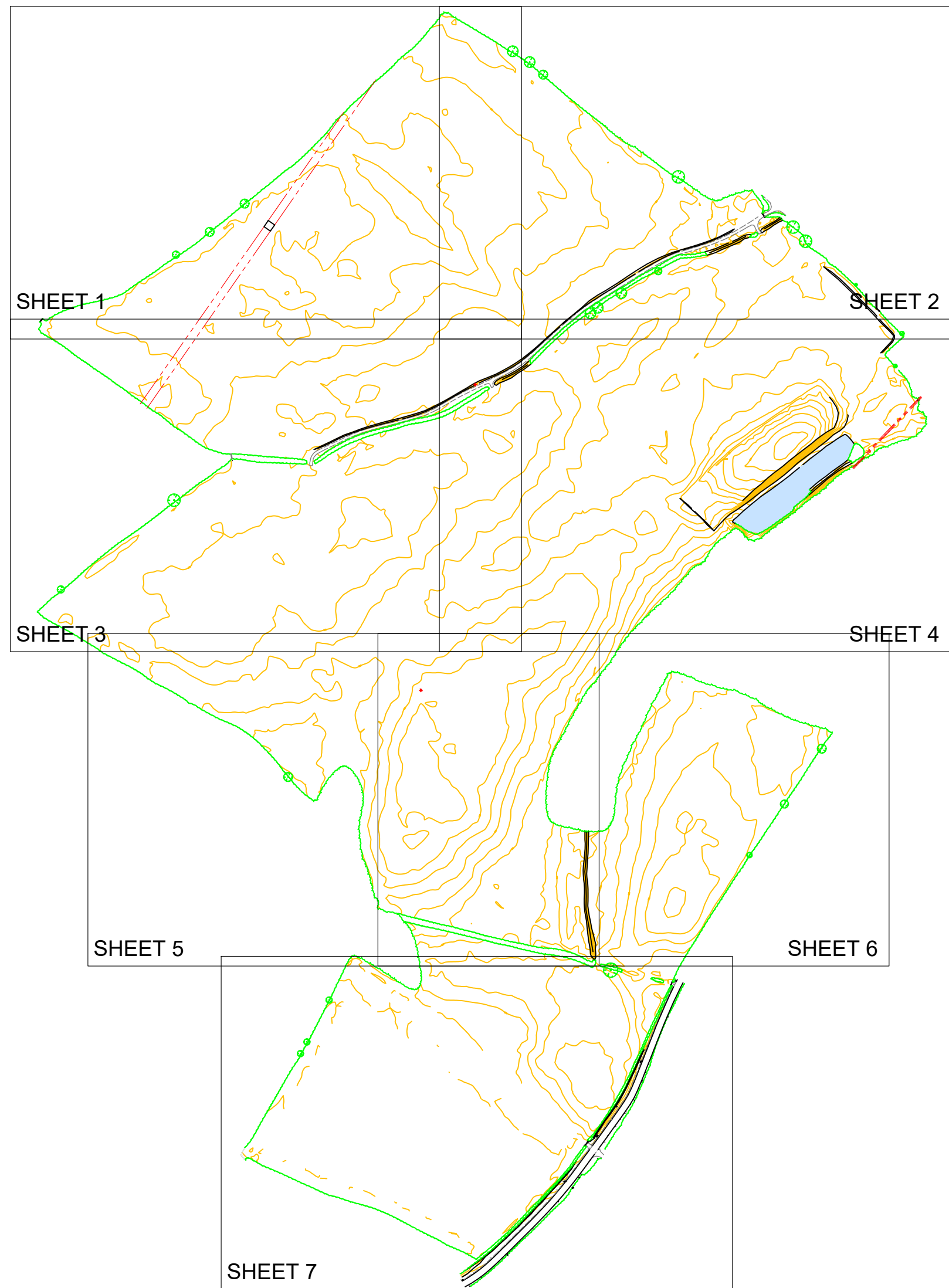


APPENDIX 2 – Topographical Survey



Sheet Location Plan, NTS

General notes

Grid and levels have been aligned with OS National Grid (OSGB36) (15).
All dimensions and levels are in metres unless noted otherwise.
This plan should only be used for its original purpose. JPP accepts no responsibility if supplied to any other party than the original client.

Key

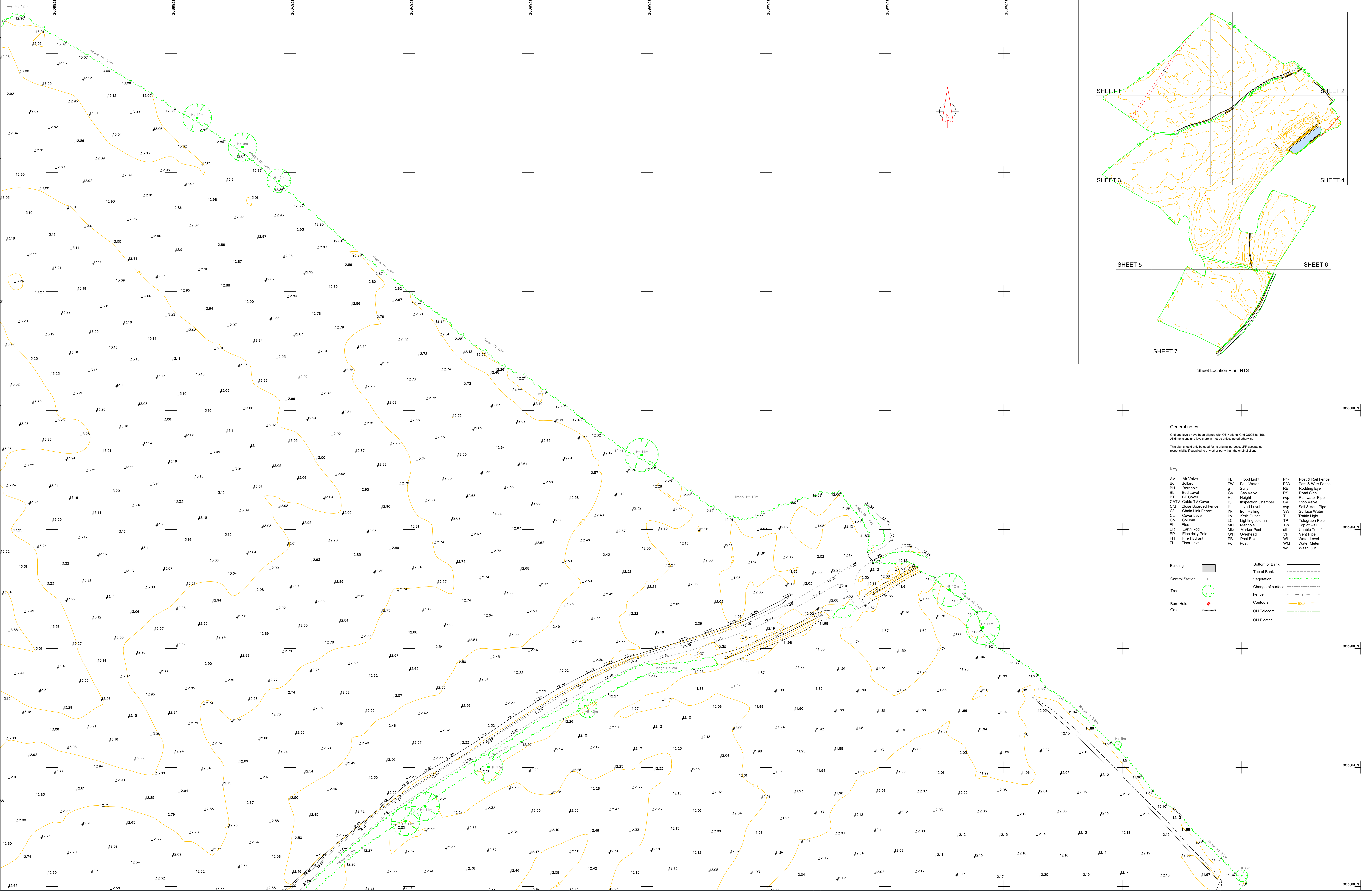
AV	Air Valve	FL	Flood Light	PR	Post & Rail Fence
BL	Bollard	FW	Foul Water	PW	Post & Wire Fence
BH	Borehole	g	Gully	RE	Rodding Eye
BL	Bed Level	GV	Gas Valve	RS	Road Sign
BT	BT Cover	HL	Height	rwp	Rainwater Pipe
CATV	Cable TV Cover	IC	Inspection Chamber	SV	Stop Valve
C/B	Cable Boarded Fence	IL	Invert Level	swp	Soil & Vent Pipe
CL	Chain Link Fence	IR	Iron Railing	SW	Surface Water
CL	Cover Level	IO	Kerb Outlet	TL	Traffic Light
Col	Column	LC	Lighting column	TP	Telegraph Pole
EI	Elec	MH	Manhole	Top of wall	
ER	Earth Rod	Mir	Marker Post	U/L	Unstable To Lift
EP	Electricity Pole	O/H	Overhead	VP	Vent Pipe
FH	Fire Hydrant	PB	Post Box	WL	Water Level
FL	Floor Level	Po	Post	WM	Water Meter
				wo	Wash Out

Building		Bottom of Bank	
Control Station		Top of Bank	
Tree		Vegetation	
Bore Hole		Change of surface	
Gate		Fence	
		Contours	
		OH Telecom	
		OH Electric	

- Infrastructure Design
- Structural Engineering
- Planning Services
- Geotechnical & Environmental
- Surveying
- Professional Advice

Drawn By:	JG	Client:	The Sirius Group
Chkd By:	TB	Project:	Kelham
Scale @ A0:	1:500	Title:	Topographical Survey Sheet 1 of 7
Date:	15/02/22	Project No.:	25701Y
Status:		Drawing No:	01
		Rev:	





General notes
Grid and levels have been aligned with OS National Grid OSG830 (15).
All dimensions and levels are in metres unless noted otherwise.
This plan should only be used for its original purpose. JPP accepts no responsibility if supplied to any other party than the original client.

Key					
AV	Air Valve	FL	Flood Light	PIR	Post & Rail Fence
Bol	Bollard	FW	Foul Water	P/W	Post & Wire Fence
BH	Borehole	g	Gully	RE	Rodding Eye
BL	Bed Level	GV	Gas Valve	RS	Road Sign
BT	BT Cover	Ht	Height	rw	Rainwater Pipe
CATV	Cable TV Cover	IC	Inspection Chamber	SV	Stop Valve
C/B	Close Boarded Fence	IL	Invert Level	SW	Soil & Vent Pipe
CL	Chain Link Fence	IR	Iron Rolling	TL	Surface Water
CL	Cover Level	ko	Kerb Outlet	TP	Traffic Light
Col	Column	LC	Lighting column	TP	Telegraph Pole
El	Elec	MH	Manhole	TW	Top of wall
ER	Earth Rod	Mv	Marker Post	u/l	Unable To Lift
EP	Electricity Pole	O/H	Overhead	VP	Vent Pipe
FD	Fire Hydrant	PB	Post Box	WL	Water Level
FL	Floor Level	Po	Post	WM	Water Meter
				wo	Wash Out

Building		Bottom of Bank	
Control Station		Top of Bank	
Tree		Vegetation	
Bore Hole		Change of surface	
Gate		Fence	
		Contours	
		OH Telecom	
		OH Electric	

☒ Northampton
4 Ironstone Way, Brixworth,
Northampton, NN16 9JL
T: 01604 783811

☐ Warwick
Units 23A, Warwick Innovation Centre,
Warwick Technology Park, Gallows Hill, Warwick, CV34 6UW
T: 02475 500530

☐ Milton Keynes
Suite 25, Linford Forum, Rockingham Drive,
Linford Road, Milton Keynes, MK12 6JF
T: 01908 889433

