and how will it be managed/ maintained in perpetuity. The ideal situation is that vegetation is grassed and is kept reasonably high or grazed by livestock. Good vegetation cover will limit the transfer of sediments and slow the flow of water.

iii. Incorporate above- or below- ground surface water attenuation features to capture runoff from the panels. There are two basic ways as follows:

a. IDEAL - Gravel filter trenches positioned under the drip line of each solar panel. Typically, these are French drains 300mm x 300mm filled with a granular material to capture and store runoff from the panels. These will encourage infiltration and provide betterment in terms of reducing surface water runoff.

b. MINIMUM - Above ground swales positioned strategically around the development to capture surface water runoff from the panels as water flows downslope. The exact dimensions and number of swales required will depend upon the situation but are likely to be acceptable where designed in accordance with CIRIA SuDS Manual. Excavated material should be deposited on the downslope bank.

iv. Provide attenuation measures for the areas of hardstanding (i.e. electrical infrastructure or kiosks). This should be done in the normal way (i.e. calculate greenfield runoff rate, calculate increase in impermeable area, conduct storage estimate to work out storage volume).

1.10 Within the 'Flood Risk Recommendations' section of the SFRA it states that 'An appropriate buffer strip must be maintained along fluvial corridors respectively, to ensure that maintenance of the channel can be undertaken;'.

[1] Flood Risk & Sustainable Drainage Local guidance for developers available at: https://api.warwickshire.gov.uk/documents/WCCC-1039-95

Peak Rainfall

1.11 Predicted future changes in peak rainfall intensity caused by climate change are provided by the EA[2], with a range of projections applied to River Basin District Management Catchments.

1.12 The Site falls within the Tame Anker and Mease Management Catchment. **Table 1.2** identifies the relevant peak rainfall climate change allowances from this Management Catchment.

Table 1.2: Peak Rainfall Climate Change Allowances for the Tame Anker and Mease Management Catchment

Tame Anker and Mease Management Catchment Allowance	Total Potential Change Anticipated for the '2050s' (Lifetime up to 2060)	Total Potential Change Anticipated for the '2070s' (2061 to 2125)
1 in 30-Year Rainfall Event		
Upper End	35%	35%
Central	20%	25%
1 in 100-Year Rainfall Event		
Upper End	40%	40%
Central	20%	25%

1.13 The future increase in rainfall will need to be considered when designing a development to ensure its drainage system is sufficient for its lifetime and that it does not increase flood risk elsewhere. When determining the appropriate allowance(s) the anticipated lifespan of the development should be considered.

1.14 **Table 1.3** provides a summary of the EA's guidance on determining the appropriate allowance(s).

[2] Environment Agency, Flood risk assessments: climate change allowances: Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed January 2023.

Table 1.3: Application of Appropriate Peak Rainfall Climate Change Allowances

Area Assessed	Anticipated Development Life Span		
	up to 2060	between 2061 and 2100	up to or beyond 2100*
Development Sites^ Assess the 1 in 30-year and 1 in 100-year storm events with the respective climate change allowance(s) applied. Development to be designed so that with the climate change allowance applied to the 1 in 100-year storm: • there is no increase in flood risk elsewhere. the development will be safe from surface water flooding	Use the Central Allowance for the 2050s	Use the Central Allowance for the 2070s+	Use the Upper End Allowance for the 2070s+
Urban Catchments Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective allowance(s) applied.			
Rural Catchments <5km² Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective central climate change allowances applied.			
Rural Catchments >5km²	Direct rainfall analysis is not appropriate, use flood flow estimation methods.		

**Includes all residential developments*
^the Lead Local Flood Authority may have local standards that also need to be considered.
+unless the 2050s allowance is greater.

1.15 The development Site has an anticipated lifespan of 40 years. Therefore, the Central allowance for the '2070s' epoch will need to be considered in the design of the associated drainage infrastructure. Although the 2070s epoch central allowance should be used for the climate change calculations in line with national guidance, to provide a conservative assessment for this scheme, the upper end allowance has been used. At the discharge of conditions design stage, the use of the 2070s epoch central allowance may be discussed for use with the LLFA and Local Planning Authority.

2. EXISTING CONDITIONS

Site location and land use

2.1 The Site is bound to the north by agricultural fields, to the east by agricultural fields and an unnamed ordinary watercourse (UOW). The south boundary of the Site is bound by the M6 motorway and Fillongley Shooting Club, Meriden Road (B4102) binds the west of the Site.

2.2 The site currently comprises agricultural land.

Topography

2.3 A topographical Survey (**Appendix 3**) shows the levels within the Site to undulate; however, the Site generally falls from the high points located at the centre of the Site towards the southern boundary and the ditches located within the Site to the east and west. The levels at the Site range from the highest point at approximately 148.7m Above Ordnance Datum (AOD) in the southern centre of the Site to approximately 122.3m AOD in the northeast Site corner.

2.4 The existing Site access levels range from 132.7m AOD to 133.6m AOD.

Existing watercourses / ditches within and adjacent to site

2.5 There are several watercourses and ditches within the Site, as shown on **Figure 2.1**.

2.6 The main watercourse on the Site is the Bourne Brook, which enters in the southwestern corner and exits along the northern boundary. There is also an Unnamed Ordinary Watercourse (UOW) within the Site, which enters in the southeast and follows the eastern Site boundary.

2.7 Several ditches can be found across the Site. One of these, located in the centre of the Site, seems to have no connection to the surrounding ditches. Another ditch, within the southern portion of the Site, connects to the some of the ditches found on the western Site boundary.

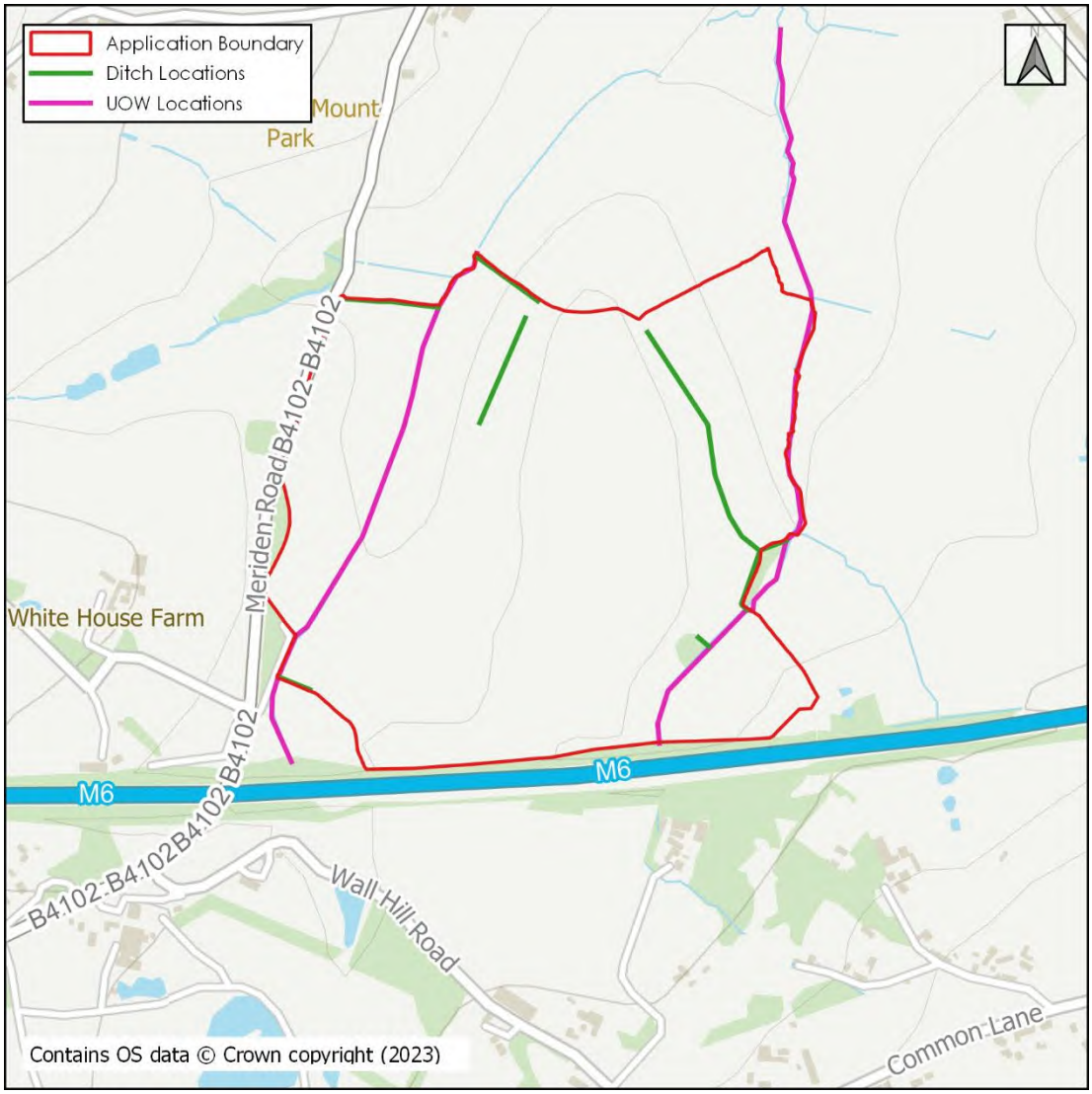

Figure 2.1 Location of ditches and UOW's

Geology

2.8 British Geological Survey (BGS) mapping shows the Site predominantly to be underlain by Keresley Member - Sandstone, a small pocket along the eastern UOW is underlain by Keresley Member – Argillaceous rocks and sandstone and conglomerate, interbedded.

2.9 Within the Site there are three superficial deposits. Along the north-western boundary there are deposits of Alluvium – clay, silt sand and gravel. A large area of Thrussington Member – Diamicton is located in the middle of the Site from the south boundary to the northern boundary. Along the UOW to the south of the Site there are traces of glaciolacustrine deposits, mid Pleistocene, clay, and silt. Rest of the Site has no recorded superficial deposits.

2.10 The geology is also supported by the report published by DUNELM Geotechnical & Environmental (report number: D10836).

2.11 Details on the bedrock geology and superficial deposits is included within **Figure 2.2**.

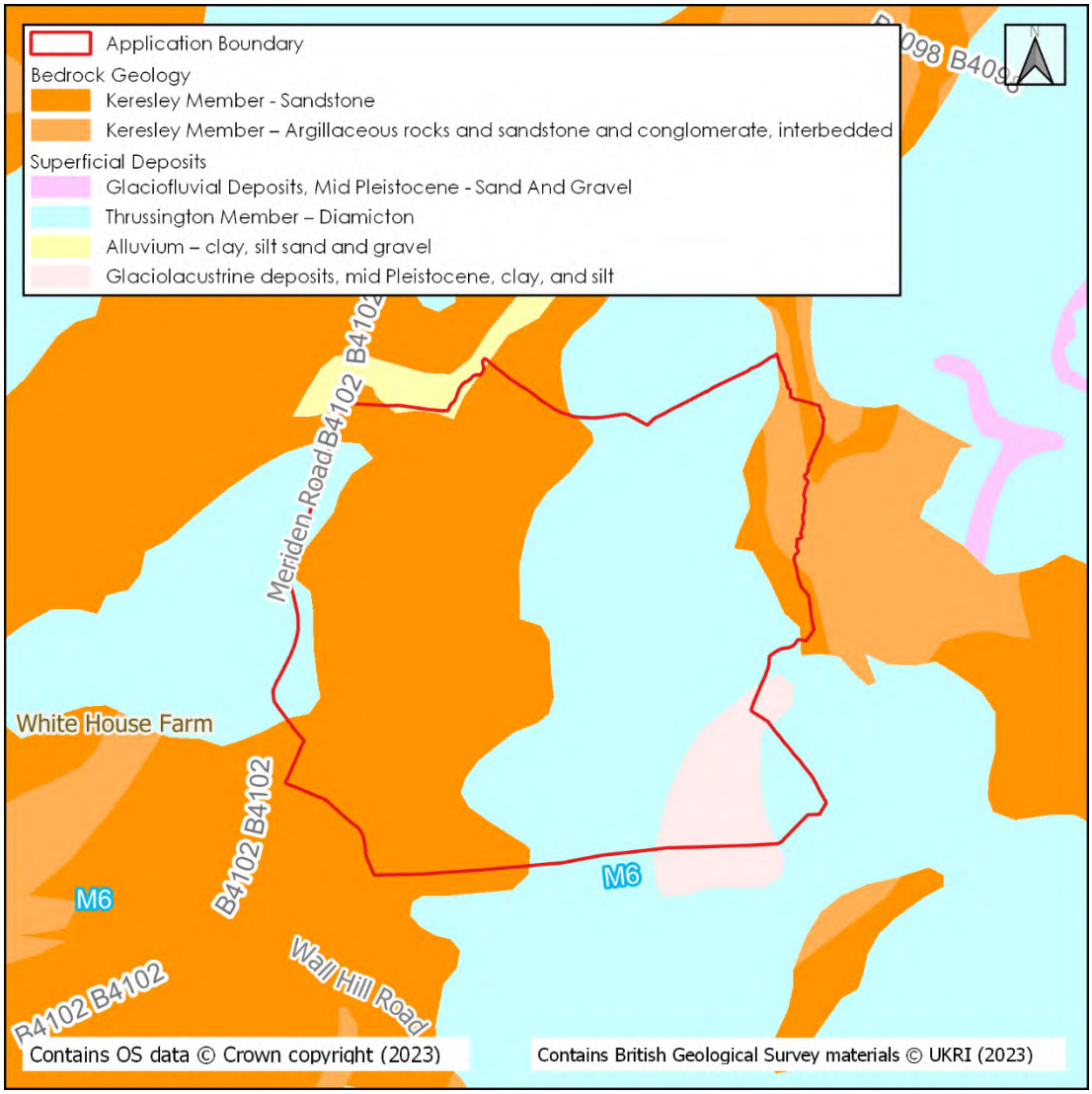

Figure 2.2: Bedrock Geology and Superficial Deposits

2.12 The EA designates the bedrock to be a principal aquifer, this means the bedrock holds a significant amount of groundwater that is used to support water supply, base flows to rivers, lakes, and wetlands on a strategic scale.

2.13 Areas of superficial deposits are classed as unproductive strata. There are several areas within the Site (mainly the central area of the Site) which is classed as a Secondary (undifferentiated) Aquifer, this means that the superficial deposit contains both characteristic traits of Secondary A and Secondary B Aquifers. There is also an area which seems to align with the area of Alluvium which is classed as a Secondary A Aquifer which is defined as a permeable layer which can support local water supplies and may form a base flow of a river.

2.14 A review of BGS borehole logs identifies records of two previous boreholes located within the Site, these are SP28NE128 and SP28NE68, which were excavated to depths of 705.24m and 716.57m, respectively. These show no recorded of ground water being struck. The Site is located in a Groundwater Source Protection Zone III.

3. DRAINAGE PROPOSALS

Surface Water Drainage

Solar Farm Research

3.1 The proposed surface water drainage strategy is based upon research on 'Hydrologic Response of Solar Farms'[3] (Cook and McCuen, 2013) and is supported by guidance published on 'Biodiversity Guidance for Solar Developments'[4] (BRE, 2014) and 'Technical Information Note TIN101: Solar Parks: Maximising Environmental Benefits'[5] (Natural England, 2011).

3.2 In summary, Cook and McCuen identify that the development of solar panels over a grassy field does not have a significant effect on the volume of runoff, the peak discharge, nor the time to peak. During the study, the runoff volume was found to increase slightly but not enough to require storm-water management facilities.

3.3 However, Cook and McCuen found that if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm water management needed. Additionally, the kinetic energy of water draining from the panels was found to be greater than that of typical rainfall, which increases the risk of erosion of soil at the base of panels.

3.4 Cook and McCuen recommend that the grass beneath the panels be well maintained or that a buffer strip (i.e., interception swale) be placed after the most downgradient row of panels, in order to maintain a drainage regime as close to existing conditions as possible.

3.5 BRE recognise that in most solar farms "*because panels are raised above the ground on posts, greater than 95% of a field utilised for solar farm development is still accessible for plant growth*". Therefore, it is considered that the majority of the site will remain as 'soft'/permeable surface post-development, with grassland around and underneath the solar arrays.

3.6 Natural England have stated in reference to solar developments that "*the key to avoiding increased run-off and soil into watercourses is to maintain soil permeability and vegetation cover. Permeable land surfaces underneath and between panels should be able to absorb rainfall as long as they are not compacted and there is some vegetation to bind the soil surface*."

[3] Hydrologic Response of Solar Farms, Journal of Hydrologic Engineering (Cook and McCuen, 2013)
[4] Biodiversity Guidance for Solar Development (BRE, 2014)
[5] TIN101: Solar Parks: Maximising Environmental Benefits (Natural England, 2011)

3.7 Based on the above research, the proposed surface water drainage strategy for the proposed solar arrays aims to minimise the compaction of soil during the construction and operation of the proposed development and incorporate a robust landscaping strategy to keep the areas beneath the panels as 'grassy' as possible during the lifetime of the development. These mitigation measures should be detailed within a Construction Environmental Management Plan (CEMP) and landscape strategy for the proposed development.

3.8 As an additional resilience measure, it is proposed that interception swales are constructed at the most downgradient row of panels to act as a form of mitigation and betterment, should the ground beneath the panels become patchy or bare during the lifetime of the development.

Construction and Operational Mitigation Measures

3.9 In order to minimise the compaction of soil during the construction phase, the temporary construction Site compound will be positioned as close as possible to the Site access to minimise the number of Heavy Goods Vehicles (HGVs) driving through the Site.

3.10 It is recommended that during construction only light machinery is used to install the solar arrays and ancillary equipment where possible. Vehicle movements should be minimised, and low ground pressure vehicles are recommended during wet weather working.

3.11 If necessary, to alleviate the effects of any compaction during the construction process, any affected areas should be chisel ploughed or harrowed and seeded prior to the solar farm becoming active.

3.12 During the operation of the solar farm, maintenance of the panels will be infrequent, minimal and will only require light machinery. Therefore, the operation of the Site is unlikely to significantly decrease the infiltration potential of the soil compared to its pre-development condition.

3.13 During the first few years of the solar farm becoming live, it is recommended that regular inspections of the planting and soil are undertaken to confirm that the grass is growing properly and is not bare or compacted. Any required remedial work should be completed as soon as possible.

Additional Resilience Mitigation Measures

3.14 Based on the mitigation proposed above, no formal surface water drainage system is necessary to manage the surface water flows emanating from the solar panels.

3.15 However, as an additional resilience measure, it is proposed to construct interception swales at the most downgradient row of solar panels to interrupt and slow potential channelised flows, enhance and promote the infiltration and interception capacity of the development, and help convey surface water over a greater surface area.

3.16 The location of the proposed swales is provided on the Conceptual Drainage Strategy provided as **Appendix 4**. Further details on the proposed swales are also provided further on within this section.

3.17 In the event of exceedance of the proposed swales, exceedance flows will follow the existing topography either into nearby watercourses or off Site onto third-party land. However, it should be noted that these exceedance flows will provide a degree of betterment on flooding on the existing scenario.

Ancillary Equipment and Roads

3.18 Although the solar panel arrays can be managed without the need for formal surface water drainage management, the ancillary equipment and roads should be assessed for their impact on the surface water runoff rates and volumes post-development.

3.19 New roads should be constructed using either Type 1 gravel, grass tracks or permeable materials so that the roads do not have an adverse impact on post-development surface water runoff rates and volumes.

3.20 If any new roads are proposed with typical impermeable surfacing, the runoff from the roads will need to me managed by a suitable surface water drainage system.

3.21 There is an existing informal parking area at the site entrance that is proposed to be retained. If the parking area is to be formalised, it should be re-surfaced with a permeable surface type, such as plastic reinforced type 1 aggregate. If the parking area is proposed to be surfaced with impermeable surfacing, a surface water drainage strategy will be required for this portion of the development.

3.22 Based on a review of the proposed masterplan, it is anticipated that the impermeable footprint of the ancillary equipment associated with the development will cover approximately 387m^2 (0.04ha), which is approximately 0.1% of the total proposed development area (62.2ha).

3.23 An assessment of the pre and post development runoff rates for the Site has been undertaken using the IH-124 method in MicroDrainage and are outlined in **Table 3.1**, with supporting calculations provided in **Appendix 5**.

Table 3.1: Existing & Proposed Runoff Rates

Return Period (Yr.)	Existing Greenfield Runoff Rate (l/s)	Post-Development Unmitigated Runoff Rate (l/s)	Post-Development Increase	
			l/s	%
1	20.4	20.5	0.1	0.5
QBAR	24.6	24.7	0.1	0.4
30	48.2	48.3	0.1	0.2
100	63.2	63.4	0.2	0.3
100 + 40%*	93.7	93.9	0.2	0.2

* Calculated by multiplying Standard Annual Average Rainfall (SAAR) by 1.4 to simulate a 40% climate change uplift on rainfall intensity

3.24 As shown within **Table 3.1**, the post-development runoff rate, when factoring in the increased impermeable area from the ancillary equipment is anticipated to increase the QBAR rate by 0.1l/s (0.4%), the 1 in 100-year runoff rate by 0.2l/s (0.3%) and the 1 in 100-year plus 40% climate change by 0.2l/s (0.2%). Therefore, the impact of developing the Site is considered to have a negligible impact on the existing runoff rate.

3.25 An assessment of the impacts the proposed ancillary equipment will have on the 1 in 100-year 6-hour runoff volume post-development has been undertaken. The pre- and post-development runoff volumes are compared in **Table 3.2**, with the supporting calculations provided within **Appendix 6**.

3.26 As the proposed development area is currently entirely greenfield, the existing runoff volume has been calculated using MicroDrainage to be 12,907m^3.

3.27 The runoff volume from the new impermeable area (i.e., 0.04ha associated with the ancillary equipment has been calculated using an average rainfall intensity of 10.7mm/hr as calculated using FEH rainfall data within Micro Drainage, and multiplied by the impermeable area, as described within **Figure 3.1**. The 100-year, 6-hour rainfall profile is presented within **Appendix 7**.

Av. Rainfall (m/hr) x 6 (hours) x Impermeable Area (m^2) = Runoff Volume (m^3)

0.0107 x 6 x 387 = 25m^3

Figure 3.1: 1 in 100-Year, 6 Hour Runoff Volume

3.28 As shown in **Figure 3.1**, the runoff volume from the newly introduced impermeable area is 25m^3. The runoff volume from the remaining permeable portion of the proposed development area (62.16ha) has been calculated using MicroDrainage to be 12,899m^3. As a result, the total post-development runoff volume is calculated to be 12,924m^3.

Table 3.2: Runoff Volume Comparison

Existing Volume (m^3)	Proposed Volume (m^3)		Difference (m^3)
	Permeable	Impermeable	
12,907	12,899	25	17

3.29 As shown within **Table 3.2**, the proposed introduction of the ancillary equipment will result in an increase of surface water runoff volume during the 1 in 100-year 6-hour event by 17m^3. This an increase of approximately 0.1% of the existing conditions within the Site.

3.30 It is anticipated that any increase in surface water runoff volume leaving the site will be intercepted within the interception swales located across the site.

Interception Swales

3.31 It is proposed that the interception swales will have 1:4 internal side slopes with a maximum design water depth of 300mm. The material excavated to install the swales will be applied to the downstream edge of the features to create an earth bund. A typical cross section of the proposed interception swales is provided within **Appendix 4**.

3.32 The proposed swales have been positioned outside of Flood Zone 3 and are also not anticipated to adversely displace any existing floodplains within the Site as no level raising will be associated with the construction of the swales.

3.33 Based on the proposed dimensions of the interception swales, it is anticipated that the maximum storage capacity of the swales is approximately 0.4m^3/m.

3.34 The interception storage capacity of the swales is such that in increase in runoff volume associated with the ancillary equipment will be intercepted by the proposed swales. Additionally, the inclusion of the swales within the development will act to provide a betterment to the existing surface water runoff rate and volume that will leave the Site onto surrounding land and Bourne Brook and the UOW post-development.

3.35 The inclusion of the interception swales across the development will also function as a mitigation measure to reduce the likelihood of any pollution incidents leaving the Site. As the risk of pollution incidents is more likely to occur during the construction phase as opposed to the operation of the Site, it is recommended that the swales are constructed early on during the construction phase and silt fences are utilised on the swales during the entire construction phase.

3.36 The proposed swales should be maintained throughout the lifetime of the development to reduce the risk of the features becoming less effective due to silt accumulation, litter accumulation or vegetation issues.

3.37 The final operations and maintenance plan should be developed during the construction design stage prior to the development becoming live; however, a basic maintenance schedule based off guidance provided within the CIRIA SuDS Manual[6] is provided within **Section 4**.

Infiltration Trenches

3.38 Gravel infiltration trenches can be installed alongside ancillary equipment in order to provide residual attenuation and land drainage, as well as intercepting exceedance flows. Illustrative locations of where the trenches are proposed to be installed are shown within **Appendix 4**.

3.39 The infiltration trench dimensions can vary; however, a 300mm wide and 300mm deep trench with a 30% void aggregate ratio would provide approximately 0.03m^3/m of attenuation.

3.40 An indicative cross section of an arrangement of utilising infiltration trenches surrounding the ancillary equipment is presented as **Figure 3.2**.

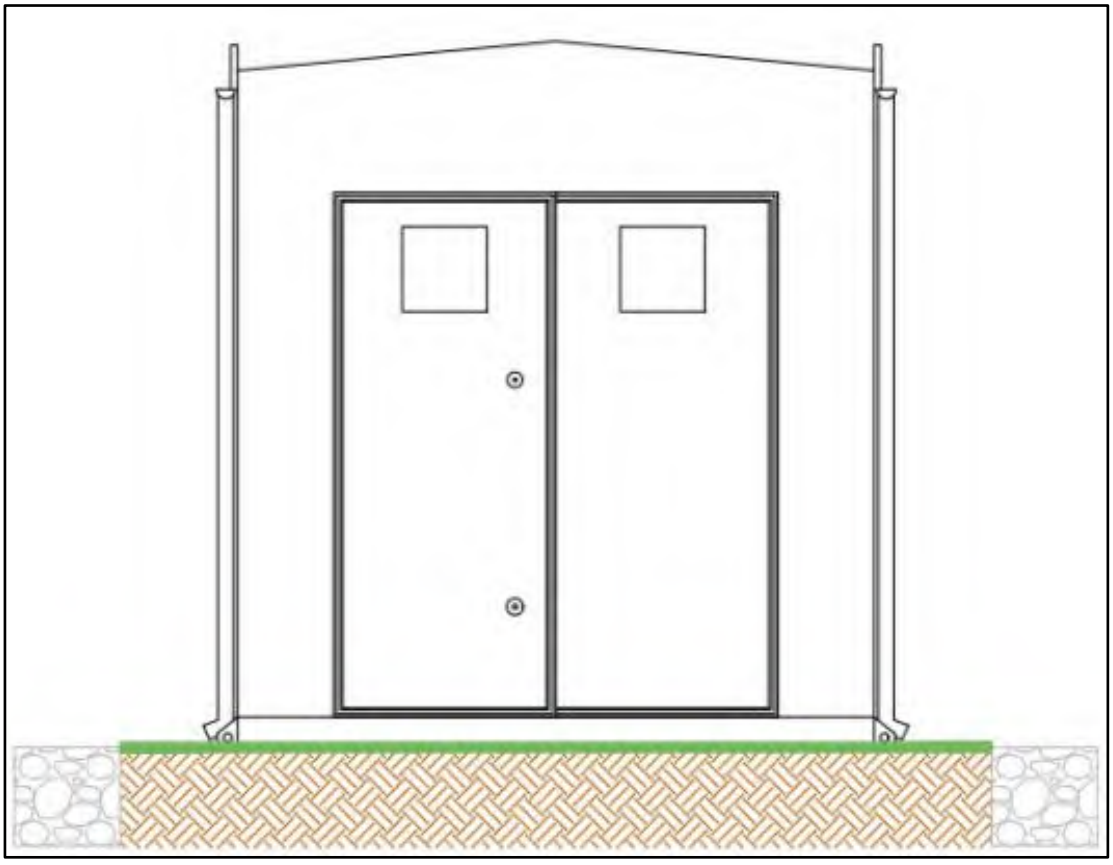

Figure 3.2: Indicative Filter Drain and Ancillary Equipment Arrangement

[6] The SuDS Manual C753 -Version 6 (CIRIA, 2019)

Foul Water Drainage

3.41 No foul water flows will be produced as a result of the proposed development. Therefore, no foul water drainage provision is required.

4. MAINTENANCE

4.1 The SuDS Manual maintenance schedule for swales, is shown in **Table 4.1**.

Table 4.1: The SuDS Manual Typical Maintenance Schedule for Swales

Maintenance Schedule	Typical Frequency	Required Action
Regular Maintenance	Monthly	• Inspect inlets, outlets, and overflows for blockages, and clear if required.
	Monthly (or as required)	• Remove litter and debris; and • Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours.
	Monthly (during growing season), or as required	• Cut grass – to retain grass height within specified design range.
	Monthly for first year then as required	• Manage other vegetation and remove nuisance plants.
	Monthly for 6 months, quarterly for 2 years, then half yearly	• Inspect vegetation coverage.
	Half yearly	• Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies.
Occasional Maintenance	As required or if bare soil is exposed over > 10% of the swale treatment area	• Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required.
Remedial Action	As required	• Repair erosion or other damage by re-turfing or reseeding; • Relevel uneven surfaces and reinstate design levels; • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface; • Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip; and • Remove and dispose of oils or petrol residues using safe standard practices.

4.2 The SuDS Manual maintenance schedule for filter drains, is shown in **Table 4.2**.

Table 4.2: The SuDS Manual Typical Maintenance Schedule for Filter Drains

Maintenance Schedule	Typical Frequency	Required Action
Regular Maintenance	Monthly (or as required)	• Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices.
	Monthly	• Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage.
	Six monthly (or as required)	• Remove sediment from pre-treatment devices.
	Six monthly	• Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies.
Occasional Maintenance	Five yearly, or as required	• At locations with high pollution loads, remove surface geotextiles and replace, and wash or replace overlying filter medium.
	As required	• Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (e.g., NJUG, 2007 or BS 3998:2010); and • Clear perforated pipework of blockages.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This DS has been written in accordance with the latest relevant local and national guidance and the latest accepted research on solar farm developments at the time of initial validation of planning application "PAP/2023/0071".

5.2 This DS is intended to be read in conjunction with the accompanying FRA (reference: NFW-BWB-ZZ-XX-RP-YE-0001_FRA).

5.3 The findings of this DS are that the proposed solar development will have negligible impact on the post-development surface water runoff rates and volumes.

5.4 Whilst the proposed development will have negligible impact on the surface water runoff regime, in accordance with the LLFA requirements it is proposed that interception swales are used within the development to mitigate against the potential risk of surface water runoff rates and volumes increasing as a result of the development.

5.5 A suitably qualified maintenance company should be appointed to undertake the required maintenance of the proposed interception swales for the proposed lifespan of the development. General best practice maintenance activities and schedules are provided within this report.

APPENDICES

Appendix 1: Letter to LLFA to Address their Comments (Reference:NFW-BWB-ZZ-XX-RP-CD-0002_LLFA Letter_S2-P01)

Warwickshire Count Council,
Flood Risk Management Team,
Planning Delivery,
Environmental Services.

Our Ref: NFW-BWB-ZZ-XX-RP-CD-0002_LLFA Letter_S2-P01
Contact: Matthew Bailey
Direct Dial: 07436 031863

Date: 26th October 2023

Dear Scarlett

SUBMISSION OF ADDITIONAL INFORMATION FOLLOWING LEAD LOCAL FLOOD AUTHROITY OBJECTION TO PLANNING APPLICATION PAP/2023/0071

I am writing to formally summarise consultation that has taken place with Warwickshire County Council Flood Risk Management Team and to submit new information following these discussions, in response to the Lead Local Flood Authority's (LLFA) objection to the proposed solar development at Fillongley (planning application reference: PAP/2023/0071). The LLFA's objection is dated 29th March 2023 and has been attached to this letter as **Appendix 1** for reference.

Following receipt of the objection, consultation has taken place both via email and a teleconference meeting on the 15th June 2023. The email correspondence undertaken with the LLFA has been attached to this letter as **Appendix 2**.

