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Nationwide Produce - Spalding

Proposed Agricultural Development, Cowper's Gate, Long Sutton, South Holland, Lincolnshire, PE12 9AY

Drainage & Maintenance Strategy

6th December 2023

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Senior Partner

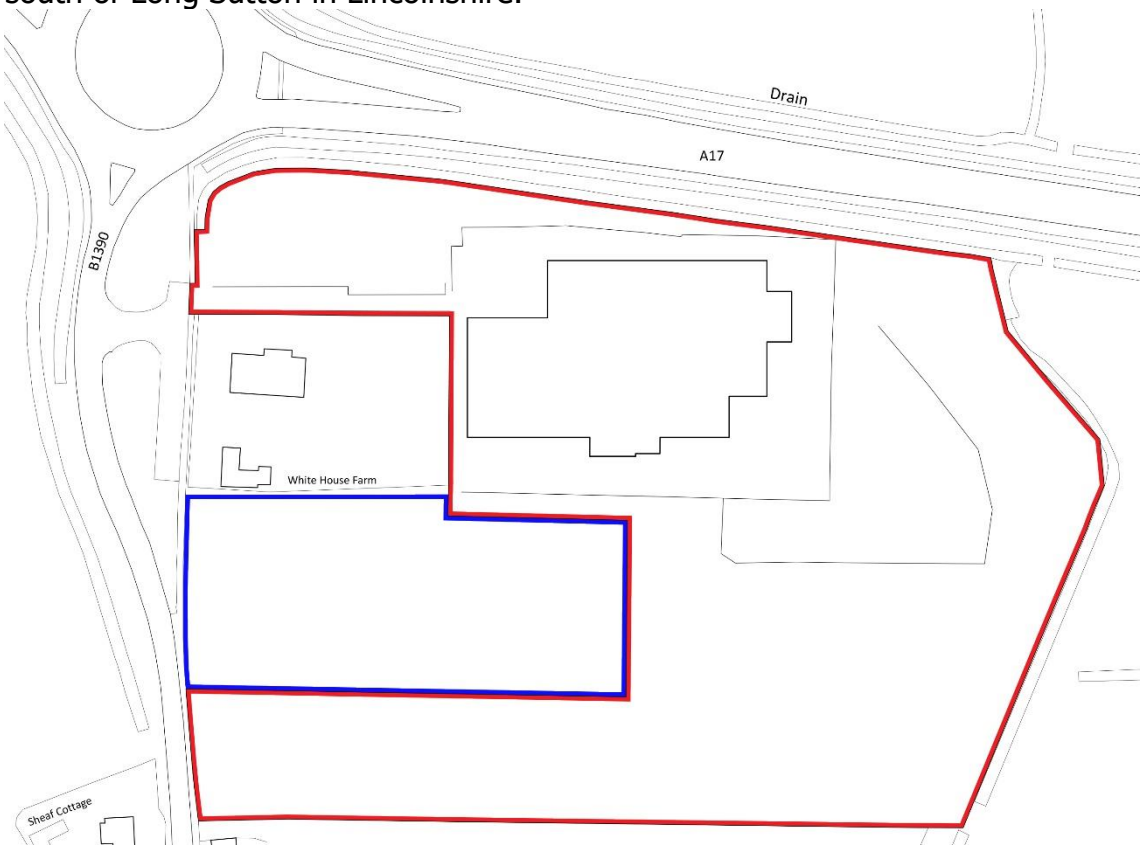
DRAINAGE STRATEGY

SUMMARY

Further to instruction from Nationwide Produce - Spalding, Stafford Infrastructure Engineering [SIE] have undertaken an assessment of the data provided for the infrastructure design on the above site, and following receipt of the topographical site survey, preliminary planning layout 889-8_SK_SP01G and other relevant data, please find below our assessment of the infrastructure design that is proposed for this development.

