

Medley's Charity

Proposed Residential Development,
Land off Low Gate, Tydd St. Mary,
Lincolnshire, PE13 5QS

Drainage & Maintenance Strategy

8th November 2022

T. R. Stafford
Senior Partner

DRAINAGE STRATEGY

SUMMARY

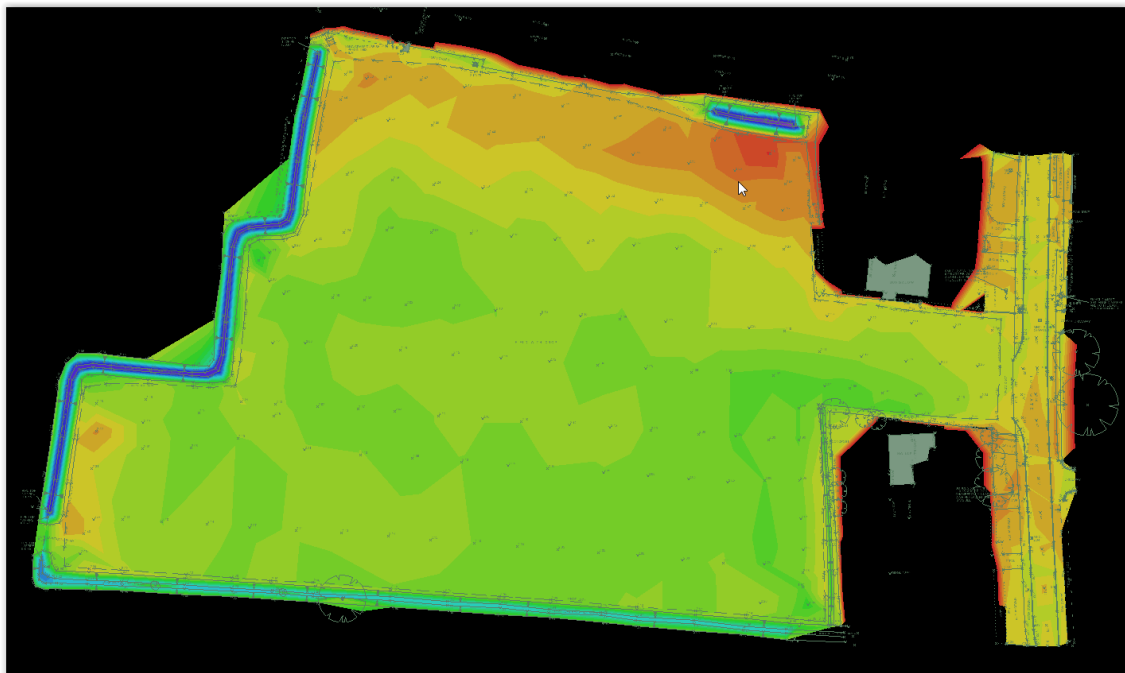
Further to instruction from Medley's Charity, SIE have undertaken an assessment of the data provided for the infrastructure design on the above site, and following receipt of the topographical site survey, soils investigation reports, the preliminary planning layout and other relevant data, please find below our assessment of the infrastructure design that is proposed for this development.

THE SITE

This site of approximately 1.54ha and is roughly rectangular sitting away from the Highway behind existing housing.

Most of the site is around 2.0-2.2mOD.