Although the objection states that BRE365 infiltration testing should be undertaken within the site, it was agreed with the LLFA that falling head tests would be acceptable (**Appendix 2**).

Falling head permeability testing was undertaken by BWB Consulting between 13th and 18th September 2023. The ground investigation findings (reference: NFW-BWB-ZZ-XX-RP-YE-0003) are presented as **Appendix 3** to this letter. A summary of the testing findings and their implications for the proposed development is provided below.

11 Portland Street
(Aytoun St Side)
Manchester
M1 3HU

Tel: 0161 233 4260

manchester@bwbconsulting.com
www.bwbconsulting.com

Summary of falling head test results and implications for the proposed development

Falling head tests were undertaken at seven Test locations across the site.

The testing demonstrated that the site has good drainage characteristics in the granular strata and poor drainage characteristics in the cohesive strata within the site. Although the drainage characteristics were poor in the cohesive strata, there was evidence of infiltration in these locations and we have calculated a rate for each test location. The infiltration rates calculated across the site range between $3.09x10^{-6}$ m/s to $2.58x10^{-9}$ m/s and generally the western region of the site showed better infiltration potential than the eastern portion.

Based on the findings of the infiltration testing, it is considered that surface water naturally drains from the site via infiltration at varying rates.

On the eastern region of the development, the only impermeable area proposed is associated with three transformer units, totalling 75m^2 of impermeable area across approximately 24.7ha (or, 247,000m^2) of land, which is the natural drainage catchment area within the east of the site. Therefore, although the infiltration rates are poor in the east of the site, the low rate and minimal impermeable area associated with the transformer units will have a negligible impact on the rate and volume of surface water leaving the site.

The use of any sort of restriction device to enable a restriction to greenfield rates from this area, would not be practical and/or feasible, based upon the significantly low calculated runoff rate. It would not be possible to physically restrict to such a low rate, whilst ensuring that any orifice/restriction device, does not become blocked with sediment etc.

Additionally, the runoff from these impermeable areas will be captured by the proposed cut off swales located upstream from any offsite receptors of surface water runoff. Surface water captured by runoff swales can slowly infiltrate into the ground.

Based on the above summary and attached ground investigation findings, it is considered that the proposed drainage strategy submitted in support of planning application PAP/2023/0071 (reference: NFW-BWB-ZZ-XX-RP-CD-0001_S2-P04) is suitable to ensure that there is no downstream detriment, based upon the surface water runoff rates and runoff volume, associated with the proposals.

In addition to the above, it is proposed that additional residual mitigation will be proposed for the isolated transformer units across the site, to reduce the likelihood of ground surrounding this infrastructure becoming 'boggy' following rainfall. This additional resilience is outlined below and will provide further attenuation to surface water running off the impermeable surfaces.

Additional Mitigation for Transformer Units

As a general resilience measure to reduce the ground becoming 'boggy' around the transformer units, we are proposing that the units will be raised 150mm above the external ground level.

Additionally, it is proposed that each transformer unit will be surrounded by infiltration trenches to capture, attenuate and discharge surface water runoff from the transformers.

The infiltration trench for each individual transformer can be sized up ahead of construction using the nearest infiltration test location for the relevant transformer. However, for the planning stage a Quick Storage Estimate (QSE) has been undertaken in MicroDrainage using the upper and lower infiltration range found during the permeability testing.

Based on the QSE outputs, the required attenuation volume for the infiltration trenches to manage the 1 in 100-year plus climate change return period ranged between 1.2m^3 – 4.3m^3 per transformer. It is expected that the volume required at detailed design will be in the middle of this range. The QSE outputs are provided as **Appendix 4**.

Maintenance Contact Details

Within their objection the LLFA ask for details of the party responsible for undertaking the future operations and maintenance of the Sustainable Drainage Systems within the proposed development.

It is understood that the ongoing maintenance of the proposed development will be undertaken by the developer of the site, as per the approach they have taken for their other operational solar sites. Their details are provided below:

- O&M provider - Enviromena Asset Manager UK Ltd
- Contact number – 03301071415
- Adress – 15 Diddenham Court, Grazeley, Reading, RG7 1JQ

Next Steps

I trust the above summary and information attached is suitable to allow the LLFA to reassess the proposed development and provide new comments on planning application PAP/2023/0071.

Yours sincerely,

Matthew Bailey
Environmental Engineer

Enc:

- Appendix 1 – LLFA Objection (reference: WCC002749/FRM/SR/001)
- Appendix 2 – LLFA Email Correspondence
- Appendix 3 – Ground Investigation Findings (reference: NFW-BWB-ZZ-XX-RP-YE-0003)
- Appendix 4 – MicroDrainage Quick Storage Estimate Outputs

Appendix 1 – LLFA Objection (reference: WCC002749/FRM/SR/001)

Your ref: PAP/2023/0071
Our ref: WCC002749/FRM/SR/001
Your letter received: 03/10/2023

SENT BY EMAIL

Mr Jeff Brown
Head of Development Control
North Warwickshire Borough Council
The Council House
South Street
Atherstone CV9 1DE

Flood Risk Management
Warwickshire County Council
Shire Hall
Warwick
Warwickshire
CV34 4RL
Tel: 01926 412982
FRMPlanning@warwickshire.gov.uk
www.warwickshire.gov.uk

FAO Jeff Brown

29 March 2023

Dear Mr Brown

PROPOSAL: **Construction of a temporary Solar Farm providing 47.7 MW output, to include the installation of ground-mounted solar panels together with associated works, equipment and necessary infrastructure**

LOCATION: **Land 800 Metres South Of Park House Farm, Meriden Road, Fillongley**

Warwickshire County Council as the Lead Local Flood Authority (LLFA) has reviewed the application which was received on the 03 October 2023. Based on the information submitted the LLFA currently recommends refusal of planning permission and **objects** to the development based on the following reasons.

Reason
The information submitted with this application does not comply with the requirements set out in the National Planning Policy Framework[i] (NPPF) and supporting Flood Risk & Coastal Change guidance[ii]. Specifically:

- The details relating to the surface water drainage are insufficient.

The submitted information does not therefore allow a suitable assessment of the proposed development, considering flood risk and surface water drainage matters.

Overcoming our objection

You can overcome our objection by submitting further information which is detailed below. This information should provide details of the proposed surface water drainage considering the scale and nature of the development to ensure the site will not increase risk elsewhere and where possible reduces flood risk overall. If this cannot be achieved we are likely to maintain our objection to the application.

At the 'full' planning stage proposals for surface water drainage should be well developed and this should be reflected in the level of detail provided. A surface water drainage scheme should be provided based on SuDS principles demonstrating how the development attenuates surface water runoff,

improves water quality and provides amenity and biodiversity. This should be supported by network level calculations demonstrating the performance of the system.

Given the above, the following comments are made and further information required is outlined. This forms the basis of our current objection:

1. As no formal outfall has been provided; therefore it is assumed that surface water is being managed on site via an infiltration-led drainage method. As the development proposes extensive use of swales, the performance of such features must be proven to be viable through appropriate testing in accordance with BRE Digest 365 Soakaway Guidance. The drainage system should be adequately sized to reflect the results of the testing.
2. Further information is required demonstrating that the proposed swales will effectively manage run-off from the impermeable areas. Supporting evidence should demonstrate how discharge from the proposed swales will be appropriately restricted to the greenfield run off rate.
3. The LLFA acknowledges that solar arrays should have a limited impact on run off rates, however this is reliant on well-maintained vegetation below the panels. Acknowledge that the concentration of runoff along the drip-edge of panels can lead to erosion issues and detail mitigation measures as appropriate, including:
    - The importance of maintaining site vegetation and how this will be achieved for the lifetime of the development.
    - Gaps between each individual cell of the solar panels to allow water to fall to the ground at multiple points and avoid concentrating run-off.
4. A site specific maintenance has been provided. Such maintenance plan should provide the name of the party responsible, including contact name, address, email address and phone number.

We ask to be re-consulted with the results of any additional information. We will provide you with bespoke comments within 21 days of receiving formal reconsultation..

Informative

a) Surface water run-off should be controlled as near to its source as possible through a sustainable drainage approach to surface water management. Sustainable Drainage Systems (SuDS) are an approach to managing surface water run-off which seeks to mimic natural drainage systems and retain water on-site as opposed to traditional drainage approaches which involve piping water off-site as quickly as possible.
b) The LLFA does not consider oversized pipes or box culverts as sustainable drainage. Where such attenuation is considered necessary, this should be supplemented with suitable above ground features such as green roofs, rain-gardens and tree pits to provide water quality, amenity and bio-diversity benefits.
c) Reference is made to the LLFA's *Flood Risk & Sustainable Drainage Local guidance for developers*[iii] which provides further advice and guidance as to how surface water drainage proposals should be designed.

Yours sincerely

Scarlett Robertson

Scarlett Robertson
Flood Risk Management Officer

Documents Reviewed:

- 11370 Land at Nailcote Farm LVA Rev B.pdf
- 11370 Land at Nailcote Farm LVA Rev B_Part2.pdf
- Application Form.pdf
- Covering Letter_Redacted..pdf
- Drainage Strategy_S2-P05_Part1.pdf
- Drainage Strategy_S2-P05_Part2.pdf
- Flood Risk Assessment_S2_P05_Part1.pdf
- Flood Risk Assessment_S2_P05_Part2.pdf
- General Layout RevF - 09-03-23.pdf
- Landscape Strategy Plan- 09-03-23.pdf
- Planning Statement Feb 23.pdf
- Site location plan.pdf

N.B. On 10th January 2023, the Defra published[iv] "the Review for implementation of Schedule 3 to the Flood & Water Management Act 2010;" this recommended implementation of Schedule 3 which the government has accepted. Warwickshire County Council will take on the role of the SuDS Approval Body (SAB), you can read more about this on our website which we will be updating periodically.

https://www.warwickshire.gov.uk/severe-weather/planning-and-sustainable-drainage/2

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[i] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

[ii] https://www.gov.uk/guidance/flood-risk-and-coastal-change

[iii] https://api.warwickshire.gov.uk/documents/WCCC-1039-95

[iv] https://www.gov.uk/government/publications/sustainable-drainage-systems-review

Appendix 2 - LLFA Email Correspondence

Matthew Bailey

From: FRM Planning <frmplanning@warwickshire.gov.uk>
Sent: 04 July 2023 10:49
To: Matthew Bailey
Subject: Re: 221748_Nailcote Farm, Fillongley, Warwickshire (Planning ref: PAP/2023/0071)

OFFICIAL

Good Morning Matthew,

As previously stated, infiltration testing compliant with BRE Digest 365 Soakaway Design Guide would be our preference however, given the nature of the development we could accept a series of failing head tests across the proposed development site. We expect a minimum of 3 repeated failing head tests for each point showing the suitability of ground conditions for repeated rainfall events.

I hope this addressess your concerns.

Best regards,
Scarlett
Flood Risk Management
Please send responses to FRMplanning@warwickshire.gov.uk
Our updated Flood Risk Guidance for Development was published in June 2023. The new guidance is available here and our website details the changes within this update.

Flood Risk Management
Planning Delivery
Environment Services
Warwickshire County Council

[redacted]
Email: FRMplanning@warwickshire.gov.uk
www.warwickshire.gov.uk
Emails sent to individual FRM officers may not be logged or processed promptly.

From: Matthew Bailey <Matthew.Bailey@bwbconsulting.com>
Sent: 21 June 2023 16:54
To: FRM Planning <frmplanning@warwickshire.gov.uk>
Cc: Keith Alger <Keith.Alger@bwbconsulting.com>
Subject: RE: 221748_Nailcote Farm, Fillongley, Warwickshire (Planning ref: PAP/2023/0071)

OFFICIAL

Hi Scarlett,

Thank you for your time last week to discuss this site / application.

Following our discussion we have put together an indicative test location plan for falling head tests across the site (see attached markup plan).

We are looking at seven total falling head tests across the site. Would this be acceptable to confirm there is infiltration within the site and address your concerns about the runoff from the ancillary equipment?

Thanks,

Matt

Matthew Bailey
Engineer | Environmental Engineering | BWB Consulting Limited

[redacted]

From: FRM Planning <frmplanning@warwickshire.gov.uk>
Sent: 12 May 2023 10:01
To: Matthew Bailey <Matthew.Bailey@bwbconsulting.com>
Subject: Re: 221748_Nailcote Farm, Fillongley, Warwickshire (Planning ref: PAP/2023/0071)

OFFICIAL

Good Morning Matthew,

We expect to see infiltration testing across this site compliant with BRE Digest 365 Soakaway Design Guide given the shallow nature of the swales. Providing the location points are within close proximity to the proposed swales we can confirm that 4 points would be sufficient, however more would be favourable.

I hope this addresses your concerns

Best regards,
Flood Risk Management
Please send responses to FRMplanning@warwickshire.gov.uk

Flood Risk Management
Planning Delivery
Environment Services
Warwickshire County Council

[redacted]
Email: FRMplanning@warwickshire.gov.uk
www.warwickshire.gov.uk
Emails sent to individual FRM officers may not be logged or processed promptly.

From: Matthew Bailey <Matthew.Bailey@bwbconsulting.com>
Sent: 05 May 2023 14:27
To: FRM Planning <frmplanning@warwickshire.gov.uk>
Cc: Keith Alger <Keith.Alger@bwbconsulting.com>
Subject: 221748_Nailcote Farm, Fillongley, Warwickshire (Planning ref: PAP/2023/0071)

F.A.O Scarlett Robertson

Hi Scarlett,

I am writing in respect of your consultee comments (dated 29/03/2023) relating to the proposed Solar Farm development at Fillongley (Planning ref: PAP/2023/0071). I have attached your comments for ease of reference.

We are in the process of preparing a response to your objection with the additional information requested. As part of this we are looking into getting soakaway testing commissioned within the site.

Please can you confirm if falling head infiltration testing would be sufficient to inform the infiltration potential of the proposed interception swales? Given the size of the development and potential logistical difficulties associated with transporting a water bowser across the site, BRE365 Digest testing may be difficult to undertake across the whole site.

The size of the site at approximately 61.5 hectares is such that we would look to have 4 test locations spread across the site. **Would you deem this sufficient?**

As the swales are only intended to be utilised as a buffer to reduce soil erosion from runoff from the solar panels and there only being approximately 2,000m^2 of impermeable area associated with the ancillary equipment, the swales provided across the site will likely be sufficient to manage any additional runoff post-development even if the infiltration rate is extremely low, which we do not expect to be the case given the Sandstone bedrock indicated on British Geological Survey mapping.

I am awaiting confirmation on the exact details on the approach to maintenance, but am expecting a detailed maintenance scope from the client, based upon other sites they operate. We will send this over to you in due course, as part of our formal response.

Your input would be appreciated as it will reduce the likelihood of undertaking abortive work and/or submit insufficient information again, in turn leading to a delay in the application process.

Many thanks,

Matt

Matthew Bailey
Engineer | Environmental Engineering | BWB Consulting Limited

[redacted]

Appendix 3 - Ground Investigation Findings (reference: NFW-BWB-ZZ-XX-RP-YE-0003)

Nailcote Farm, September 2023

Project Name:	Land at Nailcote Farm, Warwickshire
Project No:	221748
Revision:	P02
Reference:	NFW-BWB-ZZ-XX-RP-YE-0003
Author:	Thomas Flame
Approver:	Chris Rhodes

BWB Consulting Ltd (BWB) was instructed by Environmena Project Management UK Ltd (the Client) to carry out a ground investigation and permeability testing at the above site. The testing was required to obtain information regarding the suitability of the underlying geology at the site to support soakaway drainage for a proposed solar farm development.

The site currently comprises a series of large fields adjacent to Meriden Lane, near Filongley, Coventry.

Scope of Works

BWB undertook permeability testing at the site between 13th and 18th September 2023 which comprised the drilling of seven boreholes across the site and infiltration testing to assess the permeability characteristics of the underlying soils . Investigation locations are presented on **Drawing 1**, labelled FH01 – FH07.

Published geology indicates ground conditions to comprise superficial Thrussington Member deposits in the east and west of the site overlying Bedrock of the Keresley Member (sandstone). Superficial deposits are absent in the central areas of the site.

Ground Conditions

Ground conditions encountered during this investigation comprised Topsoil across the entire site comprising dark brown clayey sand with rootlets and occasional sandstone gravel.

The Thrussington Member was identified below the topsoil in FH03, FH04 and FH05 and typically comprised slightly clayey or slightly gravelly sand. Gravels consisted of sandstone and quartzite.

The Keresley Member bedrock was encountered as reddish brown clayey sand in FH01, FH03 and FH05. Cohesive strata, inferred to be weathered mudstone units of the Keresley member, or cohesive Glacial Till deposits of the Thrussington member, was encountered as a red sandy clay in FH02, FH04 and FH07. Exploratory hole logs are presented in **Appendix 1**.

Groundwater was not encountered during the drilling, however it was observed in FH06 prior to the commencement of the permeability testing. The level was recorded at 1.20m bgl on the first day of testing, and 0.90m bgl on the second day.

Soakaway Test Results

Results of the infiltration tests are presented within **Appendix 2** and a summary of the results are presented below in **Table 1**.

In FH01, FH05 and FH06, 3 full test runs were completed, wherein the water level was raised and allowed to drain at least 75% before refilling. FH02, FH03, FH04 and FH07 were filled and monitored for 24 hours without draining 75% of the way back to their original level.

Table 1: Summary of Soakaway Test Results

Location	Test No.	Permeability Rate (m/s) – Basic Time Lag Method	Permeability Rate (m/s) – General Method
FH01	A	$2.57x10^{-06}$	$3.89x10^{-07}$
	B	$2.44x10^{-06}$	$3.13x10^{-07}$
	C	$3.09x10^{-06}$	$2.03x10^{-06}$
FH02	A	N/A	$7.46x10^{-08}$
FH03	A	$2.97x10^{-07}$	$3.14x10^{-08}$
FH04	A	N/A	$2.58x10^{-09}$
FH05	A	$8.73x10^{-08}$	$1.08x10^{-07}$
	B	$1.45x10^{-07}$	$2.15x10^{-07}$
	C	$1.78x10^{-07}$	$2.69x10^{-07}$
FH06	A	$1.16x10^{-07}$	$1.37x10^{-07}$
	B	$1.25x10^{-07}$	$1.14x10^{-07}$
	C	$1.54x10^{-07}$	$4.10x10^{-07}$
FH07	A	N/A	$1.01x10^{-08}$

Conclusions

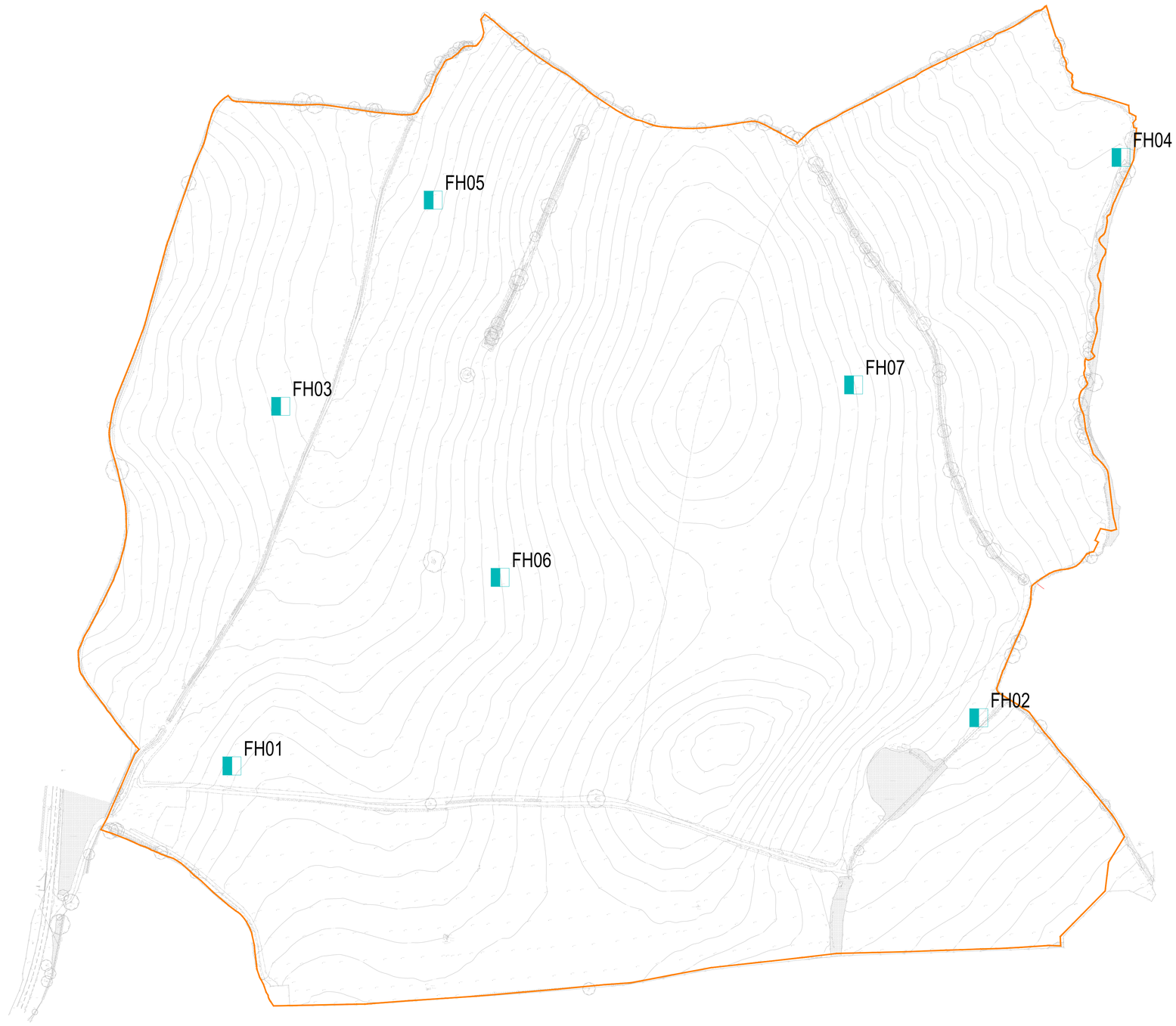
Falling head permeability testing has been conducted at the site, which has demonstrated good drainage characteristics in granular strata, and poor drainage characteristics in cohesive strata.

Yours Sincerely

[redacted]

Thomas Flame
Geo-Environmental Consultant
M.Sci (Hons), FGS

DRAWING 1: EXPLORATORY HOLE LOCATION PLAN



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. Enclosed topographical survey based on BWB Consulting drawing (Dwg No:NFW-BWB-00-ZZ-M2-G-0001) dated 15.12.22
6. Enclosed masterplan based on Enviromena Project Management UK Limited (Dwg No.P.NailcoteFarm_01_GeneralLayout_RevF)
7. This report should be read in conjunction with BWB Consulting Drainage Strategy 'NFW-BWB-ZZ-XX-RP-CD-0001'.
8. This drawing is a proof of concept only, do not consider costing from this drawing.

Legend

Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

BWB A CAF GROUP COMPANY
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Leeds | 0113 233 8000
London | 020 7407 3879
Manchester | 0161 233 4260
Nottingham | 0115 924 1100
www.bwbconsulting.com

Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Investigation Location Plan

Drawn:	T		Reviewed:	CR	
BWB Ref:	221748	Date:	27.01.23	Scale@A1:	1:2000

Drawing Status

Final

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-ZZ-XX-DR-YE-0001	**S2**	**P05**

APPENDIX 1: EXPLORATORY HOLE LOGS

BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH01	**Project Name:**	Nailcote Farm, Warwickshire		**Ground Level (m AOD):**	134.48
	Project Number:	221748		**Eastings:**	427294.27
	Client:	Environmena Project Management UK Ltd		**Northings:**	285815.87
Hole Type: WLS	**Rig:**	Premier 110	**Start & End Date:** 13/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & (Thickness (m))	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[0.10] 134.38 [2.40]	Dark brown clayey SAND.() Weathered SANDSTONE recovered as reddish brown clayey SAND.()		0.10							
		131.98	Hole Terminated at 2.50m bgl.		2.50							

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH02	**Project Name:** Nailcote Farm, Warwickshire			**Ground Level (m AOD):**	132.98
	Project Number: 221748			**Eastings:**	427939.06
	Client: Environmena Project Management UK Ltd			**Northings:**	285857.47
Hole Type: WLS	**Rig:** Premier 110	**Start & End Date:**	14/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & (Thickness (m))	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[1.00]	Grass over dark brown clayey SAND with moderate rootlet content.()									
		131.98 [1.00]	Soft reddish brown sandy CLAY.()		1.00							
		130.98	Hole Terminated at 2.00m bgl.		2.00							

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH03	**Project Name:**	Nailcote Farm, Warwickshire		**Ground Level (m AOD):**	126.52
	Project Number:	221748		**Eastings:**	427336.36
	Client:	Environmena Project Management UK Ltd		**Northings:**	286126.41
Hole Type: WLS	**Rig:**	Premier 110	**Start & End Date:** 13/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & (Thickness (m))	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[1.50]	Crops over light brown clayey SAND.()									
		125.02 [0.50]	Reddish brown very clayey SAND.()		1.50							
		124.52	Hole Terminated at 2.00m bgl.		2.00							

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

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BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH04	**Project Name:**	Nailcote Farm, Warwickshire		**Ground Level (m AOD):**	123.99
	Project Number:	221748		**Eastings:**	428061.88
	Client:	Environmena Project Management UK Ltd		**Northings:**	286341.30
Hole Type: WLS	**Rig:**	Premier 110	**Start & End Date:** 14/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & [Thickness (m)]	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[0.40]	Dark brown very clayey SAND with moderate rootlet content.()									
		123.59 [0.20]			0.40							
		123.39 [1.40]	Light brown gravelly SAND. Gravel is subangular to rounded, fine to coarse of sandstone and quartzite.()		0.60							
			Firm red sandy CLAY()									
		121.99	Hole Terminated at 2.00m bgl.		2.00							

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH05	**Project Name:**	Nailcote Farm, Warwickshire		**Ground Level (m AOD):**	125.08
	Project Number:	221748		**Eastings:**	427468.06
	Client:	Environmena Project Management UK Ltd		**Northings:**	286304.46
Hole Type: WLS	**Rig:**	Premier 110	**Start & End Date:** 13/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & (Thickness (m))	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[0.40]	Brown clayey SAND.()									
		124.68 [0.20]			0.40							
		124.48 [1.40]	Orangish brown clayey SAND.()		0.60							
			Weathered SANDSTONE recovered as redish brown clayey SAND.()									
		123.08	Hole Terminated at 2.00m bgl.		2.00							

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

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BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH06	**Project Name:**	Nailcote Farm, Warwickshire		**Ground Level (m AOD):**	134.85
	Project Number:	221748		**Eastings:**	427525.77
	Client:	Environmena Project Management UK Ltd		**Northings:**	285978.70
Hole Type: WLS	**Rig:**	Premier 110	**Start & End Date:** 13/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata			Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & (Thickness (m))	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[0.10] 134.75 [1.90]	Brown slightly clayey slightly gravelly SAND. Gravel is subangular to subrounded, fine to coarse fo sandstone.() Firm red slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of quartzite.()		0.10						
		132.85	Hole Terminated at 2.00m bgl.		2.00						

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

BOREHOLE LOG

Scale 1:50 Sheet 1 of 1

LOCATION ID					
FH07	**Project Name:**	Nailcote Farm, Warwickshire		**Ground Level (m AOD):**	140.99
	Project Number:	221748		**Eastings:**	427831.03
	Client:	Environmena Project Management UK Ltd		**Northings:**	286144.97
Hole Type: WLS	**Rig:**	Premier 110	**Start & End Date:** 14/09/2023	**Engineer:** TF	**Checker:** CR

Boring		Strata				Samples			In-Situ Tests			
Strike	Well	Level (m AOD) & [Thickness (m)]	Description	Legend	Depth (m bgl)	Type (Ublows)	From (m)	To (m)	Type	Depth (m)	Result	Casing Depth & (Water Level)
		[0.30]	Crops over dark brown very clayey SAND with moderate rootlet content.()									
		140.69 [1.70]	Firm reddish brown sandy CLAY.()		0.30							
		138.99	Hole Terminated at 2.00m bgl.		2.00							

Chiseling		
From (m bgl)	To (m bgl)	Time (hh:mm)

Water Added		
From (m bgl)	To (m bgl)	Volume (l)

Remarks

Reason for Termination:

Target depth reached.

Groundwater Remarks:

No groundwater encountered.

Other Remarks:

Location cleared of buried services. Borehole advanced to enable installation of standpipe for falling head infiltration test.

