

BOCCA FELICE, KINGS ROAD,

SPALDING, PE11 1QB

SUDS DRAINAGE DESIGN (SURFACE WATER DRAINAGE)

DOC NO: LNS1204-RP-CD-0001

ISSUE: PRELIMINARY

REV: P01

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DOCUMENT ISSUE RECORD

Rev	Report by	Description	Date	Checked by
P01	OL	Issued for review and comments	07/11/25	AM

Limitations

The assessments and interpretation have been made in line with legislation and guidelines in force at the time of writing, representing best practices at that time.

All of the comments and opinions contained in this report, including any conclusions, are based on the information obtained by AKS STRUCTURES during our investigations.

There may be other conditions prevailing on the site which have not been disclosed by this investigation and which have not been taken into account by this report. Responsibility cannot be accepted for conditions not revealed by the investigation.

Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only and confirmation of intermediate ground conditions should be considered if deemed necessary.

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1.0 INTRODUCTION

- 1.1** Development address:
Land north/west of Kings Road, Spalding, PE11 1QB
- 1.2** AKS Structures was instructed to carry out the below ground drainage design for the proposed development of a drive thru coffee unit and carwash facility at the address above and address the surface water drainage and SuDS design requirements

2.0 EXISTING DRAINAGE CONTEXT

- 2.1** The site is located to the north/west of Kings Road, Spalding. The site is approximately 0.25ha and is almost entirely impermeable due to an existing concrete slab which covers most of the site. The site is currently used as an informal carpark based on anecdotal evidence. Please refer to Appendix A for topographical survey.
- 2.2** According to British Geological Survey mapping, the site is underlain by the Oxford Clay Formation which is predominantly comprised of a mudstone.
- 2.3** There is no formal foul or surface water drainage present within the site, although there are a number of road gullies located on Kings Road. Anglian Water sewer asset records show a 600mm $\varnothing$ surface water sewer which runs along Kings Road from south to north. The records also show a 150mm $\varnothing$ which serves the 4 properties and then runs east along Kings Road. The Anglian Water sewer records can be seen in Appendix B.
- 2.4** The site's existing runoff rates for several return period events have been calculated using the modified rational method using rainfall intensities derived from FEH22 rainfall data. Please see Table 1 below for runoff rates.

Table 1: Existing surface water runoff rates

Return Period	Existing runoff rate (l/s)
Q2 Year	10.9
Q30 Years	34.52
Q100 Years	45.62

3.0 PROPOSED DRAINAGE STRATEGY

3.1 The drainage strategy has been developed based on the relevant standards, regulations and guidance, including the following:

- Building Regulations Part H, 2015;
- The CIRIA SuDS Manual;
- UK Water Design and Construction Guide ("the Code")
- DEFRA Non statutory technical standards for drainage
- Lincolnshire flood risk and water management strategy
- South East Lincolnshire Local Plan, with specific reference to the following policies:
 - Policy 4.3.e "incorporates the use of Sustainable Drainage Systems (SuDS) (unless it is demonstrated that this is not technically feasible) and confirms how these will be maintained/managed for the lifetime of development (surface water connections to the public sewerage network will only be permitted in exceptional circumstances where it is demonstrated that there are no feasible alternatives);"
 - Policy 31.A. "the adoption of the sequential approach and Exception Test to flood-risk and the incorporation of flood-mitigation measures in design and construction to reduce the effects of flooding, including SuDS schemes for South East Lincolnshire Local Plan 2011-36 all 'Major' applications"

3.2 The proposed drainage strategy has been developed in accordance with the drainage hierarchy, see below.

Surface water drainage method	Area specific application
Into the ground (infiltration)	British Geological Survey mapping indicates the site is underlain by the Oxford Clay Formation, which is an impermeable mudstone which suggests that infiltration will not be viable. A ground investigation should be carried out at a later stage and as part of this soakage testing in accordance with BRE365 should be undertaken. Should the test results suggest that infiltration would be a suitable method of surface water discharge then the proposed drainage strategy will be revised accordingly.

To a surface water body	The closest watercourse to the site is the River Welland located approximately 600m to the east of the site. Surface water discharge to this river would require crossing numerous 3rd party land owners so therefore is not considered viable.
To a surface water sewer, highway drain, or another drainage system	Anglian Water asset records show a 600mmø surface water sewer to the east of the site in Kings Road. It is proposed to discharge surface water to this sewer subject to confirmation of capacity and location of connection following Anglian Water correspondence.
To a combined sewer	N/A

- 3.3** It is proposed to restrict surface water from the development to 2l/s for all events. This is typically the lowest flow rate possible without increasing the blockage risk to the flow control device. Please see table 2 below for comparison between existing and proposed discharge rates.

