FLOOD RISK ASSESSMENT

& SUDS Strategy for Planning

New Climate change allowances appropriately addressed
NPPF and PPG compliant

New industrial units: part of Phased masterplan
Drainage Infrastructure already constructed
Capacity integrated as part of the wider site

675mm surface water sewer already in place adjacent to the site
Drainage connection previously agreed with IDB
Outfall already constructed and permit in place (topo evidence)

- No Exception Test required
- Impermeable areas and climate change addressed by SUDS: Source Control measures are feasible
- No flood impedance for any flood source

At:

Pinnacle Close, Phoenix Lane, Crowland, Peterborough PE6 0GB

September 2024

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1.0 Scope

This report contains the details of a Flood Risk Assessment and SUDS for Planning carried out by Envirosolution Ltd for Pinnacle Close, Phoenix Lane, Crowland, Peterborough PE6 0GB, henceforth referred to as “the site” in this report.

This report has been prepared for JKD and must not be relied upon by any other party without the explicit written permission of Envirosolution Ltd.

All parties to this report do not intend any of the terms of the Contracts (Right of Third Parties Act 1999) to apply to this report. Please note this report does not purport to provide definitive legal advice nor can it be used to demonstrate that the site will never flood in the future or provide exact specifications / warranties for the products used.

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2.0 Executive Summary

This FRA has been carried out in accordance with the National Planning Policy Framework (NPPF) & PPG. It is to be used to assist the Local Planning Authority (LPA) and Environment Agency (EA) when considering the flooding issues of the proposed developmentas part of a planning application.

The proposed development is an Industrial “Less Vulnerable” set of unuts on existing hard surfaced site with the same operation.

This is categorized as a “Less Vulnerable” landuse in accordance with the NPPF / PPG classifications the NPPF Exception Test does not need to be passed.

The main source of flooding is overtopping fluvial risk from the River Erewash; there is only partial protection from defences and this area is not covered hence there are no breach events to consider.

- Site and scheme not in an official FZ3b (ordinary watercourse)
- Site in part FZ3 undefended tidal / fluvial and part surface water
- No impact on channel to the south of the site
- Masterplan Drainage Infrastructure already constructed – see Topo evidence
- Capacity integrated as part of the wider site
- 675mm surface water sewer already in place adjacent to the site
- Drainage connection previously agreed with IDB
- Outfall already constructed and permit in place
- No surface water pathway is impeded:
    - Retains an open site (will flood as normal)
- No works have risk posed to or from surface water or groundwater
- No flood impedance: no flood compensation considered necessary
- Reduces flood risk overall: SUDS and flood storage within the site increased

It is considered likely that the proposed development can be constructed and operated safely in flood risk terms without increasing flood risk elsewhere and is therefore appropriate development in accordance with the NPPF/PPG.

3.0 Introduction

The FRA combined a desktop study, review of available information, consultations and an assessment of all sources of flooding posed to and from the site and proposed development, in accordance with National Planning Policy Framework (NPPF). Appropriate flood mitigation measures were then considered, either as already incorporated within the scheme or recommended for inclusion at detailed design stage. The suitability of the proposed development was also reviewed in the context of the NPPF and the technical guidance accompanying the NPPF.

4.0 Purpose of the Report

This FRA has been carried out in accordance with National Planning Policy Framework (NPPF). It is to be used to assist the Local Planning Authority (LPA) and Environment Agency (EA) when considering the flooding issues of the proposed development as part of a planning application.

The report provides the following information:

- An assessment of the flood risk posed to the site based on flood information and mapping provide by the EA and Strategic Flood Risk Assessment (SFRA);
- An assessment of the proposed development in terms of surface water run-off; and
- Proposals for measures to mitigate the flood risks posed to and from the development where appropriate.

5.0 Report Information Sources

The information source used to undertake this FRA has been collected from the following sources:

- British Geological Survey Website
- EA Website
- South Holland Council Strategic Flood Risk Assessment and Flood / SUDS Policies
- South Holland Council Website
- Lincs County Council as the LLFA SUDS and Flood Policies
- Internet mapping and searches.

6.0 Overview of British Legislation

6.1 National Planning Policy

The National Planning Policy Framework (NPPF) and PPG supercede all Planning Policy Statements (PPS's) and remaining Planning Policy Guidance (PPG's). Flood risk is retained as a key development consideration. The Sequential and Exception Tests are retained as part of the NPPF/PPG. The accompanying NPPF Technical Guidance also includes Tables 2 and 3 to assist with flood riskvulnerability classifications and development suitability.

7.0 Local Policy

Local Authorities consider flood risk through relevant environmental and climate change policies which enforce the requirements of the NPPF.

The Strategic Flood Risk Assessment (SFRA) is a key source of flood risk specific information for the area. The SFRA provides a more detailed review of flood risks and recommendations for ensuring developments can be constructed and operated safely in accordance with the NPPF. Greater detail of the SFRA is provided in the report.