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APPENDIX 2: INFILTRATION TEST RESULTS

PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH01
Date:	13-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.20
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.20
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.300	1.900	1.000
0.25	0.400	1.800	0.947
0.50	0.500	1.700	0.895
0.75	0.600	1.600	0.842
1.00	0.720	1.480	0.779
2.00	0.810	1.390	0.732
4.00	1.100	1.100	0.579
6.00	1.350	0.850	0.447
8.00	1.440	0.760	0.400
10.00	1.530	0.670	0.353
12.00	1.640	0.560	0.295
15.00	1.740	0.460	0.242
20.00	1.850	0.350	0.184
25.00	1.880	0.320	0.1684
30.00	1.900	0.300	0.158
35.00	1.920	0.280	0.147
40.00	1.950	0.250	0.132

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

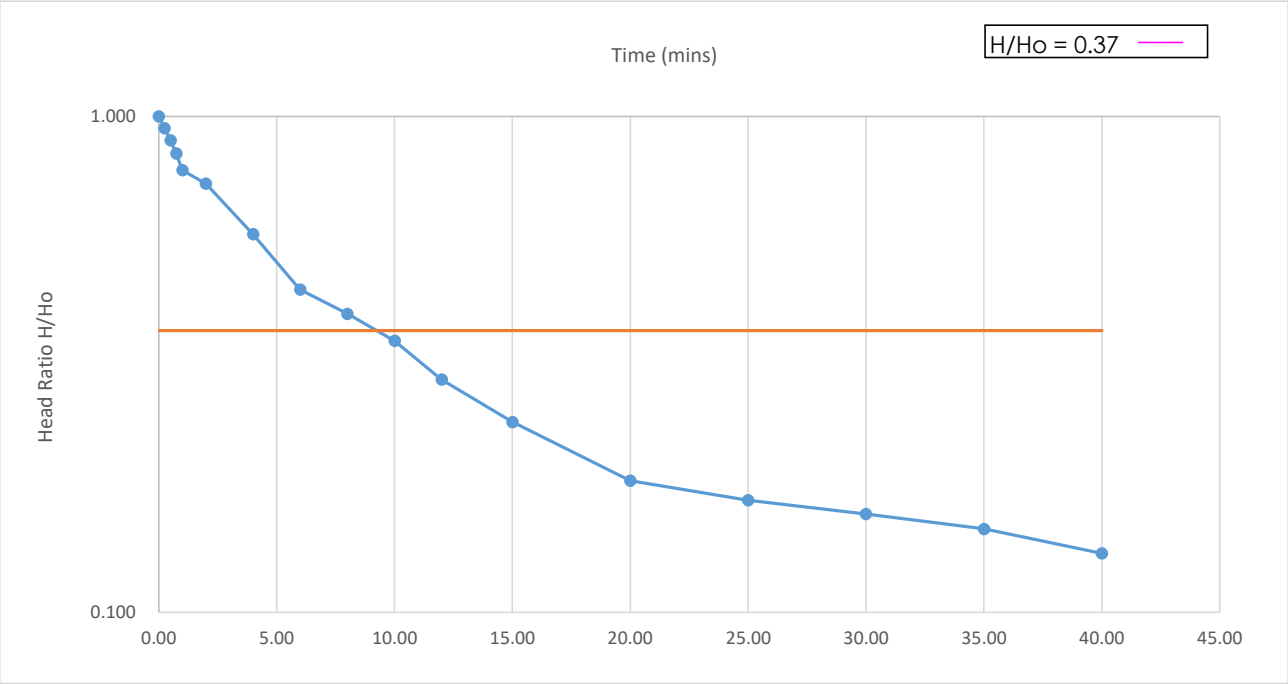
T= TIME FOR H/Ho:0.37

T=	9.00	(min)
T=	540.00	(sec)
K=	**2.57E-06**	**(m/s)**
K=	**0.222**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	20.00	(min)
t2=	40.00	(min)
H(head)1=	0.35	(m)
H(head)2=	0.25	(m)
K=	**3.89E-07**	**(m/s)**
K=	**0.034**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH01
Date:	13-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.20
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.300	1.900	1.000
0.25	0.410	1.790	0.942
0.50	0.520	1.680	0.884
0.75	0.550	1.650	0.868
1.00	0.570	1.630	0.858
2.00	0.720	1.480	0.779
4.00	1.060	1.140	0.600
6.00	1.210	0.990	0.521
8.00	1.400	0.800	0.421
10.00	1.530	0.670	0.353
12.00	1.620	0.580	0.305
15.00	1.740	0.460	0.242
20.00	1.840	0.360	0.189
25.00	1.860	0.340	0.1789
30.00	1.880	0.320	0.168
35.00	1.890	0.310	0.163
40.00	1.910	0.290	0.153
45.00	1.930	0.270	0.142
50.00	1.960	0.240	0.126

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

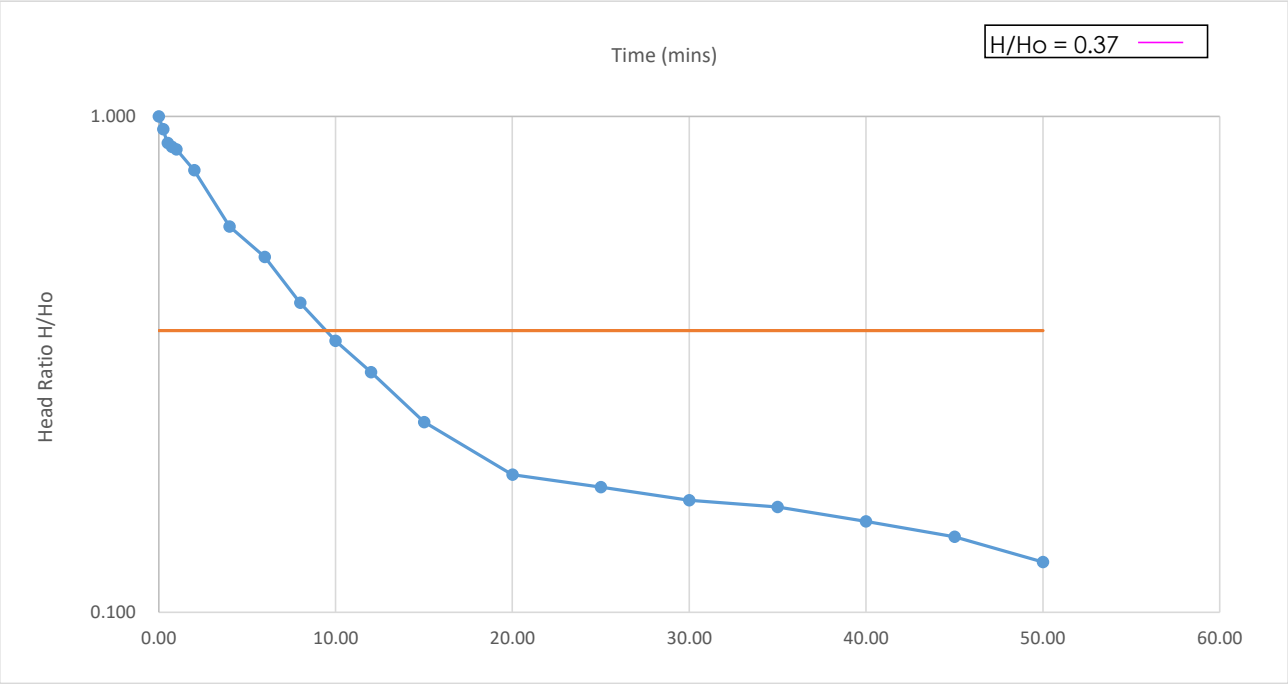
T= TIME FOR H/Ho:0.37

T=	9.50	(min)
T=	570.00	(sec)
K=	**2.44E-06**	**(m/s)**
K=	**0.210**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	20.00	(min)
t2=	50.00	(min)
H(head)1=	0.36	(m)
H(head)2=	0.24	(m)
K=	**3.13E-07**	**(m/s)**
K=	**0.027**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH01-C
Date:	13-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.20
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.20
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.300	1.900	1.000
0.25	0.320	1.880	0.989
0.50	0.450	1.750	0.921
0.75	0.500	1.700	0.895
1.00	0.650	1.550	0.816
2.00	0.820	1.380	0.726
4.00	1.100	1.100	0.579
6.00	1.400	0.800	0.421
8.00	1.540	0.660	0.347
10.00	1.680	0.520	0.274
12.00	1.750	0.450	0.237
15.00	1.820	0.380	0.200
20.00	1.850	0.350	0.184
25.00	1.900	0.300	0.1579
30.00	1.910	0.290	0.153
35.00	1.980	0.220	0.116
40.00	2.050	0.150	0.079
45.00	2.090	0.110	0.058
50.00	2.150	0.050	0.026

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

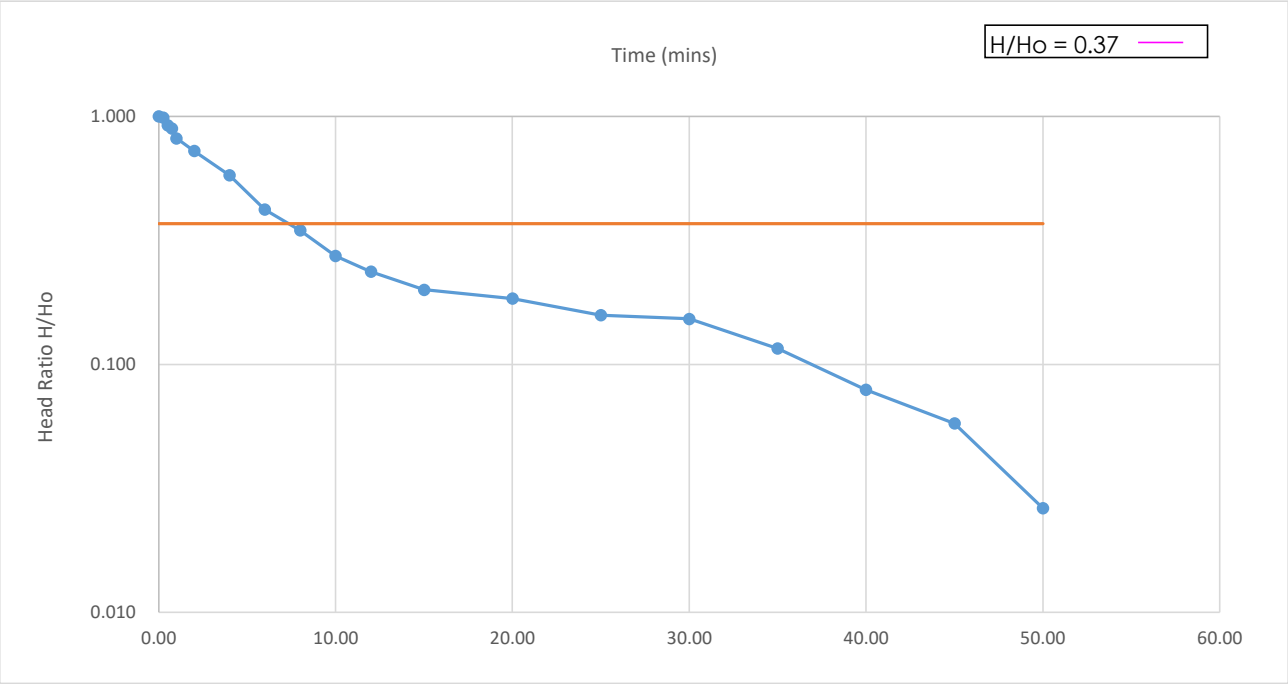
T= TIME FOR H/Ho:0.37

T=	7.50	(min)
T=	450.00	(sec)
K=	**3.09E-06**	**(m/s)**
K=	**0.267**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	30.00	(min)
t2=	50.00	(min)
H(head)1=	0.29	(m)
H(head)2=	0.05	(m)
K=	**2.03E-06**	**(m/s)**
K=	**0.176**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH02
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Mudstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	b
F Value	1.65E-01
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.200	1.800	0.900
0.50	0.230	1.770	0.885
0.75	0.270	1.730	0.865
1.00	0.320	1.680	0.840
2.00	0.450	1.550	0.775
4.00	0.500	1.500	0.750
6.00	0.570	1.430	0.715
8.00	0.600	1.400	0.700
12.00	0.690	1.310	0.655
16.00	0.710	1.290	0.645
60.00	0.750	1.250	0.625
120.00	0.800	1.200	0.600
240.00	0.880	1.120	0.5600
1440.00	1.150	0.850	0.425
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

T= TIME FOR H/Ho:0.37

T= (min)

T= 0.00 (sec)

K= #DIV/0! (m/s)

K= #DIV/0! (m/d)

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1= 120.00 (min)

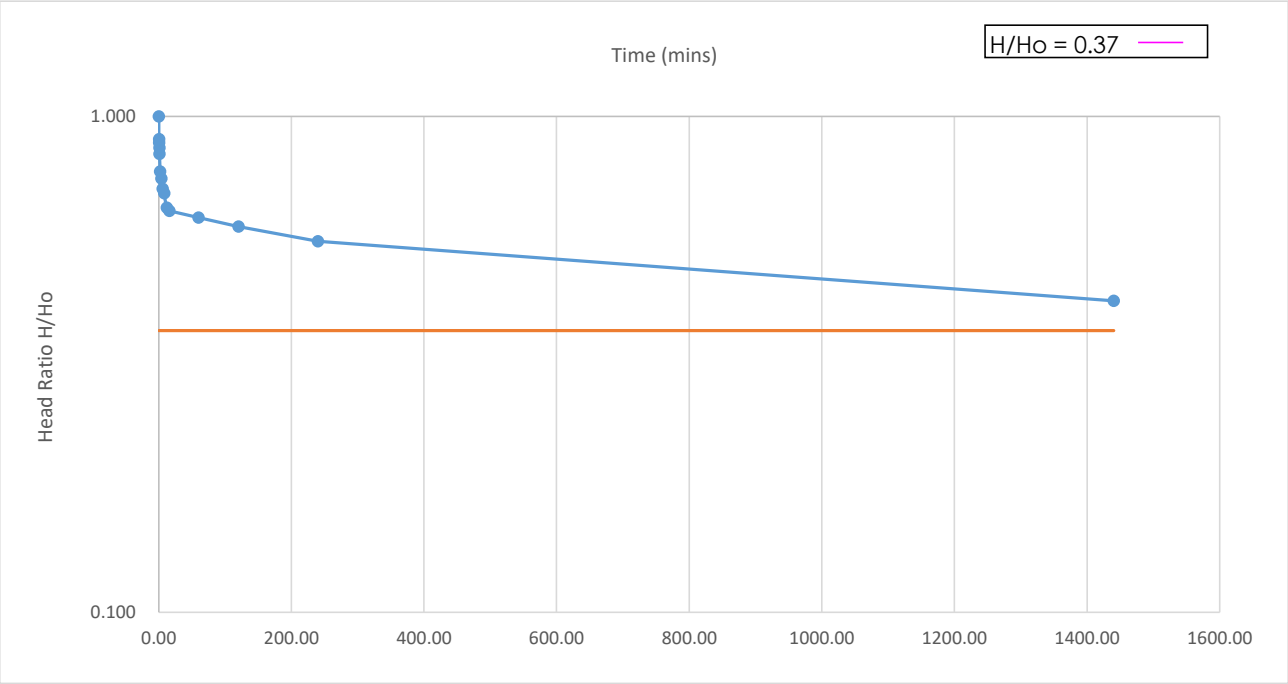
t2= 1440.00 (min)

H(head)1= 1.20 (m)

H(head)2= 0.85 (m)

K= 7.46E-08 (m/s)

K= 0.006 (m/d)



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH03
Date:	13-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Mudstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.010	1.990	0.995
0.50	0.010	1.990	0.995
0.75	0.010	1.990	0.995
1.00	0.010	1.990	0.995
2.00	0.010	1.990	0.995
10.00	0.020	1.980	0.990
20.00	0.050	1.950	0.975
60.00	0.100	1.900	0.950
120.00	0.200	1.800	0.900
240.00	0.450	1.550	0.775
1440.00	1.700	0.300	0.150
		2.000	1.000
		2.000	1.0000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

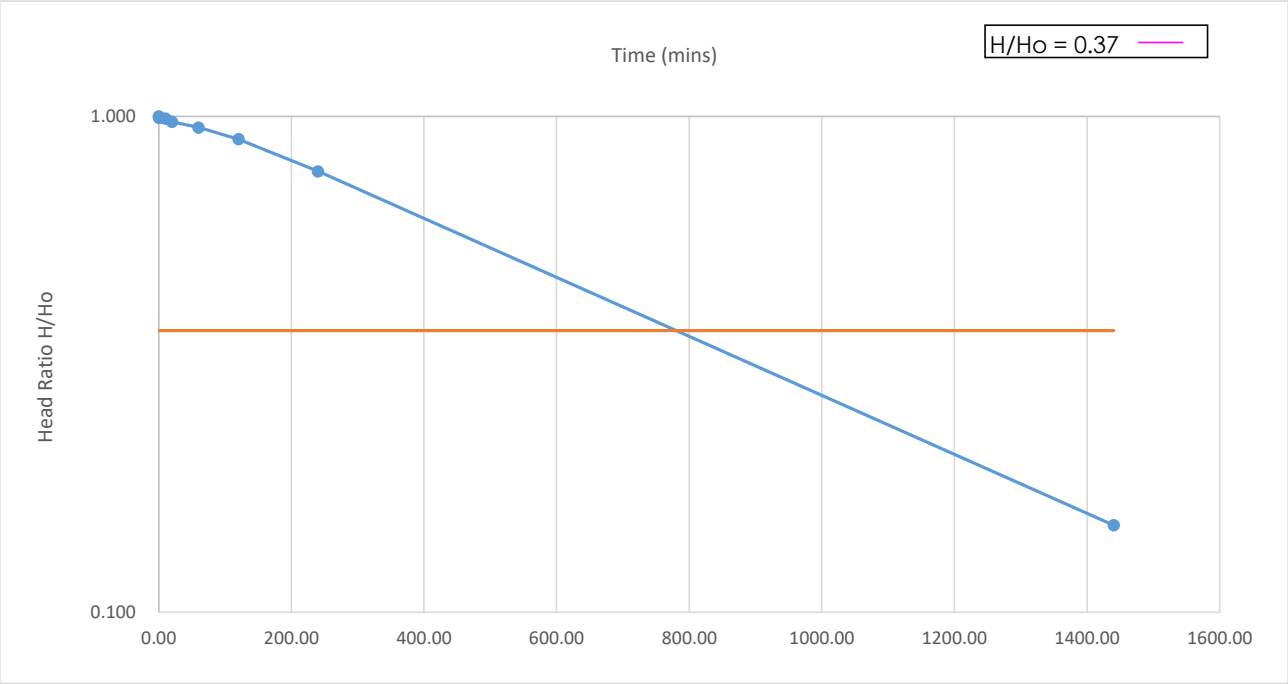
T= TIME FOR H/Ho:0.37

T=	78.00	(min)
T=	4680.00	(sec)
K=	**2.97E-07**	**(m/s)**
K=	**0.026**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	120.00	(min)
t2=	1440.00	(min)
H(head)1=	1.80	(m)
H(head)2=	0.30	(m)
K=	**3.14E-08**	**(m/s)**
K=	**0.003**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH04
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Mudstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.000	2.000	1.000
0.50	0.000	2.000	1.000
0.75	0.000	2.000	1.000
1.00	0.000	2.000	1.000
2.00	0.000	2.000	1.000
4.00	0.000	2.000	1.000
6.00	0.000	2.000	1.000
8.00	0.000	2.000	1.000
12.00	0.000	2.000	1.000
16.00	0.000	2.000	1.000
60.00	0.000	2.000	1.000
120.00	0.000	2.000	1.000
240.00	0.000	2.000	1.0000
1440.00	0.250	1.750	0.875
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

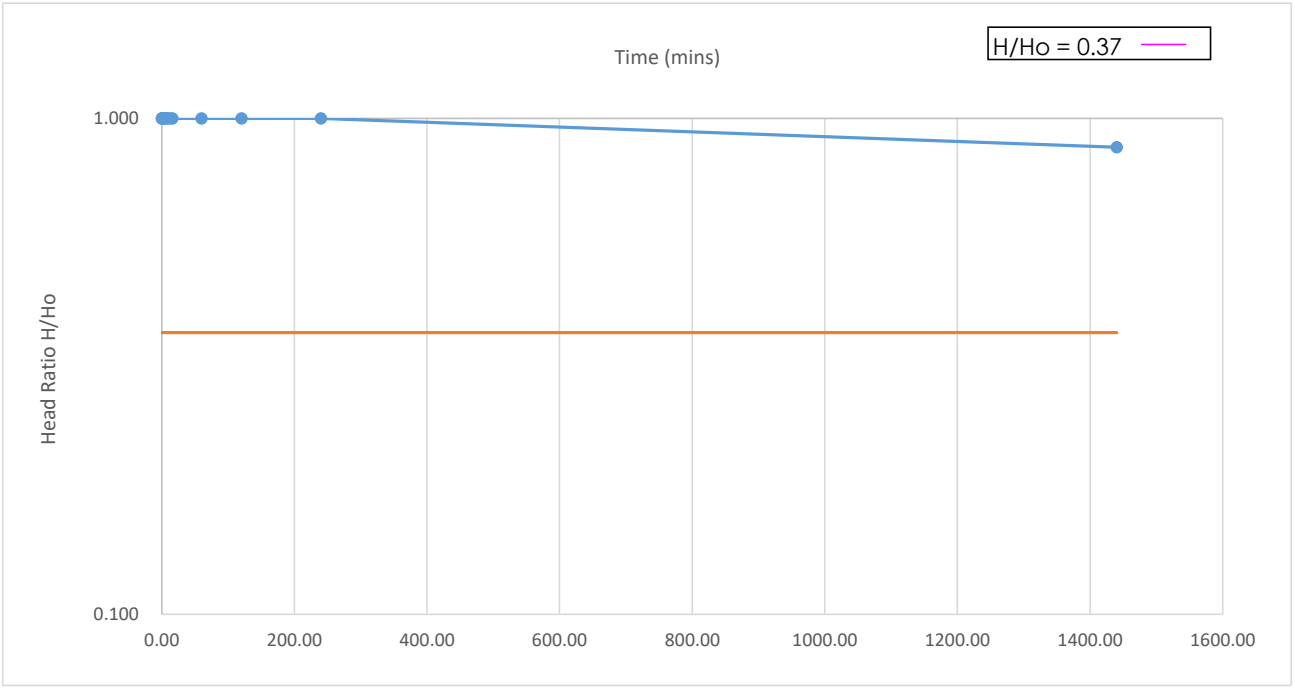
T= TIME FOR H/Ho:0.37

T=		(min)
T=	0.00	(sec)
K=	**#DIV/0!**	**(m/s)**
K=	**#DIV/0!**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	240.00	(min)
t2=	1440.00	(min)
H(head)1=	2.00	(m)
H(head)2=	1.75	(m)
K=	**2.58E-09**	**(m/s)**
K=	**0.000**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH05
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins)	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.150	1.850	0.925
0.50	0.170	1.830	0.915
0.75	0.180	1.820	0.910
1.00	0.210	1.790	0.895
2.00	0.220	1.780	0.890
4.00	0.270	1.730	0.865
6.00	0.310	1.690	0.845
8.00	0.360	1.640	0.820
20.00	0.580	1.420	0.710
30.00	0.660	1.340	0.670
90.00	1.000	1.000	0.500
240.00	1.200	0.800	0.400
1080.00	1.990	0.010	0.0050

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

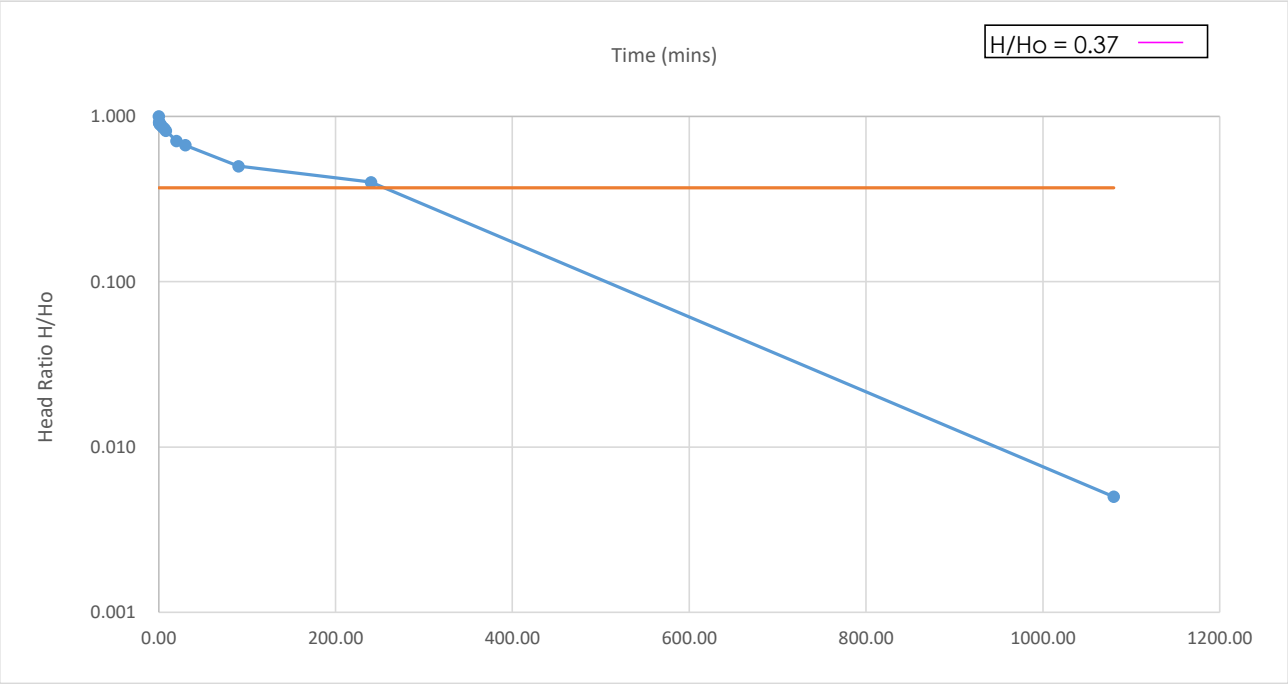
T= TIME FOR H/Ho:0.37

T=	265.00	(min)
T=	15900.00	(sec)
K=	**8.73E-08**	**(m/s)**
K=	**0.008**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	90.00	(min)
t2=	1080.00	(min)
H(head)1=	1.00	(m)
H(head)2=	0.01	(m)
K=	**1.08E-07**	**(m/s)**
K=	**0.009**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH05 B
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.170	1.830	0.915
0.50	0.180	1.820	0.910
0.75	0.180	1.820	0.910
1.00	0.190	1.810	0.905
2.00	0.210	1.790	0.895
4.00	0.240	1.760	0.880
6.00	0.280	1.720	0.860
8.00	0.280	1.720	0.860
10.00	0.300	1.700	0.850
20.00	0.400	1.600	0.800
90.00	0.930	1.070	0.535
240.00	1.510	0.490	0.245
420.00	1.950	0.050	0.0250
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

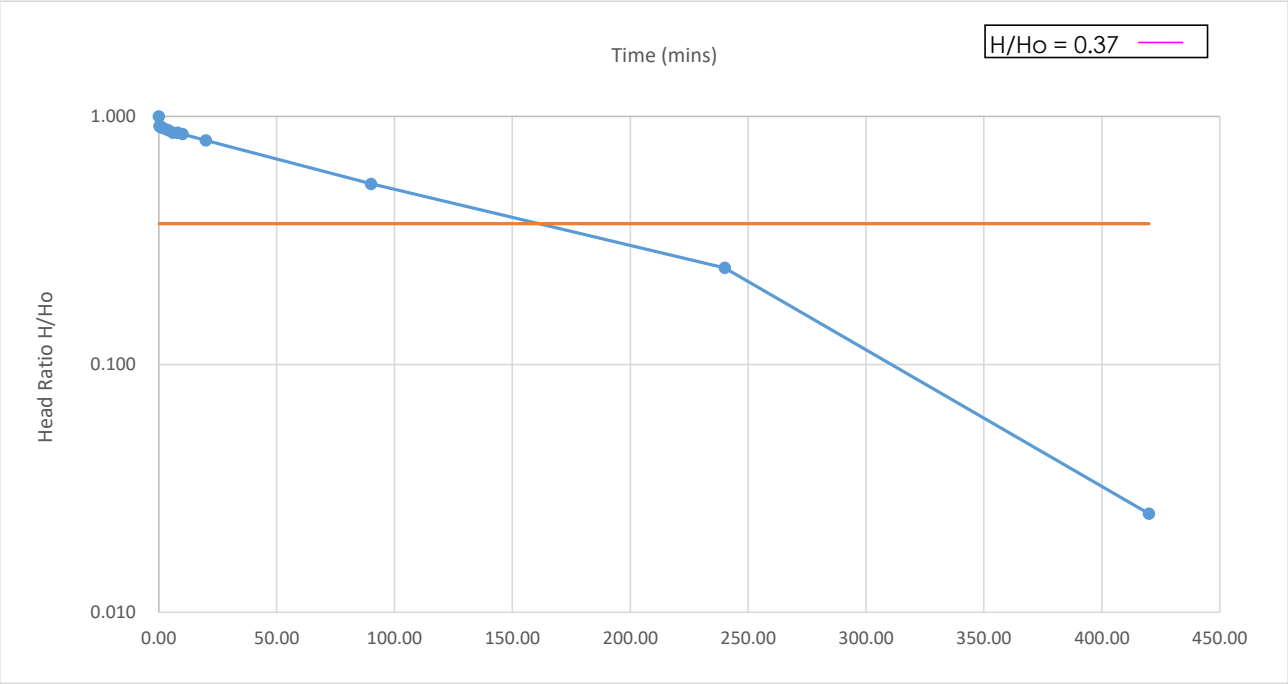
T= TIME FOR H/Ho:0.37

T=	160.00	(min)
T=	9600.00	(sec)
K=	**1.45E-07**	**(m/s)**
K=	**0.012**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	90.00	(min)
t2=	420.00	(min)
H(head)1=	1.07	(m)
H(head)2=	0.05	(m)
K=	**2.15E-07**	**(m/s)**
K=	**0.019**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH05 C
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.020	1.980	0.990
0.50	0.030	1.970	0.985
0.75	0.040	1.960	0.980
1.00	0.050	1.950	0.975
2.00	0.100	1.900	0.950
4.00	0.150	1.850	0.925
6.00	0.180	1.820	0.910
8.00	0.220	1.780	0.890
10.00	0.260	1.740	0.870
20.00	0.370	1.630	0.815
60.00	0.680	1.320	0.660
180.00	1.510	0.490	0.245
420.00	1.980	0.020	0.0100

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

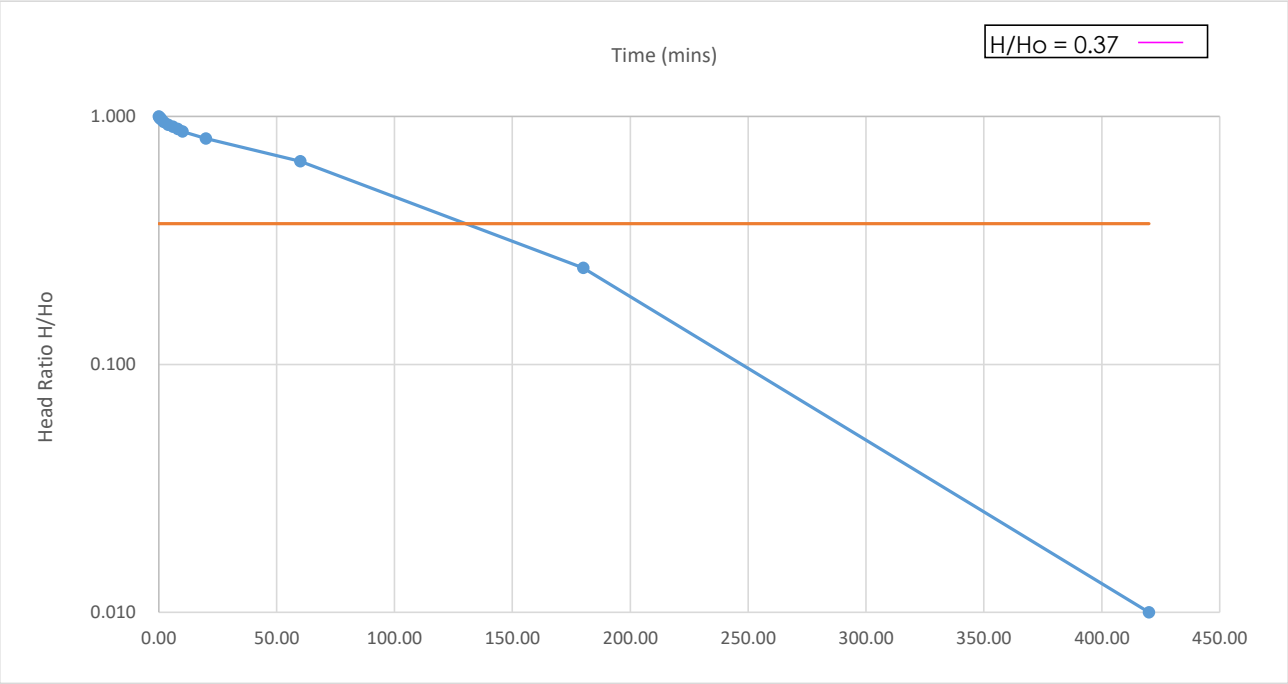
T= TIME FOR H/Ho:0.37

T=	130.00	(min)
T=	7800.00	(sec)
K=	**1.78E-07**	**(m/s)**
K=	**0.015**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	60.00	(min)
t2=	420.00	(min)
H(head)1=	1.32	(m)
H(head)2=	0.02	(m)
K=	**2.69E-07**	**(m/s)**
K=	**0.023**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH06
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	1.20
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	1.200	1.000
0.25	0.000	1.200	1.000
0.50	0.000	1.200	1.000
0.75	0.010	1.190	0.992
1.00	0.020	1.180	0.983
2.00	0.040	1.160	0.967
4.00	0.060	1.140	0.950
10.00	0.120	1.080	0.900
15.00	0.170	1.030	0.858
20.00	0.230	0.970	0.808
25.00	0.250	0.950	0.792
30.00	0.290	0.910	0.758
60.00	0.460	0.740	0.617
120.00	0.650	0.550	0.4583
150.00	0.700	0.500	0.417
300.00	0.860	0.340	0.283
360.00	1.010	0.190	0.158
		1.200	1.000
		1.200	1.000
		1.200	1.000