E: mail@jppuk.net
W: jppuk.net

• Infrastructure Design

• Structural Engineering

• Planning Services

• Geotechnical & Environmental

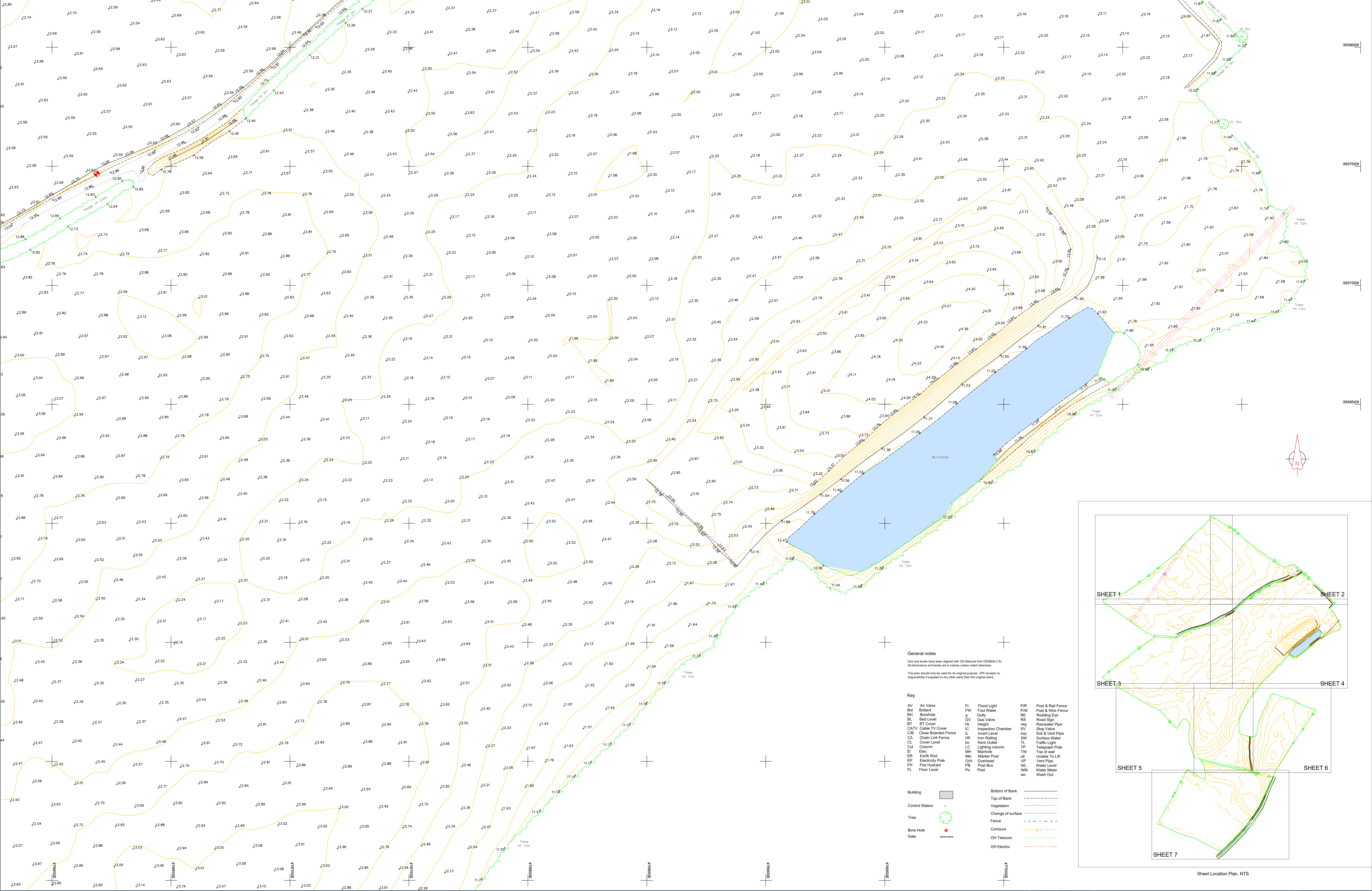
• Surveying

• Professional Advice

Drawn By:	JG	Client:	The Sirius Group
Chkd By:	TB	Project:	Kelham
Scale @ A0:	1:500	Title:	Topographical Survey Sheet 2 of 7
Date:	15/02/22		
Status:			
Project No.:	25701Y	Drawing No:	02
		Rev:	

jpp

JPP QA Document 106 R1



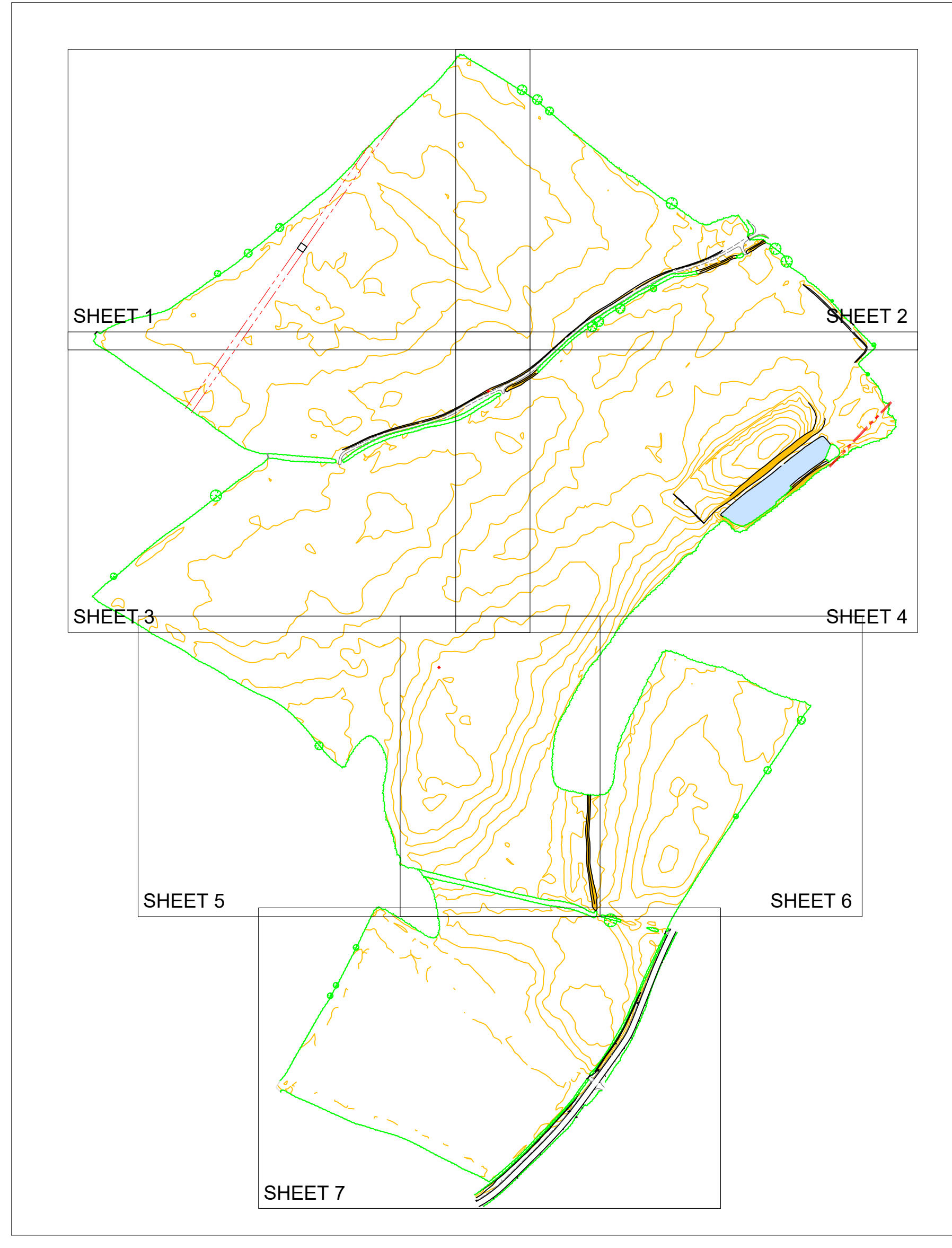
General notes

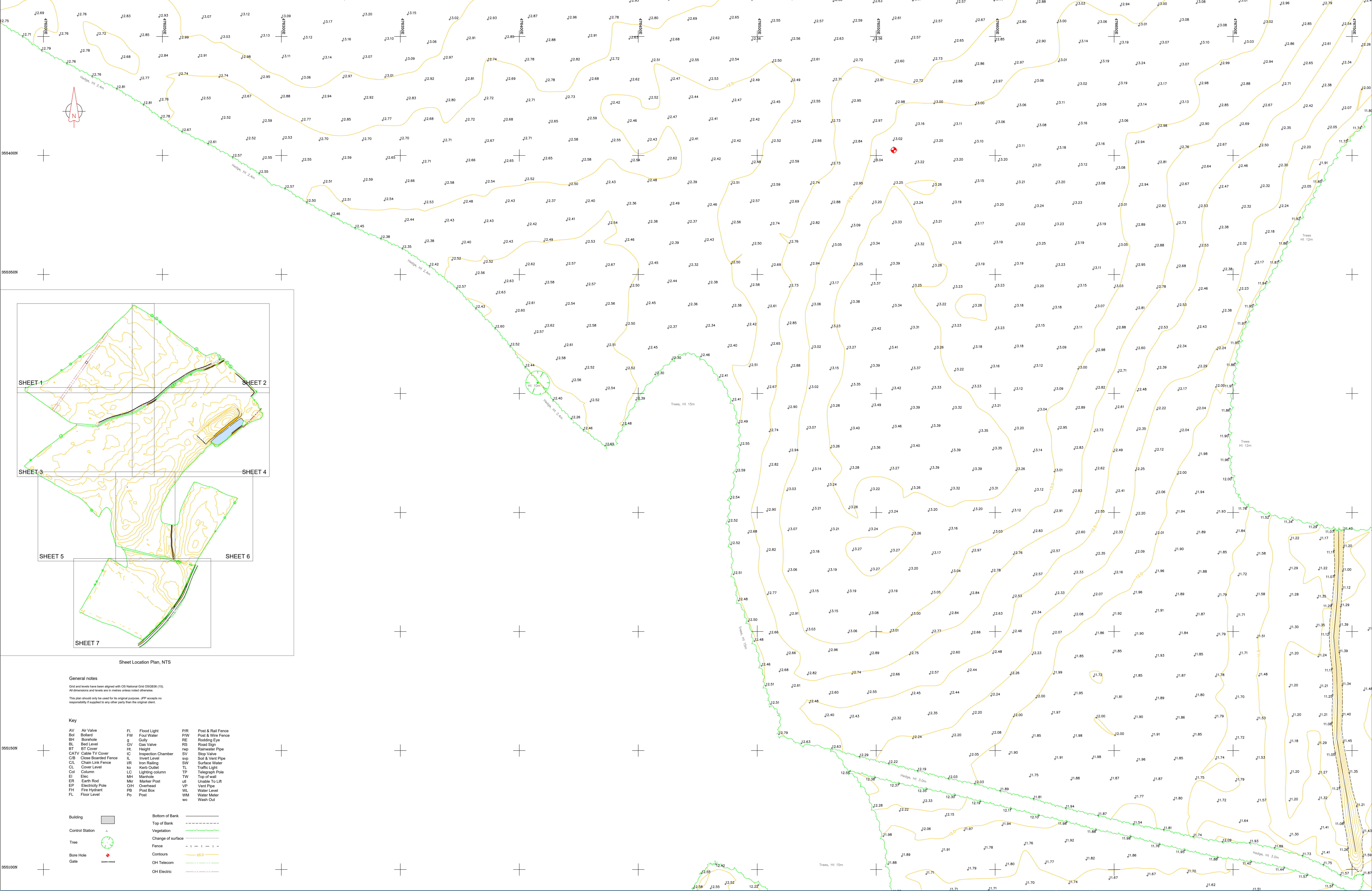
Grid and levels have been aligned with OS National Grid OSG836 (15).
All dimensions and levels are in metres unless noted otherwise.
This plan should only be used for its original purpose. JPP accepts no responsibility if supplied to any other party than the original client.