8.0 Site Status and Environmental Setting

8.1 Site Location and Status

The site is c. 0.34ha and the area of works is in FZ3 tidal / fluvial undefended and:

- located on 100% existing hardstanding

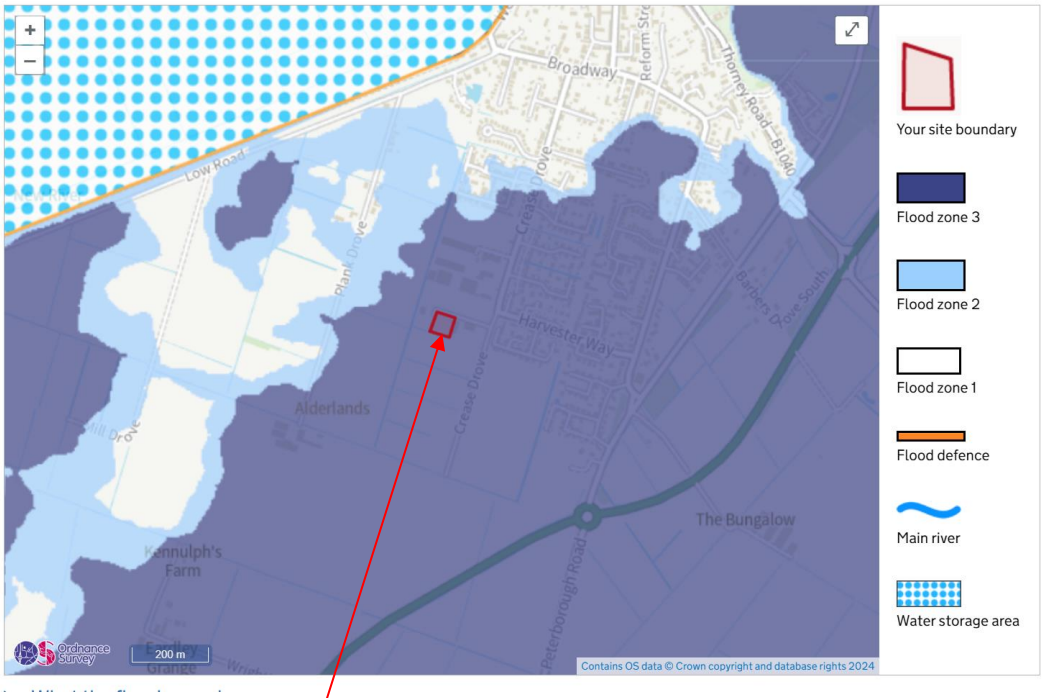
The site location plan can be seen in Appendix A.

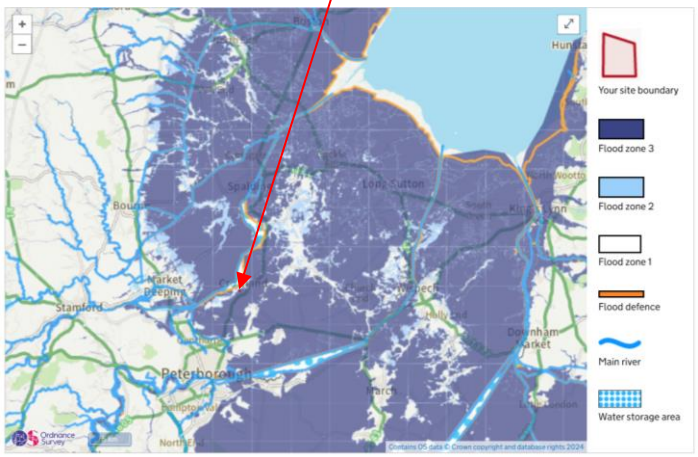
8.2 Existing Flood Risk

According to the EA flood map, the access & egress can still be in the lowest hazard from all sources of flooding, FZ1.

Flood Sources	**Site Status**	**Comment on flood risk posed to / from the development**
Fluvial / Tidal	Flood Zone 3 tidal / fluvial large floodplain Flood levels not relevant to scheme suitability for this flood setting and type of scheme Low hazard	Low hazard Scheme comprises industrial work units that will not displace floodwaters. Scheme is "Less Vulnerable" hence it is appropriate without the need to pass the Exception Test No further fluvial or tidal hazard assessment required
Groundwater	SFRA indicates site is not in an area of groundwater flooding / incidents but in elevated potential for future groundwater flooding	The proposed development will not increase the risk of groundwater flooding. The proposed industrial structure is not jeopardised by groundwater flooding; any foundations to be constructed appropriate to ground conditions encountered as part of detailed design Low Risk

Artificial Sources	Site is not within EA Reservoir Flood Warning area No other artificial sources with likely flood flowpaths that could reach the site	Low Risk
Surface Water / Sewer Flooding	Refer to EA's new surface water hazard data section above Site is not located in a Critical Drainage Area but in a EA LOW risk area Condition, depth and location of surrounding infrastructure uncertain	Impermeable areas addressed by SUDS Development will not increase the peak flow or volume of discharge from the site: Access & egress always in NO risk Low Risk
Climate Change	Included in the flood modelling extents	Development will not significantly increase the peak flow and volume of discharge from the site Low risk posed to and from the development





SFRA

The SFRA mapping is used where appropriate; the EA data are more up to date and accurate for this site and assessment.

8.3 How to address new Climate Change?

Defra issued new basin level changes to climate change allowances in Feb 2016; the EA are in the process on an area basis of deciding on prescriptive methodologies to apply these new allowances. The new allowances are greater than the previous standard 20% added to the EA's modelled 1in100year (usually). The new allowances are between 40% and 70%.

One method previously agreed on other schemes is to, when these data are available: take the difference between the 1in100year and the 1in100year + cc (old 20%) and use that as a pro rata value to work out what 40% to 70% would be and then add that to the 1in100year.

Or the EA provide their own area specific guidance, such as a specified uplift.

None of these options is necessary given the nature of the site and scheme.

