SURFACE WATER DRAINAGE TECHNICAL NOTE

FOR 2 PLOT RESIDENTIAL DEVELOPMENT

LAND EAST OF FOREST WAY, HOLBEACH, LINCOLNSHIRE, PE12 7FE

DOCUMENT REF: SW26-261-TN-01

REVISION: B

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1.0 Introduction:

The following document has been prepared in relation to the proposed surface water drainage scheme to demonstrate the intended timetable for implementation of the system and outline how the system will be managed and maintained for the lifetime of the development. The Hydrological and Hydrogeological contexts are also reviewed, along with Pollution Prevention measures and relationship to the adjacent existing basin.

The proposed development includes 2 single story dwellings which are to be constructed on land East of Forest Way, Holbeach, as shown on the figure below:

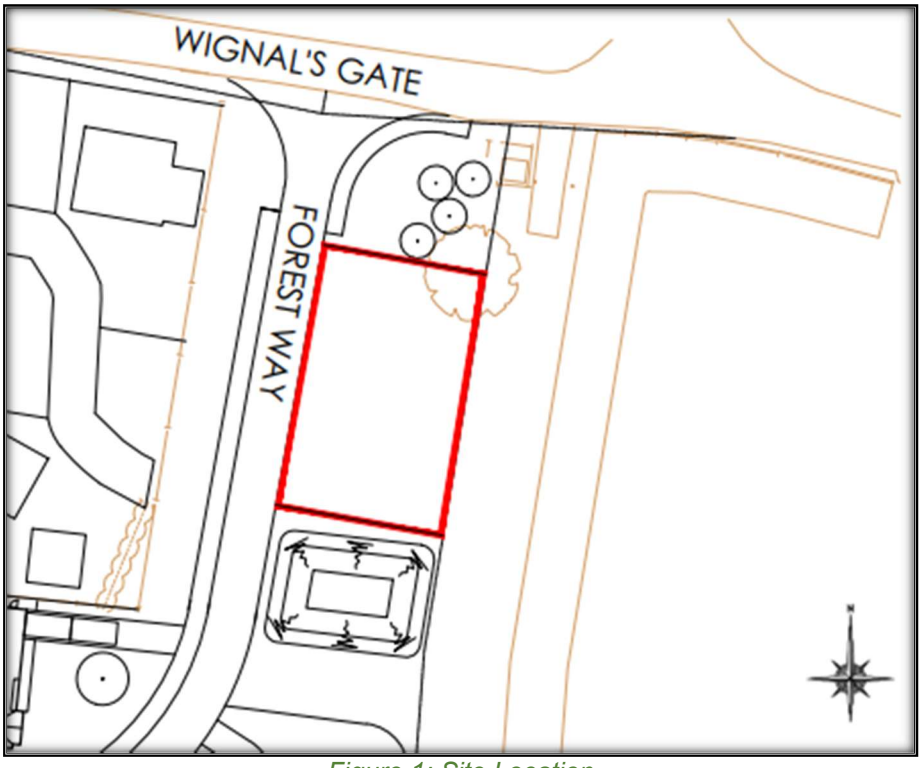


Figure 1: Site Location

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The proposed dwellings are accessed from the existing public highway as shown on the figure below:

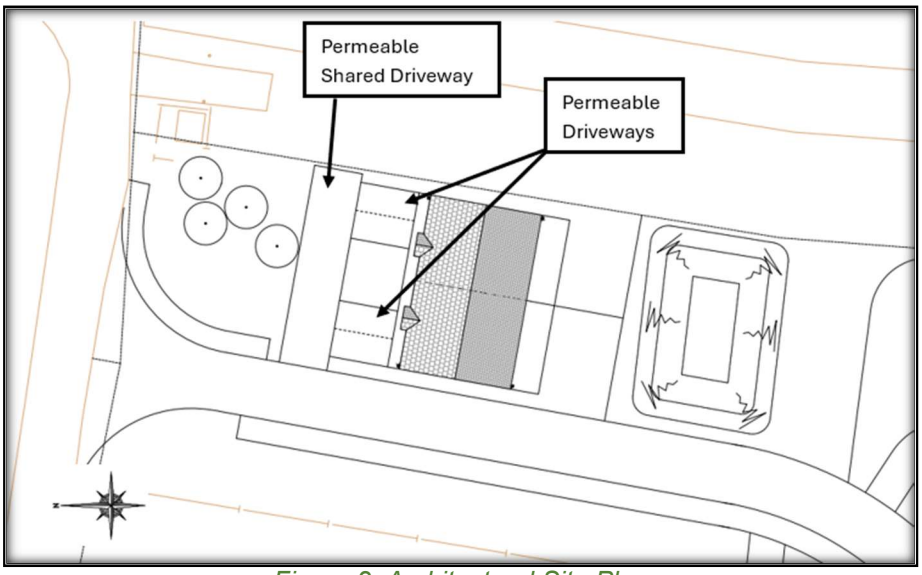


Figure 2: Architectural Site Plan

The permeable driveways are to be of a block paver construction.