Key

AV	Air Valve	FL	Flood Light	PIR	Post & Rail Fence
Bol	Bollard	FW	Foul Water	RE	Post & Wire Fence
BH	Borehole	g	Gully	RS	Rodding Eye
BL	Bed Level	GV	Gas Valve	RS	Road Sign
BT	BT Cover	HT	Height	SV	Stop Valve
CATV	Cable TV Cover	IC	Inspection Chamber	rwp	Rainwater Pipe
C/B	Close Boarded Fence	IL	Invert Level	exp	Soil & Vent Pipe
C/L	Chain Link Fence	IR	Iron Railing	SW	Surface Water
CL	Cover Level	ko	Keen Outlet	TL	Traffic Light
Col	Column	LC	Lighting column	TP	Telegraph Pole
EI	Elec	MH	Manhole	Top of wall	
ER	Earth Rod	Mkr	Marker Post	U/L	Unstable To Lift
EP	Electricity Pole	OH	Overhead	VP	Vent Pipe
FH	Fire Hydrant	PS	Post Box	WL	Water Level
FL	Floor Level	Po	Post	WM	Water Meter
				wo	Wash Out

Building		Bottom of Bank	
Control Station		Top of Bank	
Tree		Vegetation	
Bore Hole		Change of surface	
Gate		Fence	
		Contours	
		OH Telecom	
		OH Electric	





☒ Northampton
4 Ironstone Way, Brixworth,
Northampton, NN16 9JL
T: 01604 783811

☐ Warwick
Units 23A, Warwick Innovation Centre,
Warwick Technology Park, Galloway Hill, Warwick, CV34 6UW
T: 02455 505150

☐ Milton Keynes
Suite 25, Linford Forum, Reddington Drive,
Linford Road, Milton Keynes, MK12 2LS
T: 01908 889433

E: mail@jppuk.net
W: jppuk.net

• Infrastructure Design

• Structural Engineering

• Planning Services

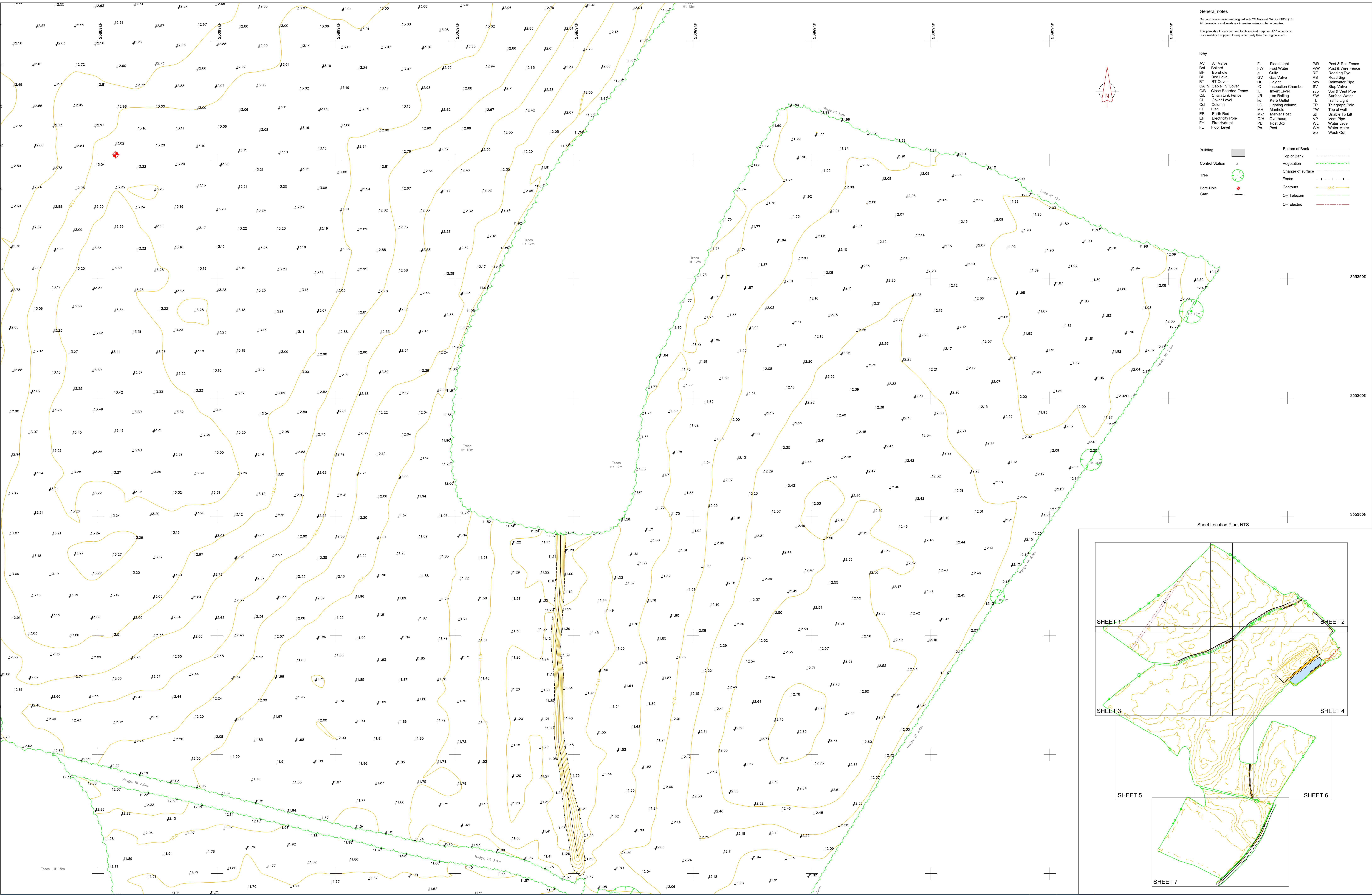
• Geotechnical & Environmental

• Surveying

• Professional Advice

Drawn By:	JG	Client:	The Sirius Group
Chkd By:	TB	Project:	Kelham
Scale @ A0:	1:500	Title:	Topographical Survey Sheet 5 of 7
Date:	15/02/22	Project No.:	25701Y
Status:		Drawing No:	05
		Rev:	

JPP QA Document 106 R1



☒ Northampton
4 Ironstone Way, Botsworth,
Northampton, NN1 5JL
T: 01604 783811

☐ Warwick
Units 23A, Warwick Innovation Centre,
Warwick Technology Park, Galloway Hill, Warwick, CV34 6UW
T: 02475 150539

☐ Milton Keynes
Suite 25, Linford Forum, Rockingham Drive,
Linford Road, Milton Keynes, MK12 8JY
T: 01908 899433

E: mail@jppuk.net
W: jppuk.net

Infrastructure Design

Structural Engineering

Planning Services

Geotechnical & Environmental

Surveying

Professional Advice

Drawn By: JG

Chkd By: TB

Scale @ A0: 1:500

Date: 15/02/22

Status:

Project No.: 25701Y

Client: The Sirius Group

Project: Kelham

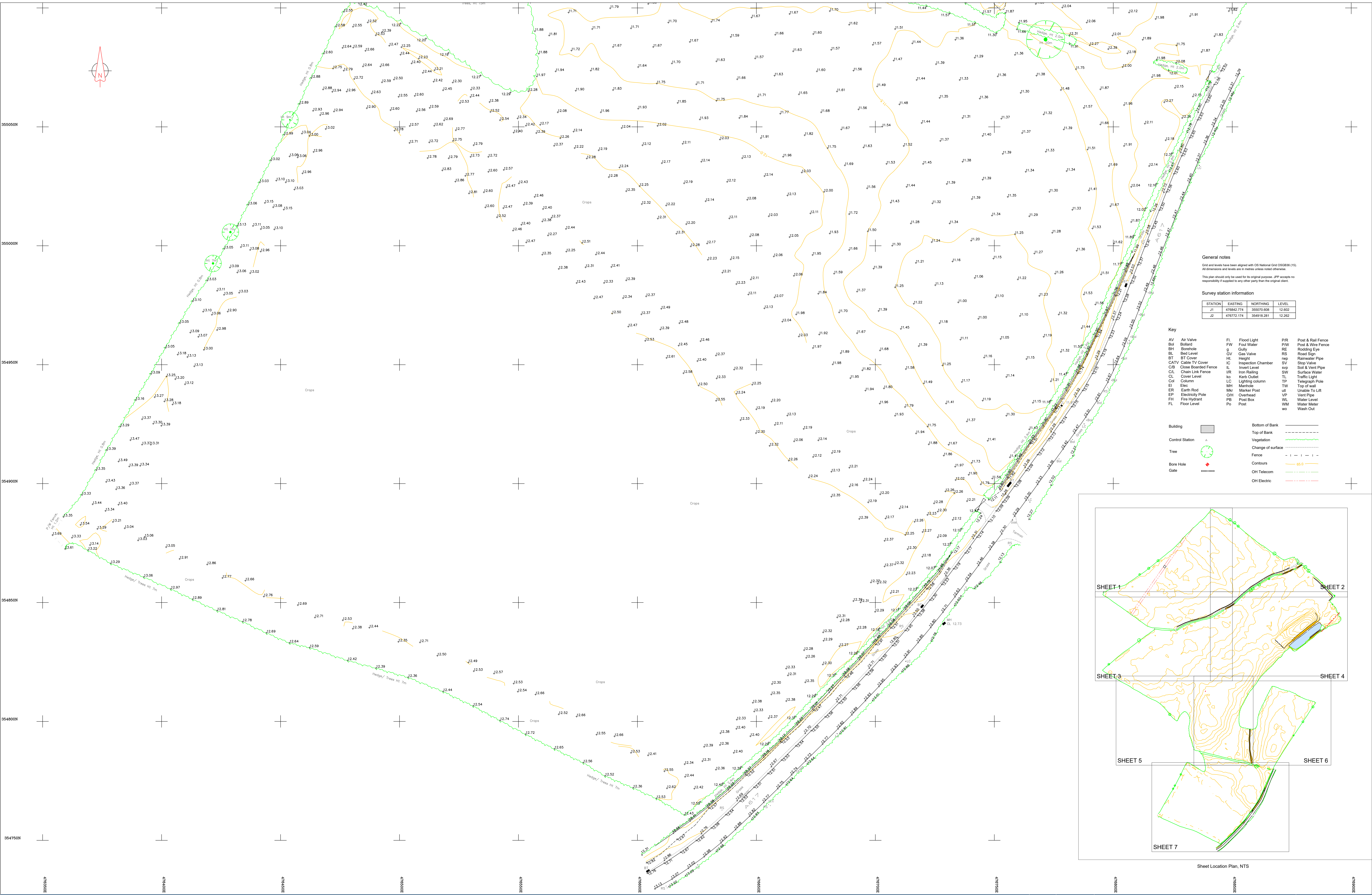
Title: Topographical Survey Sheet 6 of 7

Drawing No: 06

Rev:

jpp

JPP QA Document 106 R1



General notes

Grid and levels have been aligned with OS National Grid (OSGB36 (15)).
All dimensions and levels are in metres unless noted otherwise.

This plan should only be used for its original purpose. JPP accepts no responsibility if supplied to any other party than the original client.