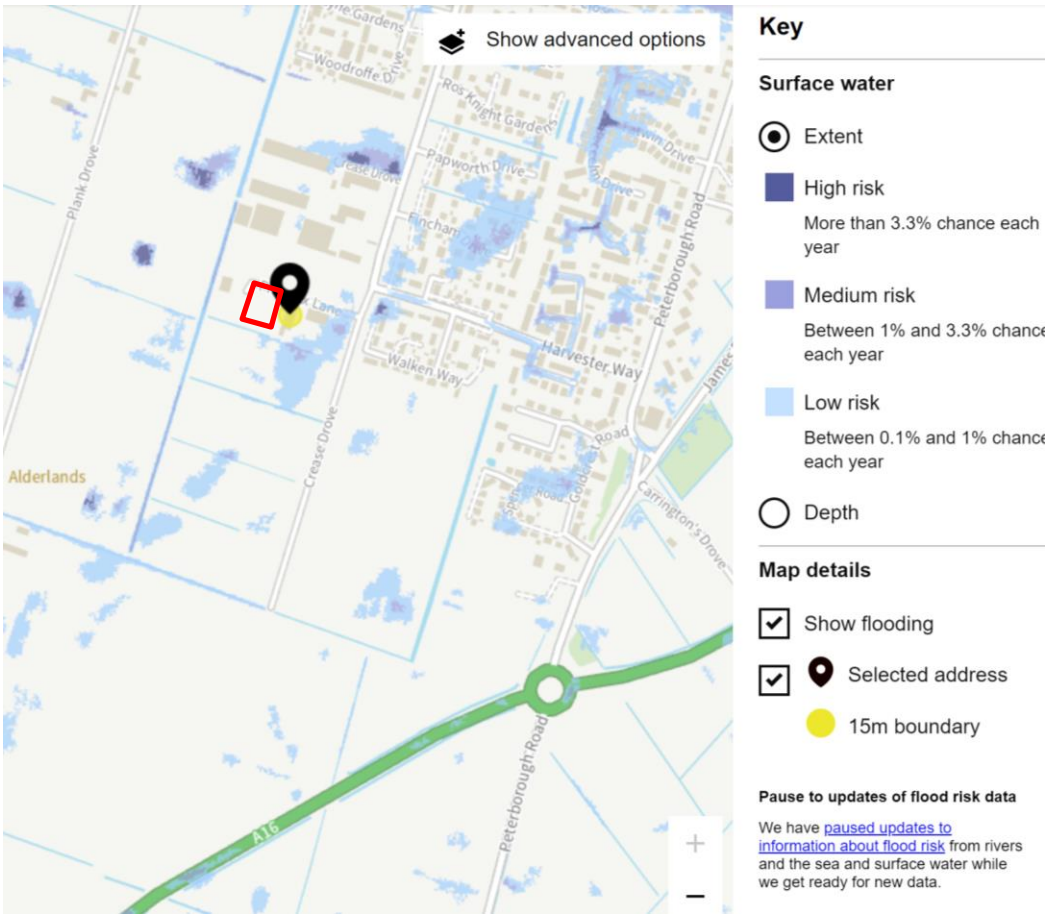
Hence: precautionary approach:

- **Nature of the structure means it can be full height flood resilient**
- **The storage unit will not displace floodplain that requires flood compensation**

8.4 EA 2024 Surface Water Hazard Mapping

Note: this is surface water hazard hence no compensation required and design responses are not required other than flood resilience and resistance as necessary; the scheme also includes SUDS betterment:

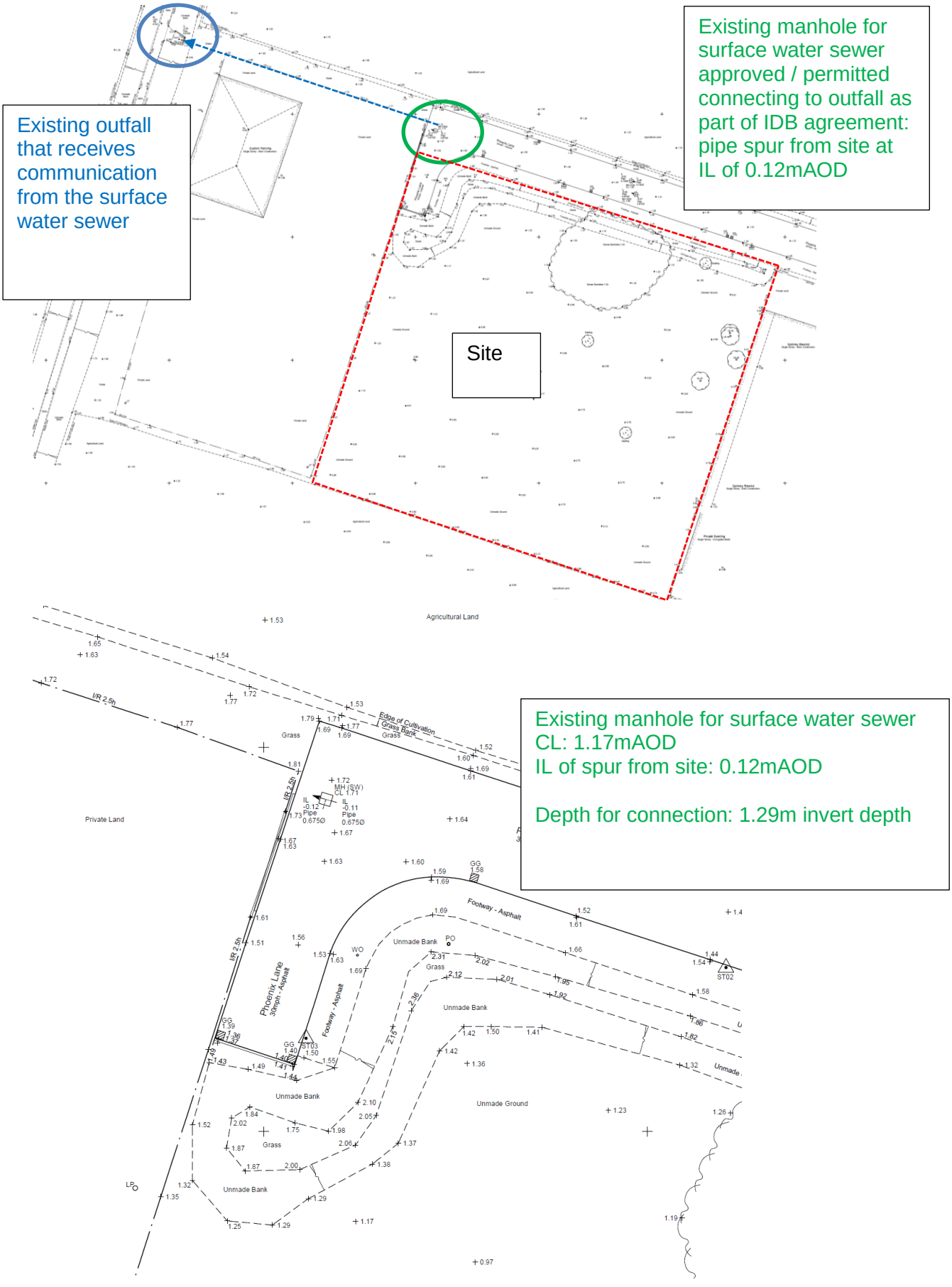
- **Access & Egress: always in NO - LOW hazard**
- **EA NO - LOW hazard in all the EA high risk scenario**
- **No surface water pathway is to be impeded**