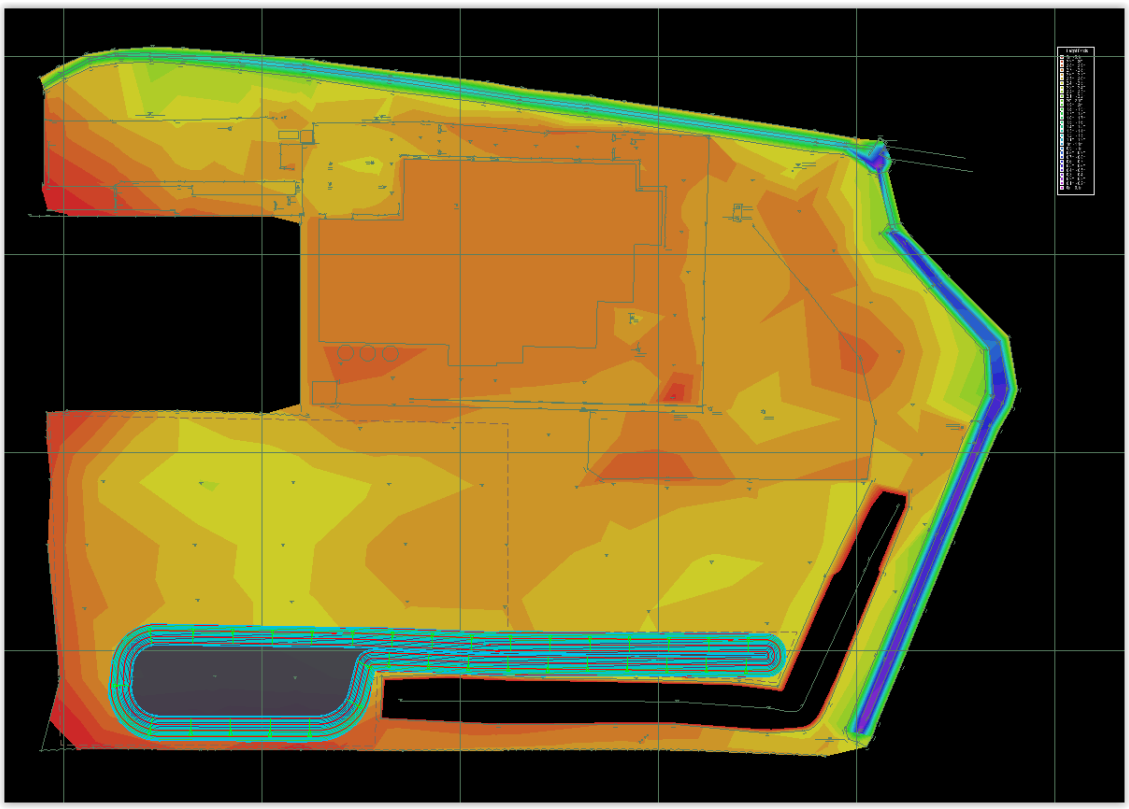
THE SITE

This site [edged Red & Blue] is approximately 3.406ha and sits to the south of The A17 Long Sutton by-pass and to the east of B1390 Cowper's Gate to the south of Long Sutton in Lincolnshire.