Table 2 - Proposed discharge rates

Return Period	Existing runoff rate (l/s)	Proposed discharge rate (l/s)	Betterment (%)
Q2 Year	10.9	2	82
Q30 Years	34.52	2	94
Q100 Years	45.62	2	96
Q100 Years + 40% climate change	63.87	2	97

- 3.4** As shown in table 2 above, the proposed discharge rate leads to a minimum betterment of 82%, and a maximum betterment of 97% in the most extreme return period event including an allowance for climate change.
- 3.5** A Section 106 application will be required in order to gain consent from Anglian Water to connect into their public surface water sewer.

- 3.6** Attenuation will be required in order to restrict runoff from the site to 2l/s. An assessment of SuDS features has been undertaken with specific reference to the proposed development and the SuDS hierarchy.
- 3.7** Open water/surface level SuDS features are not considered appropriate for the proposed development due to spatial constraints. Multiple areas of soft landscape and planting have been proposed, but these offer amenity and biodiversity benefits rather than attenuation.
- 3.8** Infiltration features are currently not considered feasible as a desktop study indicates the site is underlain by an impermeable mudstone.
- 3.9** A tanked permeable asphalt system has been proposed in the majority of the car parking areas and aisles. The permeable asphalt system will have a 300mm sub-base which has a 30% void ratio, typically formed with a type 3 material. The system will be formed with a permeable asphalt surface course, with a permeable asphalt binder course below.
- 3.10** A tanked permeable block paving system has been proposed in the pedestrian area surrounding the Bocca Felice unit. The system will have a 300mm sub-base which will have a 30% void ratio.
- 3.11** The extent of permeable paving is over half of the proposed impermeable area for the development, and in accordance with SuDS Manual Simple Index Approach to treating surface water runoff, provides a sufficient level of water treatment.
- 3.12** Refer to Appendix C for the proposed drainage strategy for the scheme.
- 3.13** Hydraulic modelling has been carried out and demonstrates that there would be no flooding for all the modelled storm events, including a climate change allowance of 40% that has been used based on the upper end allowance for the 1% annual exceedance event for the 2070 epoch.
- 3.14** Refer to Appendix D for details and results of the hydraulic modelling.
- 3.15** It is proposed to discharge foul sewerage into public foul sewer. A pre development application will be required to confirm there is sufficient capacity to accept the proposed flows at the proposed point of connection. A Section 106 application will also be required to allow the connection to be made.
- 3.16** Due to the nature of the proposed development, with specific reference to the car washing facility, a trade effluent consent may also be required.

4.0 PROPOSED MAINTENANCE STRATEGY

4.1 Regular maintenance activities

4.1.1 Inspections

- During the first year of operation, monthly (and after any significant rainfall event) inspections of the whole SuDS system should be carried out to ensure the system is functioning as designed and no damage has occurred.

4.1.2 Reporting

- An annual maintenance report and record should be prepared by the maintainer or contractor, which should be retained with the O&M manual.

4.1.3 Litter removal

- In order to reduce the risk of blockages to outlets and inlets and retain amenity value, regular litter picking is an integral part of the maintenance of SuDS systems.

4.1.4 Vegetation management

- This will include grass cutting, weed control and shrub management.

4.1.5 Sweeping

- Pervious surfaces need to be swept to keep them clear of silt and sediments to preserve their infiltration capacity.

4.2 Occasional maintenance activities

4.2.1 Sediment removal

- To ensure long-term performance, accumulated sediment should be periodically removed. During the construction and establishment of landscaping, sediment accumulation is likely to be more rapid and likely to drop significantly once vegetation is well established. In most circumstances the small amount of sediment present can be removed by hand and will not require mechanical means.
- It is important to prevent damage to the SuDS, and impacts on ecological systems and aesthetic appearance.
- Sediment traps upstream (where present) should be inspected regularly, and accumulated sediment removed.

4.3 Remedial maintenance activities

4.3.1 Infiltration surface rehabilitation

- Inspections should look for signs of clogging, such as standing water for long periods. Grassed surfaces can be remediated through scarifying, spiking and tining, or air pressure treatment.

4.3.2 Spillage action

- An oil spill kit such as 'Lubetech 90 litre Oil spill kit' is to be kept on site. To be used in accordance with manufacturer's instructions. If a spill has infiltrated into the SuDS feature sub-base or filter media, the sub-base should be removed and replaced.

5.0 CONCLUSION

- 5.1** This report provides the overall SuDS design for the proposed development and satisfies the requirements of national and local planning policy.