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

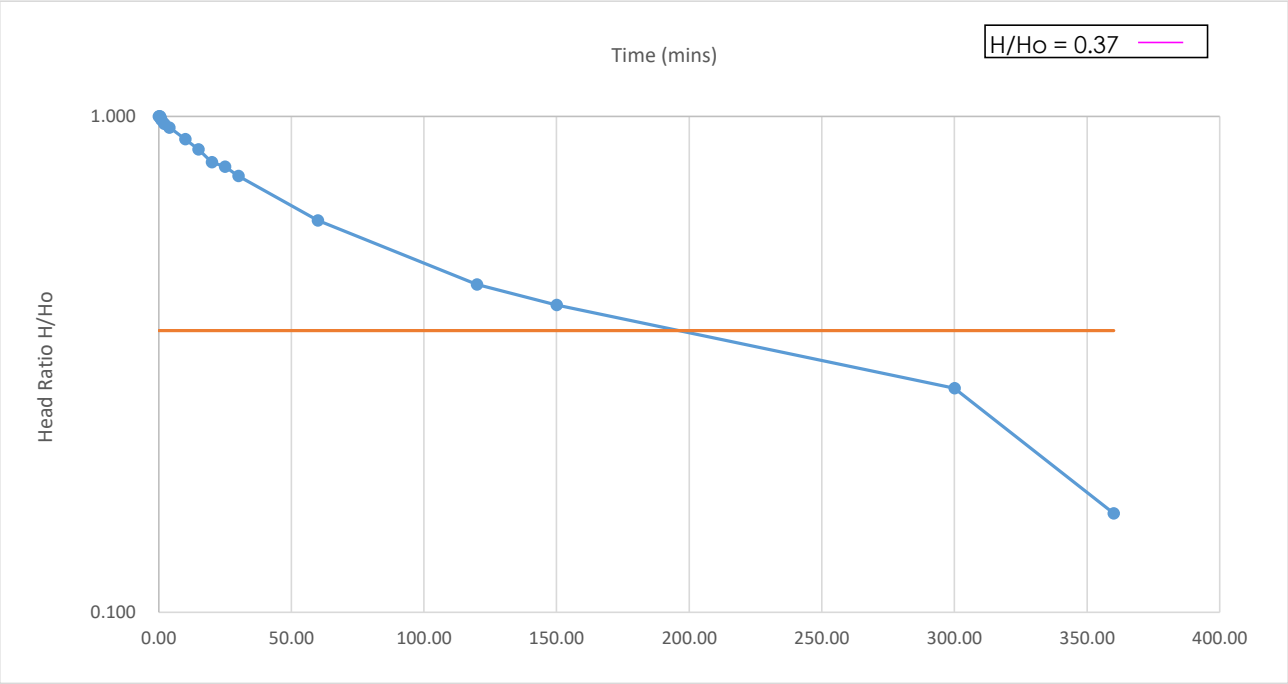
T= TIME FOR H/Ho:0.37

T=	200.00	(min)
T=	12000.00	(sec)
K=	**1.16E-07**	**(m/s)**
K=	**0.010**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	120.00	(min)
t2=	300.00	(min)
H(head)1=	0.55	(m)
H(head)2=	0.19	(m)
K=	**1.37E-07**	**(m/s)**
K=	**0.012**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH06
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	1.20
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	1.200	1.000
0.25	0.000	1.200	1.000
0.50	0.000	1.200	1.000
0.75	0.010	1.190	0.992
1.00	0.030	1.170	0.975
2.00	0.050	1.150	0.958
4.00	0.070	1.130	0.942
10.00	0.090	1.110	0.925
15.00	0.120	1.080	0.900
20.00	0.140	1.060	0.883
25.00	0.170	1.030	0.858
30.00	0.270	0.930	0.775
60.00	0.410	0.790	0.658
120.00	0.620	0.580	0.4833
150.00	0.650	0.550	0.458
360.00	1.020	0.180	0.150

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

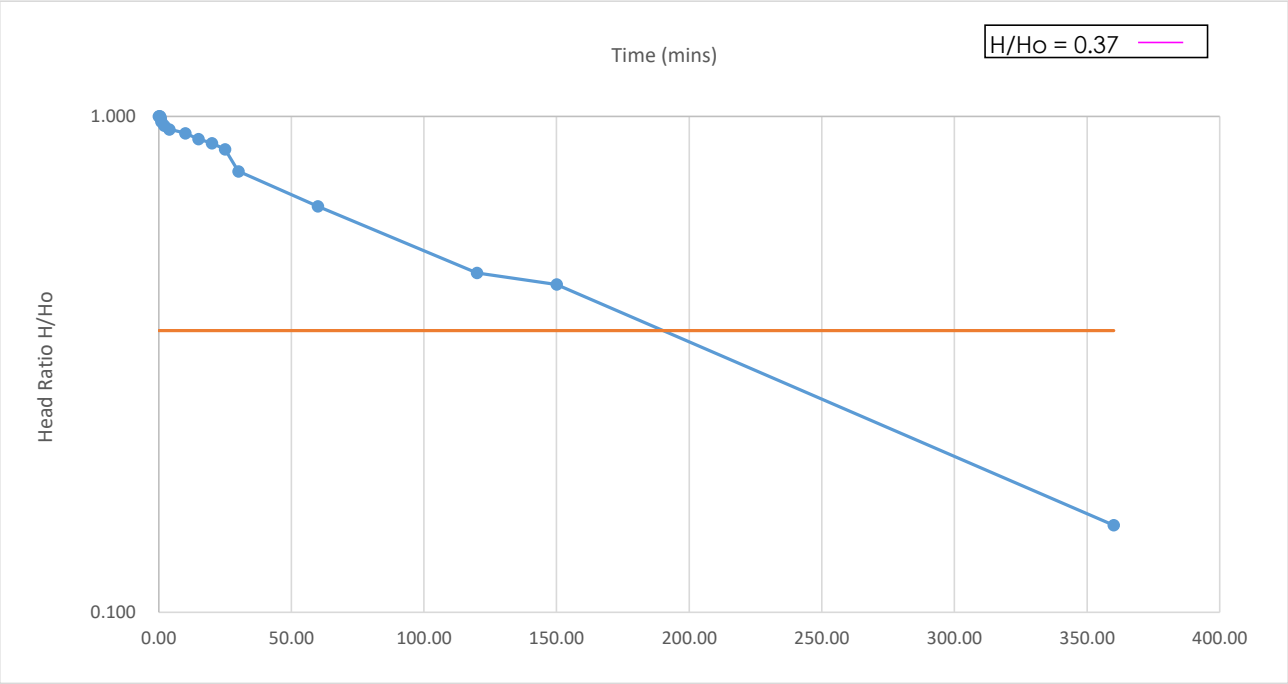
T= TIME FOR H/Ho:0.37

T=	185.00	(min)
T=	11100.00	(sec)
K=	**1.25E-07**	**(m/s)**
K=	**0.011**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	60.00	(min)
t2=	360.00	(min)
H(head)1=	0.79	(m)
H(head)2=	0.18	(m)
K=	**1.14E-07**	**(m/s)**
K=	**0.010**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH06
Date:	18-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	0.90
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Sandstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins)	Hi(mbd)	H(head)	H/Ho
0.00	0.000	0.900	1.000
0.25	0.000	0.900	1.000
0.50	0.000	0.900	1.000
0.75	0.000	0.900	1.000
1.00	0.010	0.890	0.989
2.00	0.020	0.880	0.978
4.00	0.030	0.870	0.967
6.00	0.050	0.850	0.944
8.00	0.050	0.850	0.944
10.00	0.060	0.840	0.933
15.00	0.090	0.810	0.900
20.00	0.120	0.780	0.867
25.00	0.140	0.760	0.844
30.00	0.180	0.720	0.8000
60.00	0.260	0.640	0.711
150.00	0.530	0.370	0.411
1000.00	0.899	0.001	0.001

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

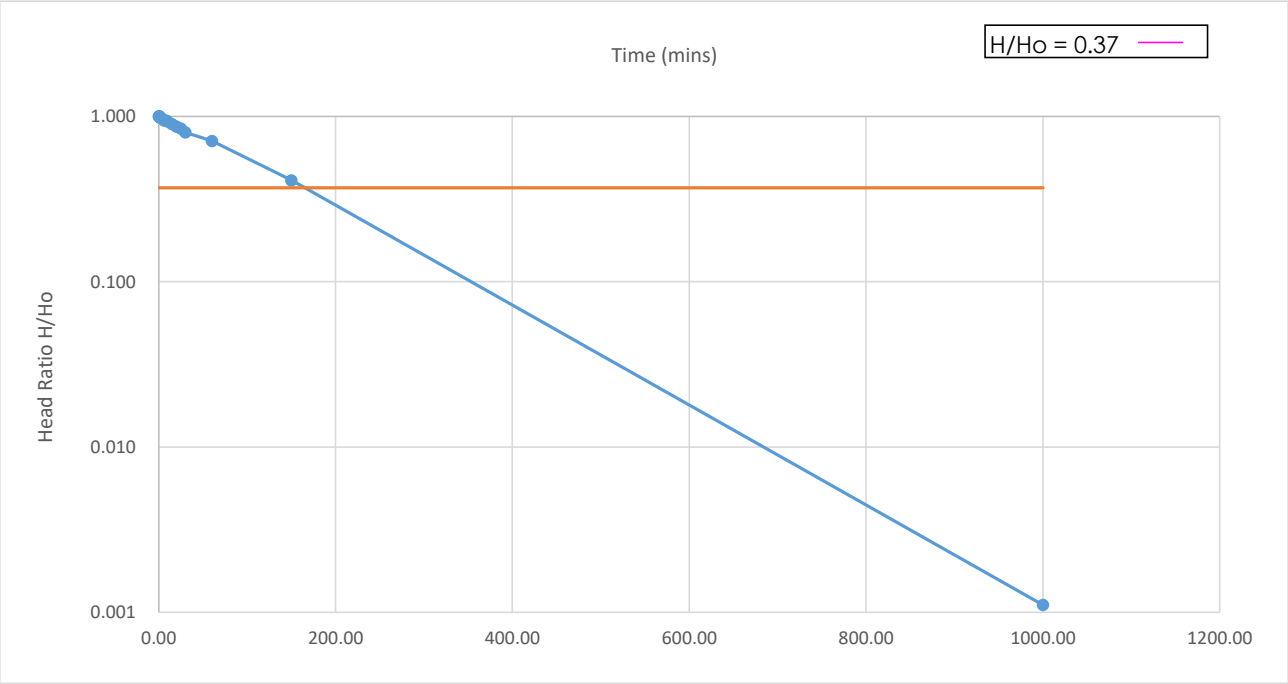
T= TIME FOR H/Ho:0.37

T=	150.00	(min)
T=	9000.00	(sec)
K=	**1.54E-07**	**(m/s)**
K=	**0.013**	**(m/d)**

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1=	1.00	(min)
t2=	300.00	(min)
H(head)1=	1.99	(m)
H(head)2=	0.01	(m)
K=	**4.10E-07**	**(m/s)**
K=	**0.035**	**(m/d)**



PIEZOMETER VARIABLE HEAD PERMEABILITY TEST

Project Name:	Nailcote Farm
Project Number:	221748
Borehole Ref:	FH07
Date:	14-Sep-23
Borehole Diameter (mm):	60
Resting Water Level (m bd):	2.00
Length (L) of Response Zone (m):	1.00

Base of Standpipe (m):	2.00
Geology:	Mudstone
Borehole Diameter (D) (m):	6.00E-02
Scenario (F):	d2
F Value	2.04E+00
Area (A) of Borehole (m^2)	2.83E-03

Time (mins	Hi(mbd)	H(head)	H/Ho
0.00	0.000	2.000	1.000
0.25	0.150	1.850	0.925
0.50	0.200	1.800	0.900
0.75	0.200	1.800	0.900
1.00	0.200	1.800	0.900
2.00	0.200	1.800	0.900
4.00	0.200	1.800	0.900
6.00	0.200	1.800	0.900
8.00	0.200	1.800	0.900
12.00	0.200	1.800	0.900
16.00	0.200	1.800	0.900
60.00	0.200	1.800	0.900
120.00	0.220	1.780	0.890
240.00	0.250	1.750	0.8750
1440.00	1.000	1.000	0.500
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000
		2.000	1.000

Basic Time Lag Method (after BS5930:1999)

K= A/(F*T)

T= TIME FOR H/Ho:0.37

T= (min)

T= 0.00 (sec)

K= #DIV/0! (m/s)

K= #DIV/0! (m/d)

General Method (after BS5930:1999)

$$k = \frac{A}{F(t_2 - t_1)} \log_e \frac{H_1}{H_2}$$

t1= 120.00 (min)

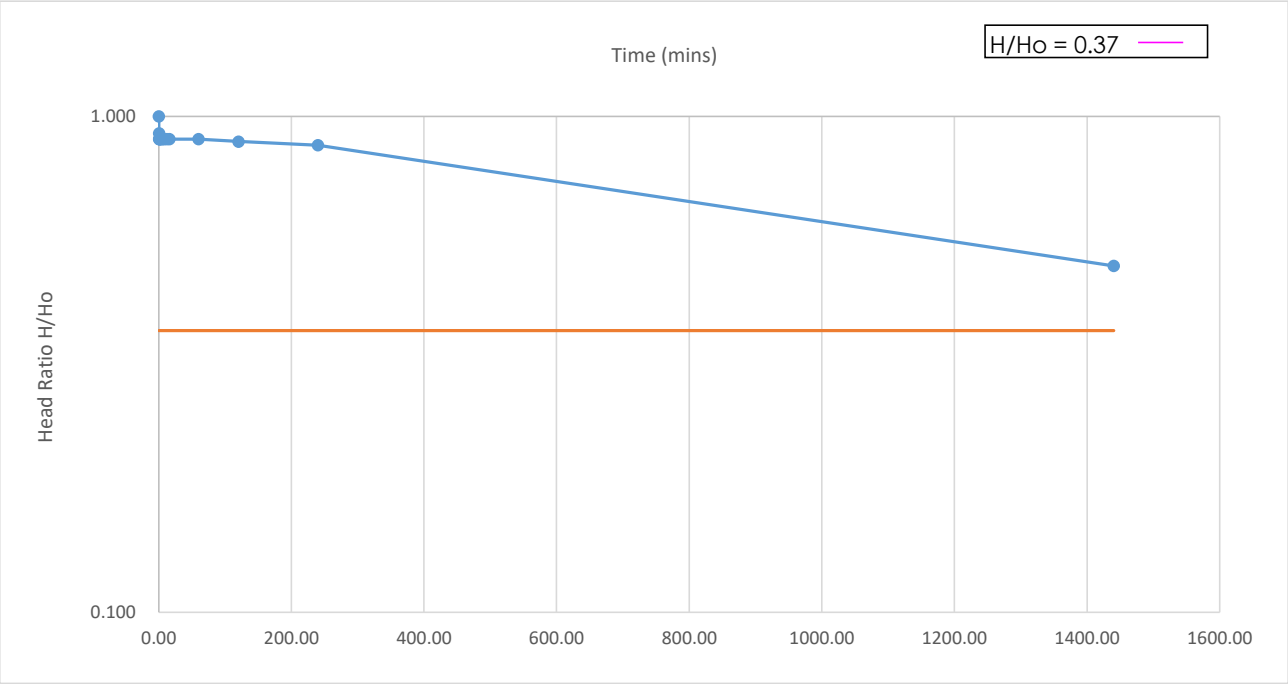
t2= 1440.00 (min)

H(head)1= 1.78 (m)

H(head)2= 1.00 (m)

K= 1.01E-08 (m/s)

K= 0.001 (m/d)

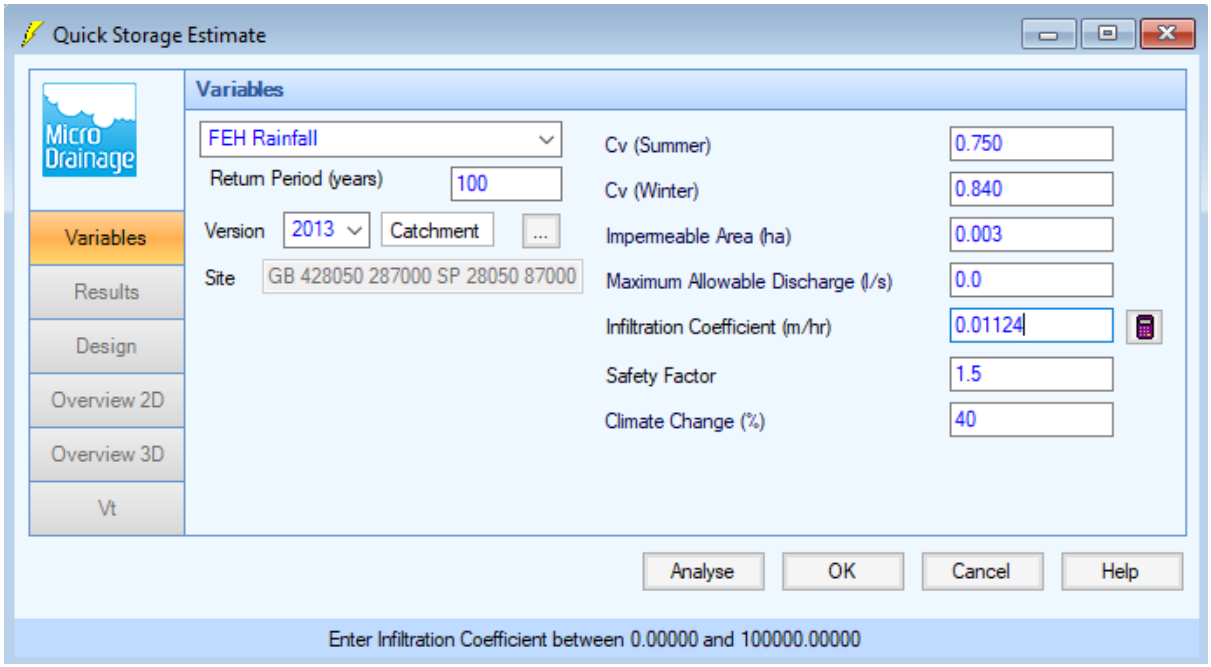


Appendix 4 - MicroDrainage Quick Storage Estimate Outputs

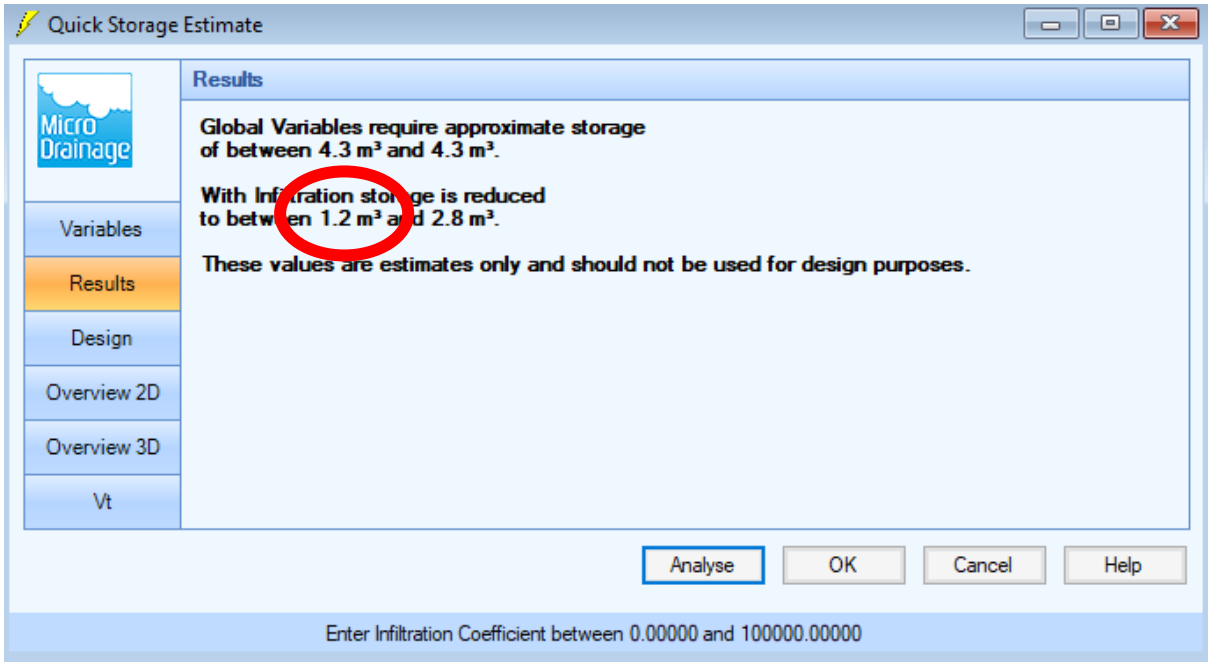
Quick Storage Estimate Outputs

Upper Band Infiltration Rate (3.09×10^{-6} m/s)

Inputs

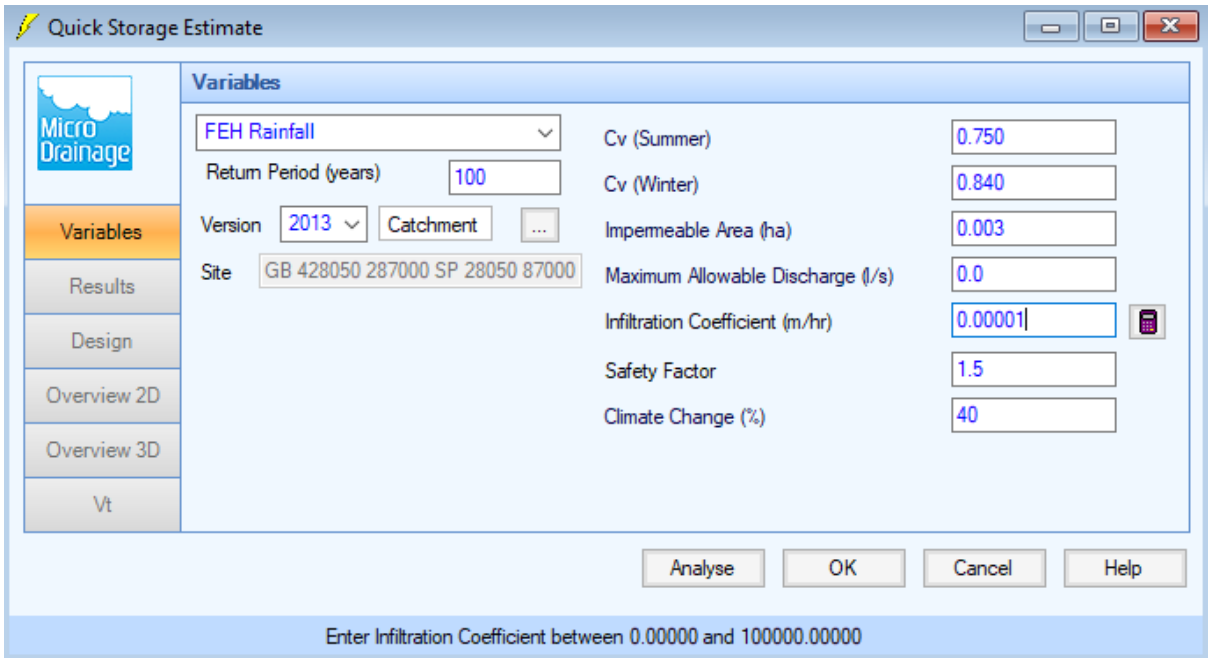


Outputs

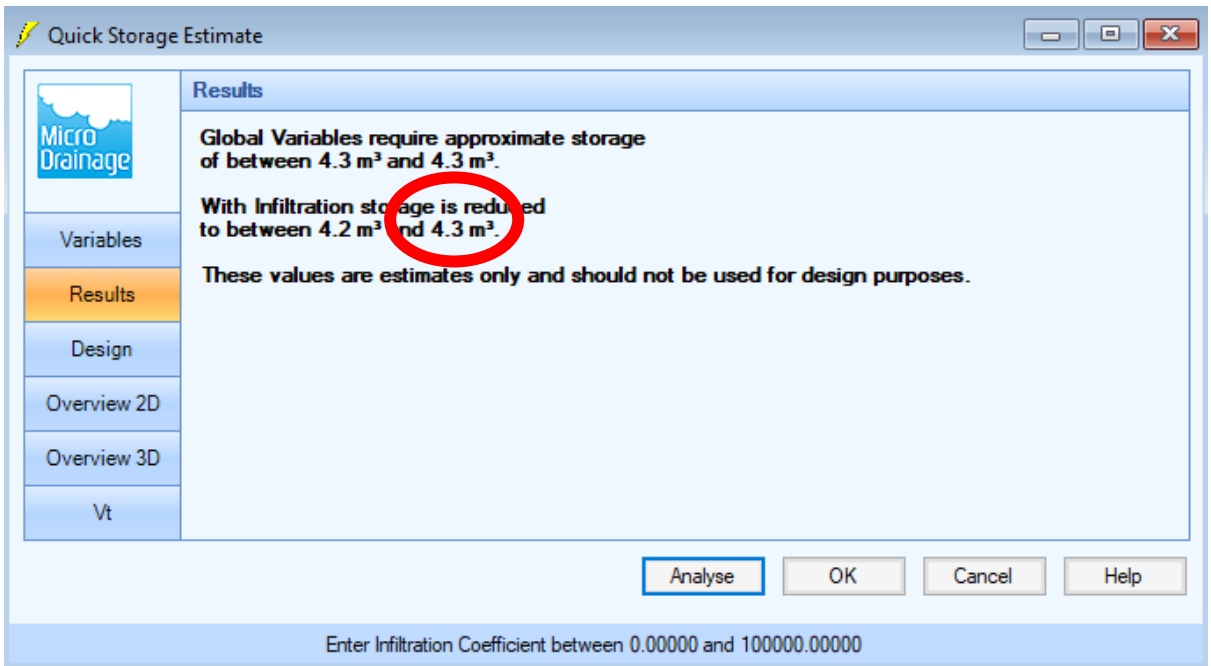


Lower Band Infiltration Rate (2.58×10^{-9} m/s)

Inputs



Outputs



Appendix 2: Proposed Development Layout and Sections

N

Public Right of Way

Public Right of Way

Site Access

Parking

DNO Substation

Customer Substation

Screening

MERIDEN ROAD

B 4102

Sinks

Issues

Pond

White House Farm

Track

Path (um)

M 6

0 20 50 100 200m

LEGEND

- Landlord Boundary
- Site Boundary
- Site Access
- Fence
- PV Array
- Transformer Station
- DNO Substation
- Customer Substation
- Public Right of Way

REV	DESCRIPTION	BY	DATE
B	Drawing created using General Layout RevN	AMS	06/11/23
A	Drawing created using General Layout RevM	CC	20/10/23

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
Reading, RG7 1JQ
T: +44 330 107 1415

SITE ADDRESS
Nailcote Farm
Nailcote Lane
Berkswell
Coventry
CV7 7DE

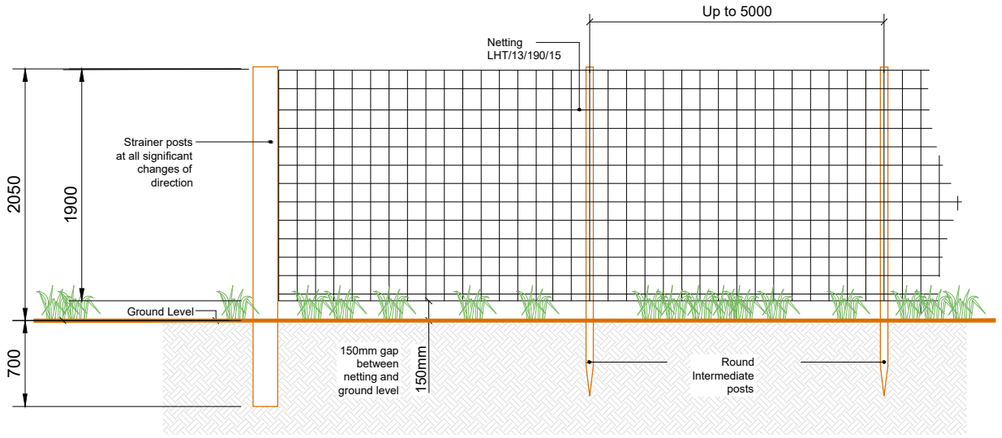
PROJECT
Fillongley Solar

TITLE
Planning Layout

NUMBER	REVISION
P Nailcote Farm_09_Planning Layout	A

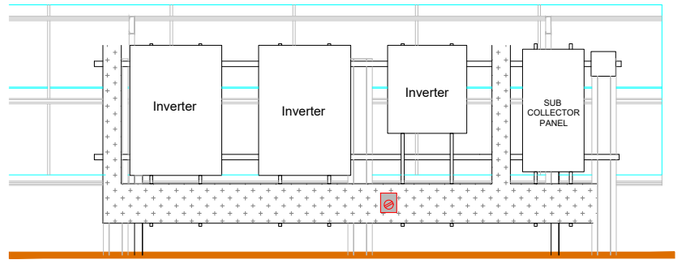
SCALE (A0)	SHEET	DRAWN	APPROVED
1:1250	1 OF 1	CC	AMS

SECURITY FENCE DETAIL
(DEER FENCE)



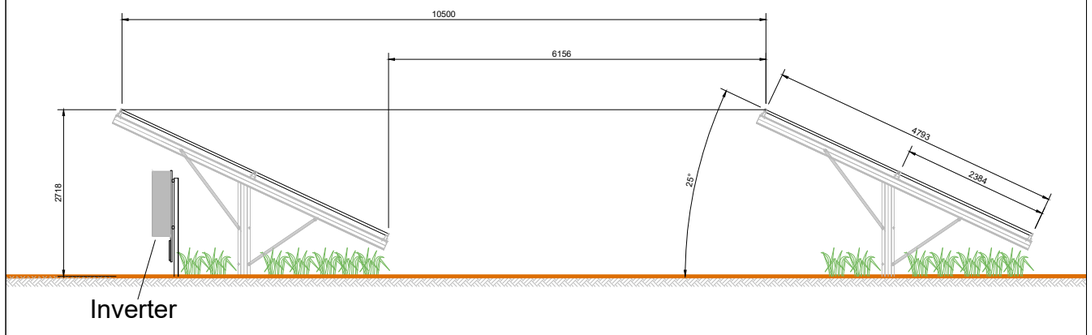
Scale 1:50 @A3

NORTH ELEVATION
(rear - showing typical inverter arrangement)



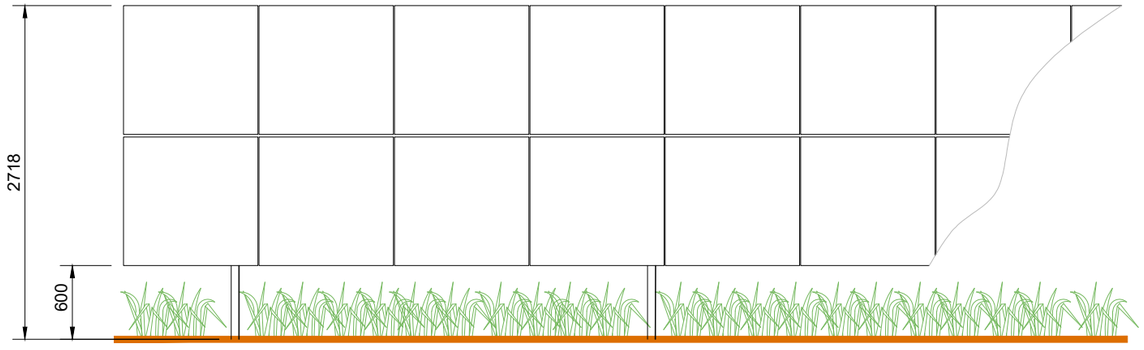
Scale 1:50 @A3

TYPICAL SECTION THROUGH ARRAY



Scale 1:100 @A3

SOUTH ELEVATION
(Front)



Scale 1:50 @A3

COMMENTS:
Units in mm.