Survey station information			
STATION	EASTING	NORTHING	LEVEL
J1	476842.774	355070.608	12.692
J2	476772.174	354919.281	12.262

- Key
- AV

Air Valve

Bol

Bollard

BH

Borehole

BL

Bed Level

BT

BT Cover

CATV

Cable TV Cover

CB

Close Boarded Fence

CL

Chain Link Fence

CL

Cover Level

Col

Column

EI

Elec

ER

Earth Road

EP

Electricity Pole

FH

Fire Hydrant

FL

Floor Level
- FL

Flood Light
- FW

Foul Water
- g

Gully
- GV

Gas Valve
- HL

Height
- IC

Inspection Chamber
- IL

Invert Level
- IR

Iron Railing
- KL

Kerb Level
- LC

Lighting column
- EL

Electric Pole
- MR

Manhole
- MP

Marker Post
- OH

Overhead
- OP

Overhead
- PD

Post Box
- Po

Post

PR

Post & Rail Fence

PWF

Post & Wire Fence

RE

Roading Eye

RS

Road Sign

nwp

Rainwater Pipe

SV

Stop Valve

svp

Soil & Vent Pipe

SW

Surface Water

TL

Traffic Light

TP

Telegraph Pole

TW

Top of wall

ut

Unable To Lift

VP

Vent Pipe

WL

Water Level

WM

Water Meter

wo

Wash Out

- Building

Control Station

Tree

Bore Hole

Gate
- Bottom of Bank

Top of Bank

Vegetation

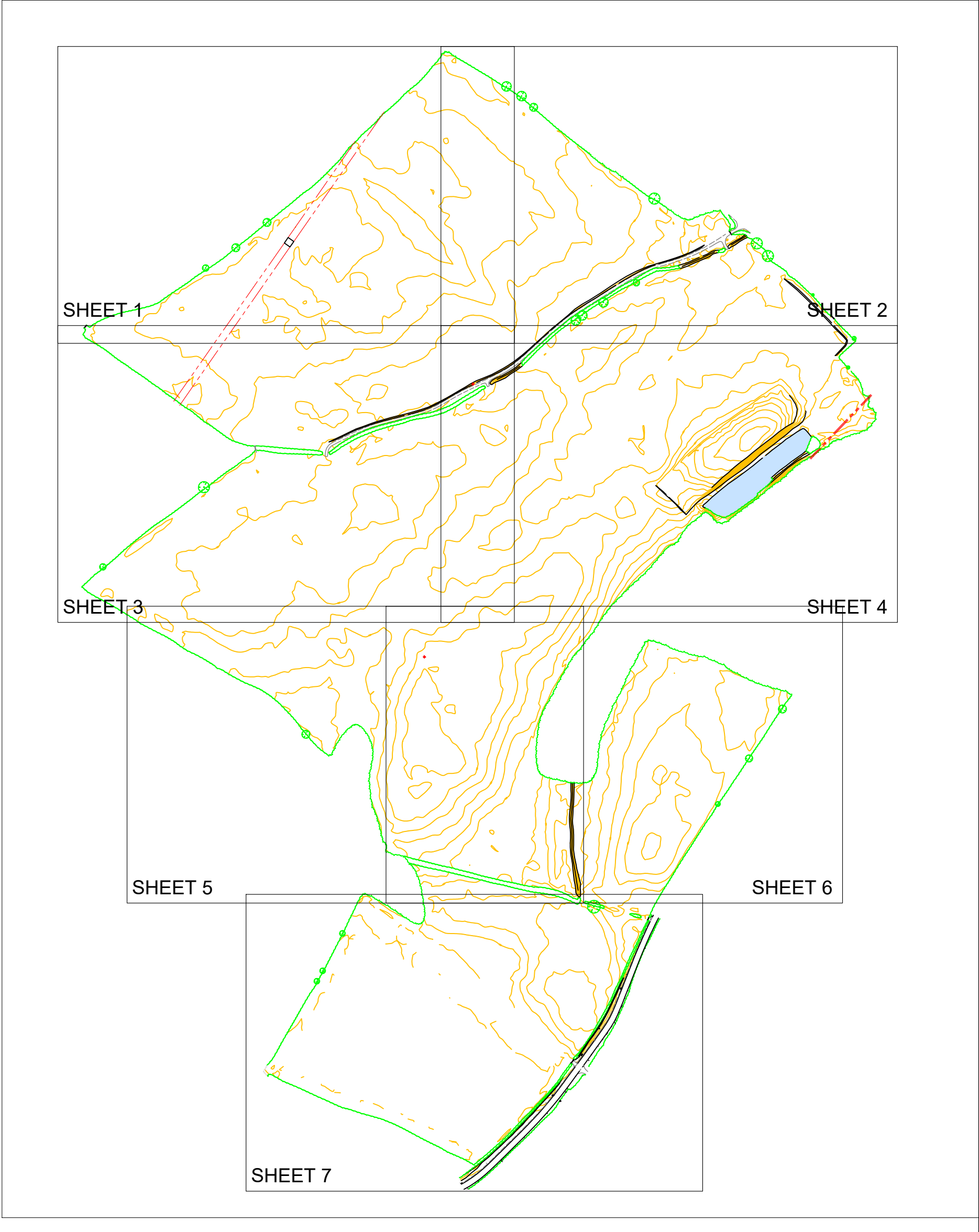
Change of surface

Fence

Contours

OH Telecom

OH Electric



APPENDIX 3 – Environment Agency Data



Ruth Evans
Via Email

Our Ref: EMD-316452

Your Ref:

Date: 26/07/2023

Dear Ruth,

Enquiry regarding Product 4 - Land to the west of Main Road, Kelham, Newark

Thank you for your enquiry which was received on 27/06/2023

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

Product 4

Detailed Flood Risk Assessment Map/data for the above site.

The Flood Map for Planning is now classed as Open Data. As such it can be downloaded free of charge under an open data licence from the following address:
<https://data.gov.uk/publisher/environment-agency>

Please refer to [Open Government Licence](#) which explains the permitted use of this information.

Information Warning - OS background mapping

The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.

Attribution

Contains Environment Agency information © Environment Agency and/or database rights.

Contains Ordnance Survey data © Crown copyright 2017 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning ([Flood Zone 2](#), [Flood Zone 3](#), [Flood Storage Areas](#), [Flood Defences](#), [Areas Benefiting from Defences](#), ,)
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely

Rose Archibald
Customers & Engagement Officer
East Midlands

For further information please contact the Customers & Engagement Team on 02084 747770

Direct e-mail:- EMDenquiries@environment-agency.gov.uk

ENC – FRA Advisory Text



Flood Map for Planning:

The Flood Map for Planning is now classed as Open Data. As such it can be downloaded free of charge under an open data licence from the following addresses:

- <https://data.gov.uk/publisher/environment-agency>
- <https://flood-map-for-planning.service.gov.uk/>

Your development is partially in **flood zone 2**

The flood zones on this map:

- refer to the land at risk of flooding and do not refer to individual properties refer to the probability of river and sea flooding.
- ignore the presence of defences,
- do not take into account potential impacts of climate change.
- This data is updated on a quarterly basis as better data becomes available.

Zone 1: Low Probability	Land having a less than 0.1% annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map for Planning – all land outside Zones 2, 3a and 3b)
Zone2: Medium Probability	Land having between a 1% and 0.1% annual probability of river flooding; or land having between a 0.5% and 0.1% annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a: High Probability	Land having a 1% (1 in 100) or greater annual probability of river flooding; or Land having a 0.5% or greater annual probability of sea. (Land shown in dark blue on the Flood Map)
Zone 3b: Functional Floodplain	• land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding). • Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. • (Not separately distinguished from Zone 3a on the Flood Map)

Probability	Percentage chance of flooding each year
1 in 2 year	50%
1 in 5 year	20%
1 in 20 year	5%
1 in 50 year	2%
1 in 100 year	1%
1 in 1000 year	0.1%
Surface Water Flooding	
1 in 30	High Risk
1 in 100	Medium Risk
1 in 1000	Low Risk

Updated Climate Change Guidance: On 19th February 2016, the [Flood risk assessments: climate change allowances](#) was published on www.gov.uk website. It has replaced previous guidance [Climate Change Allowances for Planners](#). The climate change guidance can be found at: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

The climate change allowances provided with this RFI are a 20%, 30% and 50% increase in the peak river flow for the 1% Annual Exceedance Probability (1 in 100 year) scenario. Please see the suggested allowance for your location and development in the links above. It is likely appropriate flood and climate resilience measures will need to be included.

Modelled Information: Trent and Tributaries at Newark SFRM2, Halcrow, 2011

Node point reference	Location	20% (1 in 5 year) modelled level (mAOD)	20% (1 in 5 year) modelled flow (m³/s)	10% (1 in 10 year) modelled level (mAOD)
403523466	SK 77616 55635	10.82	362.43	11.01
403523768	SK 77609 55386	10.88	358.49	11.08
403523987	SK 77473 55204	10.98	329.06	11.18
403524196	SK 77417 55020	11.10	338.91	11.27
403524425	SK 77418 54764	11.16	309.82	11.33

Node point reference	Location	10% (1 in 10 year) modelled flow (m³/s)	5% (1 in 20 year) modelled level (mAOD)	5% (1 in 20 year) modelled flow (m³/s)
403523466	SK 77616 55635	384.60	11.13	396.38
403523768	SK 77609 55386	371.86	11.20	379.40
403523987	SK 77473 55204	340.17	11.30	347.92
403524196	SK 77417 55020	353.13	11.38	368.73
403524425	SK 77418 54764	350.41	11.44	380.76

Node point reference	Location	2% (1 in 50 year) modelled level (mAOD)	2% (1 in 50 year) modelled flow (m³/s)	1.33% (1 in 75 year) modelled level (mAOD)
403523466	SK 77616 55635	11.32	407.31	11.37
403523768	SK 77609 55386	11.38	390.08	11.43
403523987	SK 77473 55204	11.47	362.43	11.53
403524196	SK 77417 55020	11.54	397.73	11.59
403524425	SK 77418 54764	11.60	429.69	11.64

Node point reference	Location	1.33% (1 in 75 year) modelled flow (m³/s)	1% (1 in 100 year) modelled level (mAOD)	1% (1 in 100 year) modelled flow (m³/s)
403523466	SK 77616 55635	408.21	11.45	409.07
403523768	SK 77609 55386	391.60	11.50	394.49
403523987	SK 77473 55204	366.06	11.60	370.25
403524196	SK 77417 55020	406.81	11.65	416.32
403524425	SK 77418 54764	444.67	11.71	460.47

Node point reference	Location	0.5% (1 in 200 year) modelled level (mAOD)	0.5% (1 in 200 year) modelled flow (m³/s)	0.1% (1 in 1000 year) modelled level (mAOD)
403523466	SK 77616 55635	11.55	410.46	11.92
403523768	SK 77609 55386	11.60	405.68	11.96
403523987	SK 77473 55204	11.69	381.77	12.06
403524196	SK 77417 55020	11.74	435.61	12.11
403524425	SK 77418 54764	11.80	489.67	12.16

Node point reference	Location	0.1% (1 in 1000 year) modelled flow (m³/s)	1% + 20% flow (1 in 100 year plus climate change) modelled level (mAOD)	1% + 20% flow (1 in 100 year plus climate change) modelled flow (m³/s)
403523466	SK 77616 55635	451.27	11.68	413.50
403523768	SK 77609 55386	481.42	11.72	422.86
403523987	SK 77473 55204	456.46	11.82	398.84
403524196	SK 77417 55020	539.17	11.87	461.07
403524425	SK 77418 54764	631.55	11.92	525.57

Please note: The flows provided represent **in channel flow only** and do not take into account flow on the floodplain.

All data is discussed as metres above Ordnance Datum (mAOD). This is based on the Ordnance Datum Newlyn in Cornwall. Tide gauges have been used over time to calculate a mean sea level datum point. This point is marked as height zero on maps in Britain. For more information please see: [Ordnance Datum Newlyn reaches 100 years | Blog | Ordnance Survey](#)

Breach Information: It is recommended that a site specific breach analysis is carried out for the site using the joint DEFRA/Environment Agency document Flood Risk Assessment Guidance for New Development (FD2320). This document can be downloaded directly using the following link ([FD2320.pdf](#)).