Yours faithfully,

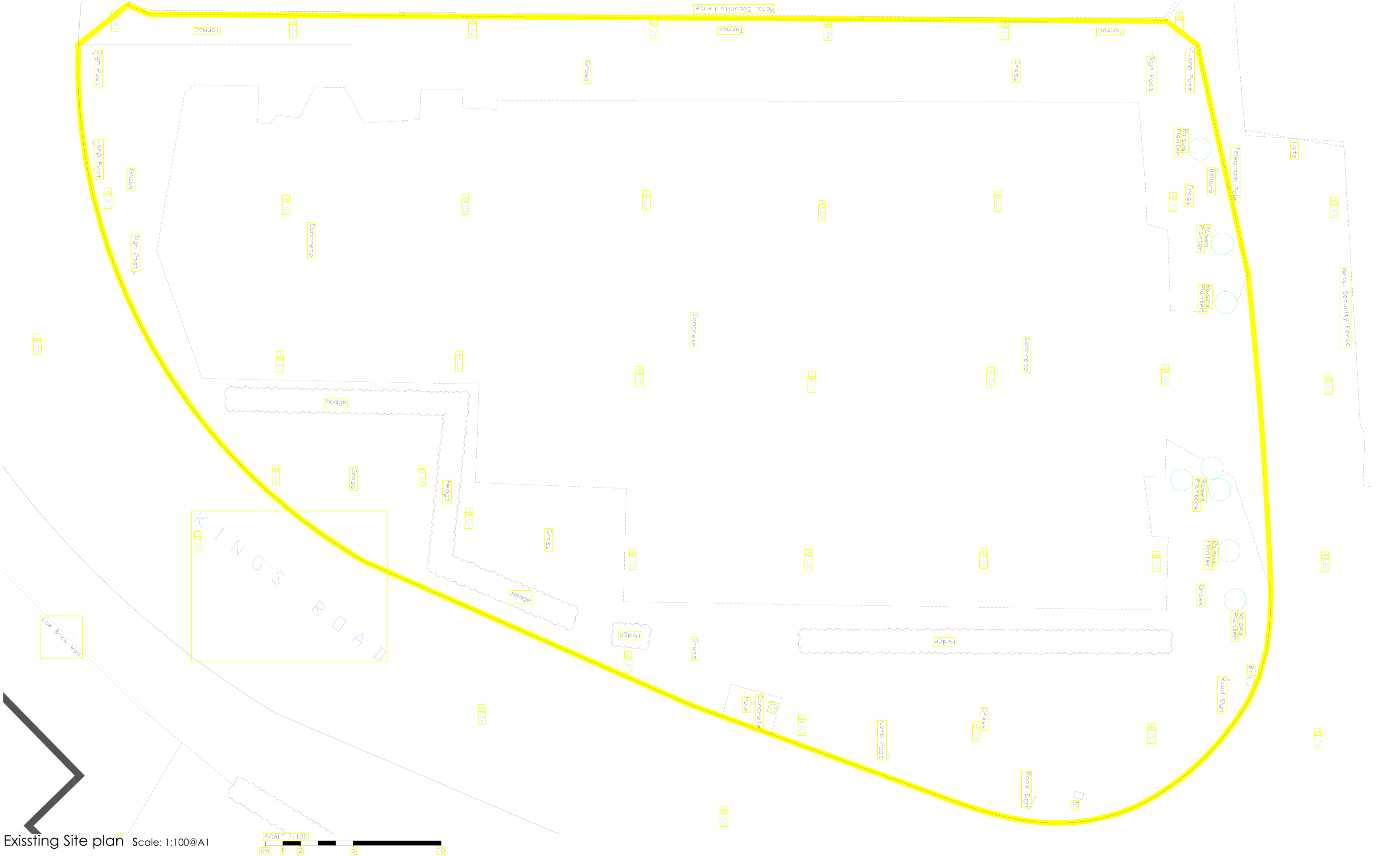
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For and on behalf of AKS Structures Ltd,

 **AKS.**
Structures

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Appendix A – Topographical Survey