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:
RevA		AMS		05/12/2022

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:

Scale:	Drawn by:	Checked by:	Signed by PM:	Date checked:	Page:	Sheet size:
N/A	AMS				1 of 1	A3

SITE ADDRESS:
Nailcote Farm
Nialcote Lane
Berkswell, Coventry

CV7 7DE

PROJECT NAME:
Nailcote Farm

TITLE:
Section views

DRAWING No.:
P.NailcoteFarm_06_SectionViews

REV:
Rev A

ENVIROMENA

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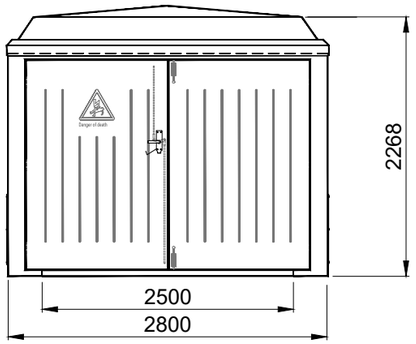
15 Diddenham Court, Grazeley
Reading, RG7 1JQ, United Kingdom



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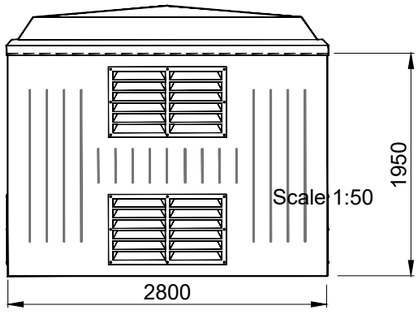

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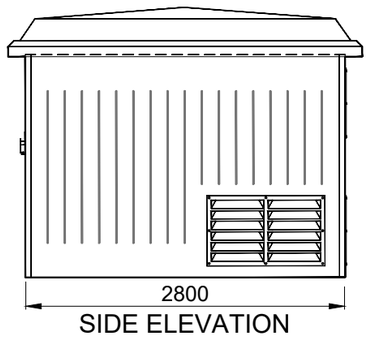
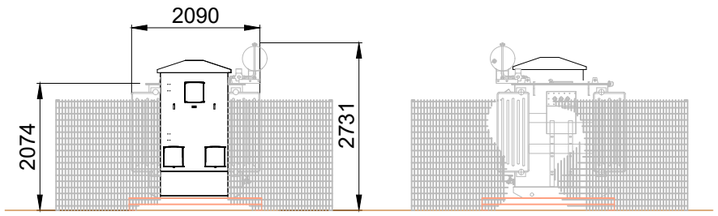


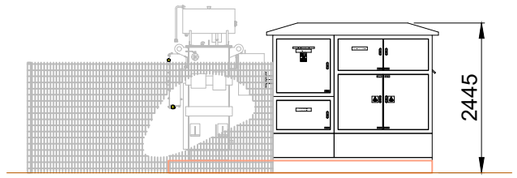
SIDE ELEVATION

CUSTOMER SWITCHGEAR ENCLOSURE



SIDE ELEVATION

SIDE ELEVATION



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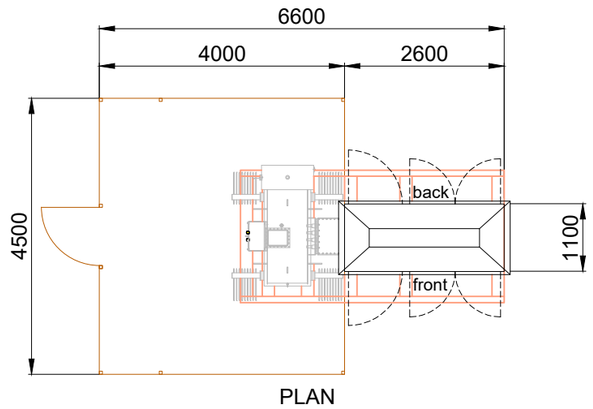
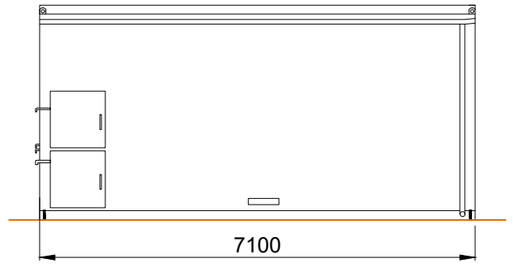


PLAN

TYPICAL LV STATION



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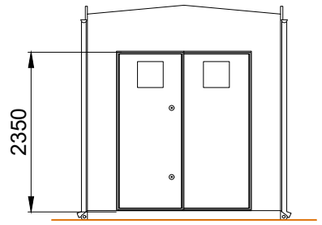

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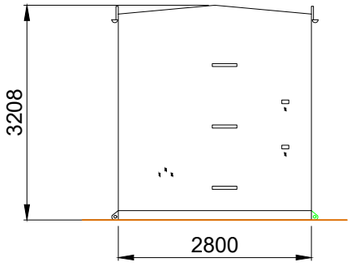

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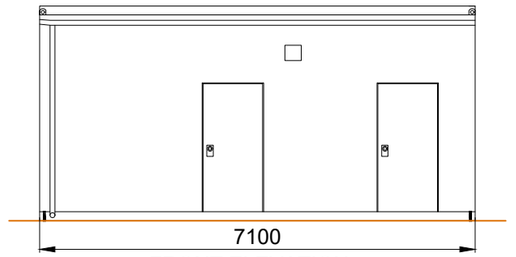
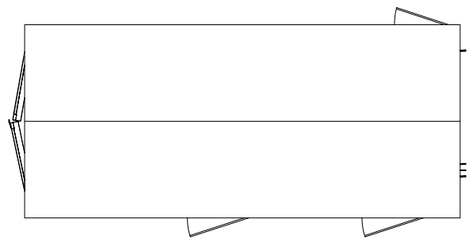


FRONT ELEVATION



PLAN

TYPICAL DNO SUBSTATION ENCLOSURE

COMMENTS:
Units in mm.

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:
RevA		AMS		05/12/2022

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:

Scale:	Drawn by:	Checked by:	Signed by PM:	Date checked:	Page:	Sheet size:
N/A	AMS				1 of 1	A3

SITE ADDRESS:
Nailcote Farm
Nialcote Lane
Berkswell, Coventry

CV7 7DE

PROJECT NAME:
Nailcote Farm

TITLE:
Building Sections view

DRAWING No.: P.NailcoteFarm_07_BuildingSectionViews

REV: Rev A

ENVIROMENA

ADDRESS:
Enviromena Project Management UK Ltd
Tel: +44 330 107 1415
15 Diddenham Court, Grazeley
Reading, RG7 1JQ, United Kingdom

Appendix 3: Topographical Survey

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	427107.293	285586.147	137.020
BWB02	427131.275	285693.351	133.907
BWB03	427147.832	285812.084	136.132

Notes

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6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan

Legend

▒	OS Buildings
🟨	Surveyed Buildings
──	Building
──	Wall
──	Kerb Channel Line
──	Top of Kerb
—·—·—	Edge of Surface
— — —	Top of Bank
— — — —	Bottom of Bank
—··—··—	Canopy / Overhang
— —	Line Marking
········	Centre Line
──	Watercourse Centre Line
──	Barrier
—·—·—	Fence
⋈	Gate
─∧─	Overhead Powerline
─◇─	Overhead Utilities
120	Contour Lines
□ ○ △	Inspection Chamber
→ 0.25	Flow direction and pipe diameter
△ 1	Station and Name
BH 1 ⌖	Monitoring Borehole
○	Tree / Bush / Sapling
∴	Area of Vegetation/ Extent of Tree Canopy
∞∞∞	Hedge
▨	Body of Water
▨	Body of Water from OS
+50.00	Spot Level
— — —	Assumed Surface Water Drainage Line
──	Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole		
		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
DP	Down Pipe	GY	Gully	TP	Telegraph Post
Elec	Electric	Ht	Height	TS	Traffic Signal
EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WM	Water Meter
FL	Floodlight			WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 1 of 6

Drawn:	B. Connelly			Reviewed:	D.Smith
BWB Ref:	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-01-DR-G-001	**S2**	**P1**

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	427107.293	285586.147	137.020
BWB02	427131.275	285693.351	133.907
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Key Plan

Legend

- ▨ OS Buildings
- 🟨 Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- □ ○ △ Inspection Chamber
- 0.25 Flow direction and pipe diameter
- △ 1 Station and Name
- BH 1 Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- +50.00 Spot Level
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole		
		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
DP	Down Pipe	GY	Gully	TP	Telegraph Post
Elec	Electric	Ht	Height	TS	Traffic Signal
EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WM	Water Meter
FL	Floodlight			WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

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Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 2 of 6

Drawn:	B. Connelly	Reviewed:	D.Smith
BWB Ref: 221748.00	Date: 15.12.22	Scale@A0:	1:500

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-02-DR-G-001	**S2**	**P1**

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
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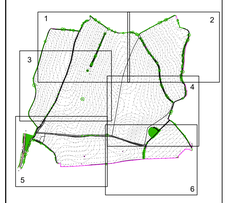
Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
Flow direction and pipe diameter
Station and Name
Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
DK	Drop Kerb	GA	Gas	TL	Traffic Light
DP	Down Pipe	GV	Gas Valve	TP	Telegraph Post
Elec	Electric	GY	Gully	TS	Traffic Signal
EP	Electricity Post	Ht	Height	UTS	Unable to Survey
ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
FH	Fire Hydrant	IFL	Internal Floor Level	WM	Water Meter
FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

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Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 2 of 6

Drawn:	B. Connelly	Reviewed:	D.Smith
BWB Ref:	221748.00	Date: 15.12.22	Scale@A0: 1:500

Drawing Status: **Information**

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-03-DR-G-001	S2	P1

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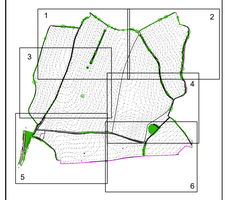

Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
0.25 Flow direction and pipe diameter
1 Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
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CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
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CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
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FL	Floodlight				

Rev	Date	Details of issue / revision	Drw	Rev.
P1	15.12.22	First Issue	BC	DS

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Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 4 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref:	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status:

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-04-DR-G-001	**S2**	**P1**

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
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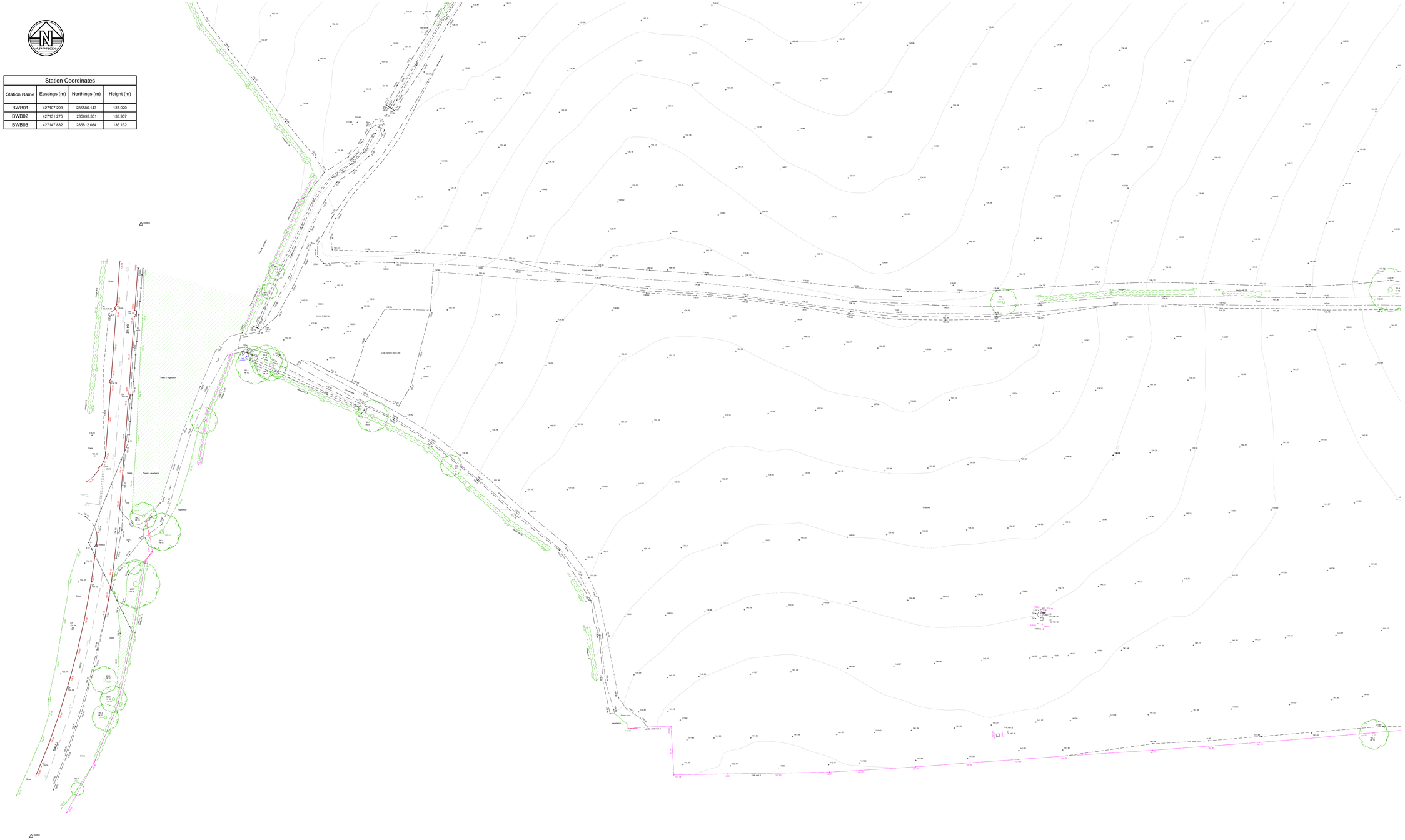

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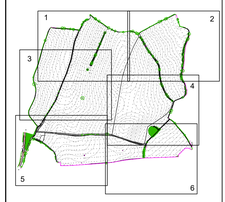
Key Plan



Legend

OS Buildings		Contour Lines	
Surveyed Buildings		Inspection Chamber	
Building		Flow direction and pipe diameter	0.25
Wall		Station and Name	1
Kerb Channel Line		Monitoring Borehole	BH 1
Top of Kerb		Tree / Bush / Sapling	
Edge of Surface		Area of Vegetation/ Extent of Tree Canopy	
Top of Bank		Hedge	
Bottom of Bank		Body of Water	
Canopy / Overhang		Body of Water from OS	
Line Marking		Spot Level	50.00
Centre Line		Assumed Surface Water Drainage Line	
Watercourse Centre Line		Surface Water Drainage Line	
Barrier			
Fence			
Gate			
Overhead Powerline			
Overhead Utilities			

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
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P1	15.12.22	First Issue	BC	DS

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

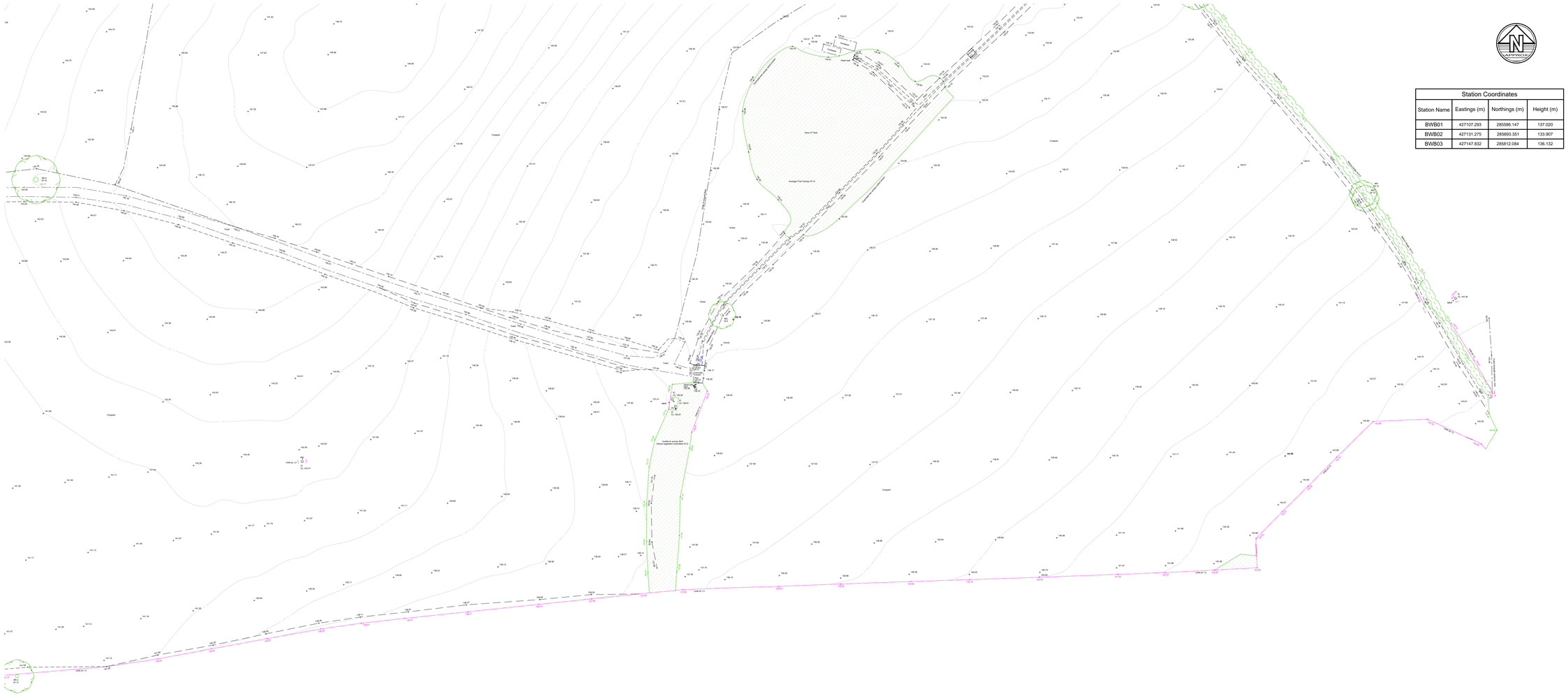
Existing Site Plan Sheet 5 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref.	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status

Information

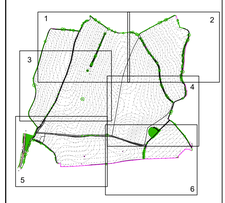
Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-05-DR-G-001	**S2**	**P1**



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- Inspection Chamber
- Flow direction and pipe diameter (0.25)
- Station and Name (BH 1)
- Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- Spot Level (50.00)
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding-Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
DK	Drop Kerb	GAS	Gas	TL	Traffic Light
DP	Down Pipe	GV	Gas Valve	TP	Telegraph Post
Elec	Electric	GY	Gully	TS	Traffic Signal
EP	Electricity Post	HT	Height	UTS	Unable to Survey
ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
FH	Fire Hydrant	IFL	Internal Floor Level	WM	Water Meter
FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

Issues & Revisions

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 6 of 6

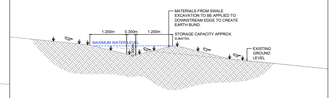
Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref.	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status: **Information**

Project - Originator - Zone - Level - Type - Role - Number:	Status	Rev
NFW-BWB-00-06-DR-G-001	**S2**	**P1**

Appendix 4: Conceptual Drainage Strategy

Section of Swale
Scale 1:100



Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. Enclosed topographical survey based on BWB Consulting drawing (Dwg No:NFW-BWB-00-ZZ-M2-G-0001) dated 15.12.22
6. Enclosed masterplan based on Enviromena Project Management UK Limited (Dwg No. "P.NailcoteFarm_01_GeneralLayout_RevN")
7. This report should be read in conjunction with BWB Consulting Drainage Strategy 'NFW-BWB-ZZ-XX-RP-CD-0001'.
8. This drawing is a proof of concept only, do not consider costing or constructing from this drawing.

Legend

- Site Boundary
- Measured Impermeable Area
- Swales
- Indicative Infiltration Trench
- General Direction of Overland Flow

Measured Impermeable Area: 387m^3 (0.04ha)

Public Right of Way

Cathodic Protection Post

Public Right of Way

Parking area to remain as existing. If parking area if to formalised, permeable surfacing types (such as type 1 aggregate / plastic reinforced crushed stone) should be used, or a formal drainage system may be required.

Site Access

Parking

DNO Substation

Customer Substation

Cathodic Protection Post

Stop Valve / Inspection Covers

Inspection Cover

Inspection Cover

Stop Tap / Wash Out / Gas Valves / Inspection Covers

P06	22.11.23	Updated based on latest Masterplan	MB	LR
P05	07.03.23	Update of Masterplan	WJ	MB
P04	17.02.23	Removal of Easement shown.	WJ	MB
P03	16.02.23	Masterplan update and repositioning of swales	MB	KA
P02	09.02.23	Masterplan update and reduction in swales	WJ	MB
P01	27.01.23	Preliminary Issue	WJ	MB
Rev	Date	Details of issue / revision	Drw	Rev

Issues & Revisions

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Conceptual Drainage Strategy

Drawn:	W. James		Reviewed:	M. Bailey	
BWB Ref:	221748	Date:	27.01.23	Scale@A1:	1:2000

Drawing Status

PRELIMINARY

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-ZZ-XX-DR-CD-0001	S2	P06

J:\2022\221748-Nailcote Farm, Warwickshire\ProjectDelivery\01-WIP\Drawings\NFW-BWB-ZZ-XX-DR-CD-0001_Conceptual Drainage Strategy.dwg

Appendix 5: Pre and Post Development Runoff Calculations

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.150
Area (ha)	62.200	Urban	0.000
SAAR (mm)	700	Region Number	Region 4

Results	**l/s**
QBAR Rural	24.6
QBAR Urban	24.6
Q100 years	63.2
Q1 year	20.4
Q2 years	22.0
Q5 years	30.2
Q10 years	36.6
Q20 years	43.7
Q25 years	46.2
Q30 years	48.2
Q50 years	54.1
Q100 years	63.2
Q200 years	74.3
Q250 years	78.0
Q1000 years	102.3

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.150
Area (ha)	62.200	Urban	0.000
SAAR (mm)	980	Region Number	Region 4

Results	**l/s**
QBAR Rural	36.5
QBAR Urban	36.5
Q100 years	93.7
Q1 year	30.3
Q2 years	32.7
Q5 years	44.8
Q10 years	54.3
Q20 years	64.8
Q25 years	68.5
Q30 years	71.4
Q50 years	80.3
Q100 years	93.7
Q200 years	110.1
Q250 years	115.6
Q1000 years	151.7

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.150
Area (ha)	62.200	Urban	0.001
SAAR (mm)	700	Region Number	Region 4

Results	**l/s**
QBAR Rural	24.6
QBAR Urban	24.7
Q100 years	63.4
Q1 year	20.5
Q2 years	22.1
Q5 years	30.4
Q10 years	36.8
Q20 years	43.8
Q25 years	46.3
Q30 years	48.3
Q50 years	54.3
Q100 years	63.4
Q200 years	74.5
Q250 years	78.2
Q1000 years	102.5

IH 124 Mean Annual Flood

Input

Return Period (years)	100	Soil	0.150
Area (ha)	62.200	Urban	0.001
SAAR (mm)	980	Region Number	Region 4

Results	**l/s**
QBAR Rural	36.5
QBAR Urban	36.5
Q100 years	93.9
Q1 year	30.3
Q2 years	32.8
Q5 years	45.0
Q10 years	54.4
Q20 years	64.9
Q25 years	68.6
Q30 years	71.6
Q50 years	80.4
Q100 years	93.9
Q200 years	110.3
Q250 years	115.8
Q1000 years	151.9

Appendix 6: Pre and Post Development Runoff Volumes

Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 428050 287000 SP 28050 87000
Data Type	Catchment
Areal Reduction Factor	1.00
Area (ha)	62.200
SAAR (mm)	709
CWI	106.161
SPR Host	32.470
URBEXT (1990)	0.0107

Results

Percentage Runoff (%)	32.22
Greenfield Runoff Volume (m^3)	12906.902

Greenfield Runoff Volume

FEH Data

Return Period (years)	100
Storm Duration (mins)	360
FEH Rainfall Version	2013
Site Location	GB 428050 287000 SP 28050 87000
Data Type	Catchment
Areal Reduction Factor	1.00
Area (ha)	62.160
SAAR (mm)	709
CWI	106.161
SPR Host	32.470
URBEXT (1990)	0.0107

Results

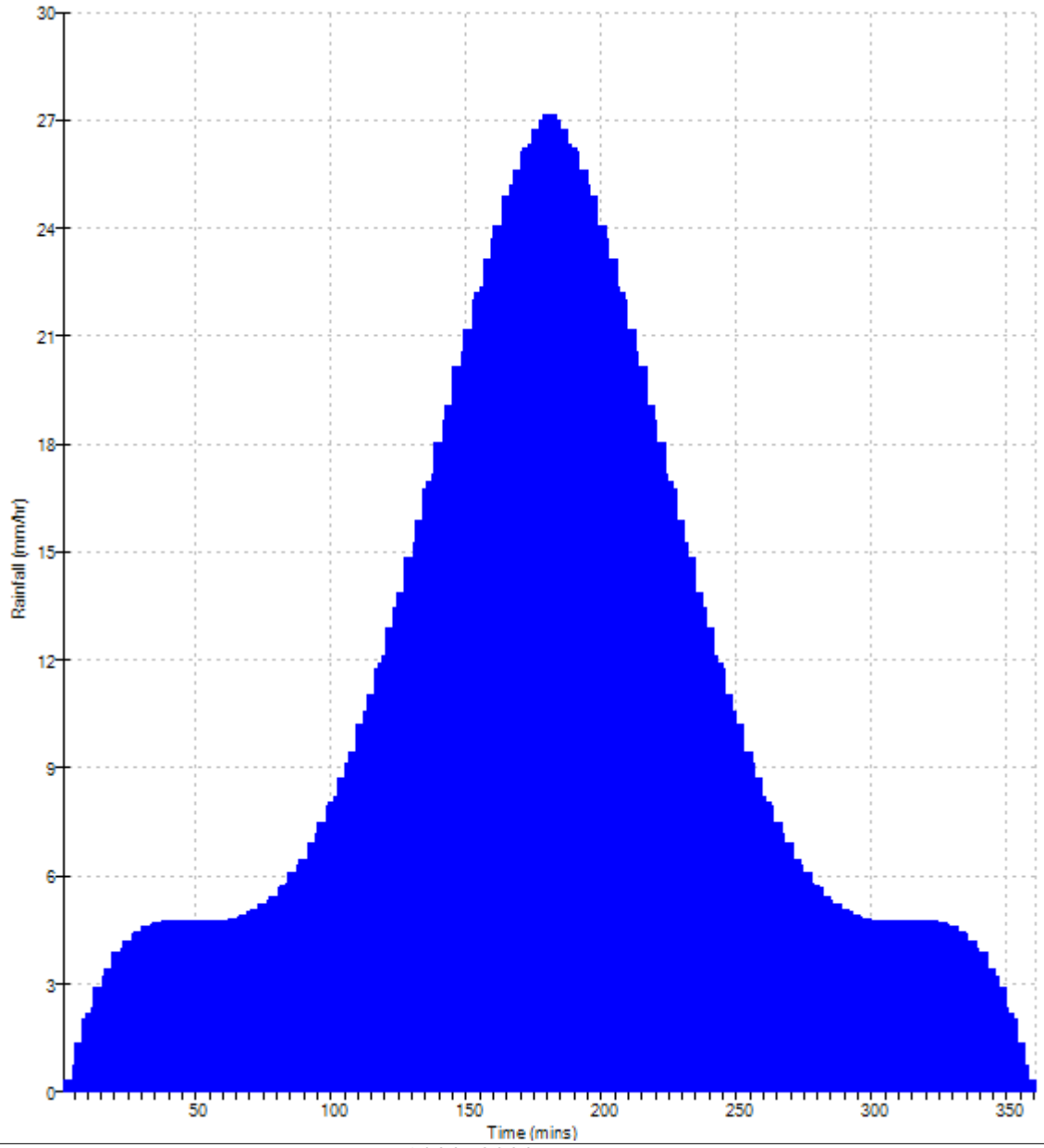
Percentage Runoff (%)	32.22
Greenfield Runoff Volume (m^3)	12898.601

Appendix 7: Rainfall Profile

Rainfall profile

Storm duration (mins) 360

FEH Data	
FEH Rainfall Version	2013
Site Location	GB 428050 287000 SP 28050 87000
Data Type	Catchment
Peak Intensity (mm/hr)	27.146
Ave. Intensity (mm/hr)	10.733
Return Period (years)	100.0



PAP/2023/0071

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ENVIRONMENT

Enviromena Project Management UK Limited
Nailcote Farm
Warwickshire
Flood Risk Assessment

ENVIRONMENT

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November 2023

DOCUMENT ISSUE RECORD

Document Number:	NFW-BWB-ZZ-XX-RP-YE-0001_FRA
BWB Reference:	221748_FRA

Author:	William James BEng (Hons), MSc
Checked:	Matthew Bailey BSc (Hons)
Approved:	Keith Alger BSc (Hons) MSc

Rev	Date	Status	Comment	Author:	Checked:	Approved:
P01	30/01/23	S2	Preliminary Issue	WJ	MB	KA
P02	10/02/23	S2	Amended to reflect comments	WJ	MB	KA
P03	16/02/23	S2	Amended to latest masterplan	WJ	MB	KA
P04	17/02/23	S2	Amended to reflect comments	WJ	MB	KA
P05	07/03/23	S2	Updated site layout	WJ	MB	KA
P06	22/11/23	S2	Updated site layout for planning resubmission	MB	LR	KA

Notice

EXECUTIVE SUMMARY

This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance (PPG). It has been produced on behalf of Enviromena Project Management UK Limited in respect of a planning application for a proposed temporary solar farm at Nailcote Farm, Warwickshire. This report demonstrates that the proposed development is at an acceptable level of flood risk subject to the recommended flood mitigation strategies being implemented.

It is understood that this FRA (dated November 2023) will be resubmitted to the live planning application "PAP/2023/0071". Therefore, the flood risk guidance at the time of the planning application validation (24/02/2023) has been used within this updated FRA.

The Site is located wholly within Flood Zone 1 (Low Probability). However, extents of Flood Zone 2 and 3 are shown adjacent to the northwest Site boundary, associated with Bourne Brook. Bourne Brook and an Unnamed Ordinary Watercourse (UOW) cross the site from the southern boundary to the northern boundary and from the southern boundary to the eastern boundary respectively. Within the Site there are several ditches; these outfall into either the Bourne Brook or UOW, with the exception of the ditch located at the centre of the Site which has no visible connectivity.

These UOWs are not included within the Environment Agency's (EA) Flood Map for Planning due to their small catchment size (i.e., < 3km^2), therefore EA surface water flood mapping has been used to indicate the potential floodplain extents associated with the UOWs.

The development should be set back an appropriate from the top of bank from Bourne Brook, the UOW and all ditches, in accordance with local guidance.

It is recommended that all ancillary equipment is raised 150mm above the external ground level to discourage water ingress. External levels adjacent to the ancillary equipment should be profiled away from the equipment to provide further mitigation against the residual risk of flooding.

Other flood risk sources such as sewer, groundwater and reservoirs have also been assessed and are considered to pose a low risk to the site.

A more detailed surface water drainage strategy has been produced to accompany this report. In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area as a result of suitable management of surface water runoff discharging from the site.

CONTENTS

FIGURES

TABLES

APPENDICES

1. INTRODUCTION

1.1 This Flood Risk Assessment (FRA) has been prepared in accordance with the requirements set out in the National Planning Policy Framework (NPPF) and the associated Planning Practice Guidance. The FRA has been produced on behalf of Enviromena Project Management UK Limited in respect of a planning application for a proposed temporary solar farm at Nailcote Farm, Warwickshire.

1.2 This FRA is intended to support a full planning application (PAP/2023/0071), the level of detail included is commensurate and subject to the nature of the proposals at the planning stage. Summary information is included as **Table 1.1**.

1.3 It is understood that this FRA (dated November 2023) will be resubmitted to the live planning application "PAP/2023/0071". Therefore, the flood risk guidance at the time of the planning application validation (24/02/2023) will be used within this updated FRA.

Table 1.1: Site Summary

Site Name	Nailcote Farm
Location	Warwickshire
NGR (approx.)	SP 275 860
Application Site Area (ha)	62.2 (Approx.)
Development Type	Solar Farm
Flood Zone Classification	Flood Zone 1
NPPF Vulnerability	Essential Infrastructure
Anticipated Development Lifetime	40 years
Environment Agency Office	West Midlands
Lead Local Flood Authority	Warwickshire County Council
Local Planning Authority	North Warwickshire Borough Council
Planning Application	PAP/2023/0071

Sources of Data

i. Topographical Survey by BWB Consulting, reference NFW-BWB-00-ZZ-M2-G-001
ii. OS Explorer Series mapping
iii. Warwickshire County City Council Consultation

iv. Environment Agency (EA) Risk of Flooding from Surface Water Data
v. Warwickshire County Council Strategic Flood Risk Assessment
vi. Warwickshire County Council Preliminary Flood Risk Assessment
vii. North Warwickshire Borough Council Local Plan
viii. Ground Investigations undertaken by DUNELM Geotechnical & Environmental (reference: D10836)
ix. British Geological Survey Drift & Geology Maps

Existing Site

1.4 The Site is located approximately 785m south-west of Fillongley and 9km northwest of Coventry city centre. The Site's location is illustrated within **Figure 1.1**.