DESIGN & Operation RESPONSE

- The scheme is not residential; there is no reason for persons to be at the site or return to the site in the event of the extreme future flood events reaching the site
- The scheme will not have an impact on surrounding areas based on the EA data and scheme design (no flood compensation is required)
- Given scheme comprises industrial works units, the materials used will be inherently flood resilient

8.5 Existing drainage


Existing outfall that receives communication from the surface water sewer
Existing manhole for surface water sewer approved / permitted connecting to outfall as part of IDB agreement: pipe spur from site at IL of 0.12mAOD
Site
Agricultural Land
Existing manhole for surface water sewer
CL: 1.17mAOD
IL of spur from site: 0.12mAOD
Depth for connection: 1.29m invert depth
Private Land
Grass
Unmade Bank
Unmade Ground
Footway - Asphalt
Phoenix Lane
Edge of Cultivation
Grass Bank
MH (SW)
CL 1.71
IL -0.12 Pipe 0.675Ø
IL -0.11 Pipe 0.675Ø
I/R 2.5h
ST02
ST03

9.0 Assessment of Proposed Development

9.1 Proposed Development

The proposed development can be seen in Appendix A.

The proposed development comprises

- Industrial / “Less Vulnerable” units on existing hard surfaced site with the same operation as surrounding industrial estate
- Low surface water hazard
- No groundwater impacts posed to or from the site and scheme
- Increase in impermeable areas on the site addressed by SUDS as standard; no increase in flood risk off site
- Drainage: existing surface water sewer discharging to approved outfall as part of IDB permit is located adjacent to the site
    - This was intended for this site to connect to
    - Invert depth of 1.29m; all SUDS on site can be well above that level hence gravity drainage is feasible (see below)

Given the location of the building away from the flood source and the nature of the structures, floodwaters will be able to pass through unimpeded.

9.2 SUDS Drainage Strategy and Connections / Discharge Point

Impermeable areas addressed by:

- Source Control: rain garden planted area adjacent to discharge point feasible
- Pragmatic low maintenance SUDS as appropriate to the operation of the site
- Connection to existing surface water infrastructure that has been already built to accommodate the site

Any “dirty” areas will be drained with a separate system separate to the “clean areas”.

The development will:

a) continue to discharge surface water in a controlled manner
b) Maximise new porous and permeable areas (see AppB)

No additional formal drainage strategy is considered necessary at this stage given the existing infrastructure already provided for the site.

The drainage system will be amended / extended to include the storage unit as necessary; this does not present a flood risk posed to or from the scheme.

Regardless, where feasible and appropriate, the drainage strategy is based on the following:

- Separate foul and surface and separate systems for “clean” and “dirty” areas
- As required, capacity based on the 1 in 100 year storm including for climate change
- SUDS to be incorporated

New Climate change will be accommodated appropriately: 40%.

9.3 SUDS Inverts

- Lowest SUDS will be the 0.8m deep cellular tank, assuming a generous 300mm top layer for all areas of the site to connect to the tank via gravity
- This is a total depth of 1.1mAOD
- The invert for the surface water sewer is 1.29mAOD
- This allows c. 0.19m fall available
- There is a total of 30.0m distance from the tank to the surface water connection
- The total available drop is easily feasible across this distance and hence appropriate to allow sufficient fall for gravity drainage

9.4 SUDS Calculations

- Use 100% of the site
- Assume the required reduction in discharge from site of 50%
- Use 3.0 l/s as the new restriction rate given existing discharge to a waterbody (drainage ditch)
    - 675mm surface water sewer provided on site will easily accommodate the 3.0l/s even with all the other plots already discharging to the surface water sewer as 3.0l/s is well below the brownfield runoff rate for this size of plot
- Store for the full 1in100year+40%cc
- This means 100% of all events including the 1in30year will be retained on site
- Calculations indicate 124.00m3 of storage required
- See Appendix B