A proposed surface water drainage design has been prepared by Apple Engineering, drawing reference 26114-102, extracted below:

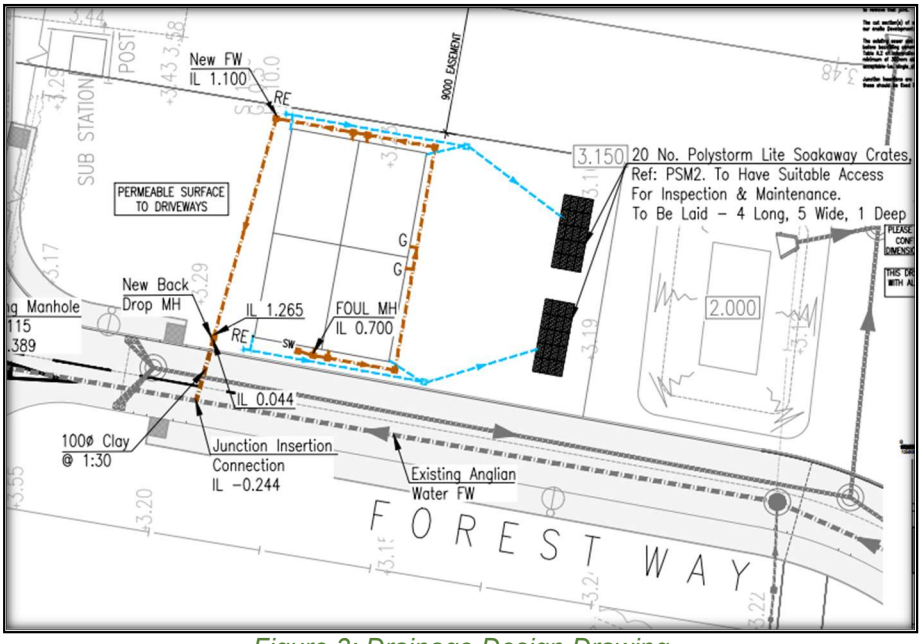


Figure 3: Drainage Design Drawing

The infiltration-based surface water drainage system has been designed based on an infiltration rate of 2.03×10^{-6}m/s following testing undertaken by SRC Ltd. for the adjacent residential development site, during March 2018. Additional infiltration testing was undertaken in August 2026 on this development site by Apple

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Engineering. This testing demonstrated an infiltration rate of $6.92x10^{-6}$m/s. This infiltration rate is greater than the infiltration rate previously identified.

2.0 Timetable for Implementation:

The surface water drainage scheme proposed by Apple Engineering will be implemented in the following manner:

- The stone sub-base beneath the permeable shared driveway and the individual driveways will be utilised as a clean working platform to gain access to the site.
- The stone sub-base should not be trafficked excessively during the construction phase, as this will over compact the sub-base and compromise the hydraulic performance.
- Should the stone sub-base beneath the permeable shared driveway and the individual driveways become contaminated with soil/silt during the construction phase, a minimum of 100mm stone depth should be scraped to remove the contamination.
- The final driveway surface, i.e. block pavers and bedding layer, will not be installed until the dwellings are watertight and the heavy trades are off site.
- The surface water pipes and inspection chambers will be installed at a similar time to the foundations and sub-structure masonry.
- The soakaways located in the rear gardens will be installed prior to the roofs being tiled.

3.0 Management and Maintenance Plan:

The proposed site is to remain entirely private and will be the responsibility of the homeowners.

3.1 Dwelling Roof Water:

The dwelling roof water is to be collected via gutters and downpipes which discharge to an underground drainage system local to each plot. The underground drainage system comprises of inspection chambers and pipes which discharge into the soakaway located in the rear gardens.

The system should be inspected and maintained at yearly intervals, or if signs of poor performance are noticed during heavy rainfall, in order to ensure that all components continue to perform effectively.

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3.2 Driveways:

The driveways are to be constructed of permeable block paving, and are to have a voided stone sub-base to attenuate the rainfall event, prior to infiltration to ground. These are designed hydraulically for a 1:100 year plus climate change rainfall event.

These areas are required to be in good working order to function as intended and prevent run-off onto the public highway. They should generally be maintained in accordance with The SuDS Manual C753:

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

Figure 4: Permeable Paving Maintenance Requirements (The SuDS Manual C753)

4.0 Hydrological & Hydrogeological Context:

4.1 Hydrological Context:

In terms of the hydrological context of the proposed development the permeable driveways are designed for up to an including the 1:100 year plus climate change rainfall event. For storms in excess of this, the overland surface water runoff will enter the adjacent IDB maintained watercourse along the sites Eastern boundary.