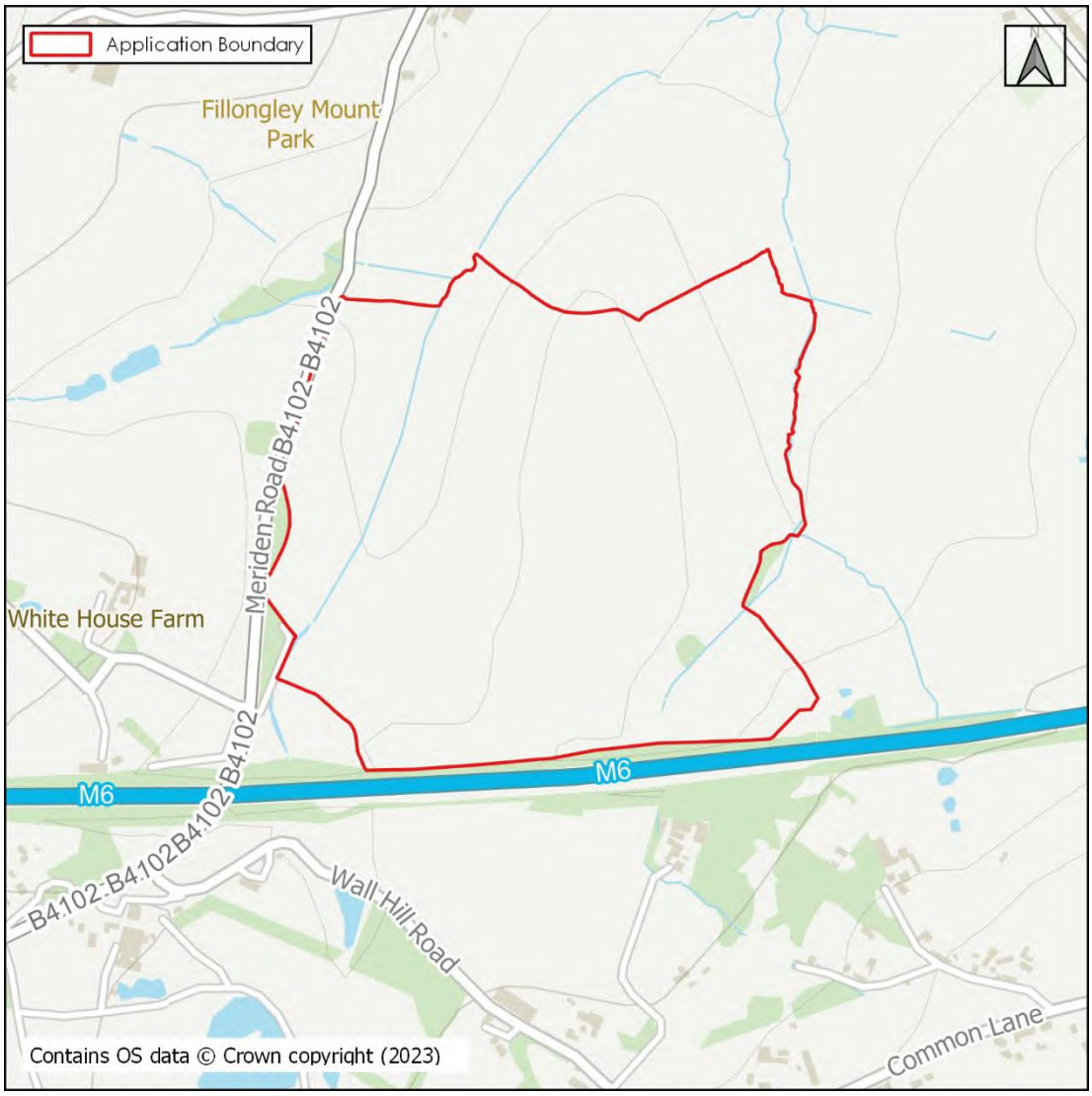

Figure 1.1: Site Location

1.5 The existing Site access is via a dirt track off Meriden Road (B4102). The Site is bound to the north by agricultural fields, to with further agricultural fields and an unnamed ordinary watercourse (UOW) to the east. The southern boundary of the Site is bound by the M6 motorway and Fillongley Shooting Club, the west of the Site is bound by Meriden Road (B4102).

1.6 Within the Site there is the UOW along the east boundary, as well as Bourne Brook which cuts through the west of the Site on a south to north axis and exits along the northern boundary.

1.7 A topographical Survey (**Appendix 1**) shows the levels within the Site to undulate; however, the Site generally falls from the high points located at the centre of the Site towards the southern boundary and the ditches located within the Site to the east and west. The levels at the Site range from the highest point at approximately 148.7m Above Ordnance Datum (AOD) in the southern centre of the Site to approximately 122.3m AOD in the northeast Site corner.

1.8 The existing Site access levels range from 132.7m AOD to 133.6m AOD.

Proposed Development

1.9 The proposed development is for the construction of a temporary Solar Farm, to include the installation of ground-mounted solar panels together with associated works, equipment and necessary infrastructure.

1.10 The existing access road will remain unchanged.

1.11 A proposed development plan is presented in **Appendix 2**.

2. FLOOD RISK PLANNING POLICY & GUIDANCE

National Planning Policy Framework

2.1 The NPPF[1] sets out the Government's national policies on different aspects of land use planning in England in relation to flood risk. Planning Practice Guidance (PPG) is also available online[2].

2.2 The PPG sets out the vulnerability to flooding of different land uses. It encourages development to be located in areas of lower flood risk where possible and stresses the importance of preventing increases in flood risk off site to the wider catchment area.

2.3 The PPG also states that alternative sources of flooding, other than fluvial (river flooding), should be considered when preparing an FRA.

2.4 The PPG includes a series of tables that define Flood Zones (Table 1), the flood risk vulnerability classification of development land uses (Table 2) and 'compatibility' of development within the defined Flood Zones (Table 3).

2.5 This FRA is written in accordance with the NPPF and the PPG.

Flood Map for Planning

2.6 With particular reference to planning and development, the Flood Map for Planning identifies Flood Zones in accordance with Table 1 of the Planning Practice Guidance. Further details on the Flood Zone classifications are outlined in **Table 2.1**.

Table 2.1: Flood Zone Classifications

Flood Zone	Description
Flood Zone 1 (Low Probability)	Land having less than a 1 in 1000 annual probability of river or sea flooding (<0.1% Annual Exceedance Probability). All land outside of Flood Zone 2 and 3.
Flood Zone 2 (Medium Probability)	Land having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% - 0.1% AEP); or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% - 0.1% AEP).
Flood Zone 3a (High Probability)	Land having a 1 in 100 or greater annual probability of river flooding (>1% AEP); or land having a 1 in 200 or greater annual probability of flooding from the sea (>0.5% AEP). This is represented by "Flood Zone 3" on the Flood Map for Planning.
Flood Zone 3b (The Functional Floodplain)	Flood Zone 3b (The Functional Floodplain) is defined as land where water must flow or be stored in times of flood. This is not identified or separately distinguished from Zone 3a on the Flood Map for Planning.

[1] Revised National Planning Policy Framework, Ministry of Housing, Communities & Local Government, amended 2021
[2] Planning Practice Guidance: https://www.gov.uk/government/collections/planning-practice-guidance

2.7 The site is shown to be located entirely within Flood Zone 1, as shown in **Figure 2.1**.

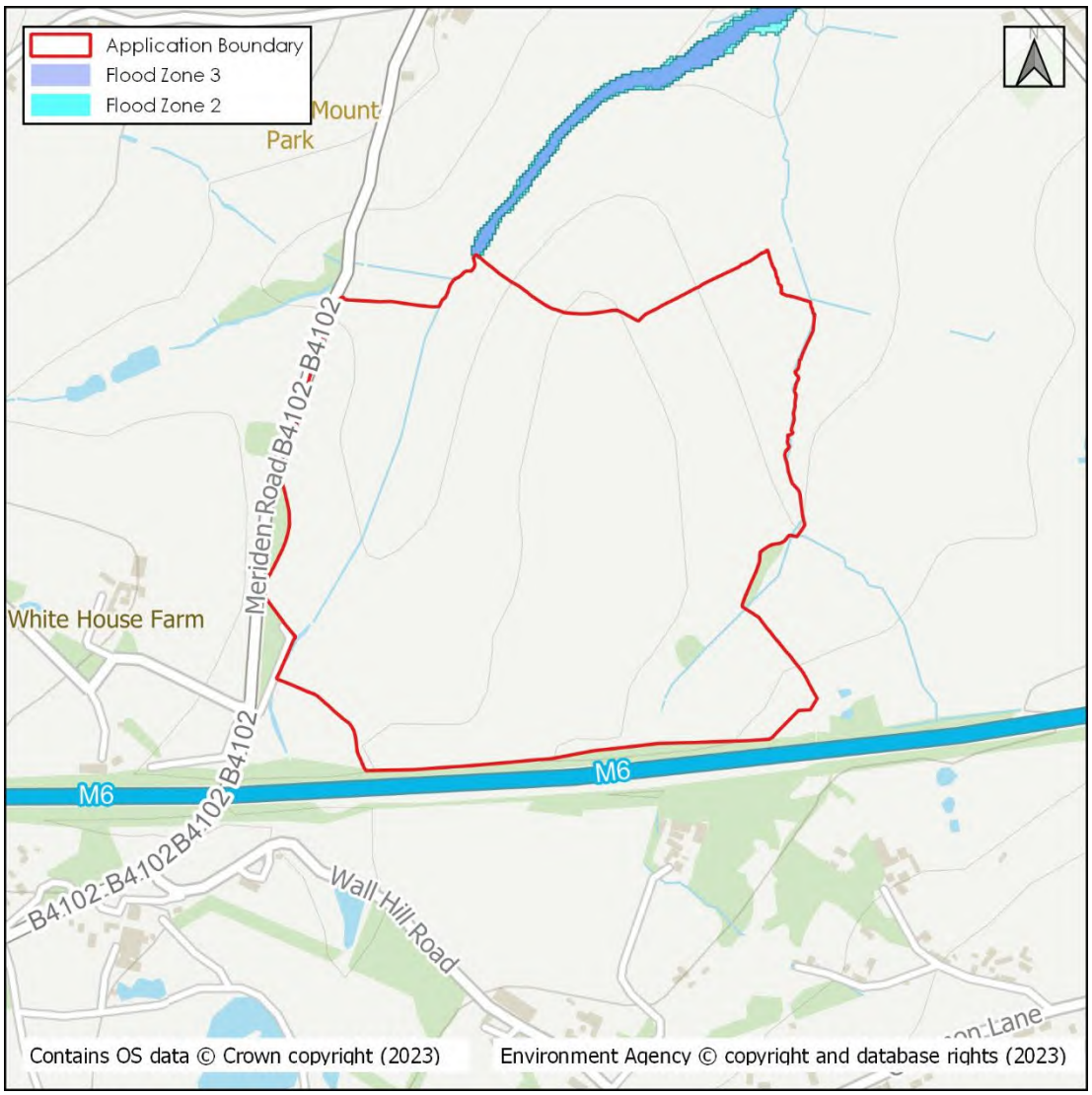

Figure 2.1: Flood Map for Planning

The Design Flood

2.8 The PPG identifies that new developments should be designed to provide adequate flood risk management, mitigation, and resilience against the 'design flood' for their lifetime.

2.9 This is a flood event of a given annual flood probability, which is generally taken as fluvial (river) and surface water (pluvial) flooding likely to occur with a 1% annual probability (a 1 in 100 chance each year), or tidal flooding with a 0.5% annual probability (1 in 200 chance each year), against which the suitability of a proposed development is assessed and mitigation measures, if any, are designed.

Climate Change

Peak River Flow

2.10 Predicted future changes in peak river flows caused by climate change are provided by the EA[3], with a range of projections applied to regionalised 'River Basin Districts', which are further subdivided into Management Catchments.

2.11 The Site falls within the Tame Anker and Mease Management Catchment of the Humber River Basin District. **Table 2.2** identifies the relevant peak river flow climate change allowances from this Management Catchment.

Table 2.2: Peak River Flow Climate Change Allowances for the Tame Anker and Mease Management Catchment within the Humber River Basin District

Allowance Category	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2125)
Upper End	24%	30%	51%
Higher Central	15%	17%	30%
Central	10%	11%	22%

2.12 When determining the appropriate allowance for use in a FRA the Flood Zone classification, flood risk vulnerability and the anticipated lifespan of the development should be considered. **Table 2.3** provides a matrix summarising the EA's guidance on determining the appropriate allowance(s).

Table 2.3: Application of Appropriate Peak River Flow Climate Change Allowances

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
1	Use the central allowance where a location may fall within Flood Zone 2 or 3 in the future.				
2	Use the higher central allowance	Use the central allowance			
3a	Use the higher central allowance	Development should not be permitted	Use the central allowance		
3b	Use the higher central allowance	Development should not be permitted			Use the central allowance

[3] Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed January 2023.

Flood Zone	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
If development is considered appropriate by the local authority when not in accordance with Flood Zone vulnerability categories, then it would be appropriate to use the higher central allowance.					

2.13 The site is located entirely within Flood Zone 1, the proposed development is classified as essential infrastructure, and it has an anticipated lifespan of 40 years. Therefore, the Central allowance for the 2050s epoch will be considered.

2.14 Therefore, to ensure the development is designed adequately for its lifetime an allowance of 11% will be applied to the design flood to identify minimum development levels.

Peak Rainfall

2.15 Predicted future changes in peak rainfall intensity caused by climate change are provided by the EA[4], with a range of projections applied to River Basin District Management Catchments.

2.16 The site falls within the Tame Anker and Mease Management Catchment. **Table 2.4** identifies the relevant peak rainfall climate change allowances from this Management Catchment.

Table 2.4: Peak Rainfall Climate Change Allowances for the Tame Anker and Mease Management Catchment

Tame Anker and Mease Management Catchment Allowance	Total Potential Change Anticipated for the '2050s' (Lifetime up to 2060)	Total Potential Change Anticipated for the '2070s' (2061 to 2125)
1 in 30-Year Rainfall Event		
Upper End	35%	35%
Central	20%	25%
1 in 100-Year Rainfall Event		
Upper End	40%	40%
Central	20%	25%

2.17 The future increase in rainfall will need to be considered when designing a development to ensure its drainage system is sufficient for its lifetime and that it does not increase flood risk elsewhere. When determining the appropriate allowance(s) the anticipated lifespan of the development should be considered.

[4] Environment Agency, Flood risk assessments: climate change allowances: Environment Agency, Flood risk assessments: climate change allowances: https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances. Last Accessed January 2023.

2.18 **Table 2.5** provides a summary of the EA's guidance on determining the appropriate allowance(s).

Table 2.5: Application of Appropriate Peak Rainfall Climate Change Allowances

<table>
<tr><th rowspan="2">Area Assessed</th><th colspan="3">Anticipated Development Life Span</th></tr>
<tr><th>up to 2060</th><th>between 2061 and 2100</th><th>up to or beyond 2100*</th></tr>
<tr><td>Development Sites^

Assess the 1 in 30-year and 1 in 100-year storm events with the respective climate change allowance(s) applied.

Development to be designed so that with the climate change allowance applied to the 1 in 100-year storm:
• there is no increase in flood risk elsewhere
the development will be safe from surface water flooding</td><td rowspan="3">Use the Central Allowance for the 2050s</td><td rowspan="3">Use the Central Allowance for the 2070s+</td><td rowspan="3">Use the Upper End Allowance for the 2070s+</td></tr>
<tr><td>Urban Catchments

Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective allowance(s) applied.</td></tr>
<tr><td>Rural Catchments <5km²

Assess the flood risk at the 1 in 30-year and 1 in 100-year storm events with the respective central climate change allowances applied.</td></tr>
<tr><td>Rural Catchments >5km²</td><td colspan="3">Direct rainfall analysis is not appropriate, use flood flow estimation methods.</td></tr>
</table>

**Includes all residential developments*
^the Lead Local Flood Authority may have local standards that also need to be considered.
+unless the 2050s allowance is greater

2.19 The development site has an anticipated lifespan of 40 years. Therefore, the Central allowance for the '2070s' epoch will need to be considered in the design of the associated drainage infrastructure.

Strategic Flood Risk Assessment

2.20 A Strategic Flood Risk Assessment (SFRA) is a study carried out by one or more local planning authorities to assess the risk to an area from flooding from all sources, now and in the future.

2.21 The Stratford-on-Avon District Council, Warwickshire County Council, Warwickshire Borough Council & Rugby Borough Council Level 1 SFRA[5] has been reviewed in the production of this FRA. The SFRA provides information specific to the site location in the form of fluvial, surface water and groundwater flood risk mapping, as well as records of historical flooding. It also includes flood risk policy and guidance for the area. Information from the Level 1 SFRA has been referenced within **Section 3** where applicable.

Preliminary Flood Risk Assessment

2.22 A Preliminary Flood Risk Assessment (PFRA) is an assessment of floods that have taken place in the past and floods that could take place in the future. It generally considers flooding from surface water runoff, groundwater and ordinary watercourses, and is prepared by the Lead Local Flood Authorities (LLFAs).

2.23 The Warwickshire PFRA[6] considers flooding from surface water runoff, groundwater, ordinary watercourses and canals. It also references the historical river flooding which occurred in the local area in 1998, 2007 and 2008.

2.24 In 2017 an Addendum[7] was produced for the PFRA, this states that they are publishing several Section 19 reports from the March 2016 flood event, an update to the Flood Map for surface Water and Risk of Flooding from Surface Water maps, Upon review no applicable information in relation to flood risk at the site was identified within the PFRA Addendum.

Local Flood Risk Management Strategy

2.25 A Local Flood Risk Management Strategy (LFRMS) is prepared by an LLFA to help understand and manage flood risk at a local level.

2.26 The LFRMS aims to ensure that the knowledge of local flood risk issues is communicated effectively so that they can be better managed. The LFRMS also aims to promote sustainable development and environmental protection. The Warwickshire County Council LFRMS[8] has been reviewed during the production of this report.

River Basin Flood Risk Management Plan

2.27 Flood Risk Management Plans (FRMPs) explain the risk of flooding from rivers, the sea, surface water, groundwater and reservoirs. FRMPs set out how risk management authorities will work with communities to manage flood and coastal risk. Risk management authorities include the EA, Natural Resources Wales, local councils, internal drainage boards, Highways England and LLFAs.

[5] Stratford-on-Avon District Council, Warwickshire County Council, Warwickshire Borough Council & Rugby Borough Council Level 1 Level 1 Strategic Flood Risk Assessment (URS, September 2013)
[6] Warwickshire Preliminary Flood Risk Assessment (Royal Haskoning, May 2011)
[7] Preliminary flood risk assessment: Warwickshire County Council Addendum available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/698528/PFRA_Warwickshire_County_Council_2017.pdf
[8] Warwickshire County Council Local Flood Risk Management Strategy (Michael Green, Richard Stevens, Andy Smith, April 2016)

2.28 The first FRMPs were published in March 2016 with the latest FRMP was published in December 2022. They describe actions to manage flood risk across England between 2021 to 2027.

2.29 The site is located within the Humber River Basin District, and the Humber River Basin District FRMP[9] has been reviewed and the relevant site scale objectives have been considered in **Section 4** of this report.

Local Plan

2.30 The North Warwickshire Local Plan 2021[10] is the Statutory Development Plan for North Warwickshire and is the basis for determining planning applications. This Local Plan Strategy document sets out the overall vision and planning strategy for development in the borough and contains planning policies to ensure that new development addresses the economic, environmental and social needs of the area.

2.31 Policy LP29: Development Considerations within the Local Plan states that developments should 'manage the impacts of climate change through the design and location of development, including sustainable building design and materials, sustainable drainage, water efficiency measures, use of trees and natural vegetation and ensuring no net loss of flood storage capacity'.

2.32 It is also stated in policy LP29 that the development must 'protect the quality and hydrology of ground or surface water sources so as to reduce the risk of pollution and flooding, on site or elsewhere'.

[9] Humber River Basin District Flood Risk Management Plan (Environment Agency, December 2022) available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1120221/Humber-FRMP-2021-2027.pdf
[10] North Warwickshire Local Plan (September 2021, North Warwickshire Borough Council)

3. POTENTIAL SOURCES OF FLOOD RISK

3.1 Flooding can occur from a variety of sources, or combination of sources, which may be natural or artificial. **Table 3.1** below identifies the potential sources of flood risk to the site in its current condition, and the impacts which the development could have in the wider catchment, prior to mitigation. These are discussed in greater detail in the forthcoming section. The mitigation measures proposed to address flood risk issues and ensure the development is appropriate for its location are discussed within **Section 4**.

Table 3.1: Pre-Mitigation Sources of Flood Risk

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Fluvial			X		The site is located in Flood Zone 1. However, extents of Flood Zones 2 and 3 associated with Bourne Brook are located adjacent to the northwest site boundary.
		X			There are several ditches and UOW's located within the Site. These generally convey water towards Bourne Brook.
Coastal				X	This Site is not tidally influenced.
Canals				X	There are no canals in the vicinity.
Groundwater			X		SFRA groundwater susceptibility mapping indicates the Site to be at 25% or lower susceptibility to groundwater flooding.
Reservoirs and waterbodies			X		The Site is shown to fall far outside the nearest mapped maximum reservoir failure extent and is not situated downstream of an impounded artificial body of water.
Pluvial runoff			X		EA surface water flood risk mapping shows several low to high-risk surface water flow routes. These are to be associated with the UOW's. The high-risk areas are generally contained within the UOW's channel.
Sewers			X		There is no evidence of public or private sewers within the site or the immediate vicinity.

Flood Source	Potential Risk				Description
	High	Medium	Low	None	
Effect of Development on Wider Catchment			X		Given the nature of the proposed development. There is a negligible risk of impedance of flood routes and/or displacement of floodplains from the solar arrays. There is a residual risk of the ancillary equipment impeding / displacing flood routes / if situated within areas of pluvial flood risk.
			X		The nature of the proposed development will have a negligible impact on the surface water runoff and volume regime within the Site. However, residual risks remain.

Fluvial Flood Risk

3.2 Flooding from watercourses occurs when flows exceed the capacity of the channel, or where a restrictive structure is encountered, which leads to water overtopping the banks into the floodplain. This process can be exacerbated when debris is mobilised by high flows and accumulates at structures.

EA Flood Map for Planning

3.3 The Site is entirely located within Flood Zone 1 (Low Probability). However, extents of Flood Zone 2 and 3 are present adjacent to the northwest Site boundary, associated with Bourne Brook downstream from the Site.

3.4 A 'Product 4' request has been sent to the EA requesting any hydraulic modelled flood data associated with the Bourne Brook at the Site. The response from the EA is included in **Appendix 4**. The EA did not have any hydraulic modelling information to provide regarding the Site.

3.5 The areas of Flood Zone 2 and 3 are shown not to be extensive and constrained to the channel. Without results relating to the potential impacts of climate change, the Flood Zone 2 extent (1 in 1000-year event) can be used as a proxy.

Ordinary Watercourse and Ditches

3.6 The UOW's and ditches present within the Site are not included in the EA's Flood Zone mapping, due to the small catchments (i.e., <3km^2) associated with them. The indicative locations of the watercourses are shown in **Figure 3.1**.

3.7 In the absence of Flood Zone mapping and the EA hydraulic model flood data, the EA's surface water flood risk map can provide a useful indicator of the potential floodplain extents associated with the UOW's. This is shown **Figure 3.2** in with mappings showing the potential flood depths during the 1 in 100-year rainfall event presented as **Figure 3.3**.

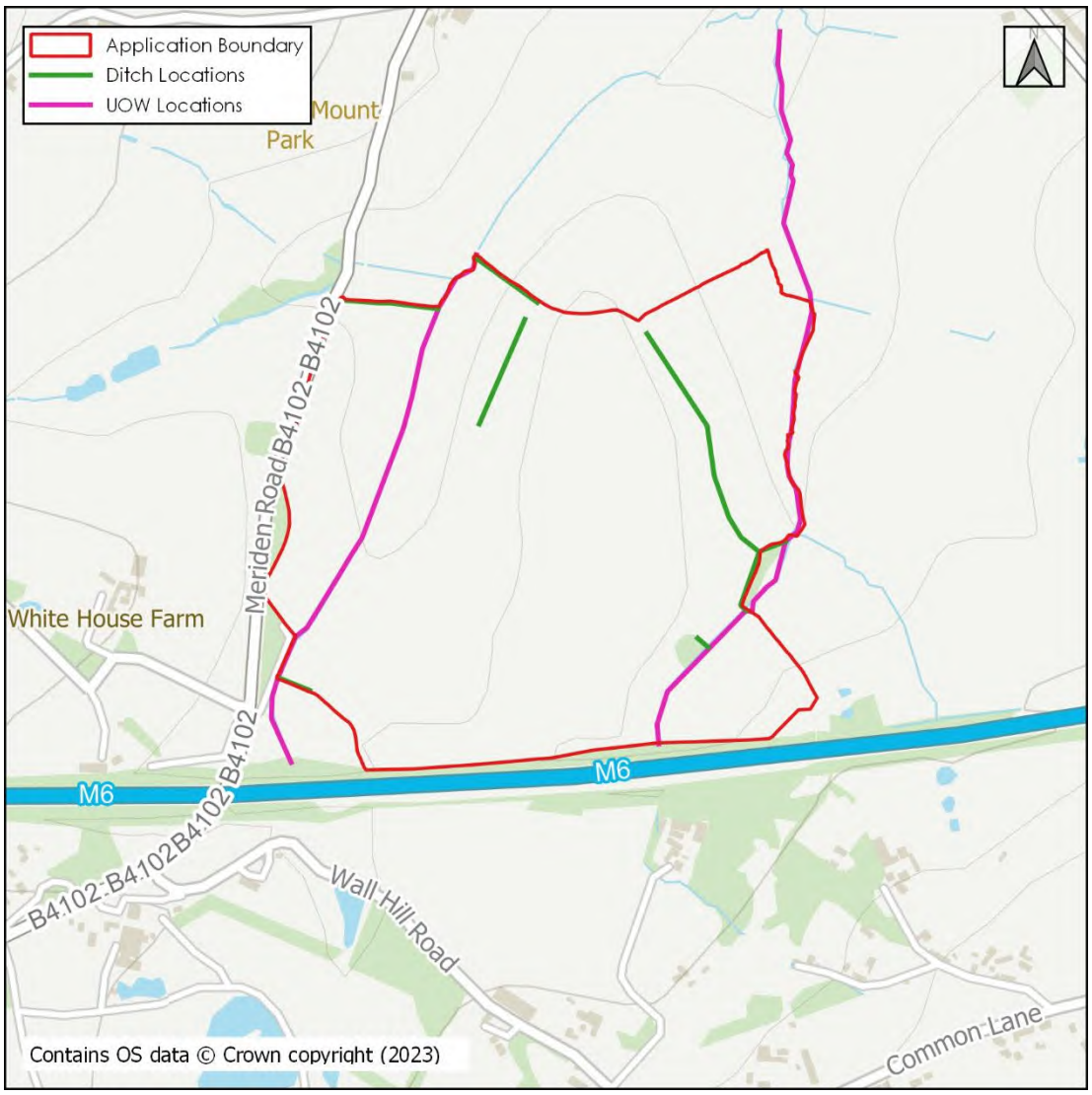

Figure 3.1: Location of UOWs and Ditches

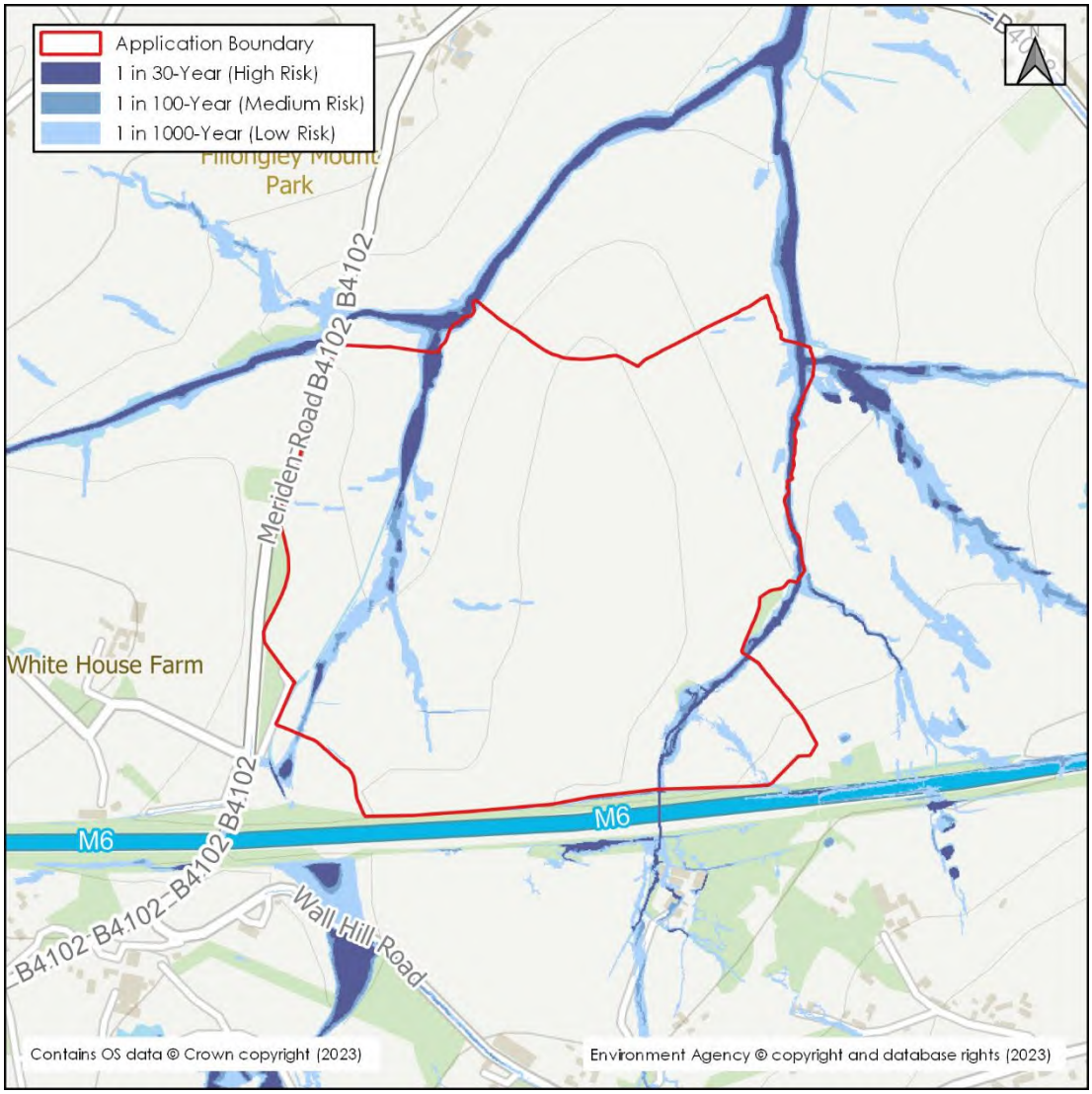

Figure 3.2: EA Surface Water Flood Extents

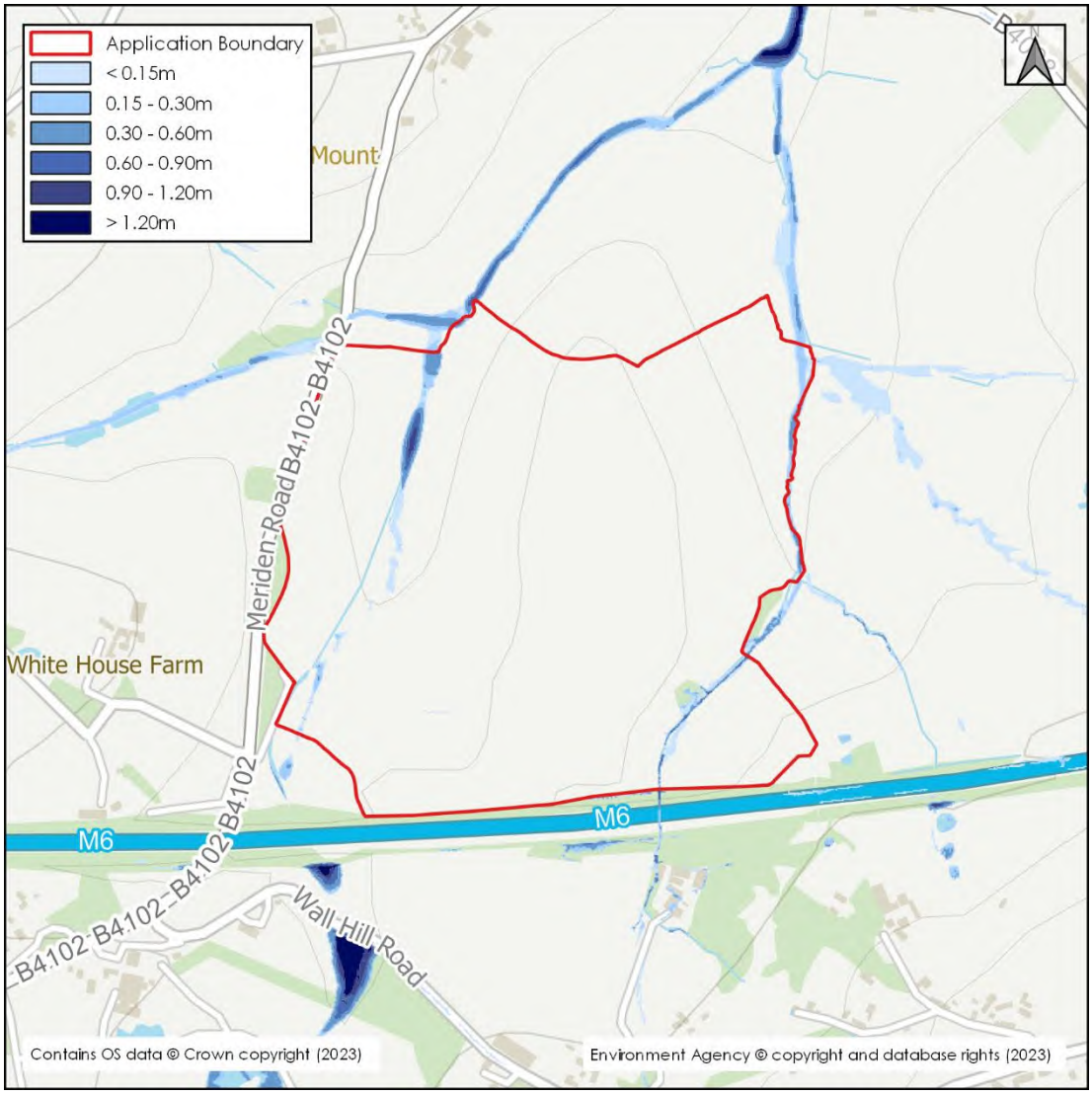

Figure 3.3: EA Surface Water Flood Depths Mapping for 1 in 100-year Event

3.8 From a review of the topographical survey and surface water flood risk mapping, the pluvial flow routes are shown to be relatively confined to the UOWs and therefore it is expected that flows are likely to remain in channel during the 1 in 30-year and 1 in 100-year events, with some exceedance during the 1 in 1000-year return period. Any exceedance flows are shown to remain close to the channel as they are conveyed towards the UOW or Bourne Brook. Typically, the depths are shown not to exceed 600mm.