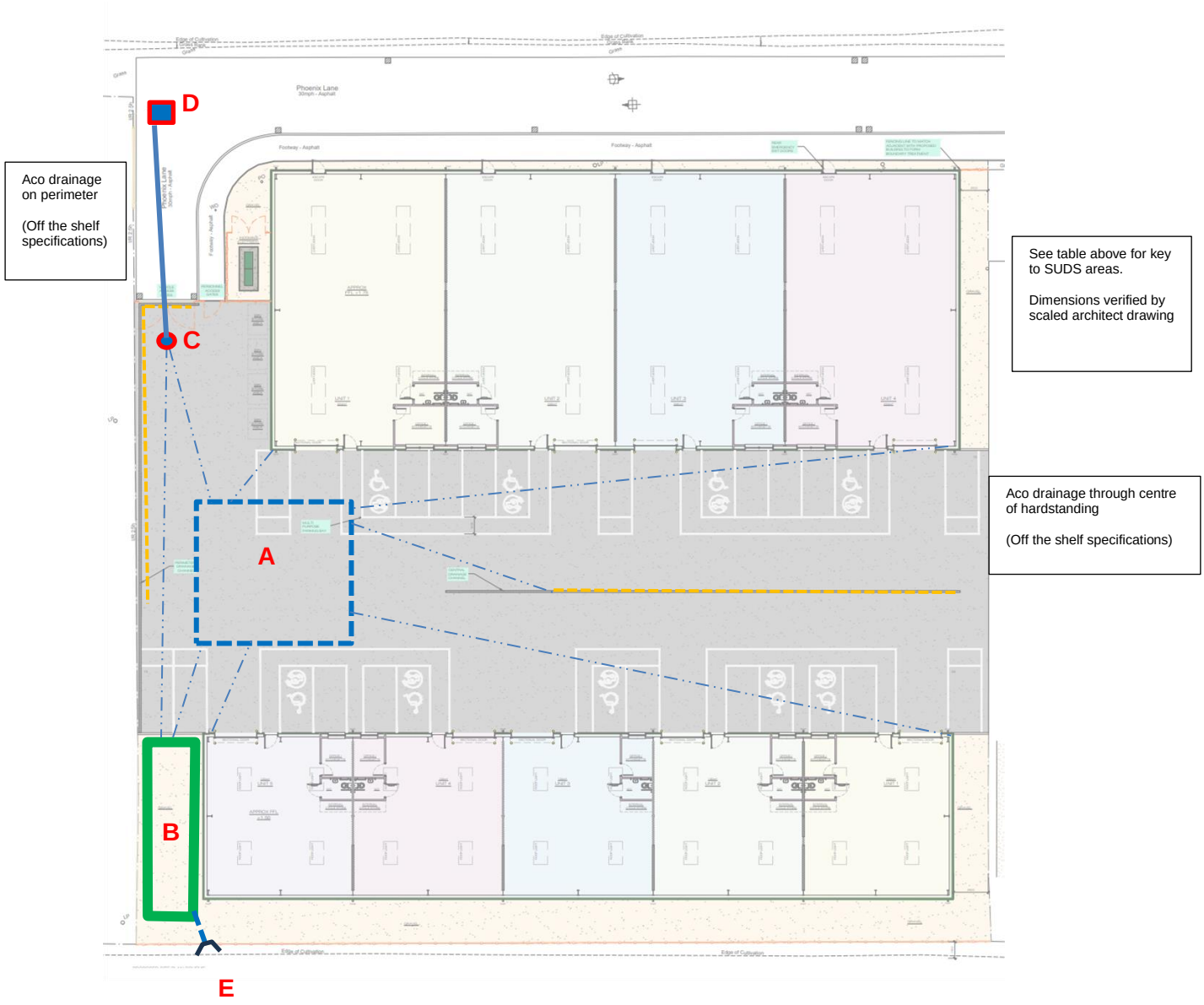
9.5 SUDS Specifications

Formal SUDS Type	Source Control	Dimensions	Storage Volume
A. Rain Garden in communal area (total area is c. 220.0m2) Easily accessible for maintenance	Yes & Natural Interception	Use raised perimeter edges and operate as a Source Control swale (planting specification by project ecologist) = 87.5m2 with 0.2m raised kerb edge = 17.5m3	17.5m3
B. Cellular Storage *Below the parking area.* *Needs to be shallow given watertable setting* *(Still required by some LLFA's as back up if the water company will adopt / subject to water company requirements at the time)*	*No*	*Use tank of* *Eg: 11.0m by 16.0m by 0.8m depth = 140.8m* *Assume 95% void ratio* *= 133.76m3* *Off the shelf specifications are widely available*	*Minimum 133.76m3 available*
		Total	**151.26m3** **Greater than the already oversized 124.0m3 required**

Connections: roof / hardstanding to tank storage (A) and Source Control (B); thence communicated to (C) the final manhole on site with a 3.0l/s hydrobrake / vortex control restriction; this then communicates to D) the already constructed manhole for the surface water sewer. This communicates to the existing outfall already constructed as part of the approved / permitted outfall

At D) there is an optional informal low order storm overflow from the Source Control SUDS area to the channel to the south but this is not necessary

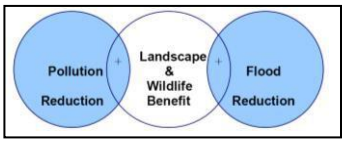
Cellular specification to be detailed to meet the weight requirements of types of vehicles using the site



9.6 SUDS Hierarchy Check

Concept SUDS Strategy

The following diagram indicates the philosophy behind the proposed SUDS strategy, and is taken from the EA's SUDS guidance:



(Source: Environment Agency, 2009)

Table 3 indicates the SUDS Hierarchy Appraisal for the site and proposed development:

Table 3: Site Specific SUDS Appraisal

SUDS Hierarchy	SUDS Technique	Potential Benefits			Site Specific	
		Flood Reduction	Pollution Reduction	Landscape & Wildlife Benefit	?	Scheme Specific SUDS Suitability Appraisal and Comment
Most Sustainable ↕ Least Sustainable	Living Roofs OR Rain garden storage area	•	•	•	*	Rain Garden vegetated storage area possible to incorporate on site (eg: Blue, Green and Brown roofs). Lightweight structure however suggests not feasible
	Ponds / Basins	•	•	•	x	Not considered necessary and also not possible to incorporate on site given nature of site and operations
	Swales / Rain Garden Storage areas	•	•	•	✓	Included as source control SUDS as the biodiversity area
	Infiltration Techniques	•	•		x	Not possible to incorporate on site given proximity to watercourse
	Permeable Surfaces with Lined Granular Aggregate Storage / Rain garden planter	•	•		*	Possible to incorporate and can be specified at detailed design
	Tanked Systems	•			✓	Not considered necessary and is not sustainable