Defence Information Flood defence data is routinely updated and freely available at: [AIMS Spatial Flood Defences \(inc. standardised attributes\) - data.gov.uk](#) and [AIMS Asset Bundle - data.gov.uk](#).

Historic Information We have records of historic fluvial flooding at this location in **2000**. Please note that we may or may not hold the original records in question. We do not make any claim as to the reliability of recorded flood extents or that all flood events in the area have been recorded. Please also be aware that flood defences may have been built subsequent to these historic flood events. Note - This information relates to the area the above named property is in, and is not specific to the property itself - it **does not** provide an indicator of flood risk **at individual property level**.

Surface Water & Drainage: The Environment Agency (empowered under the Water Resources Act 1991) concentrates on the major elements of the drainage system, managing flood risk arising from designated "main rivers" and the sea. The Flood & Water Management Act (2010) has given Lead Local Flood Authorities (LLFAs) responsibility for the management of local flood risk, which includes surface runoff, groundwater and flooding from ordinary watercourses (smaller rivers and streams). The LLFA for this area is **Nottinghamshire County Council**, and we recommend that you contact them with concerns about any flooding issues for this area. This area is also under the management of **Trent Valley Internal Drainage Board**. This is due to the complex drainage system. Further information and maps for surface water, ordinary watercourses, and reservoir flooding can be found here:

<https://www.gov.uk/check-long-term-flood-risk> ; [Reservoir flood maps: when and how to use them - GOV.UK \(www.gov.uk\)](#)

Open Data Information: Many datasets are now classed as Open Data and as such can be downloaded free of charge under an open data licence from the following address: <https://data.gov.uk/publisher/environment-agency>

Permitting Information: Under the Environmental Permitting (England and Wales) Regulations 2016, any permanent or temporary works in, over or under a designated main river will require an Environmental Permit for Flood Risk Activities from the Environment Agency. Any permanent or temporary works within 8 metres of the top of bank of a designated main river, or landward toe of a flood defence may require an Environmental Permit for Flood Risk Activities from the Environment Agency. In addition, any permanent or temporary works within the floodplain of a designated main river may also require an Environmental Permit for Flood Risk Activities. To find out whether your activity requires a permit or falls under a relevant exclusion, exemption or standard rule please follow this link: <https://www.gov.uk/guidance/flood-risk-activities-environmental-permits>. The Environment Agency require access to the watercourse and free movement up to 8m from the river bank/ defence for maintenance purposes.

Please note that a permit is separate to and in addition to any planning permission granted.

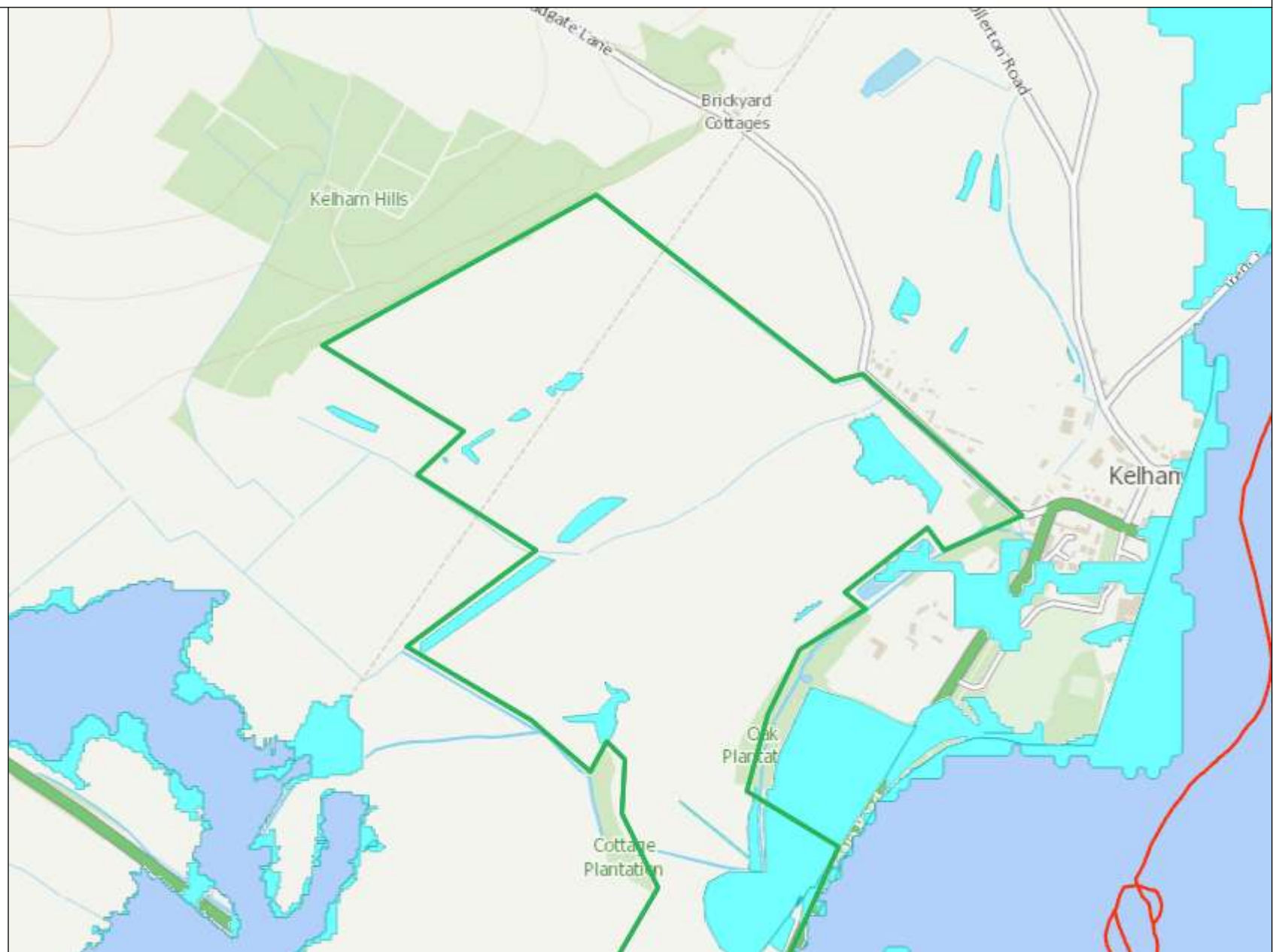
Strategic flood risk assessments: We recommend that you check the relevant local authority's strategic flood risk assessment (SFRA) as part of your work to prepare a site specific flood risk assessment. This should give you information about: the potential impacts of climate change in this catchment areas defined as functional floodplain flooding from other sources, such as surface water, ground water and reservoirs. This data has been generated by strategic scale flood models and is not intended for use at the individual property scale. If you're intending to use this data as part of a flood risk assessment, please include an appropriate modelling tolerance as part of your assessment. The Environment Agency regularly updates its modelling. We recommend that you check the data provided is the most recent, before submitting your flood risk assessment.

Flood Risk Assessment Advisory: All guidance on how to complete a full site specific Flood Risk Assessment (FRA) can be found here: [Flood risk and coastal change - GOV.UK \(www.gov.uk\)](#). Furthermore professional assistance can be provided by our planning officers, by contacting planning.trentside@environment-agency.gov.uk.

Detailed Flood Map, centred on west of Main Road, Kelham [EMD316452]

Legend

-  Statutory Main Rivers
-  Defences
-  Flood Storage Areas
-  Flood Zone 3
-  Flood Zone 2



Detailed River Network Map, centred on west of Main Road, Kelham [EMD316452]

Legend

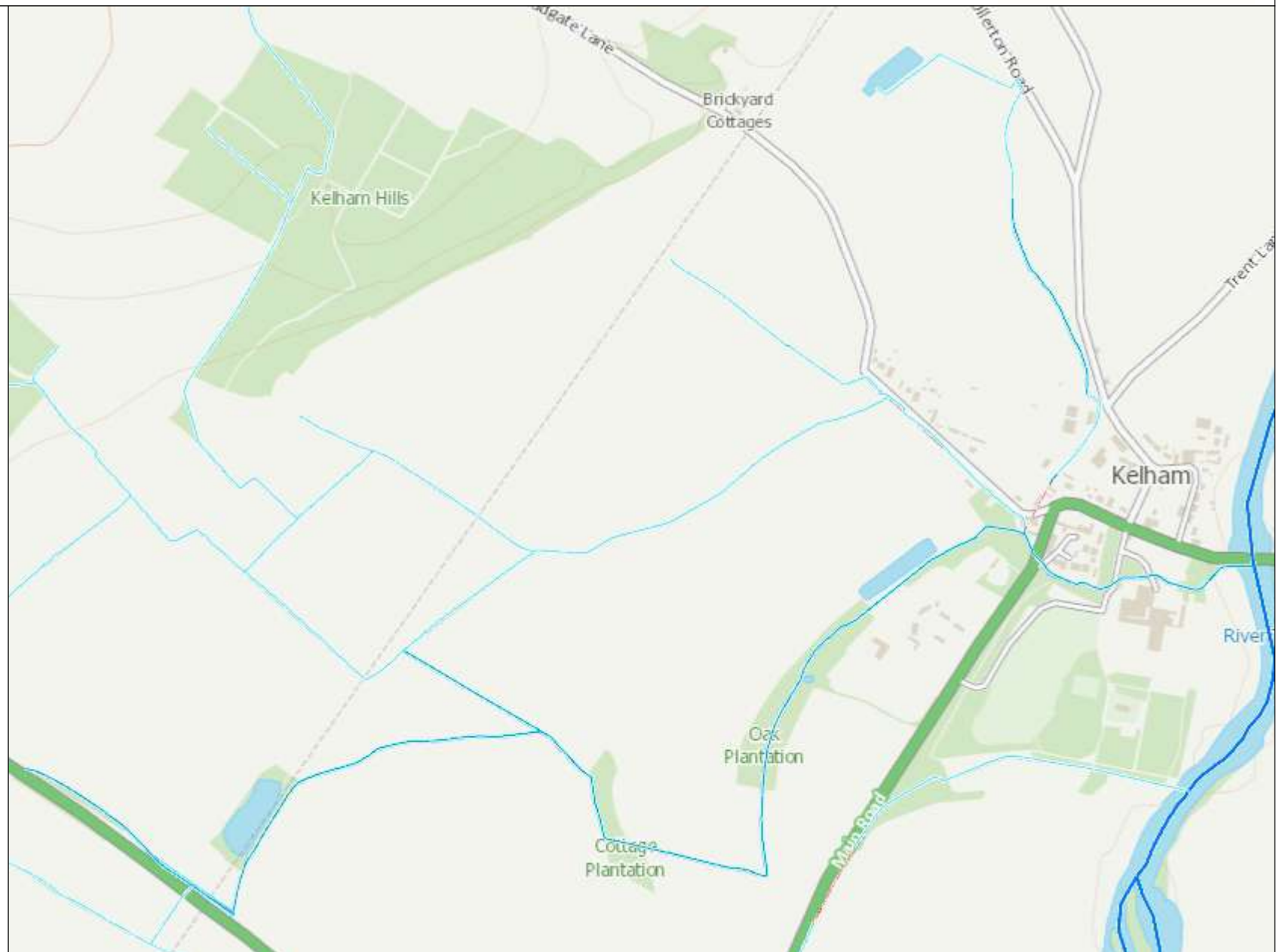
Detailed River Network

- Primary River
- Secondary River
- Tertiary River
- Lake / Reservoir
- Canal
- Canal Tunnel
- Extended Culvert
- Multiple Channel Culvert
- Underground River (potential sewer)
- Underground River (inferred)
- Underground River (local knowledge)
- Undefined