3.9 The depth of ditches vary across the Site ranging from 0.3m deep to 1m deep, the majority of the ditches can be measured to 0.8m deep. The Site noticeably raised above most of the ditches with the exception of the land directly west of the ditch located in the middle of the Site and the land directly east of the ditch located within the east of the Site.

3.10 The overland flow route associated with the western UOW differs marginally compared to the indicative route shown in **Figure 3.1;** however, this is considered to have occurred due to the EA's surface water mapping not fully representing the connectivity within the UOW, as it runs through the site. It is therefore considered that the overland flow route should be aligned to the UOW.

3.11 When considering the future impacts of climate change on the flows within the UOW's, it is expected that there will be an increase in the floodplain extents and depths. However, due to the minimal increase, it is expected that the majority of the site will be unaffected by any potential flooding from these watercourses.

Historical Flood Events

3.12 There are no historical records referenced within the EA recorded flood outlines or within the SFRA of fluvial flooding known to have occurred within the site.

Pluvial Flood Risk

3.13 Pluvial flooding can occur during prolonged or intense storm events when the infiltration potential of soils, or capacity of drainage infrastructure is overwhelmed leading to the accumulation of surface water and the generation of overland flow routes.

3.14 Risk of flooding from surface water mapping has been prepared by the EA, this shows the potential flooding which could occur when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. An extract from the mapping is included in **Figure 3.2**.

3.15 As shown in **Figure 3.2,** the majority of the site is shown to be at very low risk of surface water flooding. There are several pluvial flow routes located within the Site, presenting a low to high risk of surface water flooding, associated with Bourne Brook and the UOWs. The risk associated with these features has been assessed above in the fluvial section.

3.16 There are small pockets of low-medium risk of surface water flooding, these are isolated and assumed to be related to topographical depressions.

3.17 The access road is shown to be at low risk of pluvial flooding and the site can be access and egressed via Meriden Road which is generally at very low risk of pluvial flooding.

3.18 Overall, the Site is considered to be at low risk of surface water flooding.

Groundwater Flood Risk

3.19 Groundwater flooding occurs when the water table rises above ground elevations. It is most likely to happen in low lying areas underlain by permeable geology. This is most common on regional scale chalk aquifers, but there may also be a risk on sandstone and limestone aquifers or on think deposits of sands and gravels underlain by less permeable strata such as that in a river valley.

3.20 British Geological Survey (BGS) mapping shows the Site predominantly to be underlain by Keresley Member - Sandstone, a small pocket along the eastern UOW is underlain by Keresley Member – Argillaceous rocks and sandstone and conglomerate, interbedded.

3.21 Within the Site there are three superficial deposits. Along the north-western boundary there are deposits of Alluvium – clay, silt sand and gravel. A large area of Thrussington Member – Diamicton is located in the middle of the Site from the south boundary to the northern boundary. Along the UOW to the south of the Site there are traces of glaciolacustrine deposits, mid Pleistocene, clay and silt. Rest of the Site has no recorded superficial deposits. **Figure 3.4** shows the arrangement of Bedrock Geology and Superficial Deposits within the Site

3.22 The geology is also supported by the report published by DUNELM Geotechnical & Environmental (report number: D10836). Within 'Appendix C' of this report is a Groundsure report which states that the risk of groundwater flooding is to be considered 'low-risk'.

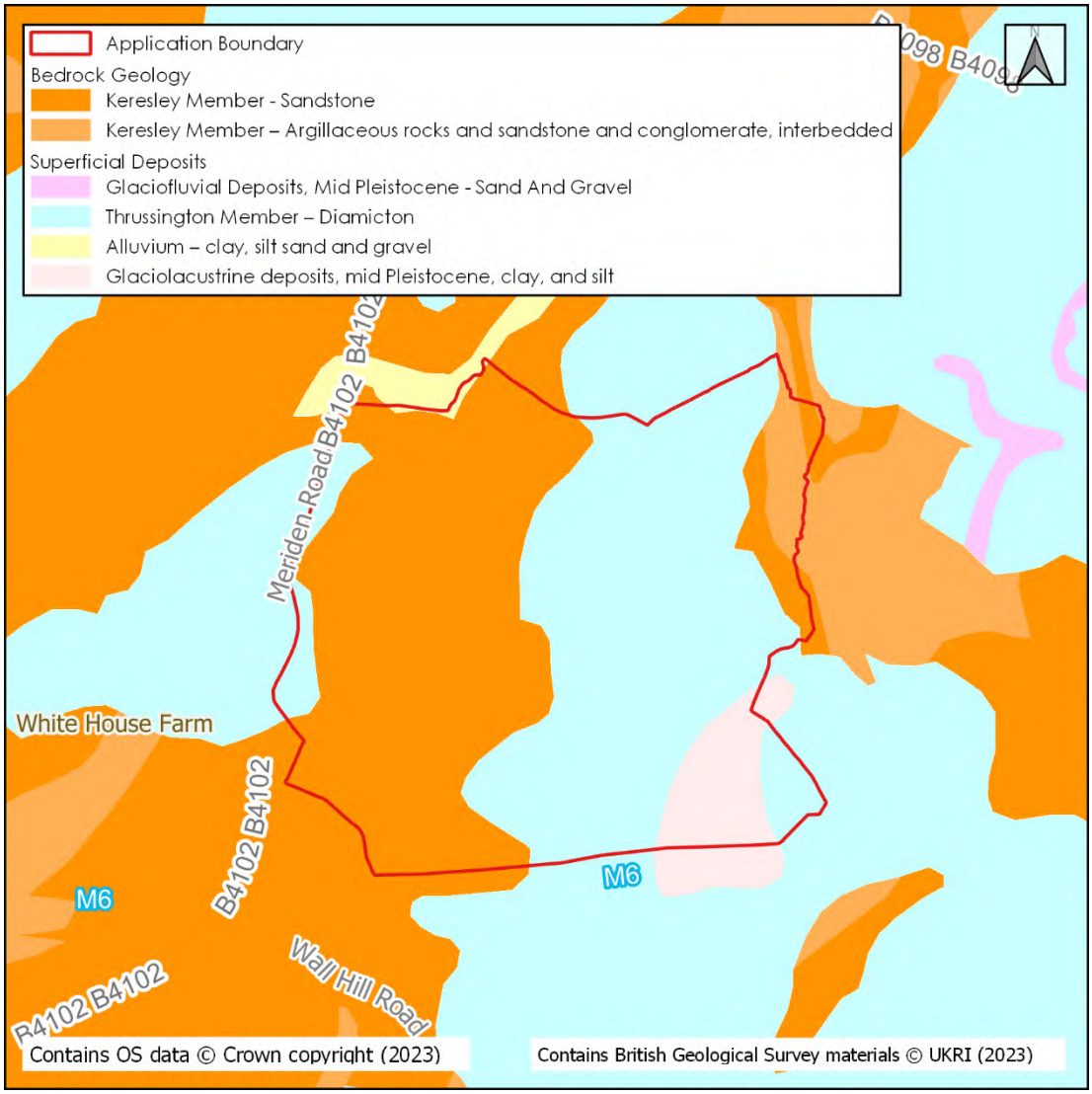

Figure 3.4: Bedrock Geology and Superficial Deposit

3.23 The EA designates the bedrock strata to be principal aquifers, this means the bedrock holds a significant amount of groundwater that is used to support water supply, base flows to rivers, lakes and wetlands on a strategic scale.

3.24 The areas of superficial deposits are classed as unproductive strata. There are several areas within the site (mainly the central area of the site) which is classed as a Secondary (undifferentiated) Aquifer, this means that the superficial deposit contain both characteristic traits of Secondary A and Secondary B Aquifers. There is also an area which seems to align with the area of Alluvium which is classed as a Secondary A Aquifer which is defined as a permeable layer which can support local water supplies and may form a base flow of a river.

3.25 A review of BGS borehole logs identifies records of two previous boreholes located within the Site, these are SP28NE128 and SP28NE68, which were excavated to depths of 705.24m and 716.57m, respectively. These show no recorded of ground water being struck.

3.26 The site is located in a Groundwater Source Protection Zone III.

3.27 The Warwickshire SFRA reports the susceptibility of areas to groundwater flooding at a 1km^2 grid tile scale. The site is located within a series of tiles where the geological and hydrogeological properties of the land indicate that the susceptibility to groundwater flooding (groundwater emergence) is <25%.

3.28 Neither the Warwickshire County Council nor Warwickshire County Council SFRA have provided any evidence to suggest that the site has historically flooded from groundwater sources.

3.29 The overall risk posed by groundwater source is therefore considered to be low.

Flood Risk from Sewer

3.30 Sewer flooding can occur when the capacity of the infrastructure is exceeded by excessive flows, or as a result of a reduction in capacity due to collapse or blockage, or if the downstream system becomes surcharged. This can lead to the sewers flooding onto the surrounding ground via manholes and gullies, which can generate overland flows.

3.31 From the obtained Severn Trent Water (STW) sewer records which are included in **Appendix 5**, there are no recorded public sewers within the Site. A review of the topographical survey included as **Appendix 1**, also shows no evidence of drainage infrastructure within the Site boundary.

3.32 Any sewers located within the immediate surrounding area are likely to be within the highway and therefore in the event of any exceedance flows would be managed by the highway.

3.33 The overall risk posed by the sewer source is considered to be low.

Effect of Development on Wider Catchment

Displacement of Floodplain and Impedance of Flood Flows

3.34 The nature of the development is such that there will be negligible displacement of the floodplain or impedance of flood flows, with the raised nature of the panels enabling flows to pass beneath them freely.

3.35 The most significant risk for the impedance of flood flows associated with the proposed development is the proposed fence and ancillary equipment if located within the regions of the Site shown to at risk of surface water flooding. These areas are however considered minimal due to flows being contained with the various ditches within the site. Appropriate mitigation for the residual risk is outlined within **Section 4**.

Development Land Use/Drainage Considerations

3.36 The runoff regime will not be significantly impacted as a result of the proposed development. The surface water drainage considerations and mitigation have been assessed in more detail within an accompanying Drainage Statement (DS, reference: NFW-BWB-ZZ-XX-RP-CD-0001_DS).

3.37 The proposed development will result in a negligible increase in impermeable surfaces, leading to a minor increase in runoff rates and volumes. Appropriate mitigation measures to manage the residual risks are outlined in the accompanying DS

4. FLOOD RISK MITIGATION

4.1 **Section 3** has identified the sources of flooding which could potentially pose a risk to the site and the proposed development. This section of the FRA sets out the mitigation measures which are to be incorporated within the proposed development to address and reduce the risk of flooding to within acceptable levels.

Sequential Arrangement

4.2 The Site has been sequentially arranged such that no development is located within all ancillary equipment is located entirely within Flood Zone 1 and areas at very low risk.

Exception Test

4.3 The requirement to undertake an Exception Test is based upon the vulnerability of the proposed development and Flood Zone status as outlines in **Table 4.1**.

Table 4.1: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood risk vulnerability classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required^	✓	×	Exception Test Required	✓
	Zone 3b Functional Floodplain	Exception Test Required*	✓*	×	×	×

^In Flood Zone 3a essential infrastructure should be designed and constructed to remain operational and safe in times of flood.
*In Flood Zone 3b (functional floodplain) essential infrastructure that has passed the Exception Test, and water compatible uses should be designed and constructed to; remain operational and safe for users in times of flood, result in no net loss of floodplain storage, and not impede water flows and not increase flood risk elsewhere.

4.4 As the proposed development is classified as 'Essential Infrastructure' and is located within Flood Zones 1, the development is considered to be suitable without the need for an exception test.

Watercourse Easements

4.5 In line with the Warwickshire county council SFRA, an appropriate easement should be applied from the top of bank of all watercourses for maintenance access.

Fencing

4.6 The proposed fences around the perimeter of the proposed development should be designed such that water can flow freely through the fence where possible, particularly within the regions indicated to be at risk of flooding. They should be appropriately inspected and maintained following flood events, especially to prevent the accumulation of debris.

Development Levels

4.7 It is recommended that the ancillary equipment associated with the solar development are raised 150mm above the external ground level, along with being set back from the ditches/areas impacted by pluvial source.

4.8 External levels adjacent to the ancillary equipment should be profiled away from the equipment to provide further mitigation against the residual risk of flooding.

Flood Resilient/Resistant Construction

4.9 The solar panels are raised and therefore are expected to be protected in the event of a potential out of bank flows. They are not expected to impede pluvial/fluvial flows. An assessment of the fluvial and surface water flood depths and extents has been undertaken, these are anticipated to be within the appropriate easement from the top of banks and the UOW channels. With this in mind, the proposed minimum 600mm clearance between the ground level and underside of the lowest part of the solar panel, (see sections shown in **Appendix 3**) is considered appropriate.

Surface Water Drainage Considerations

4.10 An assessment of the surface water drainage regime has been undertaken in a Drainage Strategy (DS, reference: NFW-BWB-ZZ-XX-RP-CD-0001_DS) which accompanies this FRA.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 This FRA has been prepared in accordance with requirements set out in the NPPF and the associated PPG. The FRA has been produced on behalf of Enviromena Project Management UK Limited in respect of a planning application for a proposed temporary solar farm located at Nailcote Farm, Warwickshire.

5.2 This FRA is intended to support a full planning application, the level of detail included is commensurate and subject to the nature of the proposals at the planning stage. It is understood that this FRA (dated November 2023) will be resubmitted to the live planning application "PAP/2023/0071". Therefore, the flood risk guidance at the time of the planning application validation (24/02/2023) has been used within this updated FRA.

5.3 This report demonstrates that the proposed development is at an acceptable level of flood risk, subject to the recommended flood mitigation strategies being implemented. The identified risks and mitigation measures are summarised within **Table 5.1**.

Table 5.1: Summary of Flood Risk Assessment

Flood Source	Risk & Proposed Mitigation Measures
Fluvial/Pluvial	The Site is wholly within Flood Zone 1. There are several areas of low to high-risk flows associated with the Bourne Brook and UOWs that flow through the Site. Flows within the UOWs are shown to be constrained to the channel. The proposed development should be set 8m back from the top of bank of Bourne Brook, the UOW and all ditches. It is recommended that all ancillary equipment is raised 150mm above the surrounding area and set back from areas impacted by pluvial sources, to deter water ingress. External levels adjacent to the ancillary equipment should be profiled away from the equipment to provide further mitigation against the residual risk of flooding. The proposed fencing around the development should be hydraulically 'permeable' where possible, particularly around regions of the Site which are at risk of flooding.
Other Flood Risk Sources.	Other flood risk sources including, groundwater, sewer and reservoirs have been assessed and are considered to be at low risk such that specific mitigation is not deemed to be required.
Impact of the Development	The proposed development is anticipated to have a negligible impact on the existing floodplain and flow routes located within the site. The proposed solar arrays located within the site are considered to be 'permeable' in terms of flood water displacement and impedance. The anticipated impact from the development is considered to be negligible; however, a more detailed assessment is provided within the accompanying DS.
This summary should be read in conjunction with BWB's full report. It reflects an assessment of the Site based on information received by BWB at the time of production.	

5.4 In compliance with the requirements of NPPF, and subject to the mitigation measures proposed, the development could proceed without being subject to significant flood risk. Moreover, the development will not increase flood risk to the wider catchment area as a result of suitable management of surface water runoff discharging from the site.

APPENDICES

Appendix 1: Topographical Survey

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	427107.293	285586.147	137.020
BWB02	427131.275	285693.351	133.907
BWB03	427147.832	285812.084	136.132

Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in metres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.
5. No scale factor has been applied to this survey, therefore the os coordinates are to be treated as arbitrary. Please refer to survey station information below for on site control establishment.
6. All coordinates and height data relate to OSGB36(15). Control stations are coordinated by means of GPS receiving real time corrections via OS smart net.
7. All manhole data is collected from ground level therefore discrepancies may occur. More accurate data is only achievable via confined space entry.
8. OS license number: 100022432

Key Plan

Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
- Line Marking
- Centre Line
- Watercourse Centre Line
- Barrier
- Fence
- Gate
- Overhead Powerline
- Overhead Utilities
- Contour Lines
- □ ○ △ Inspection Chamber
- 0.25 Flow direction and pipe diameter
- △ 1 Station and Name
- BH 1 Monitoring Borehole
- Tree / Bush / Sapling
- Area of Vegetation/ Extent of Tree Canopy
- Hedge
- Body of Water
- Body of Water from OS
- +50.00 Spot Level
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point
BG	Back Gully
BO	Bollard
BS	Bus Stop
BT	British Telecom
C	Crest
CL	Cover Level
CMP	Cable Marker Post
CCTV	Security Camera
CTV	Cable TV
DC	Drainage Channel
DK	Drop Kerb
DP	Down Pipe
Elec	Electric
EP	Electricity Post
ER	Earth Rod
FH	Fire Hydrant
FL	Floodlight
FBW	Fence Barbed Wire
FCB	Fence Closed Board
FCL	Fence Chain Link
FEL	Fence Electric
FMP	Fence Metal Panel
FMR	Fence Metal Railing
FOB	Fence Open Board
FPW	Fence Post & Wire
FSP	Fence Steel Palisade
FWM	Fence Wire Mesh
FFL	Finished Floor Level
FP	Flagpole
Gas	Gas
GV	Gas Valve
GY	Gully
Ht	Height
IC	Inspection Chamber
IFL	Internal Floor Level
IL	Invert Level (as a reduced level)
LB	Litter Bin
LP	Lamp Post
MH	Manhole
Mkr	Service Marker
PB	Post Box
PT	Post
RE	Rodding Eye
SP	Sign Post
ST	Stop Tap
SV	Stop Valve
TCB	Telephone Call Box
THL	Threshold Level
TL	Traffic Light
TP	Telegraph Post
TS	Traffic Signal
UTS	Unable to Survey
WL	Water Level
WM	Water Meter
WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

Issues & Revisions

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Client
Enviromena Project Management UK Limited

Project Title
Nailcote Farm, Warwickshire

Drawing Title
Existing Site Plan
Sheet 1 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref:	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status
Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-01-DR-G-001	**S2**	**P1**

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- +50.00 Spot Level
- Assumed Surface Water Drainage Line
- Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
		FSP	Fence Steel Palisade	ST	Stop Tap
CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole		
		Gas	Gas	THL	Threshold Level
DK	Drop Kerb	GV	Gas Valve	TL	Traffic Light
DP	Down Pipe	GY	Gully	TP	Telegraph Post
Elec	Electric	Ht	Height	TS	Traffic Signal
EP	Electricity Post	IC	Inspection Chamber	UTS	Unable to Survey
ER	Earth Rod	IFL	Internal Floor Level	WL	Water Level
FH	Fire Hydrant	IL	Invert Level (as a reduced level)	WM	Water Meter
FL	Floodlight			WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 2 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref:	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-02-DR-G-001	**S2**	**P1**

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
BWB01	427107.293	285586.147	137.020
BWB02	427131.275	285693.351	133.907
BWB03	427147.832	285812.084	136.132

Notes

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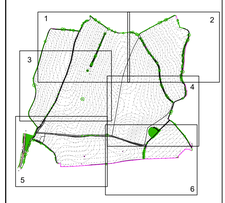
8. OS license number: 100022432

Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
Flow direction and pipe diameter
Station and Name
Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
BG	Back Gully	FCB	Fence Closed Board	LP	Lamp Post
BO	Bollard	FCL	Fence Chain Link	MH	Manhole
BS	Bus Stop	FEL	Fence Electric	Mkr	Service Marker
BT	British Telecom	FMP	Fence Metal Panel	PB	Post Box
C	Crest	FMR	Fence Metal Railing	PT	Post
CL	Cover Level	FOB	Fence Open Board	RE	Rodding Eye
CMP	Cable Marker Post	FPW	Fence Post & Wire	SP	Sign Post
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CCTV	Security Camera	FWM	Fence Wire Mesh	SV	Stop Valve
CTV	Cable TV	FFL	Finished Floor Level	TCB	Telephone Call Box
DC	Drainage Channel	FP	Flagpole	THL	Threshold Level
DK	Drop Kerb	GA	Gas	TL	Traffic Light
DP	Down Pipe	GV	Gas Valve	TP	Telegraph Post
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EP	Electricity Post	Ht	Height	UTS	Unable to Survey
ER	Earth Rod	IC	Inspection Chamber	WL	Water Level
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FL	Floodlight	IL	Invert Level (as a reduced level)	WO	Wash Out

Rev	Date	Details of issue / revision	Drw	Rev
P1	15.12.22	First Issue	BC	DS

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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 2 of 6

Drawn:	B. Connelly	Reviewed:	D.Smith
BWB Ref:	221748.00	Date: 15.12.22	Scale@A0: 1:500

Drawing Status: **Information**

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-03-DR-G-001	S2	P1

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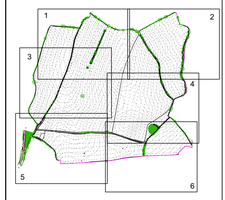
Key Plan



Legend

OS Buildings
Surveyed Buildings
Building
Wall
Kerb Channel Line
Top of Kerb
Edge of Surface
Top of Bank
Bottom of Bank
Canopy / Overhang
Line Marking
Centre Line
Watercourse Centre Line
Barrier
Fence
Gate
Overhead Powerline
Overhead Utilities
Contour Lines
Inspection Chamber
0.25 Flow direction and pipe diameter
1 Station and Name
BH 1 Monitoring Borehole
Tree / Bush / Sapling
Area of Vegetation/ Extent of Tree Canopy
Hedge
Body of Water
Body of Water from OS
50.00 Spot Level
Assumed Surface Water Drainage Line
Surface Water Drainage Line

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
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Rev	Date	Details of issue / revision	Drw	Rev.
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Client

Enviromena Project Management UK Limited

Project Title

Nailcote Farm, Warwickshire

Drawing Title

Existing Site Plan Sheet 4 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref:	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status:

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-04-DR-G-001	**S2**	**P1**

Station Coordinates			
Station Name	Eastings (m)	Northings (m)	Height (m)
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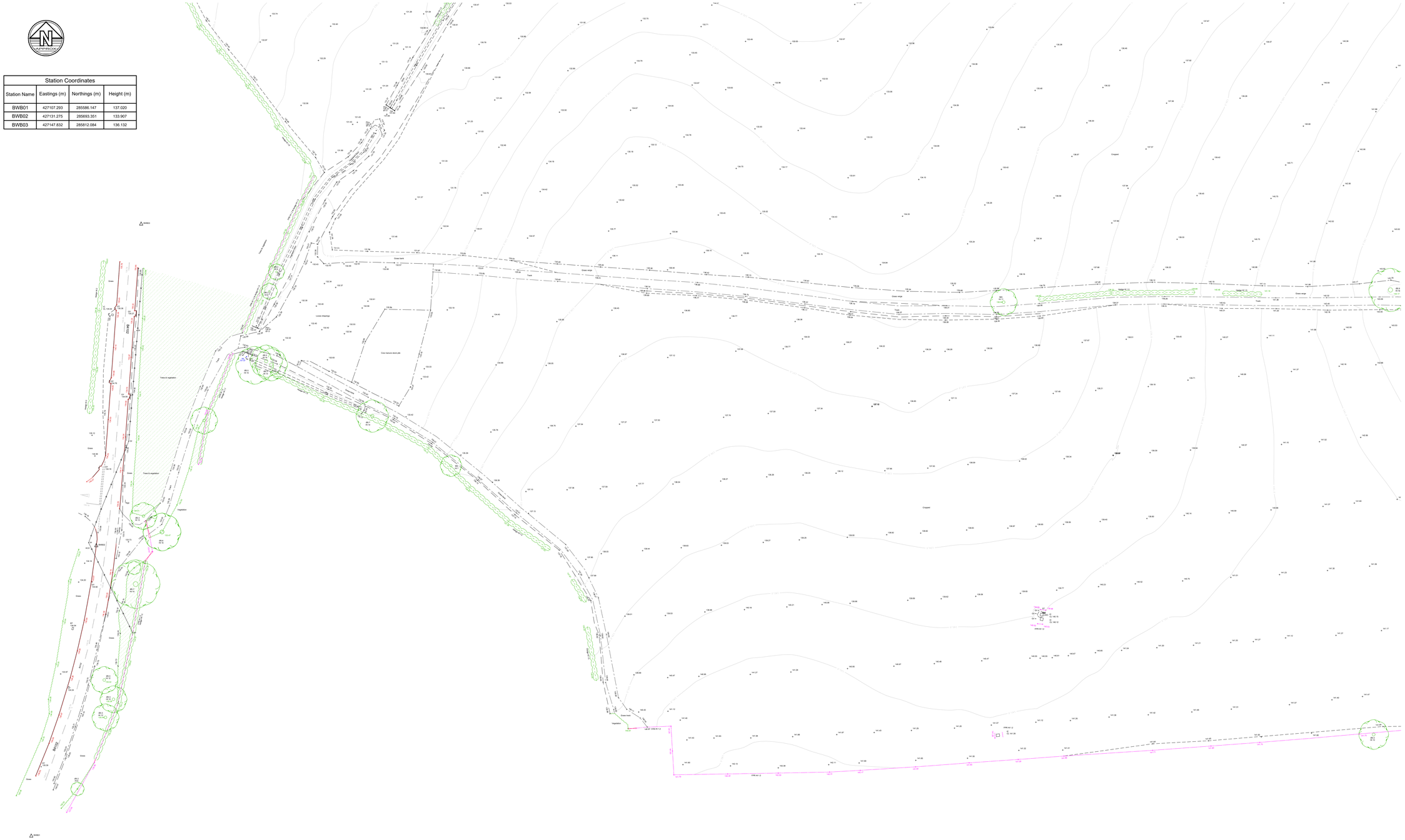

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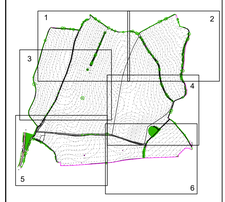
Key Plan



Legend

OS Buildings		Contour Lines	
Surveyed Buildings		Inspection Chamber	
Building		Flow direction and pipe diameter	0.25
Wall		Station and Name	1
Kerb Channel Line		Monitoring Borehole	BH 1
Top of Kerb		Tree / Bush / Sapling	
Edge of Surface		Area of Vegetation/ Extent of Tree Canopy	
Top of Bank		Hedge	
Bottom of Bank		Body of Water	
Canopy / Overhang		Body of Water from OS	
Line Marking		Spot Level	50.00
Centre Line		Assumed Surface Water Drainage Line	
Watercourse Centre Line		Surface Water Drainage Line	
Barrier			
Fence			
Gate			
Overhead Powerline			
Overhead Utilities			

AP	Anchor Point	FBW	Fence Barbed Wire	LB	Litter Bin
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Client

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Project Title

Nailcote Farm, Warwickshire

Drawing Title

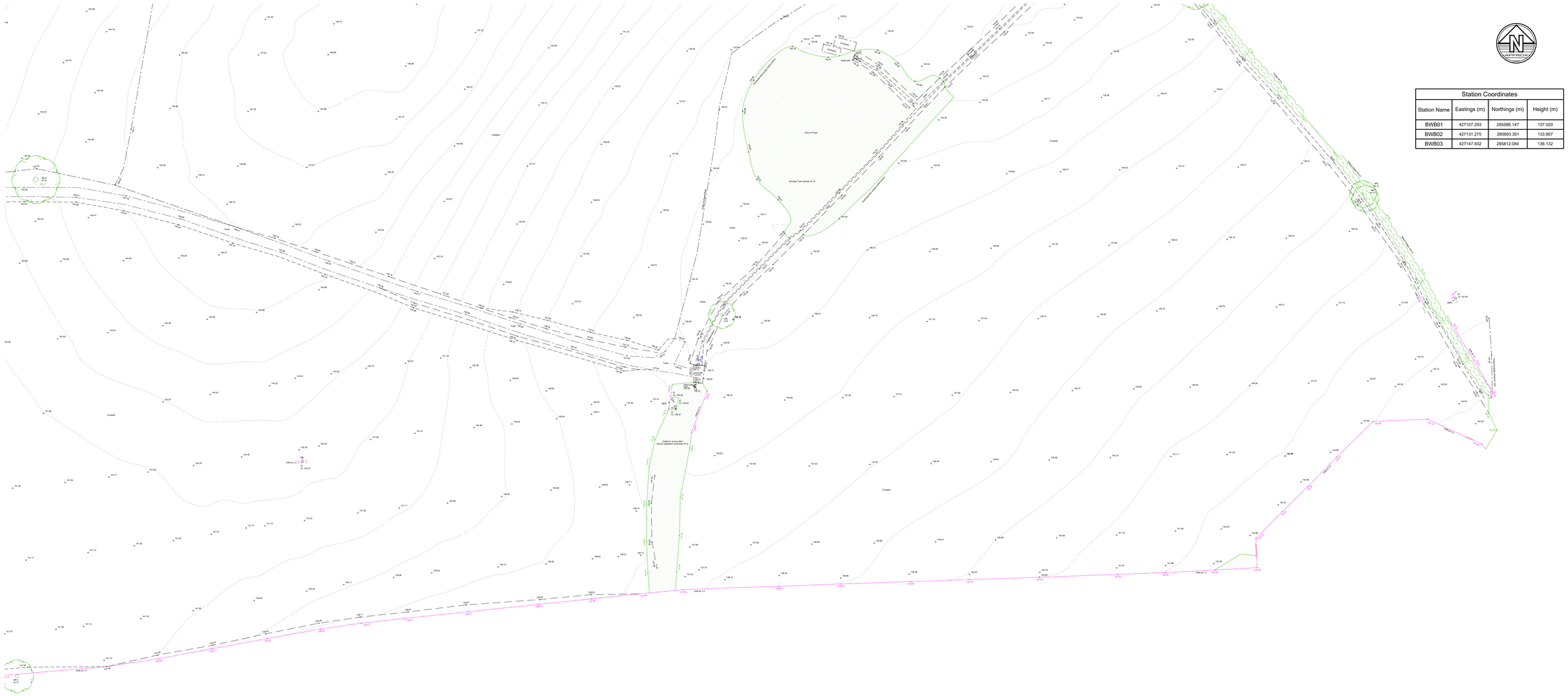
Existing Site Plan Sheet 5 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref.	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status