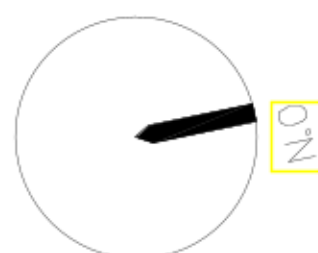
Existing Site plan Scale: 1:100@A1

NOTES

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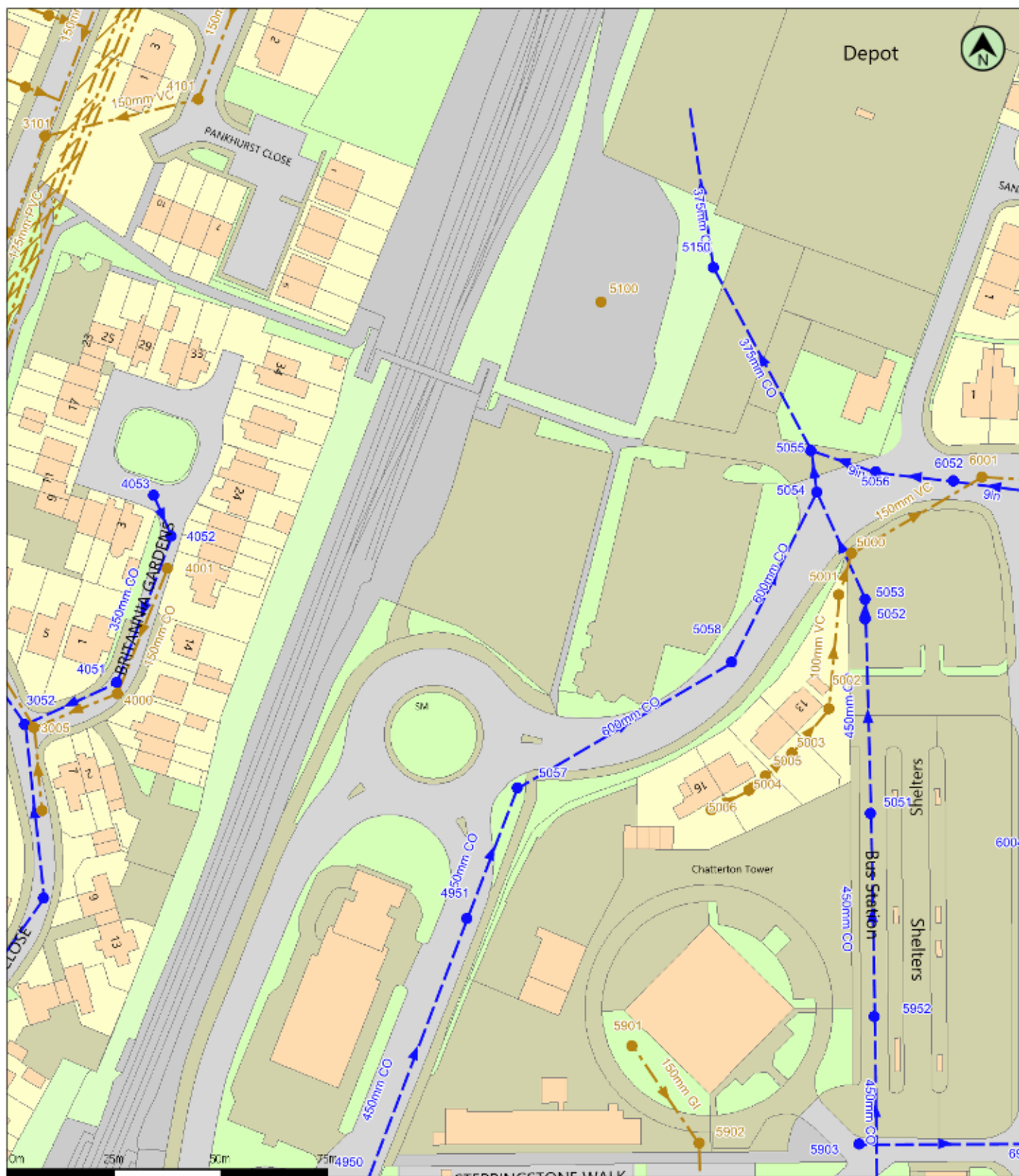


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CLIENT
Steel Frame Building System
PROJECT
BOCCA FELICE
AND INTELIJET
Kings Road
Spalding

DRAWING TITLE
EXISTING SITE PLAN
BOCCA FELICE/INTELIJET
SCALE @ A1
1/100
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REV