Location Plan

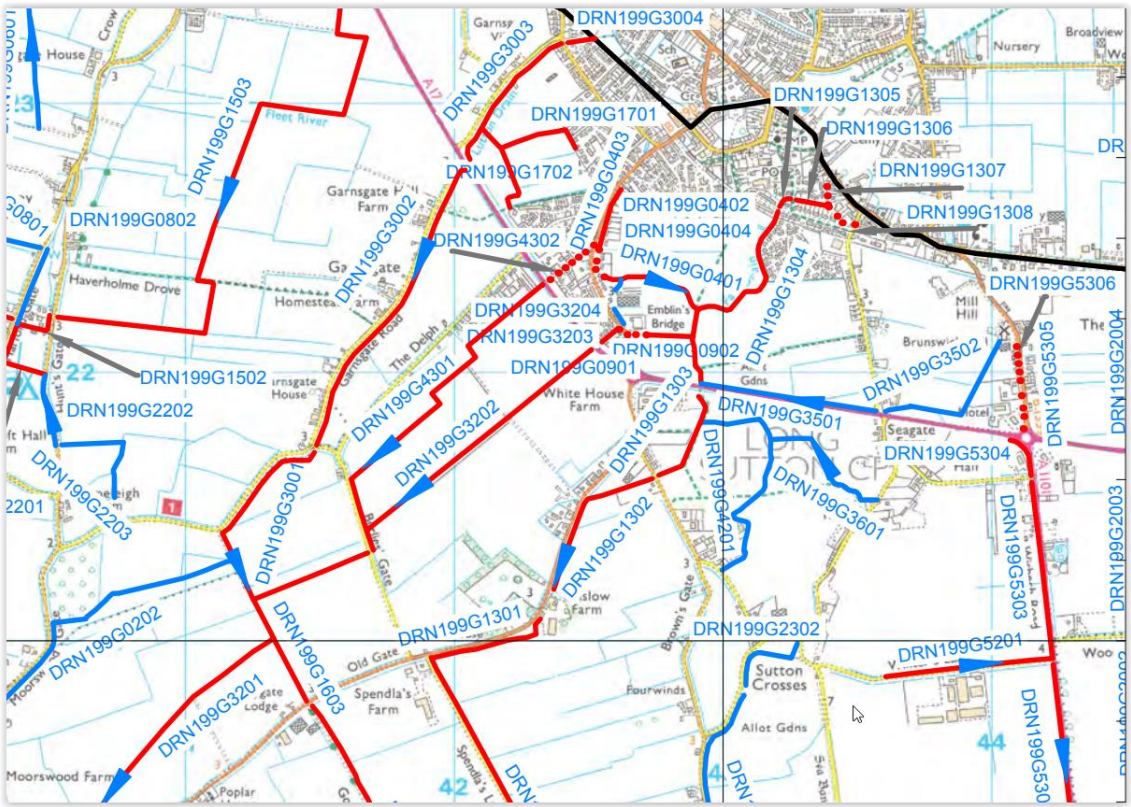
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Coloured survey level drawing with development layout and pond

The site falls slightly from west to east from around 3.0 to 2.4mOD.
The development areas are between 2.8 & 2.5mOD with very slight gradients.

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The site is within the South Holland IDB area and the existing and proposed surface water discharge from the site will be directed into the High Priority watercourse H13 Falls Drain [DRN199G1303] running south along the eastern site boundary.

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As the processes being undertaking inside the existing and proposed buildings need a level floor, Finished Floor Levels [FFL's] need to be identical to the existing site so there will be no raising of slab or ground levels.

SURFACE WATER DISPOSAL

The soils have no soakage potential.
Percolation is therefore not an option.

The SHIDB watercourse on the eastern boundary of the site falls to the south.

The lowest ditch bed level is 0.36mOD at the southern end of the watercourse. We propose, with IDB approval, to put the site outfall in this location.

Connection to the ditch +300mm up, i.e. 0.66mOD will make the bed of the pond 0.78mOD, with the top of the banks at natural ground level at 2.5mOD so it is capable of holding a 1m depth of water with a minimum of 720mm of freeboard.

This is 420mm more than would normally be allowed to enable the existing and proposed drainage to have sufficient gradients from all areas of the site to the pond. Cover over some of these systems will be minimal.

Where possible, the new surface areas will be permeable or drain to swales that discharge to the pond. Roof runoff will be piped to the ponds directly or into the permeable sub-base as this is considered clean runoff.

All permeable pavements will have granular sub-base providing SuDs source control and storage utilising a 30% void ratio aggregate.

These permeable pavements will be lined to form a tank[s].

Greenfield runoff values for QBar result in a 4.99l/s discharge rate.
See attached HR Wallingford Greenfield runoff calcs.

IDB requirements are that we discharge no more than 1.4l/s/ha and as the site is 3.406ha this would be 4.77l/s.

It is generally accepted that 5l/s should be considered as the minimum discharge rate to ensure that controls operate correctly with no undue blockages, so we propose to apply for a discharge consent based on this figure.

The pond indicated on the drawings is sized to suite the 100yr+40% climate change event and can provide 1,514cum of attenuation at 1m depth.

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The proposed permeable areas add up to 5959sqm [not including urban creep] using a minimum of 300mm suitable stone with a 30% void ratio would give a further 5959 x 0.3 x 0.3 = 536cum of source-controlled storage, bringing the total to 1514 + 536 = 2050cum or 35% more than is strictly required.