Offline Drainage features

Detailed River Network

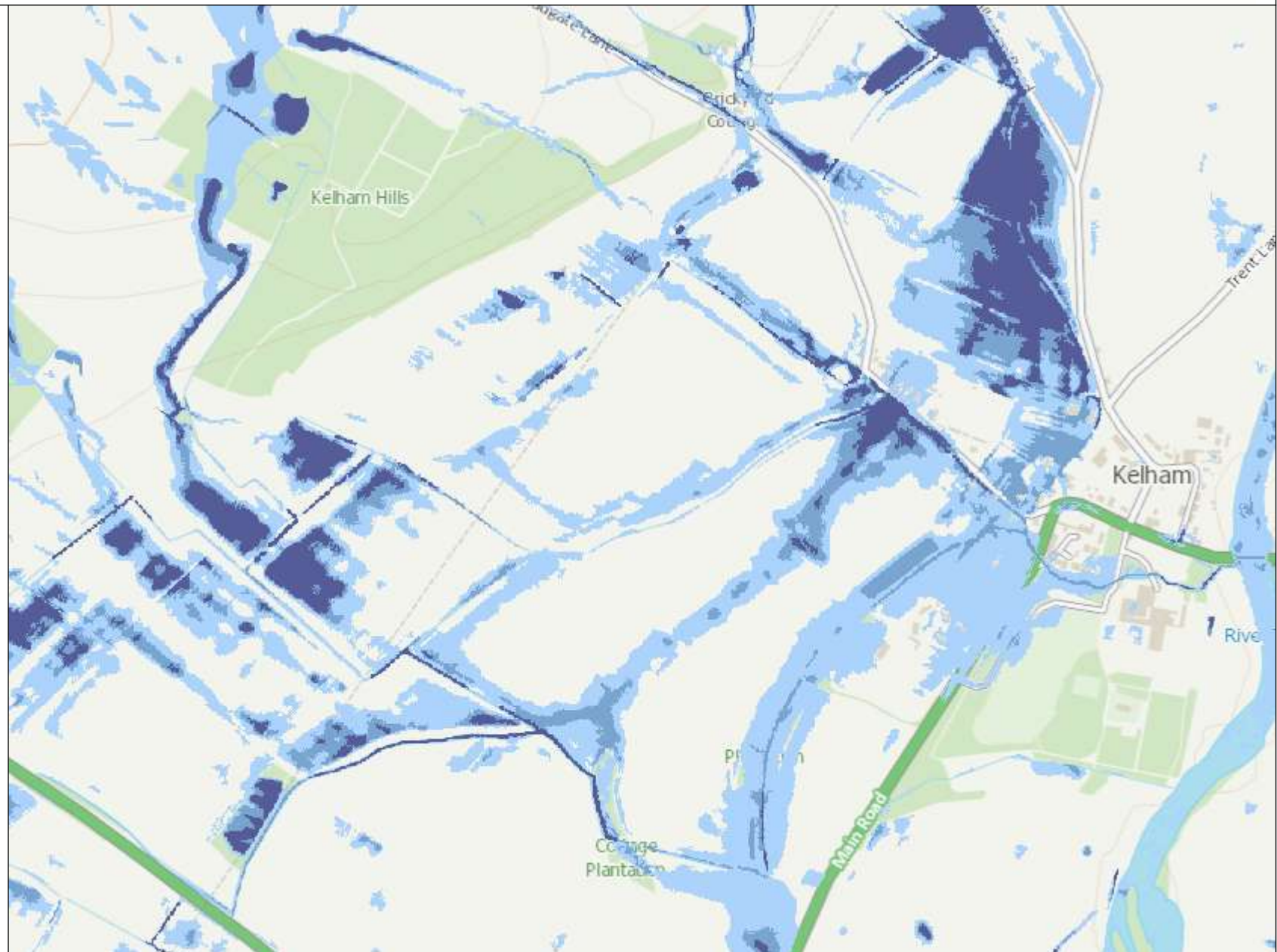
- Primary River
- Secondary River
- Tertiary River
- Lake / Reservoir
- Canal
- Canal Tunnel
- Extended Culvert
- Multiple Channel Culvert
- Underground River (potential sewer)
- Underground River (inferred)
- Underground River (local knowledge)
- Undefined



Surface Water Flood Map, centred on west of Main Road, Kelham [EMD316452]

Legend

-  Flood Extent 1 in 30
-  Flood Extent 1 in 100
-  Flood Extent 1 in 1000



Flood Defence Map centred on Land West of Main Street, Kelham - Ref: [EMD316452]



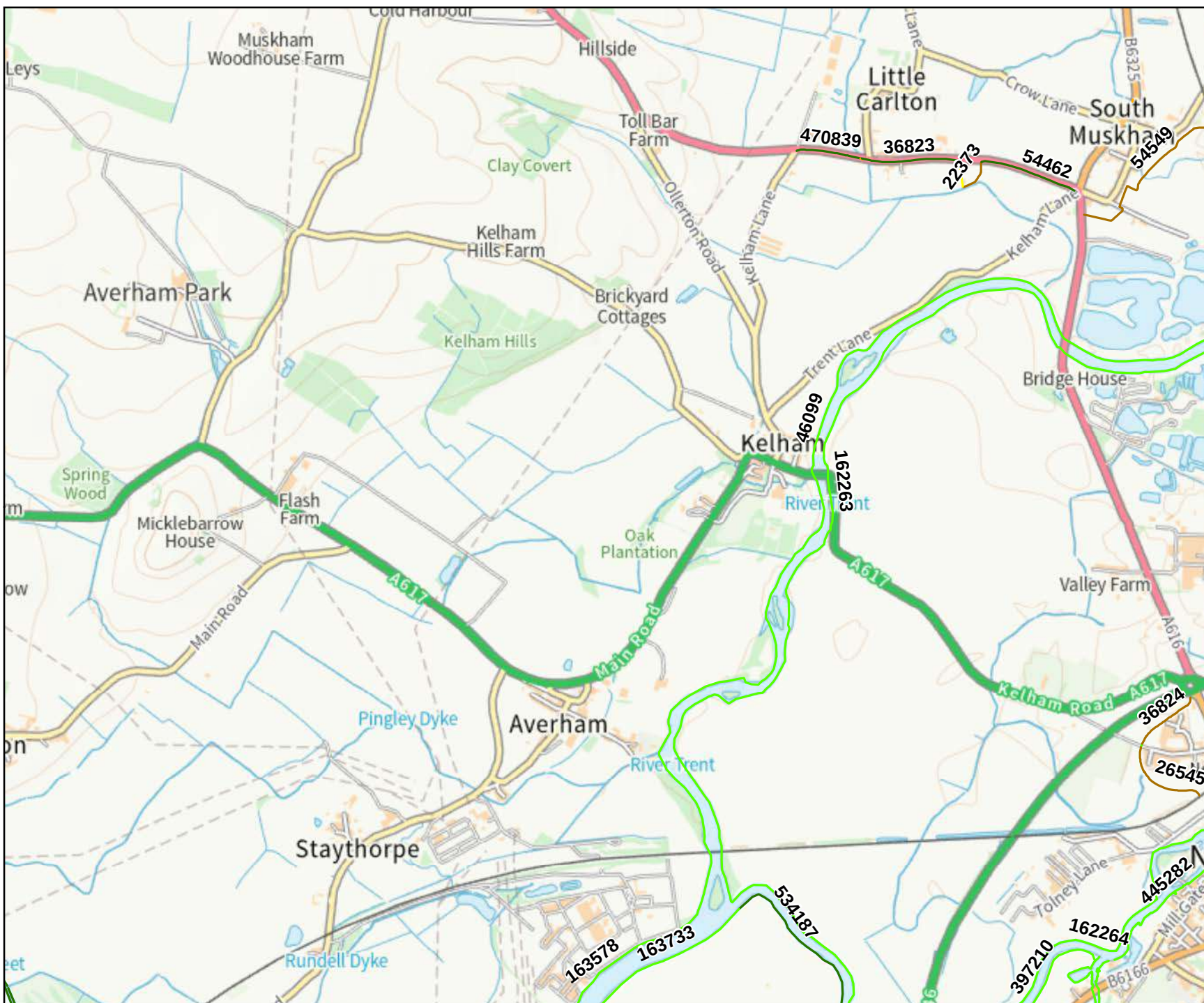
Scale 1:25,000
Date created: 17 July 2023

Legend

EMD Defences - March 2023

ASSETTYPE

- Bridge Abutment
- Demountable Defence
- Embankment
- Engineered High Ground
- Flood Gate
- Natural High Ground
- Spillway
- Wall



Flood Defence Map centred on Land West of Main Street, Kelham - Ref: [EMD316452]



Scale 1:10,000

Date created: 17 July 2023

Legend

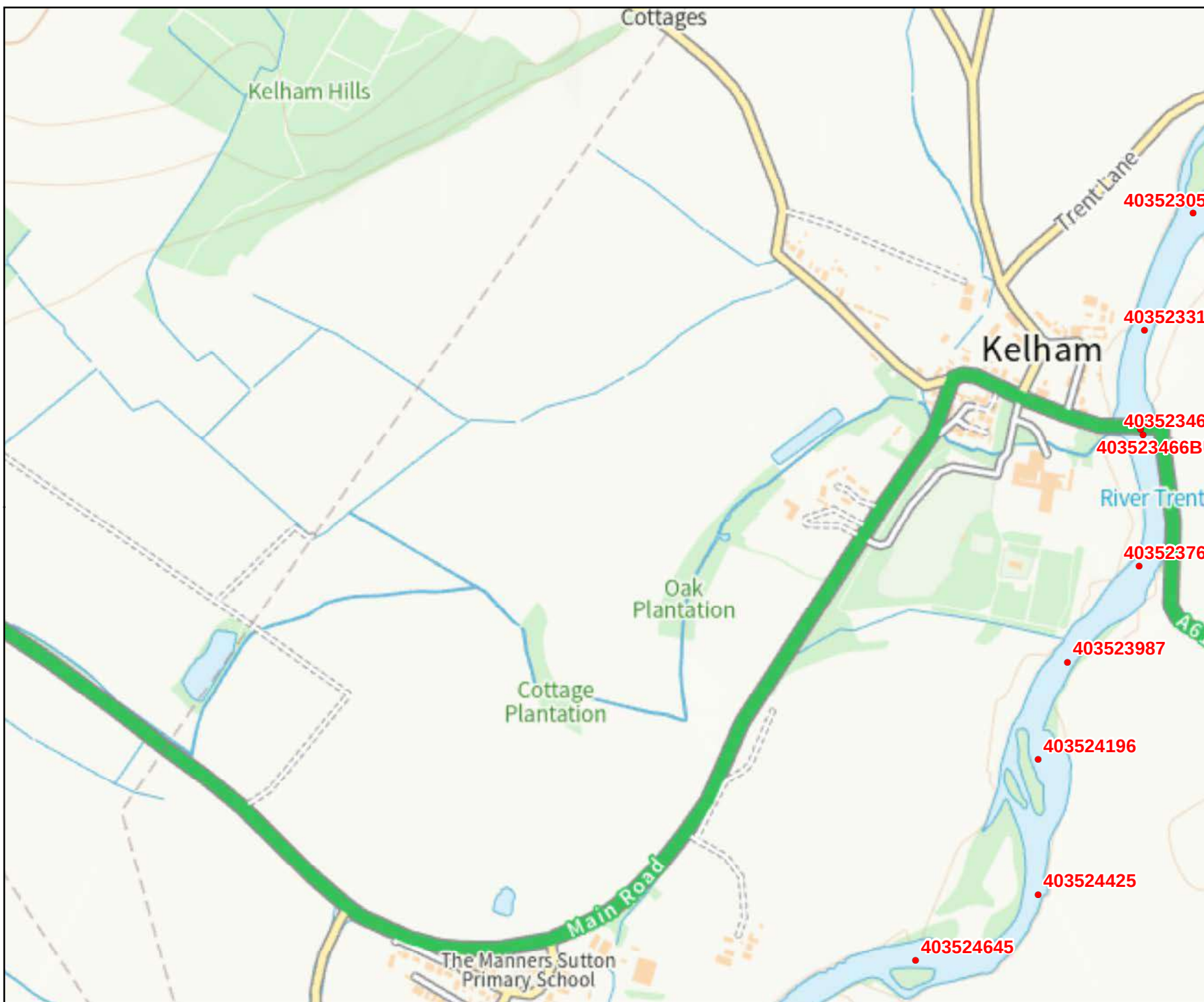
- Modelled_nodes_June23

SOURCE

Trent and Tributaries

- Newark SFRM2, Halcrow, July 2011
- Gunthorpe CC Update, EA, 2021

© Environment Agency copyright and/or database rights 2022.
© Ordnance Survey copyright and/or database rights 2022.
All rights reserved. Ordnance Survey Licence No 100024198.