Appendix B – Anglian Water Sewer Records



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Scale: 1:1250

Date: 13/10/25

Wastewater Plan A4

Data updated: 30/09/25

Map Centre: 524505,323057

Our Ref: 1908386 - 1

Powered by digdal

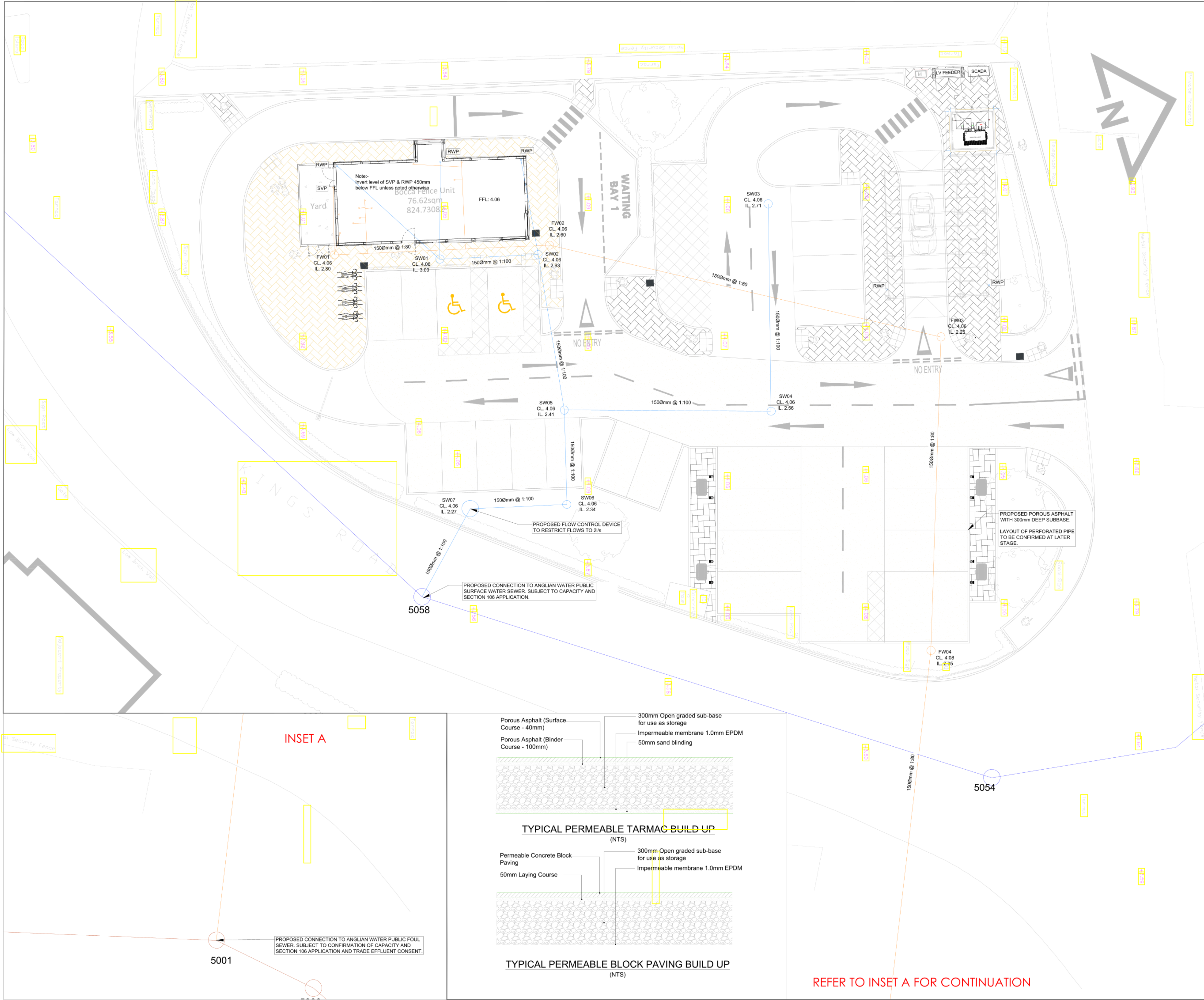
Foul Sewer	--- Outfall*	⊕ Sewage Treatment Works
Surface Sewer	--- Inlet*	⊕ Public Pumping Station
Combined Sewer	--- Manhole*	● Decommissioned Pumping Station
Final Effluent		
Rising Main*		
Private Sewer*		
Decommissioned Sewer*		

*(Colour denotes effluent type)

ousman@aks-structures.co.uk
BoccaFelice Spalding
love every drop anglianwater

This plan is provided by Anglian Water pursuant its obligations under the Water Industry Act 1991 sections 198 or 199. It must be used in conjunction with any search results attached. The information on this plan is based on data currently recorded but position must be regarded as approximate. Service pipes, private sewers and drains are generally not shown. Users of this map are strongly advised to commission their own survey of the area shown on the plan before carrying out any works. The actual position of all apparatus MUST be established by trial holes. No liability whatsoever, including liability for negligence, is accepted by Anglian Water for any error or inaccuracy or omission, including the failure to accurately record, or record at all, the location of any water main, discharge pipe, sewer or disposal main or any item of apparatus. This information is valid for the date printed. This plan is produced by Anglian Water Services Limited (c) Crown copyright and database rights 2025 Ordnance Survey AC0000813445. This map is to be used for the purposes of viewing the location of Anglian Water plant only. Any other uses of the map data or further copies is not permitted. This notice is not intended to exclude or restrict liability for death or personal injury resulting from negligence.