Key:
Potentially suitable at the site: * Incorporated in the scheme: ✓ Not suitable / possible at the site:

9.7 Flood Resilience

The proposed development will utilize the flood resilient techniques recommended in the NPPF Technical Guidance where appropriate and also the recommendations that have previously been issued by various councils:

These include:

- Plasterboards if required will be installed in horizontal sheets rather than conventional vertical installation methods to minimise the amount of plasterboard that could be damaged in a flood event
- Wall sockets will be raised to as high as is feasible and practicable in order to minimise damage if flood waters inundate the property
- The ground floor levels will be raised above existing ground level where feasible
- Any wood fixings on ground floor will be robust and/or protected by suitable coatings in order to minimise damage during a flood event
- If required: airbricks / air vents will be raised to as high as is feasible and practicable
- Waterproofing will be installed as necessary and above the main floor slab and tied in to the walls where appropriate, to reduce the turnaround time for returning the property to full operation after a flood event.
- The ground floor waterproofing will be extended to an appropriate level above existing ground levels
- **Sensible storing of any materials easily damaged by water at higher levels within the building**

9.8 Refuge and Evacuation

Based on the likely flood risk and nature of the proposed development and non-permanent residence at the site, it is considered the following flood response management will likely mean the site can be operated safely in flood risk terms.

The site is within an EA Flood Warning area.

Range of Flood Events

The following section provides the recommended flood response given the different flood scenarios at the site.

A precautionary approach has been taken.

It is a clear cut flood response: a) evacuation b) non site attendance and evacuation.

Prior Warning

1. **Before Attending Site consult the EA flood warning**
2. **Do not attend site if Flood Warning in operation**

All site users will consult the EA flood warning before attending site

If upon advice from the EA early warning of potential overtopping from the River Erewash the preferred response is not to attend site, avoiding the hazard at the site.

Late Tidal / Fluvial Flood Warning and/or Whilst on site Areas Inundating

1. Upon observation of inundation, evacuate using access to the west

The recommended evacuation route to Flood Zone 1 is to use the access to Truman Street

- North to Crowford itself in FZ1

This route does go through lower hazard areas as identified in the EA mapping.

It is recommended that the future tenants understand and sign up to the EA Flood Warning scheme.

No return to site until the EA Flood Warning indicates the all clear and upon observation the floodwaters have receded from the site.

Nighttime Flood Awareness (if security on-site)

Not an anticipated requirement given nature of "working day" uses

If it is known there are / have been wet weather conditions

a) the site should be evacuated as a precautionary measure
b) the EA Flood Warning should be checked before retiring for the night
c) if warning suggests conditions could deteriorate / weather conditions remain / become "wetter" the site should be evacuated

9.9 Flood Response Management

The EA have a clear set of warning levels which are replicated below. Tenants should read the plan and understand the response requirements.

Flood Safety Pack

All main site users / nighttime users should ensure a flood safety evacuation pack is kept in a safe and easily accessible place. This should include as a minimum:

- First aid kit & Torch
- Warm clothing or blanket
- List of appropriate contact numbers
- Bottled water
- Waterproofs / Wellington boots
- Non-perishable food

The most up to date EA procedural levels should be read and understood by all tenants:

9.10 Annual Monitoring

It is recommended that tenants should contact the EA on an annual basis to confirm the flood status of the property.

If the flood status has changed, this evacuation and refuge plan should be reviewed and updated by suitable flood risk consultants as appropriate.

9.11 Flood Risk Vulnerability

According to the NPPF / PPG retained Flood Risk Vulnerability Classification, the proposed storage use would be classified as a worse case as “Less Vulnerable.”

The NPPF also retained Flood Risk Vulnerability and Flood Zone “Compatibility” Classification; this states that a “Less Vulnerable” development in FZ3 and in low hazard from other sources does not require the Exception Test to be passed.

10.0 Conclusion

The proposed development is an Industrial “Less Vulnerable” units with the same operation as surrounding areas.

This is categorized as a “Less Vulnerable” landuse in accordance with the NPPF / PPG classifications the NPPF Exception Test does not need to be passed.

The main source of flooding is overtopping fluvial risk from the River Erewash; there is only partial protection from defences and this area is not covered hence there are no breach events to consider.

- Site and scheme not in an official FZ3b (ordinary watercourse)
- Site in FZ3 and part surface water
- No surface water pathway is impeded:
    - Retains an open site with a 202m2 unit (will flood as normal)
- No works have risk posed to or from surface water or groundwater
- No flood impedance: no flood compensation considered necessary
- Reduces flood risk overall: SUDS and flood storage within the site increased

It is considered likely that the proposed development can be constructed and operated safely in flood risk terms without increasing flood risk elsewhere and is therefore appropriate development in accordance with the NPPF/PPG.

11.0 Appendices

A. Site Location and Scheme proposals
B. SUDS calculations

Appendix A

PLANNING



1:150 SCALE BAR (M)

0 1.5 3 4.5 6 7.5 9 10.5 12 13.5 15

N

W SUNSET E SUNRISE S

NOTES:

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PROPOSED LEGEND

- PROPOSED GRAVEL AREAS 20mm WASHED
- PROPOSED TARMAC AREAS
- PROPOSED CONCRETE PAD FOR PLANT
- PROPOSED 2.4M High V MESH FENCE IN GREEN WITH VEHICLE & PEDESTRIAN GATES
- PROPOSED DISABLED PARKING BAY
- PROPOSED ELECTRIC VEHICLE PARKING BAY

REF.	DATE	DESCRIPTION
A	28.10.2024	UPDATES TO PARKING ARRANGEMENT AND PERSONNEL DOOR POSITIONS.