Modelled Flood Extents Map
centred on Land West of Main Street, Kelham - Ref: [EMD316452]



Scale 1:10,000

Date created: 17 July 2023

Modelled Flood Extents

	1 in 2 year extent
	1 in 5 year extent
	1 in 10 year extent
	1 in 20 year extent
	1 in 30 year extent
	1 in 50 year extent
	1 in 75 year extent
	1 in 100 year extent
	1 in 200 year extent
	1 in 1000 year extent

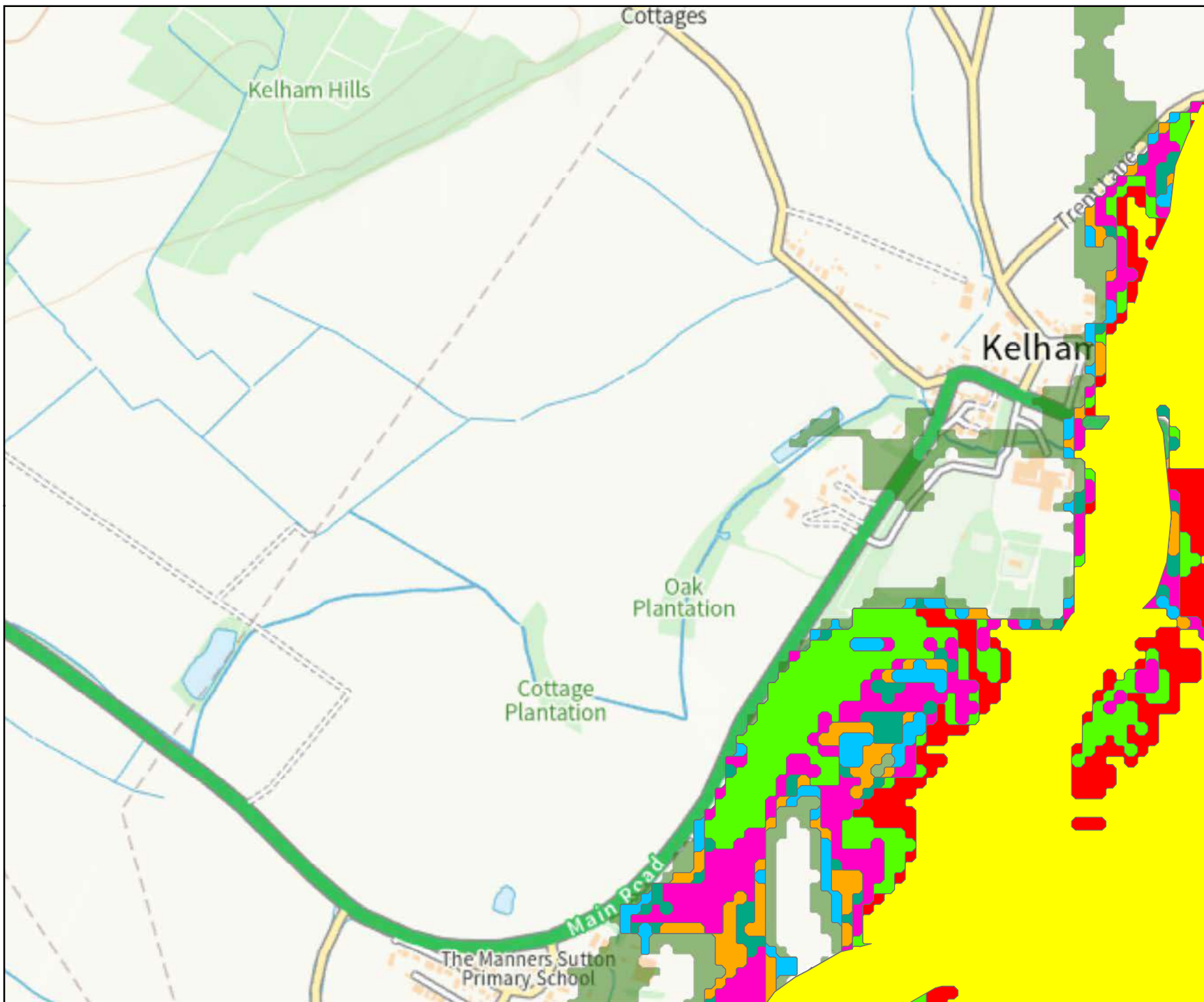
SOURCE

Trent and Tributaries

- Newark SFRM2, Halcrow, July 2011

- Gunthorpe CC Update, EA, 2021

© Environment Agency copyright and/or database rights 2022.
© Ordnance Survey copyright and/or database rights 2022.
All rights reserved. Ordnance Survey Licence No 100024198.



Floodplain Heights Map

centred on Land West of Main Street, Kelham - Ref: [EMD316452]



Scale 1:10,000

Date created: 17 July 2023

Legend

1 in 1000 year height (mAOD)

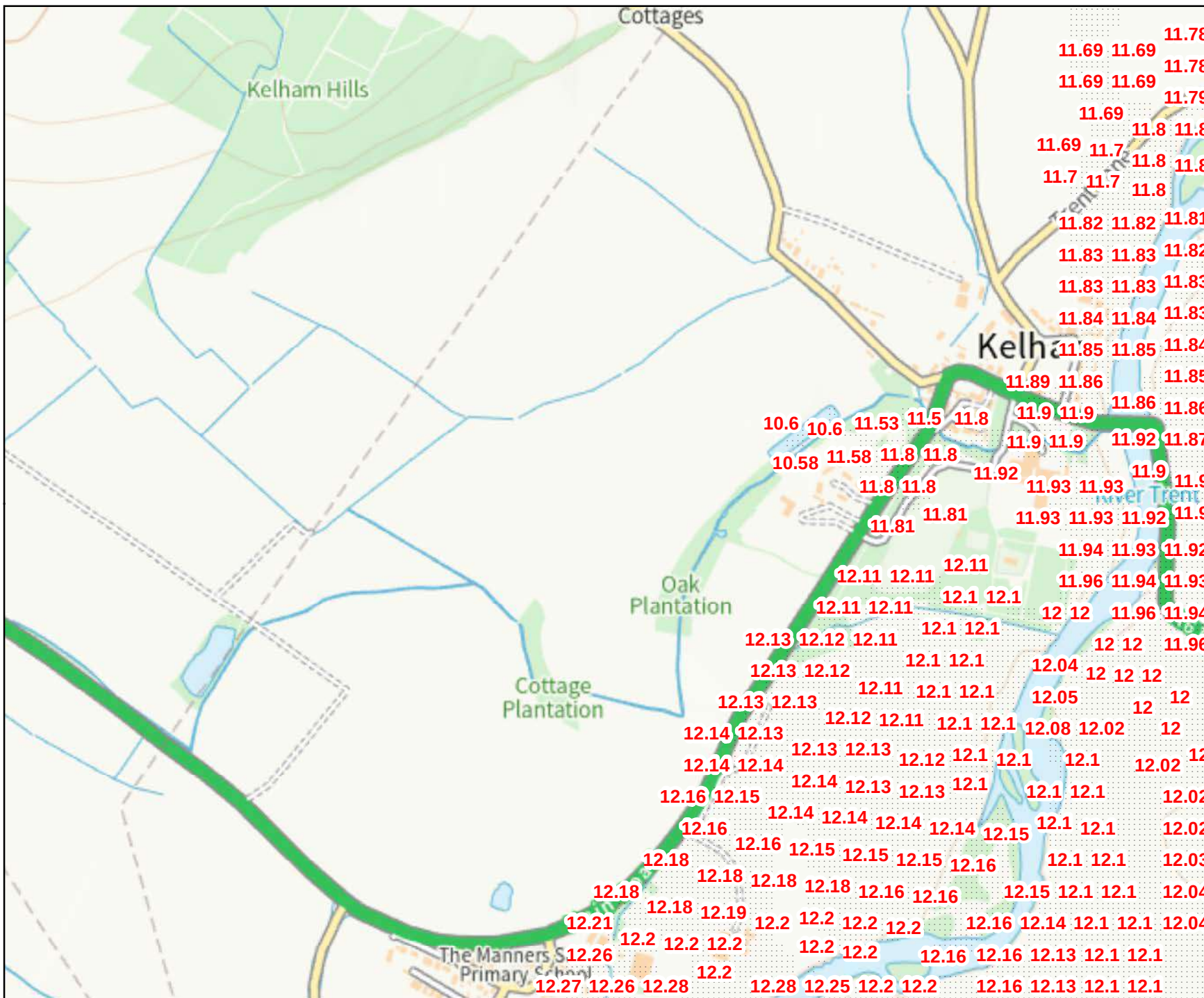
SOURCE

Trent and Tributaries

- Newark SFRM2, Halcrow, July 2011

- Gunthorpe CC Update, EA, 2021

© Environment Agency copyright and/or database rights 2022.
© Ordnance Survey copyright and/or database rights 2022.
All rights reserved. Ordnance Survey Licence No 100024198.



Modelled Flood Extents Map
centred on Land West of Main Street, Kelham - Ref: [EMD316452]



Scale 1:10,000

Date created: 17 July 2023

Modelled Flood Extents
Climate Change Legend

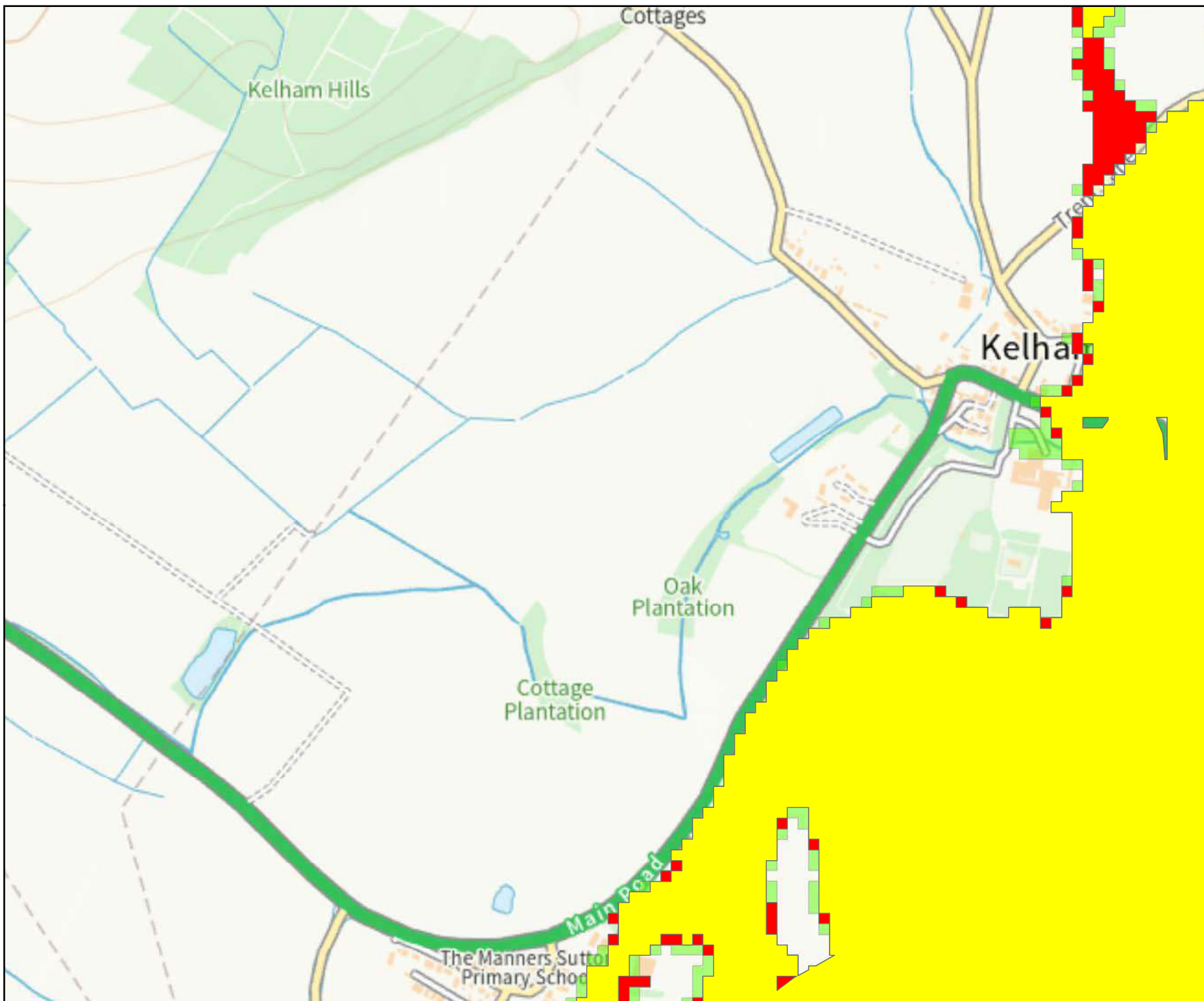
-  1 in 100 year +20%CC extent
-  1 in 100 year +30%CC extent
-  1 in 100 year +50%CC extent