Appendix C – Proposed Drainage Strategy



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- ANY DRAWING ERRORS OR DIVERGENCIES SHOULD BE BROUGHT TO THE ATTENTION OF AKS STRUCTURES LIMITED AT THE ADDRESS SHOWN BELOW.
- DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE FOLLOWING BEFORE WORK COMMENCES:
- THE CDM DESIGN ISSUES REGISTER
 - THE AKS STRUCTURES RISK SERIES OF DRAWINGS
 - THE PROJECT CDM RISK REGISTER
- DO NOT SCALE FROM THIS DRAWING
1. This drawing is to be read in conjunction with the Architects Drawings.
 2. All dimensions are in millimetres unless noted otherwise.
 3. Use only given dimensions. Refer to Architect's drawings for all other dimensions or if appropriate, taken dimensions from site.
 4. This drawing is to be read in conjunction with all other project drawings.
 5. All dimensions to be checked/taken on site by Contractors.
 6. All proprietary products are to be installed in strict accordance with manufacturers written instructions.
 7. Public sewers recreated based on Anglian Water asset records. Levels to be confirmed via survey at later stage.
 8. Location of RWP's and foul stacks to be confirmed at later stage
 9. Cover and invert levels of chambers, and pipe diameters and gradients to be confirmed at later stage.

- LEGEND**
- EXISTING PUBLIC SURFACE WATER DRAINAGE
 - EXISTING PUBLIC FOUL DRAINAGE
 - PROPOSED PRIVATE SURFACE WATER DRAINAGE
 - PROPOSED PRIVATE FOUL DRAINAGE
 - PROPOSED POROUS ASPHALT
 - PROPOSED PERMEABLE PAVING

P01	Issued for planning	OL	AM	07/11/25
REV.	DESCRIPTION	DRAWN	CHECKED	DATE
ISSUES & REVISIONS				

INFORMATION

PURPOSE OF ISSUE



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PROJECT TITLE
BOCCA FELICE, SPALDING, PE11 1QB

DRAWING TITLE
PROPOSED DRAINAGE STRATEGY

SKETCH NO. LNS1204-DR-C-0001	DATE 31/10/25	REVISION P01
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SCALE @ A1
1:125