There will be significant betterment from the original site runoff as the old discharge point will eventually be removed and the new system will cater for the whole of the site with all areas passing through the pond and single outfall control.

The final design will be refined to ensure compliance and make the most of the SuDs Management Train on the site.

FOUL WATER DISPOSAL

There is a private foul system on the site, any new foul water facilities that are be built into the new areas will be connected to this system and any changes required in capacity will be addressed.

As commercial sites usually have very little by way of foul water discharge, it is not envisaged that any major changes will be required.

Any increase in flows will be advised to Anglian Water using a S106 application.

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MAINTENANCE STRATEGY

Maintenance Responsibility

1. All pipes, manholes, swales, ponds, and underdrains will be maintained by the owner occupier.

2. The existing open watercourse to the east will continue to be maintained by South Holland IDB.

Recommended Private Area Maintenance Requirements

Proposed Permeable access areas

All permeable areas are to be swept quarterly to clear leaves and to ensure they are clean, tidy, and free from dust and debris.

At times of sweeping, inspections to take place to assess any damage to road, kerbs, lighting etc., and any maintenance carried out to ensure user safety is maintained.

Areas of permeable paving are to be maintained in accordance with CIRIA guidelines.

It should be noted that vacuum sweeping of any blockwork drives should not be carried out unless it is proposed to immediately replace the grit removed from between the blocks.

Any grit loss should immediately be replaced to prevent deterioration of the surface courses.

Existing Non-Permeable access areas

It is also recommended that these areas and their attendant drainage systems are also regularly cleaned and checked for blockages.

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General Drainage Areas

A system of regular inspections should be established. Initially these inspections should be carried out in October and March, however, this may be modified to suit observations over time.

Items to be observed and cleared are high levels of grit, leaves, and other such detritus.

The main aim of these inspections will be to prevent siltation of the surface water system, which, if allowed to develop will reduce the effectiveness of the system and may, over time, reduce the attenuation volumes provided.

The following elements should be inspected and cleaned as part of this preventative routine:

Chambers, particularly catchpits

Headwalls and control chambers

Gullies and channels

Landscape

Generally, watercourses and ponds should be cut and maintained regularly so that grass remains reasonably short, chambers and headwalls to be always kept free of silt and debris. Maintenance of the ditch is NOT to be carried out if it is full or if the depth of standing water in the main channel exceeds 300mm.

Please refer to schedules below.

Additional Maintenance Requirements

It is suggested that all new employees are informed of the use and function of the surface water system at induction.

No loose materials such as soils or sand etc. shall be stockpiled directly on the permeable blockwork areas.

It is further recommended that the 'Bag it and Bin it' leaflet is handed to new employees to ensure unsuitable items are not flushed into the foul drainage system.

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Operation and Maintenance Requirements for Permeable Pavements [CIRIA]

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Operation and Maintenance Requirements for Detention Basins [CIRIA]

TABLE 22.1 Operation and maintenance requirements for detention basins

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Cut grass – meadow grass in and around basin	Half yearly (spring – before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets, outlets and overflows for blockages, and clear if required.	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies.	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually (as set out in Chapter 23)
Occasional maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

Operation and Maintenance Requirements for Swales [CIRIA]

TABLE 17.1 Operation and maintenance requirements for swales

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

Operation and Maintenance Requirements for Receiving Ordinary Watercourse

Maintenance Schedule	**Required Action**	**Typical Frequency**
Regular Maintenance	Walkover inspection of receiving ordinary watercourse	6 monthly (or as required)
	Maintenance dredge the receiving ordinary watercourse from the Control headwall Weir to the confluence with the main channel to remove silt build up and restore design bed level	First maintenance dredge on completion of SuDS swales and then 5-yearly (or as required)
	Vegetation is to be cut annually as a minimum.	Annually

9059-109 DRAINAGE AREAS

HR Wallingford
Greenfield Runoff Calculations
&
Surface Water Calculations

BAG IT & BIN IT

Drainage Areas (separate drawing no. 9059-109)