SOURCE

Trent and Tributaries

- Newark SFRM2, Halcrow, July 2011
- Gunthorpe CC Update, EA, 2021

© Environment Agency copyright and/or database rights 2022.
© Ordnance Survey copyright and/or database rights 2022.
All rights reserved. Ordnance Survey Licence No 100024198.



Floodplain Heights Map

centred on Land West of Main Street, Kelham - Ref: [EMD316452]



Scale 1:10,000

Date created: 17 July 2023

Legend

1 in 100 year +50%CC height (mAOD)

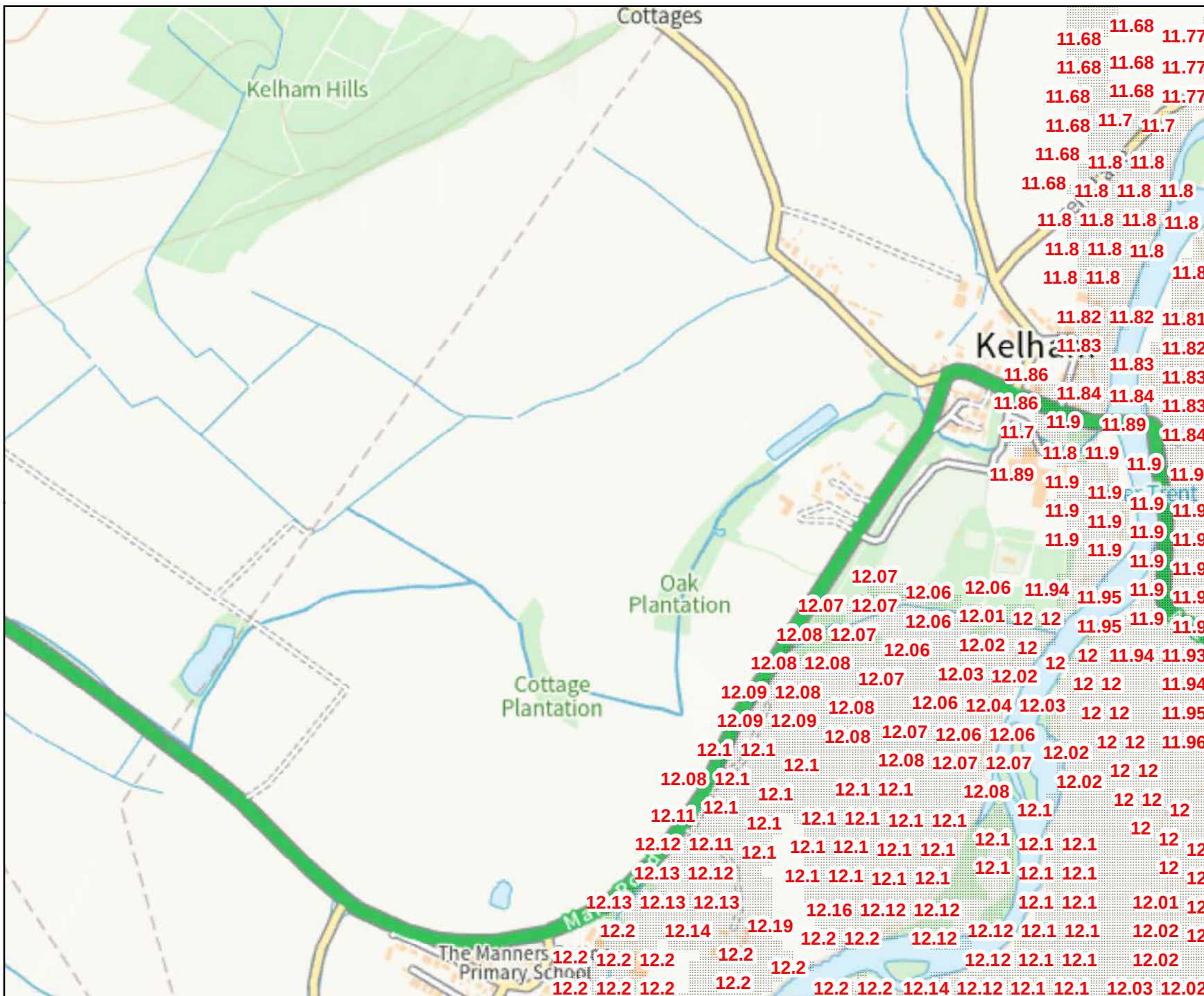
SOURCE

Trent and Tributaries

- Newark SFRM2, Halcrow, July 2011

- Gunthorpe CC Update, EA, 2021

© Environment Agency copyright and/or database rights 2022.
© Ordnance Survey copyright and/or database rights 2022.
All rights reserved. Ordnance Survey Licence No 100024198.



APPENDIX 4 – IoH 124 Method Calculations

Calculated by:	Emma Serjeant
Site name:	Kelham BESS & Solar
Site location:	Kelham

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details	
Latitude:	53.09013° N
Longitude:	0.85873° W
Reference:	1575588517
Date:	Sep 17 2023 21:21

Runoff estimation approach

IH124

Site characteristics

Total site area (ha):	0.22
-----------------------	------

Methodology

Q _{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	4	4
HOST class:	N/A	N/A
SPR/SPRHOST:	0.47	0.47

Hydrological characteristics

	Default	Edited
SAAR (mm):	591	591
Hydrological region:	4	4
Growth curve factor 1 year:	0.83	0.83
Growth curve factor 30 years:	2	2
Growth curve factor 100 years:	2.57	2.57
Growth curve factor 200 years:	3.04	3.04

Notes

(1) Is $Q_{\text{BAR}} < 2.0 \text{ l/s/ha}$?

When Q_{BAR} is $< 2.0 \text{ l/s/ha}$ then limiting discharge rates are set at 2.0 l/s/ha .

(2) Are flow rates $< 5.0 \text{ l/s}$?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

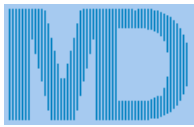
(3) Is $\text{SPR/SPRHOST} \leq 0.3$?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Q_{BAR} (l/s):	0.87	0.87
1 in 1 year (l/s):	0.72	0.72
1 in 30 years (l/s):	1.74	1.74
1 in 100 year (l/s):	2.24	2.24
1 in 200 years (l/s):	2.65	2.65

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX 5 – Infiltration Calculations



MasterDrain
SW 16.52

KRS Environmental Limited.

www.krsenvironmental.com

3 Princes Square, Princes Street,
Montgomery
Powys, SY15 6PZ
Tel: 01686 668957 Mob: 07857 264 376
email: keelan@krsenvironmental.com

Job No.		
Sheet no. 1		
Date 22/09/23		
By	Checked	Reviewed

Project **Kelham**
Title **BRE365 Infiltration Calculations**

Rectangular pit design data:-

Pit length	= 80 m	Pit width	= 5 m
Depth below invert	= 1 m	Percentage voids	= 30.0%
Imperm. area	= 2223 m ²	Infiltr. factor	= 0.00005 m/s
Return period	= 100 yrs	Climate change	= 40%

Calculations :-

Surface area of soakaway to 50% storage depth (not inc. base):-

$$a_{s50} = 2 \times (\text{length} + \text{width}) \times \text{depth}/2 = 85.0 \text{ m}^2$$

Outflow factor : $O = a_{s50} \times \text{Infiltration rate} = 0.00425 \text{ m/s}$

Soakaway storage volume : $S_{\text{actual}} = \text{length} \times \text{width} \times \text{depth} \times \% \text{voids}/100 = 120.0 \text{ m}^3$

Duration	Rainfall mm/hr	Inflow m ³	Depth (hmax) m	Outflow m ³	Storage m ³
5 mins	223.3	41.2	0.33	1.27	39.93
10 mins	165.8	61.2	0.49	2.54	58.65
15 mins	132.8	73.8	0.58	3.82	70.00
30 mins	86.6	96.2	0.74	7.65	88.58
1 hrs	53.8	119.5	0.87	15.30	104.25
2 hrs	32.3	143.7	0.94	30.60	113.12
4 hrs	18.9	168.4	0.89	61.20	107.19
6 hrs	13.7	182.6	0.76	91.80	90.80
10 hrs	9.1	202.3	0.41	153.00	49.27
24 hrs	4.5	239.6	0.00	367.20	0.00

Actual volume : $S_{\text{actual}} = 120.000 \text{ m}^3$

Required volume : $S_{\text{reqd.}} = 113.120 \text{ m}^3$

Soakaway volume storage OK.

Minimum required a_{s50} : 80.13 m²

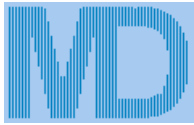
Actual a_{s50} : 85.00 m²

Minimum depth required: 0.94 m

Time to maximum 2 hrs

Emptying time to 50% volume = $t_{s50} = S_{\text{reqd}} \times 0.5 / (a_{s50} \times \text{Infiltration rate}) = 03:41 \text{ (hr:min)}$

Soakaway emptying time is OK.



MasterDrain
SW 16.52

KRS Environmental Limited.

www.krsenvironmental.com

3 Princes Square, Princes Street,
Montgomery
Powys, SY15 6PZ
Tel: 01686 668957 Mob: 07857 264 376
email: keelan@krsenvironmental.com

Job No.		
Sheet no. 2		
Date 22/09/23		
By	Checked	Reviewed

Project **Kelham**
Title **BRE365 Infiltration Calculations**

Location hydrological data (FSR):-

Location	= NEWARK (NORTHANTS)	Grid reference	= TF2100
M5-60 (mm)	= 19	r	= 0.42
Soil index	= 0.30	SAAR (mm/yr)	= 570
WRAP	= 2	Area	= England and Wales

Soil classification for WRAP type 2

- i) Very permeable soils with shallow ground water;
- ii) Permeable soils over rock or fragipan, commonly on slopes in western Britain associated with smaller areas of less permeable wet soils;
- iii) Moderately permeable soils, some with slowly permeable subsoils.

N.B. The rainfall rates are calculated using the location specific values above in accordance with the Wallingford procedure.