REFER TO INSET A FOR CONTINUATION

Appendix D – Hydraulic Modelling Calculations



Interception Model

Fri Nov 07 2025 18:04

Hydraulics

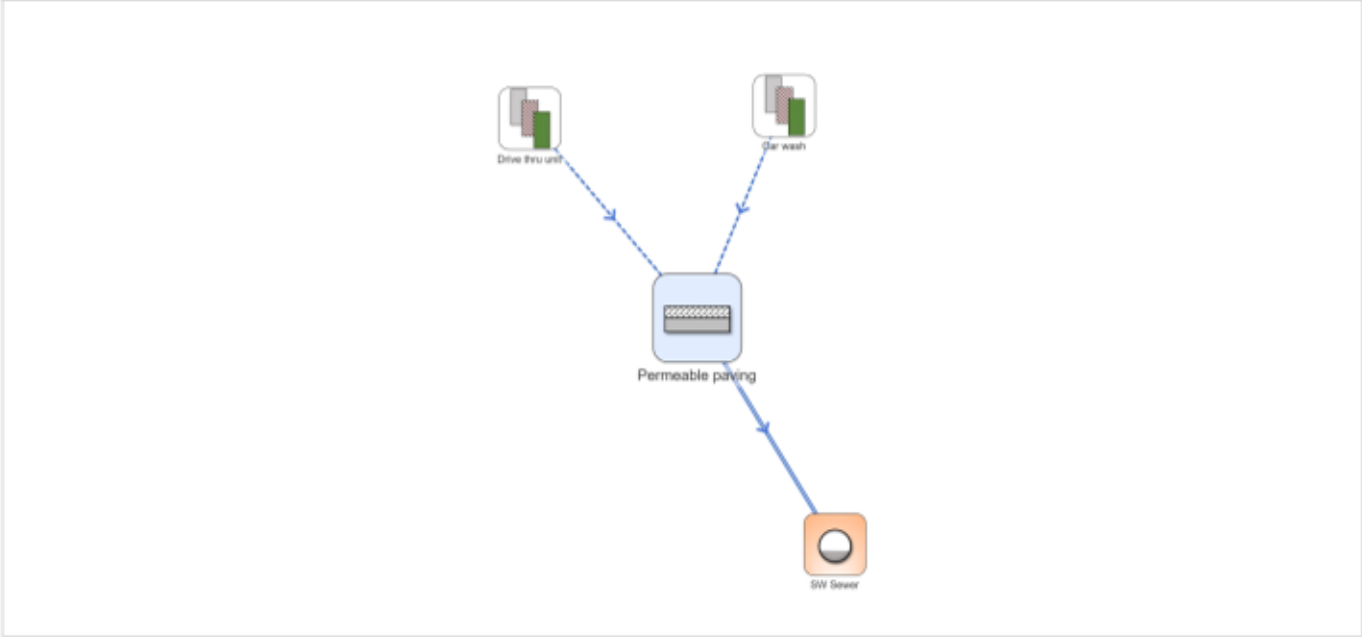
Proposed Site Information

Modeller	OL			
Organisation	AKS			
Site Name	Bocca Felice, Spalding			
Site Description				
Planning Reference				
Postcode				
Total Site Area (ha)	0.25			
Total Drained Areas (ha)	Paved	Roof	Grass / vegetated	Open SuDS
	0.051	0.049	0	0.086
Areas not served by the drainage network (ha)	0.064			
SuDS types	Type		Count	
	Pervious Pavement		1	
	Sewer Outfall		1	
Model Signatures	Model Version	Signature	Model Run	
	1.2.5	4fdd2b49	2025-11-07T18:06:50.755Z	

Proposed SuDS Network

Node name	Node type	Downstream node	Contributing area - paved	Contributing area - roof	Contributing area - grass / vegetated
Drive thru unit	contributing_area	Permeable paving	0	490	0
Car wash	contributing_area	Permeable paving	510	0	0
Permeable paving	pervious_pavement	SW Sewer	0	0	0
SW Sewer	outfall_sewer		0	0	0

Proposed SuDS Layout



Rainfall & Runoff input data

Rainfall type	Design storm				
Design storm data source	FEH22				
Design storm data location					
Climate change factor (%)	40				
Design storm events	Name	Return period (years)	Duration (min)	Depth (mm)	Depth inc CC (mm)
	2 year, 1440 minutes + CC	2	1440	33.24	46.54
	2 year, 720 minutes + CC	2	720	29.18	40.85
	2 year, 360 minutes + CC	2	360	25.08	35.11
	2 year, 120 minutes + CC	2	120	17.26	24.16
	2 year, 60 minutes + CC	2	60	12.12	16.97
	30 year, 1440 minutes + CC	30	1440	73.88	103.43
	30 year, 720 minutes + CC	30	720	66.69	93.37
	30 year, 360 minutes + CC	30	360	59.05	82.67
	30 year, 120 minutes + CC	30	120	46.31	64.83
	30 year, 60 minutes + CC	30	60	38.26	53.56
	100 year, 1440 minutes + CC	100	1440	100.02	140.03
	100 year, 720 minutes + CC	100	720	88.7	124.18
	100 year, 360 minutes + CC	100	360	76.92	107.69
	100 year, 120 minutes + CC	100	120	60.02	84.03
	100 year, 60 minutes + CC	100	60	50.55	70.77
Grass / vegetated runoff method	Variable percentage runoff				
Soil type	Very impermeable clay soils				
Standard Percentage Runoff (%)	47.0				

Fixed percentage runoff (%)	Paved 100	Roof 100
Depression storage (mm)	Paved Roof 1	Grass / vegetated 0.2 5
Range of infiltration rates given for the site (m/s)	Minimum 1e-5	Maximum 1e-5

What is the peak flow rate at the site outfall for extreme events?

	2 year +CC	30 year +CC	100 year +CC
Storm durations run (minutes)	60, 120, 360, 720, 1440	60, 120, 360, 720, 1440	60, 120, 360, 720, 1440
Critical duration (minutes)	120	60	60
Peak drainage flow rate at site outfall for the critical duration storm (l/s)	0.6	2.48	2.79

	Rainfall depth (mm)	Peak drainage flow rate at site outfall (l/s)
100 year 60 minutes +CC	70.77	2.79
100 year 120 minutes +CC	84.03	2.77
30 year 60 minutes +CC	53.56	2.48
100 year 360 minutes +CC	107.69	2.45
30 year 120 minutes +CC	64.83	2.42
30 year 360 minutes +CC	82.67	1.82
100 year 720 minutes +CC	124.18	1.8
30 year 720 minutes +CC	93.37	1.09
100 year 1440 minutes +CC	140.03	0.85
2 year 120 minutes +CC	24.16	0.6
2 year 60 minutes +CC	16.97	0.6
30 year 1440 minutes +CC	103.43	0.14
2 year 360 minutes +CC	35.11	0.13
2 year 720 minutes +CC	40.85	0
2 year 1440 minutes +CC	46.54	0

How much flooding occurs from the drainage system for extreme events?