Information

Project - Originator - Zone - Level - Type - Role - Number	Status	Rev
NFW-BWB-00-05-DR-G-001	**S2**	**P1**



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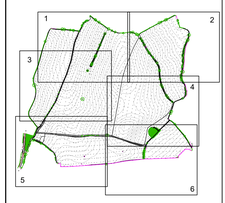
Key Plan



Legend

- OS Buildings
- Surveyed Buildings
- Building
- Wall
- Kerb Channel Line
- Top of Kerb
- Edge of Surface
- Top of Bank
- Bottom of Bank
- Canopy / Overhang
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Project Title

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Drawing Title

Existing Site Plan Sheet 6 of 6

Drawn:	B. Connelly		Reviewed:	D.Smith	
BWB Ref.	221748.00	Date:	15.12.22	Scale@A0:	1:500

Drawing Status: **Information**

Project - Originator - Zone - Level - Type - Role - Number:	Status	Rev
NFW-BWB-00-06-DR-G-001	**S2**	**P1**

Appendix 2: Proposed Development and Sections Plan

N

Public Right of Way

Public Right of Way

Site Access

Parking

DNO Substation

Customer Substation

Screening

MERIDEN ROAD

B 4102

Sinks

Issues

Pond

White House Farm

Track

Path (um)

M 6

0 20 50 100 200m

LEGEND

- Landlord Boundary
- Site Boundary
- Site Access
- Fence
- PV Array
- Transformer Station
- DNO Substation
- Customer Substation
- Public Right of Way

REV	DESCRIPTION	BY	DATE
B	Drawing created using General Layout RevN	AMS	06/11/23
A	Drawing created using General Layout RevM	CC	20/10/23

ENVIROMENA

COMPANY DETAILS
Enviromena Project Management UK Ltd,
15 Diddenham Court, Grazeley,
Reading, RG7 1JQ
T: +44 330 107 1415

SITE ADDRESS
Nailcote Farm
Nailcote Lane
Berkswell
Coventry
CV7 7DE

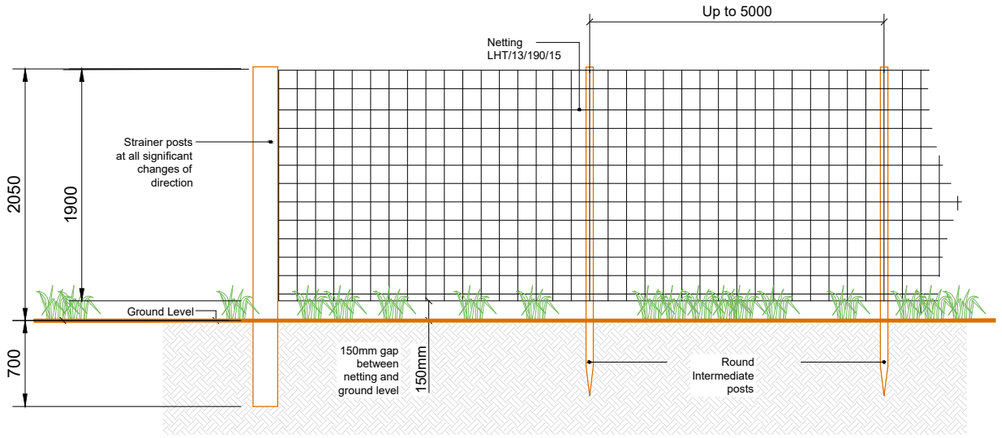
PROJECT
Fillongley Solar

TITLE
Planning Layout

NUMBER	REVISION
P Nailcote Farm_09_Planning Layout	A

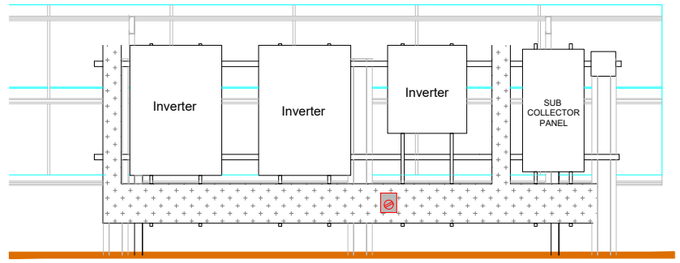
SCALE (A0)	SHEET	DRAWN	APPROVED
1:1250	1 OF 1	CC	AMS

SECURITY FENCE DETAIL
(DEER FENCE)



Scale 1:50 @A3

NORTH ELEVATION
(rear - showing typical inverter arrangement)



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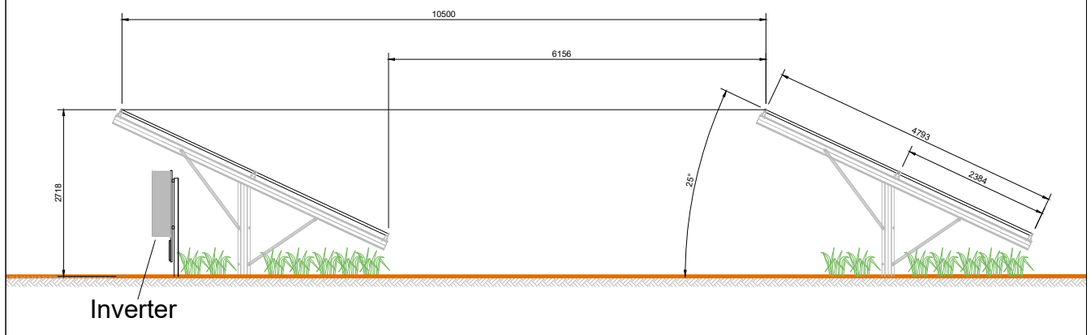
TYPICAL SECTION THROUGH ARRAY



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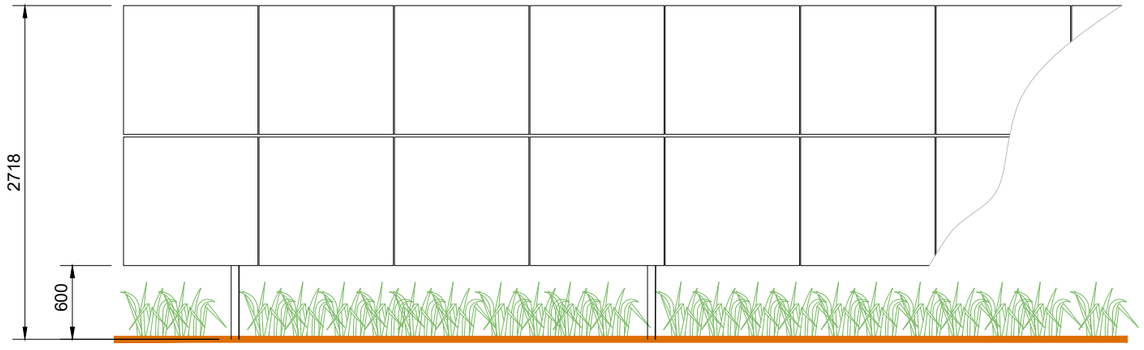
SOUTH ELEVATION
(Front)



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COMMENTS:
Units in mm.

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:
RevA		AMS		05/12/2022

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:

Scale:	Drawn by:	Checked by:	Signed by PM:	Date checked:	Page:	Sheet size:
N/A	AMS				1 of 1	A3

SITE ADDRESS:
Nailcote Farm
Nialcote Lane
Berkswell, Coventry

CV7 7DE

PROJECT NAME:
Nailcote Farm

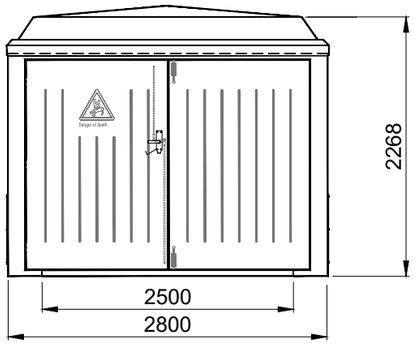
TITLE:
Section views

DRAWING No.:
P.NailcoteFarm_06_SectionViews

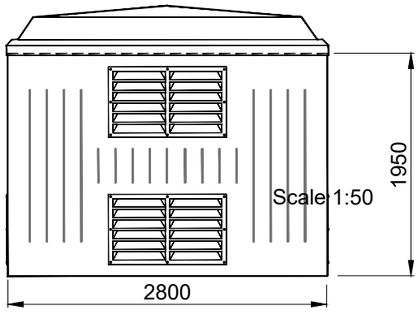
REV:
Rev A

ENVIROMENA

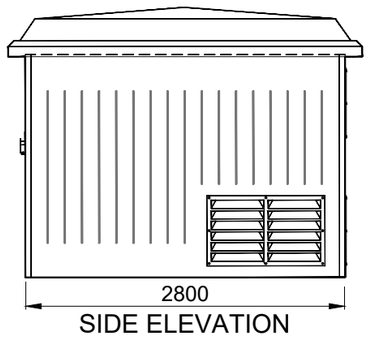
ADDRESS:
Enviromena Project Management UK Ltd
Tel: +44 330 107 1415
15 Diddenham Court, Grazeley
Reading, RG7 1JQ, United Kingdom



FRONT ELEVATION

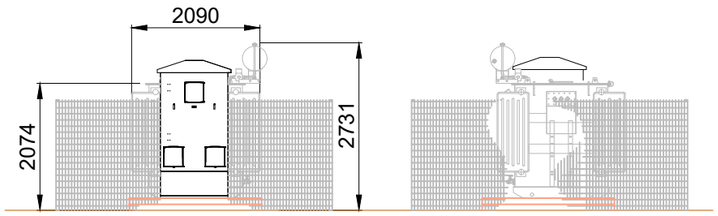


REAR ELEVATION



SIDE ELEVATION

CUSTOMER SWITCHGEAR ENCLOSURE



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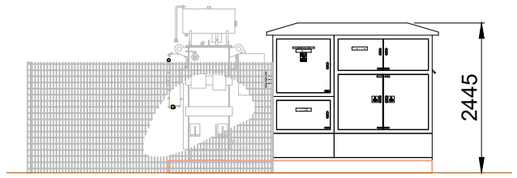

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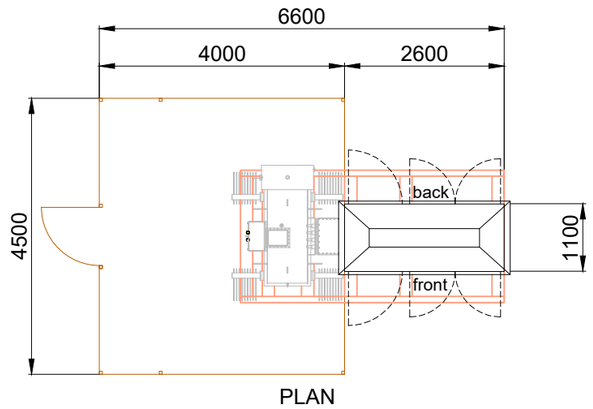
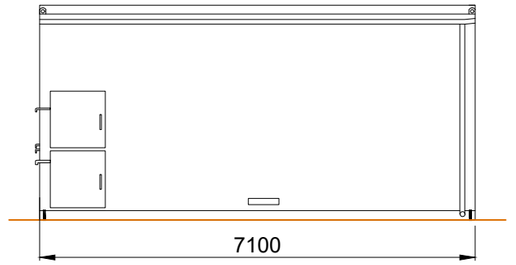
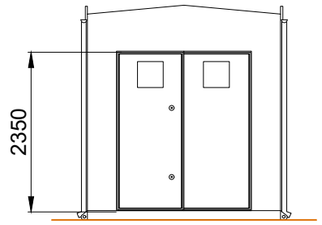


PLAN

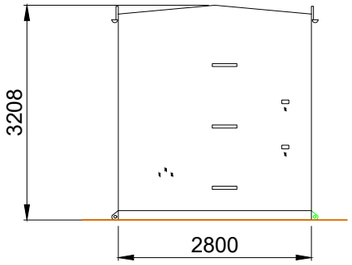
TYPICAL LV STATION



BACK ELEVATION



SIDE ELEVATION



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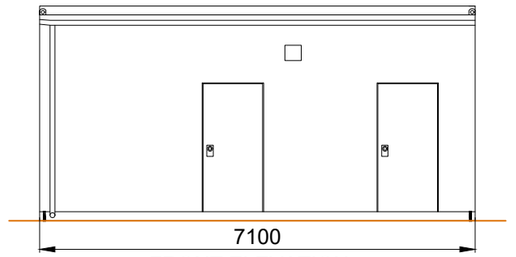

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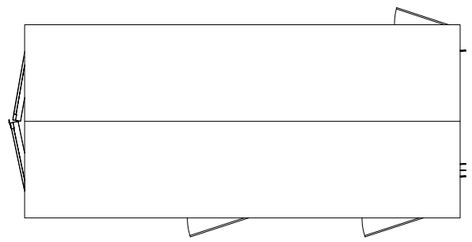

PLAN

TYPICAL DNO SUBSTATION ENCLOSURE

COMMENTS:
Units in mm.

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:
RevA		AMS		05/12/2022

REVISION:	DESCRIPTION:	REVISED BY:	APPROVED BY:	DATE:

Scale:	Drawn by:	Checked by:	Signed by PM:	Date checked:	Page:	Sheet size:
N/A	AMS				1 of 1	A3

SITE ADDRESS:
Nailcote Farm
Nialcote Lane
Berkswell, Coventry

CV7 7DE

PROJECT NAME:
Nailcote Farm

TITLE:
Building Sections view

DRAWING No.: P.NailcoteFarm_07_BuildingSectionViews

REV: Rev A

ENVIROMENA

ADDRESS:
Enviromena Project Management UK Ltd
Tel: +44 330 107 1415
15 Diddenham Court, Grazeley
Reading, RG7 1JQ, United Kingdom

Appendix 3: NPPF Flood risk Vulnerability and Flood Zone Compatibility

Flood Risk Vulnerability Classifications (recreated from the NPPF Planning Practise Guidance)

Vulnerability Classification	Description
Essential infrastructure	• Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. • Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood. • Wind turbines. • Solar farms.
Highly Vulnerable	• Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent. (Where there is a demonstrable need to locate such installations for bulk storage of materials with port or other similar facilities, or such installations with energy infrastructure or carbon capture and storage installations, that require coastal or water-side locations, or need to be located in other high flood risk areas, in these instances the facilities should be classified as 'Essential Infrastructure'.)
More Vulnerable	• Hospitals • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. • Non–residential uses for health services, nurseries and educational establishments. • Landfill* and sites used for waste management facilities for hazardous waste. • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	• Police, ambulance and fire stations which are not required to be operational during flooding. • Buildings used for shops; financial, professional and other services; restaurants, cafes and hot food takeaways; offices; general industry, storage and distribution; non-residential institutions not included in the 'more vulnerable' class; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill* and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment works which do not need to remain operational during times of flood. • Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place. • Car parks.
Water-Compatible Development	• Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel working. • Docks, marinas and wharves. • Navigation facilities. • Ministry of Defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

Flood Zone Compatibility (recreated from the NPPF Planning Practise Guidance)

Flood Zone	Vulnerability Classification				
	Essential infrastructure	**Highly Vulnerable**	**More Vulnerable**	**Less Vulnerable**	**Water Compatible**
Flood Zone 1 (Low Probability)	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate	Development is appropriate
Flood Zone 2 (Medium Probability)	Development is appropriate	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk.	Development is appropriate	Development is appropriate	Development is appropriate
Flood Zone 3a (High Probability)	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk the sustainability benefits of the development to the community outweigh the flood risk. Additionally, essential infrastructure should be designed and constructed to remain operational and safe in times of flood.	Development should not be permitted	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk.	Development is appropriate	Development is appropriate

Flood Zone	Vulnerability Classification				
	Essential infrastructure	**Highly Vulnerable**	**More Vulnerable**	**Less Vulnerable**	**Water Compatible**
Flood Zone 3b (The Functional Floodplain)	To be deemed appropriate an exception test is required to demonstrate: • The development will be safe for its life time without increasing flood risk elsewhere, and where possible reduce overall flood risk • the sustainability benefits of the development to the community outweigh the flood risk. Additionally, development should be designed and constructed to: • remain operational and safe for users in times of flood; • result in no net loss of floodplain storage; • not impede water flows and not increase flood risk elsewhere.	Development should not be permitted	Development should not be permitted	Development should not be permitted	Development is appropriate if designed and constructed to: • remain operational and safe for users in times of flood; • result in no net loss of floodplain storage; • not impede water flows and not increase flood risk elsewhere.

Appendix 4: Environment Agency's Response

Product 4 (Detailed Flood Risk Data) for site at Nailcote Farm, Warwickshire, CV7 8BP NGR: SP 27537 86018.

Reference number: 294712
Date of issue: 24/01/2023

We are unable to provide you with a full product 4 response because:

- There is no detailed modelled information available for this site because it is not close to a main river.
- In addition, we do not have any records of flooding and there are no EA operated / maintained flood defences in the immediate area.
- Please note however, the location of the site sits partially within flood zone 3 risk and is designated a "flood alert" area. The Alerts relate to Middle Tame area and affects low-lying land and roads between Water Orton and Tamworth.
- There are also flags for risks from surface water on the site and as such, we would suggest that you contact your lead local flood authority- Warwickshire County Council. They should be able to provide you with further guidance on the risks from ordinary water courses and surface water flood risks in your specific area.

Flood Map for Planning (Rivers and Sea)

The Flood Map for planning (Rivers and Sea) indicates the area at risk of flooding, **assuming no flood defences exist**, for a flood event with a 0.5% chance of occurring in any year for flooding from the sea, or a 1% chance of occurring for fluvial (river) flooding (flood zone 3). It also shows the extent of the Extreme Flood Outlines (Flood zone 2) which represents the extent of a flood event with a 0.1% chance of occurring in any year, or the highest recorded historic extent if greater. The flood zones refer to the land at risk of flooding and **does not** refer to individual properties. It is possible for properties to be built at a level above the floodplain but still fall within the risk area.

The Flood Map only indicates the extent and likelihood of flooding from rivers or the sea. It should also be remembered that flooding may occur from other sources such as surface water sewers, road drainage, etc. This map can be accessed via our website: https://flood-map-for-planning.service.gov.uk/

Recorded Flooding

With regards to the history of flooding I can advise that we do not have any records of flooding in this area. It is possible that other flooding may have occurred that we do not have records for, and other organisations, such as the Lead Local Flood Authority or Internal Drainage Boards (where relevant), may have records.

Email: Enquiries_Westmids@environment-agency.gov.uk
Website: www.gov.uk/government/organisations/environment-agency

Risk of Surface Water Flooding Map

Managing the risk of flooding from surface water is the responsibility of Lead Local Flood Authorities. The 'risk of flooding from surface water' map has been produced by the Environment Agency on behalf of government, using information and input from Lead Local Flood Authorities.

You may wish to contact your Local Authority who may be able to provide information on surface water.

It is not possible to say for certain what the flood risk is but we use the best information available to provide an indication so that people can make informed choices about living with or managing the risks. The information we supply does not provide an indicator of flood risk at an individual site level. Further information can be found on the Environment Agency's website, https://flood-warning-information.service.gov.uk/long-term-flood-risk

Definition of flood zones

- Zone 1 - The area is within the lowest probability of flooding from rivers and the sea, where the chance of flooding in any one year is less than 0.1% (i.e. a 1000 to 1 chance).
- Zone 2 - The area which falls between the extent of a flood with an annual probability of 0.1% (i.e. a 1000 to 1 chance) fluvial and tidal, or greatest recorded historic flood, whichever is greater, and the extent of a flood with an annual probability of 1% (i.e. a 100 to 1 chance) fluvial / 0.5% (i.e. a 200 to 1 chance) tidal. (Land shown in light blue on the Flood Map).
- Zone 3 - The chance of flooding in any one year is greater than or equal to 1% (i.e. a 100 to 1 chance) for river flooding and greater than or equal to 0.5% (i.e. a 200 to 1 chance) for coastal and tidal flooding.

Note: The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding. Reference should therefore also be made to the Strategic Flood Risk Assessment when considering location and potential future flood risks to developments and land uses.

Email: Enquiries_Westmids@environment-agency.gov.uk
Website: www.gov.uk/government/organisations/environment-agency

Appendix 5: Severn Trent Water Sewer Asset Plans

Date: 20/12/22

Scale: 1:1250

Map Centre: 427703,286004

Data updated: 14/12/22

Our Ref: 1032108 - 1

Wastewater Plan A0

Public Foul Gravity/Lateral Drain	Highway Drain	Manhole Foul
Public Combined Gravity/Lateral Drain	Overflow Pipe	Manhole Surface
Public Surface Water Gravity/Lateral Drain	Disposal Pipe	Abandoned Pipe
Pressure Foul	Culverted Water Course	Chamber
Pressure Combined	Pumping Station	Section 104 sewers are shown in green
Pressure Surface Water	Fitting	Private sewers are shown in magenta

jurgita.v@bwbconsulting.com

Nailcote Farm

SEVERN TRENT

GENERAL CONDITIONS AND PRECAUTIONS TO BE TAKEN WHEN CARRYING OUT WORK ADJACENT TO SEVERN TRENT WATER'S APPARATUS

Please ensure that a copy of these conditions is passed to your representative and/or your contractor on site. If any damage is caused to Severn Trent Water Limited (STW) apparatus (defined below), the person, contractor or subcontractor responsible must inform STW immediately on:
0800 783 4444 (24 hours)

a) These general conditions and precautions apply to the public sewerage, water distribution and cables in ducts including (but not limited to) sewers which are the subject of an Agreement under Section 104 of the Water Industry Act 1991(a legal agreement between a developer and STW, where a developer agrees to build sewers to an agreed standard, which STW will then adopt); mains installed in accordance with an agreement for the self-construction of water mains entered into with STW and the assets described at condition b) of these general conditions and precautions. Such apparatus is referred to as "STW Apparatus" in these general conditions and precautions.

b) Please be aware that due to The Private Sewers Transfer Regulations June 2011, the number of public sewers has increased, but many of these are not shown on the public sewer record. However, some idea of their positions may be obtained from the position of inspection covers and their existence must be anticipated.

c) On request, STW will issue a copy of the plan showing the approximate locations of STW Apparatus although in certain instances a charge will be made. The position of private drains, private sewers and water service pipes to properties are not normally shown but their presence must be anticipated. This plan and the information supplied with it is furnished as a general guide only and STW does not guarantee its accuracy.

d) STW does not update these plans on a regular basis. Therefore the position and depth of STW Apparatus may change and this plan is issued subject to any such change. Before any works are carried out, you should confirm whether any changes to the plan have been made since it was issued.

e) The plan must not be relied upon in the event of excavations or other works in the vicinity of STW Apparatus. It is your responsibility to ascertain the precise location of any STW Apparatus prior to undertaking any development or other works (including but not limited to excavations).

f) No person or company shall be relieved from liability for loss and/or damage caused to STW Apparatus by reason of the actual position and/or depths of STW Apparatus being different from those shown on the plan.

In order to achieve safe working conditions adjacent to any STW Apparatus the following should be observed:

1. All STW Apparatus should be located by hand digging prior to the use of mechanical excavators.

2. All information set out in any plans received from us, or given by our staff at the site of the works, about the position and depth of the mains, is approximate. Every possible precaution should be taken to avoid damage to STW Apparatus. You or your contractor must ensure the safety of STW Apparatus and will be responsible for the cost of repairing any loss and/or damage caused (including without limitation replacement parts).

3. Water mains are normally laid at a depth of 900mm. No records are kept of customer service pipes which are normally laid at a depth of 750mm; but some idea of their positions may be obtained from the position of stop tap covers and their existence must be anticipated.

4. During construction work, where heavy plant will cross the line of STW Apparatus, specific crossing points must be agreed with STW and suitably reinforced where required. These crossing points should be clearly marked and crossing of the line of STW Apparatus at other locations must be prevented.

5. Where it is proposed to carry out piling or boring within 20 metres of any STW Apparatus, STW should be consulted to enable any affected STW Apparatus to be surveyed prior to the works commencing.

6. Where excavation of trenches adjacent to any STW Apparatus affects its support, the STW Apparatus must be supported to the satisfaction of STW. Water mains and some sewers are pressurised and can fail if excavation removes support to thrust blocks to bends and other fittings.

7. Where a trench is excavated crossing or parallel to the line of any STW Apparatus, the backfill should be adequately compacted to prevent any settlement which could subsequently cause damage to the STW Apparatus. In special cases, it may be necessary to provide permanent support to STW Apparatus which has been exposed over a length of the excavation before backfilling and reinstatement is carried out. There should be no concrete backfill in contact with the STW Apparatus.

8. No other apparatus should be laid along the line of STW Apparatus irrespective of clearance. Above ground apparatus must not be located within a minimum of 3 metres either side of the centre line of STW Apparatus for smaller sized pipes and 6 metres either side for larger sized pipes without prior approval. No manhole or chamber shall be built over or around any STW Apparatus.

9. A minimum radial clearance of 300 millimetres should be allowed between any plant or equipment being installed and existing STW Apparatus. We reserve the right to increase this distance where strategic assets are affected.

10. Where any STW Apparatus coated with a special wrapping is damaged, even to a minor extent, STW must be notified and the trench left open until the damage has been inspected and the necessary repairs have been carried out. In the case of any material damage to any STW Apparatus causing leakage, weakening of the mechanical strength of the pipe or corrosion-protection damage, the necessary remedial work will be recharged to you.

11. It may be necessary to adjust the finished level of any surface boxes which may fall within your proposed construction. Please ensure that these are not damaged, buried or otherwise rendered inaccessible as a result of the works and that all stop taps, valves, hydrants, etc. remain accessible and operable. Minor reduction in existing levels may result in conflict with STW Apparatus such as valve spindles or tops of hydrants housed under the surface boxes. Checks should be made during site investigations to ascertain the level of such STW Apparatus in order to determine any necessary alterations in advance of the works.

12. With regard to any proposed resurfacing works, you are required to contact STW on the number given above to arrange a site inspection to establish the condition of any STW Apparatus in the nature of surface boxes or manhole covers and frames affected by the works. STW will then advise on any measures to be taken, in the event of this a proportionate charge will be made.

13. You are advised that STW will not agree to either the erection of posts, directly over or within 1.0 metre of valves and hydrants,

14. No explosives are to be used in the vicinity of any STW Apparatus without prior consultation with STW.

TREE PLANTING RESTRICTIONS

There are many problems with the location of trees adjacent to sewers, water mains and other STW Apparatus and these can lead to the loss of trees and hence amenity to the area which many people may have become used to. It is best if the problem is not created in the first place. Set out below are the recommendations for tree planting in close proximity to public sewers, water mains and other STW Apparatus.

15. Please ensure that, in relation to STW Apparatus, the mature root systems and canopies of any tree planted do not and will not encroach within the recommended distances specified in the notes below.

16. Both Poplar and Willow trees have extensive root systems and should not be planted within 12 metres of a sewer, water main or other STW Apparatus.

17. The following trees and those of similar size, be they deciduous or evergreen, should not be planted within 6 metres of a sewer, water main or other STW Apparatus. E.g. Ash, Beech, Birch, most Conifers, Elm, Horse Chestnut, Lime, Oak, Sycamore, Apple and Pear. Asset Protection Statements Updated May 2014

18. STW personnel require a clear path to conduct surveys etc. No shrubs or bushes should be planted within 2 metre of the centre line of a sewer, water main or other STW Apparatus.

19. In certain circumstances, both STW and landowners may wish to plant shrubs/bushes in close proximity to a sewer, water main of other STW Apparatus for screening purposes. The following are shallow rooting and are suitable for this purpose: Blackthorn, Broom, Cotoneaster, Elder, Hazel, Laurel, Privet, Quickthorn, Snowberry, and most ornamental flowering shrubs.

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

Manhole Reference	Liquid Type	Cover Level	Invert Level	Depth to Invert

BWB

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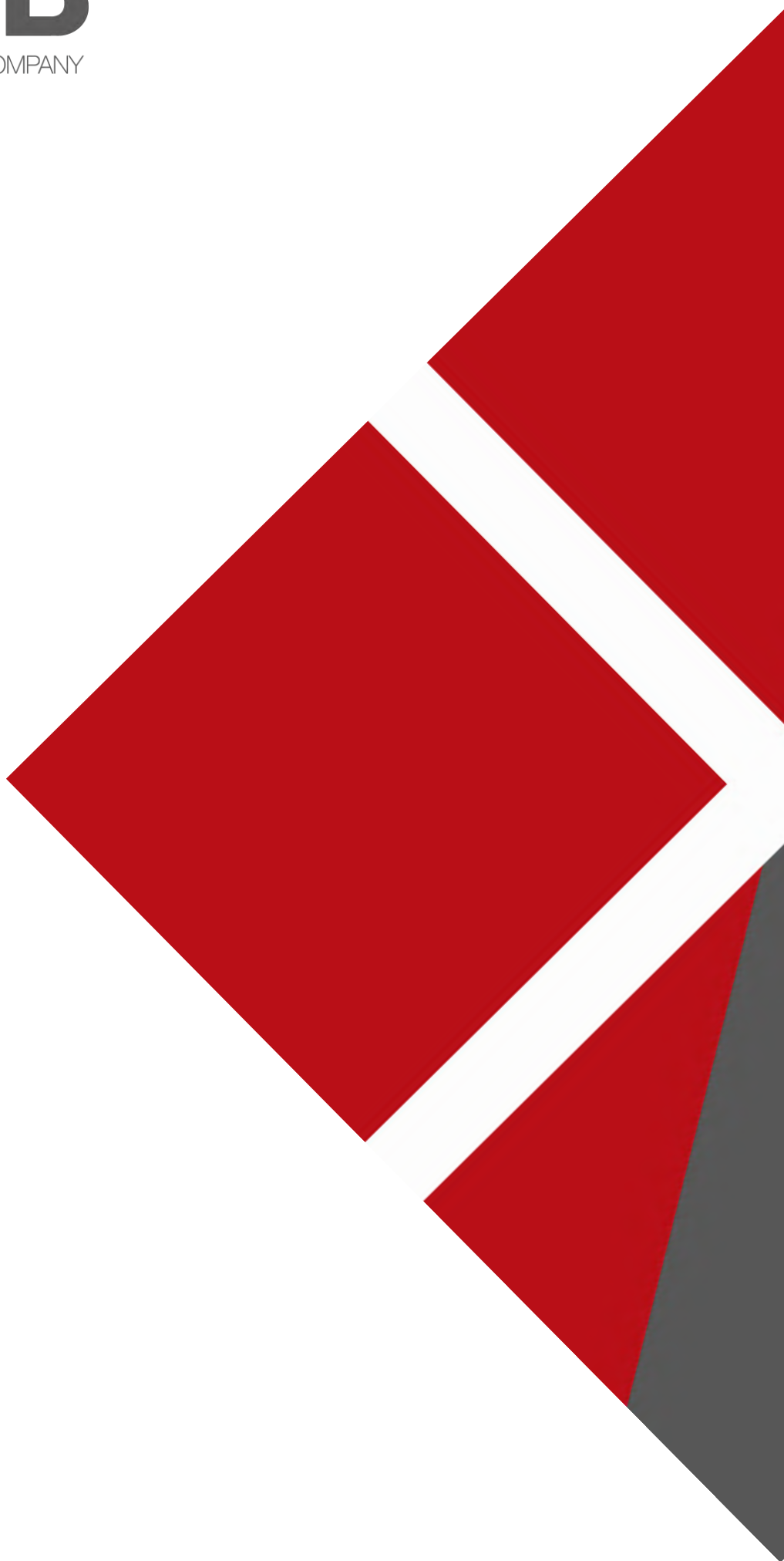

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