4.2 Hydrogeological Context:

The Ground Investigation undertaken by SRC Ltd. during March 2018 states that the borehole closest to this development had a standing water level 1.6m below ground level which equates to 1.300m AOD. Given the close proximity of this development

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site to the adjacent IDB watercourse it would be reasonable to assume that groundwater levels will generally remain lower than average for the area.

As discussed in Section 6 of this Technical Note in further detail, the proposed roof water soakaway structures are to have a formation level of 2.300m AOD. Therefore, the distance between the recorded groundwater level and the soakaway structure is 1m which meets the minimum requirements of SuDS guidance.

5.0 Pollution Prevention:

The measures to prevent pollution of groundwaters has been assessed using the Simple Index Approach method as specified within the CIRIA C753 'The SuDS Manual'.

There are two classifications of drained area for this development, which are residential roofs (highlighted blue on the following figure) and Property Driveways (highlighted green on the following figure). These have a pollution hazard level of very low and low respectively.

Pollution hazard indices for different land use classifications

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways[1]	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways[1]	High	0.8[2]	0.8[2]	0.9[2]

Figure 5: Pollution Hazard Indices

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The following figure demonstrates the mitigation indices appropriate for both area classifications and are highlighted accordingly, blue for residential roofs and green for property driveways.

Indicative SuDS mitigation indices for discharges to groundwater			
Characteristics of the material overlying the proposed infiltration surface, through which the runoff percolates[1]	**TSS**	**Metals**	**Hydrocarbons**
A layer of dense vegetation underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.6[4]	0.5	0.6
A soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.3	0.3
Infiltration trench (where a suitable depth of filtration material is included that provides treatment, ie graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20 mm gravel) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.4[4]	0.4	0.4
Constructed permeable pavement (where a suitable filtration layer is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential[2] of at least 300 mm in depth[3]	0.8[4]	0.8	0.8
Proprietary treatment systems[5,6]	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Figure 6: SuDS Mitigation Indices for Groundwater Discharges

The SRC Ltd. Ground Investigation for the adjacent residential development site demonstrated that fine sandy silt strata is present on site. This soil type is classified as having satisfactory sorption potential and therefore the highlighted mitigation indices required are met. These mitigation indices are in excess of the hazard indices for TSS, Metals and Hydrocarbons.

6.0 Existing Attenuation Basin:

The drainage design prepared by Apple Engineering, drawing reference 26114-102, illustrates a rear garden level of approximately 3.200m AOD and Polystorm Lite Soakaway crates. Manufacturers recommendations are for these crates to be installed with 500mm of cover. The crates will therefore have a top of crate level of 2.700m AOD and a formation level of 2.300m AOD.

The adjacent existing attenuation basin which serves part of the adjacent residential developments Highway drainage has a bed level of 2.000m AOD. This basin is situated ‘offline’ of the Highway drainage system it serves and will therefore only attenuate water during design storms and not everyday rainfall.

Based on the above the proposed soakaway crate formation levels are to be 300mm above the base of the attenuation basin. The crates are to be located 8.5m from the attenuation basin bed. Given these factors we determine that the location of the crates relative to the attenuation basin will not have a detrimental effect on the functionality of either structure.

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7.0 Conclusion:

In conclusion, the above outlines the timetable for implementation of the drainage system and ensures that surface water run-off will be safely managed during the construction phase and ensures that the systems are not compromised by construction activities.

The management and maintenance requirements are also discussed and should be given to the future homeowners to ensure that the surface water systems are maintained adequately. The permeable driveways and underground surface water systems and soakaways are to remain the sole responsibility of the future homeowners. There are no arrangements for the systems to be adopted by any public authority or statutory body.

In terms of the Hydrological and Hydrogeological contexts, the proposed 2-plot residential development permeable driveway surface has been designed for a 1:100+CC rainfall event. The identified groundwater levels have been reviewed and it is demonstrable that the surface water drainage features are 1m above this level. The presence of the large IDB maintained watercourse along the Eastern site boundary provides additional robustness and a safe and effective final destination for any overland surface water run-off exceedance flows.

The proposals have been reviewed in accordance with the CIRIA C753 ‘The SuDS Manual’ Simple Index Approach for assessing the pollution control. It has been demonstrated that the drainage arrangement proposals exceed the pollution hazard levels of the roofs and driveways on the development and is therefore satisfactory.

The proximity of the adjacent existing attenuation basin has been considered in relation to the proposed roof water soakaways. Given the level difference and distance between these structures it is not considered that either structure will have a detrimental effect on one another’s functionality.

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