	2 year +CC	30 year +CC	100 year +CC
Storm durations run (minutes)	60, 120, 360, 720, 1440	60, 120, 360, 720, 1440	60, 120, 360, 720, 1440
Critical duration (minutes)	120	60	60
Total volume of flooding from the site drainage system for the critical duration storm (m ³)	0	0	0

	Rainfall depth (mm)	Flooding volume (m ³)
100 year 60 minutes +CC	70.77	0
100 year 120 minutes +CC	84.03	0
30 year 60 minutes +CC	53.56	0
100 year 360 minutes +CC	107.69	0
30 year 120 minutes +CC	64.83	0
30 year 360 minutes +CC	82.67	0
100 year 720 minutes +CC	124.18	0
30 year 720 minutes +CC	93.37	0
100 year 1440 minutes +CC	140.03	0
2 year 120 minutes +CC	24.16	0
2 year 60 minutes +CC	16.97	0
30 year 1440 minutes +CC	103.43	0
2 year 360 minutes +CC	35.11	0
2 year 720 minutes +CC	40.85	0
2 year 1440 minutes +CC	46.54	0

Evaluation

Runoff Destination

Rainwater Harvesting	There are roofs on this site that do not drain to rainwater harvesting systems. Rainwater harvesting systems should be considered for roof drainage wherever practical to minimise resource consumption.
Infiltration	Some or all of the proposed SuDS components allow for infiltration. To ensure the designs of these components are robust you need to confirm that: • The infiltration component is protected from sediment buildup by putting adequate pre-treatment measures in place • The highest likely groundwater level is more than 1m below the base of the infiltration system, or appropriate design risk management has been undertaken • Any underlying aquifer is adequately protected from infiltration of potentially contaminated runoff • Infiltration will not exacerbate any groundwater flooding risk • Infiltration will not cause geotechnical or structural instability • Infiltration will not mobilise any soil contamination.
Discharge to a sewer	Some of the proposed discharge points are to sewers. Wherever possible, discharges should be to a watercourse or other surface water body to help protect the capacity of subsurface pipework. If the discharge has to be to a sewer, then surface water sewers should always be preferred. Discharges to combined sewers should only be used in exceptional circumstances, with the approval of the organisation responsible for that sewer.
Discharge to a surface water body	-

Flow Control

Peak flow rate at the site outfall for the 2 year(s) return period event	The peak discharge rate at the outfall is less than 2 l/s for 2 year return period event.
Peak flow rate at the site outfall for the 30 year(s) return period event	The peak discharge rate at the outfall is greater than 2 l/s for 30 year return period event. This may put receiving waterbodies or sewers at risk. The acceptability of these flows should be checked and the outfall control adjusted if required.
Peak flow rate at the site outfall for the 100 year(s) return period event	The peak discharge rate at the outfall is greater than 2 l/s for 100 year return period event. This may put receiving waterbodies or sewers at risk. The acceptability of these flows should be checked and the outfall control adjusted if required.
Peak flow rate criteria for 2 year return period event	The peak discharge flow rate criteria for the 2 year return period is higher than a typical flow rate for a natural catchment. Check whether this criteria are appropriate with the authorities responsible for the receiving system and planning. UK users can estimate Greenfield runoff rates at www.uksuds.com .
Critical duration for the 2 year return period event	For the 2 year return period event, 5 storm durations have been run. You should check that this is a sufficient number of durations for the storm duration that causes the highest (outfall peak flow rate/system flood volume) to be established.
Critical duration for the 30 year return period event	For the 30 year return period event, 5 storm durations have been run. The storm duration rainfall event causing the worst (outfall peak flow rate/system flooding) may not have been run. Check whether any other storm durations may result in greater peak flow rates at the outfall or flooding from the drainage system.
Critical duration for the 100 year return period event	For the 100 year return period event, 5 storm durations have been run. The storm duration rainfall event causing the worst (outfall peak flow rate/system flooding) may not have been run. Check whether any other storm durations may result in greater peak flow rates at the outfall or flooding from the drainage system.

Amenity and Biodiversity

Amenity and Biodiversity	The proportion of impervious area drained using blue-green vegetated SuDS is 0%. Check whether amenity and biodiversity benefits of the system could be improved by draining a greater proportion of impervious area using well designed blue-green vegetated SuDS.
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