REVISIONS AS ABOVE

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PLANNING

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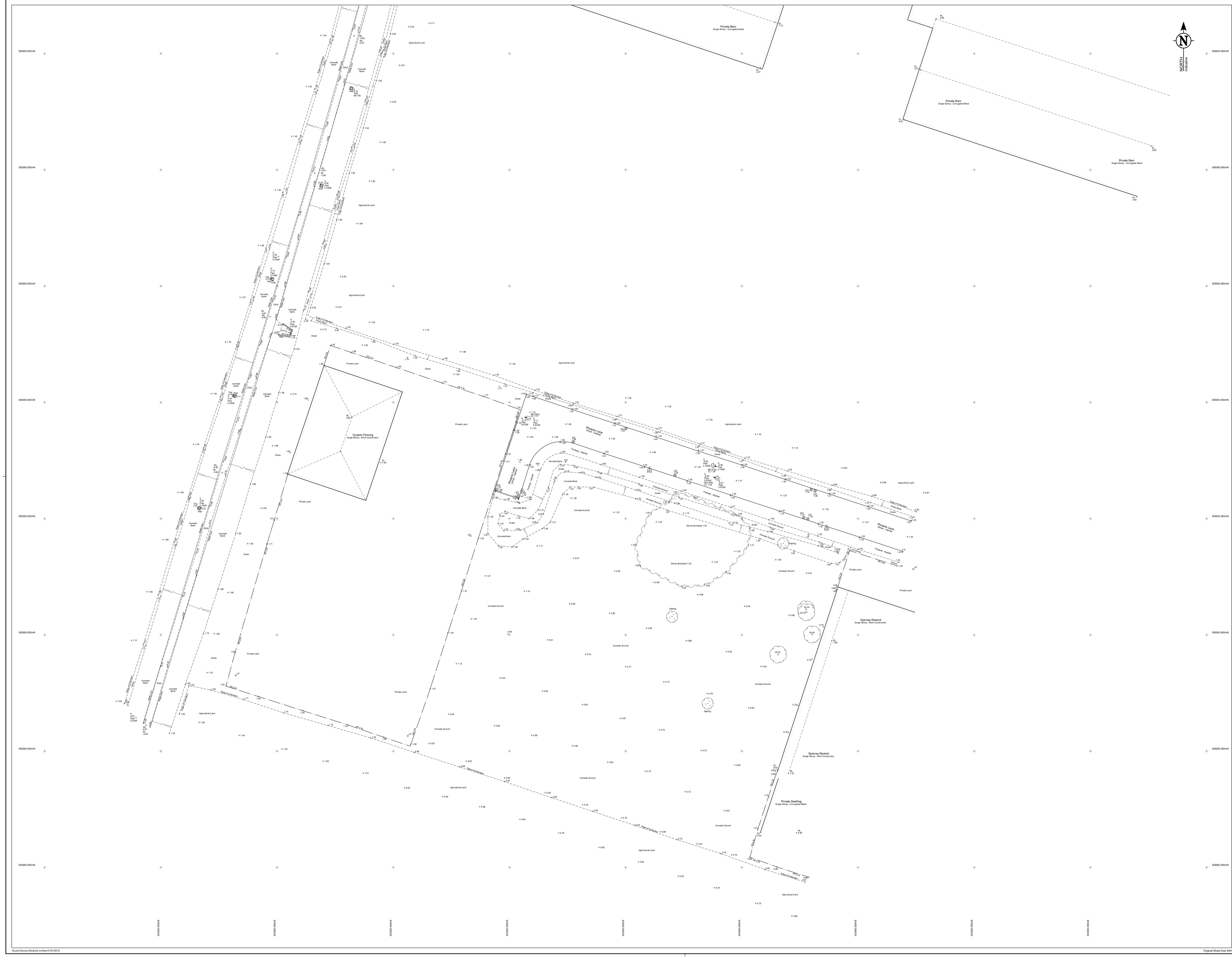
PROJECT TITLE:
PROPOSED 9 No INDUSTRIAL UNITS
WITH EXTERNAL WORKS

DRAWING INFORMATION:
PROPOSED SITE PLAN

SCALE:	DATE:	DRAWN BY:
AS STATED @ A1	OCT 2024	HC

DRAWING REFERENCE: 24139-PL002A
REVISION:

CHECKED / ISSUED BY:
DATE:



TOPOGRAPHICAL & MEASURED BUILDING SURVEYS

ABBREVIATIONS & SYMBOLS

AH	Arch Head Level	ET	EP=Transformer	RSD	Roller Shutter Door
AB	Air Brick	FB	Flower Bed	RSJ	Rolled Steel Joist
AR	Assumed Route	FC/Lev/False	Ceiling Level	SI	Sign Post
AV	Air Valve	FBD	Floor Board Direction	SL	Window Sill Level
BB	Bellcrie Beacon	FH	Fire Hydrant	SP	Arch Spring Point Level
BH	Bore Hole	FL	Floor Level	SV	Stop Valve
BL	Bed Level	FP	Flag Pole	SW	Surface Water
BO	Bollard	FW	Foul Water	SY	Cable Pit Survey
BS	Bus Stop	GG	Gully Grate	TAC	Tactile Paving
BU	Bush	GV	Gas Valve	TC	Telecom Cover
BW	Barbed Wire Fence	HL	Window Head Level	TH	Trial Pit
BX	Box (Utilities)	IC	Inspection Cover	THL	Threshold Level
C/B	Close Board Fence	IL	Invert Level	TL	Traffic Light
CL	Cover Level	IR	Iron Railings	ToF	Top of Fence
CL	Chain Link Fence	KO	Kerb Outlet	ToW	Top of Wall
C-Lev	Ceiling Level	LP	Lamp Post	TP	Telegraph Pole
Col.	Column	MH	Manhole	TS	Traffic Signal Cover
C/P	Chestnut Paling Fence	MP	Marker Post	TV	Cable TV Cover
CR	Cable Riser	NB	Name Board	UC	Unknown Cover
C/W	Chicken Wire	OHL	Overhead Line (approx)	UK	Unknown Tree
DC	Drainage Channel	Pan	Panel Fence	UMG	Unmade Ground
Dis	Dilapidated	PB	Post Box	USB	Under Side Beam
DL	Door Level	PM	Parking Meter	UTL	Unable To Lift
DP	Down Pipe	PO	Post	UTS	Unable To Survey
DR	Drain	P/R	Post & Rail Fence	VP	Vent Pipe
EBx	Electric Box	P/W	Post & Wire Fence	WB	Waste Bin
EC	Electric Supply Cover	RE	Roding Eye	WH	Weep Hole
EL	Eaves Level	RL	Ridge Level	WL	Water Level
EP	Electric Pole	RP	Reflector Post	WM	Water Meter
ER	Earth Rod	RS	Road Sign	WO	Wash Out
					Survey Control Station

DRAWING NOTES

Topographical Surveys

Trees are drawn to scale showing the average canopy spread. Descriptions and heights should be used as a guide only.

All building names, descriptions, number of storeys, construction type including roof line details are indicative only and taken externally from ground level.

All below ground details including drainage, voids and services have been identified from above ground and therefore all details relating to these features including: sizes, depth, description etc will be approximate only. All critical dimensions and connections should be checked and verified prior to starting work.

Detail, services and features may not have been surveyed if obstructed or not reasonably visible at the time of the survey.

Surveyed physical features may not necessarily represent the legal boundary line.

Measured Building Surveys

Measurements to internal walls are taken to the wall finishes at approx 1m above the floor level and the wall assumed to be vertical.

General

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work. Any errors or discrepancies must be notified to Survey Solutions immediately.

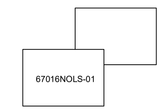
The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The survey control listed is only to be used for topographical surveys at the stated scale. All control must be checked and verified prior to use.

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This drawing should only be scaled using digital methods.

Sheet Layout



SURVEY CONTROL CO-ORDINATES

STATIONS	EASTINGS	NORTHINGS	LEVEL	DESCRIPTION

SURVEY GRID AND LEVEL DATUM

The coordinate system established for this survey is related to Ordnance Survey (OS) National Grid at multiple points using GNSS with a scale factor of 1.000.

The level datum established for this survey is related to Ordnance Survey (OS) using GPS Smartnet.

To avoid discrepancies within the survey, adding to the survey or setting out points from the survey, any coordinated data must be directly derived from the original survey control. Survey Solutions are not responsible for any third-party adding survey data to the existing information.

REV.	DESCRIPTION	DRAWN	APPR.	DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

0845 040 5969
survey-solutions.co.uk

IPSWICH BEDFORD BIRMINGHAM BRISTOL COVENTRY CRAWLEY GLASGOW
LONDON-CENTRAL LONDON-EAST MANCHESTER NORWICH NOTTINGHAM THAMES VALLEY

PROJECT TITLE	PINNACLE CLOSE, CROWLAND, PETERBOROUGH, PE6 0GB.			
DRAWING DETAIL	TOPOGRAPHICAL SURVEY Sheet 1 of 2			
CLIENT	J KNIGHT DESIGN LTD			SCALE 1:200
SURVEYOR BTR	SURVEY DATE 30/04/2024	CHECKED BY MG	APPROVED BY JIA	DWG STATUS FINAL
DRAWING NUMBER 67016NOLS-01			REVISION	ISSUE DATE 03/05/2024

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Original Sheet Size A0H

Appendix B

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	George Locke
Site name:	Pinnacle Close, PE6 0GB
Site location:	Pinnacle Close, PE6 0GB

This is an estimation of the storage volume requirements that are needed 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). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	52.66733° N
Longitude:	0.17637° W
Reference:	1692371305
Date:	Aug 06 2024 21:32

Site characteristics

Total site area (ha):	0.34
Significant public open space (ha):	0
Area positively drained (ha):	0.34
Impermeable area (ha):	0.17
Percentage of drained area that is impermeable (%):	50
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	0.34
Net impermable area for storage volume design (ha):	0.19
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	2	2
SPR:	0.3	0.3

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	63
Rainfall 100 yrs 12 hrs:	--	96.25
FEH / FSR conversion factor:	1.25	1.25
SAAR (mm):	554	554
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.4	0.4
Hydological region:	5	5
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 10 year:	1.65	1.65
Growth curve factor 30 year:	2.45	2.45

Design criteria

Climate change allowance factor:	1.4		Growth curve factor 100 years:	3.56	3.56
Urban creep allowance factor:	1.1		Q_{BAR} for total site area (l/s):	0.47	0.47
Volume control approach	Use long term storage		Q_{BAR} for net site area (l/s):	0.47	0.47
Interception rainfall depth (mm):	5				
Minimum flow rate (l/s):	3				

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	3	3
1 in 30 years (l/s):	3	3
1 in 100 year (l/s):	3	3

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	124	124
Long term storage 1/100 years (m^3):	0	0
Total storage 1/100 years (m^3):	124	124

This report was produced using the storage estimation tool developed by HRWallingford 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 http://uksuds.com/terms-and-conditions.htm. The outputs from this tool have been used to estimate storage volume requirements. 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 these data in the design or operational characteristics of any drainage scheme.