The highest point on the site is 2.81mOD in the north-east corner

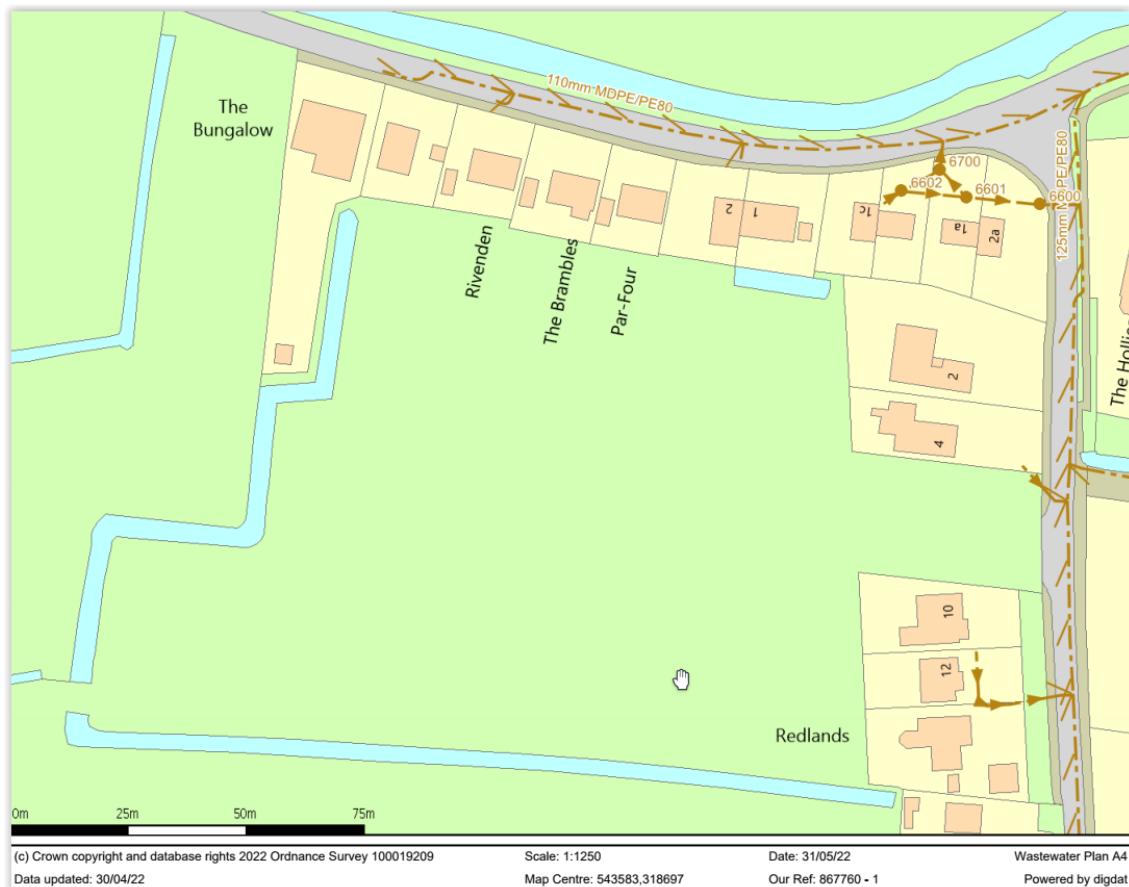


There is a riparian open ditch to the south and a North Level IDB drain snaking along the entire western and northern boundary.

Continued

FOUL WATER DISPOSAL

There is an adopted vacuum Foul Water System in the roads to the north and east of the proposed development.



Discussions are ongoing with Anglian Water as how best to design the foul system on the site and connect it with the existing system.

This might involve extending the vacuum system into the site or pumping the flows to a connection point on the existing system near the site entrance.

Whether this can be an adopted system or not remains to be seen, but ideally it will be offered for adoption by Anglian Water under a S104/S106 agreement.

SURFACE WATER DISPOSAL

The soils report indicates that soakage potential is very poor, so percolation is not an option.

The pond has been placed in the south-west corner and set 9m away from the top of the IDB ditch to the west and north.

Continued

The ditch bed is approximately 0.7mOD and the preliminary pond base has been set at 0.8mOD meaning that the top of the sloping 1:3 banks, allowing for 1m maximum depth of attenuated water plus 300mm freeboard, can easily be accommodated within the depth available to existing ground level.

As it is intended to have the road adopted under S38/S278, this will be designed to LCC Highways standards as a cross-fall road into a swale with an underdrain that will outfall into the pond.

It is expected that AW will adopt the swale underdrain and chambers.

The first 45m of the proposed road will pass through the existing housing fronting Low Gate and service the site to the rear.

The length of this part of the road will fall away from the site toward the site entrance and be drained using traditional trapped road gullies connected to the existing Highway Drain alongside the main road.

This is because there is no practical way to install adoptable SuDs in this area and no way to fall into the site without going under existing ground levels and compromising the remaining site levels.

Drives within the site will be designed as permeable pavements, with tanked attenuation storage in the sub-base beneath to cater for the house, garage, and drive runoff.

The drives will then be connected to the pond or swale underdrain after first being throttled using orifice plates to make maximum use of the attenuation each drive affords.

Achieving greenfield runoff is not possible as the control required to achieve that on a diminutive site like this would be much too small and fall below the minimum normally accepted by the EA and IDB.

Therefore, a control will be installed to discharge from the pond the accepted recommended minimum of 5l/s to the IDB drain. It is understood that this will attract an increased infrastructure charge.

Preliminary calculations show that for the 100yr +40% climate change storm run-off using a final discharge rate of 5l/s. 704cum can be attenuated in the pond and 153cum can be attenuated in the permeable pavements, which is sufficient for this site.

Continued

MAINTENANCE STRATEGY

Maintenance Responsibility

1. Any new areas of highway created, and its attendant drainage, will be adopted by Lincolnshire County Highways and maintained by them.
2. The adopted FWS and swale underdrains and their chambers will be adopted and maintained by Anglian Water.
3. All areas of private permeable drives any associated features and planting are to be maintained by the homeowners via a management company.
4. Existing and modified open watercourses will continue to be maintained by current and future owners in accordance with the notes on Receiving Ordinary Watercourse.

Recommended Private Area Maintenance Requirements

Access road & Drives

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.

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.

Continued

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

Road gullies

Landscape

Please refer to the landscaping scheme and the Landscape Management plan for the site.

Generally, watercourses 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 for Homeowners

It is also recommended that each homeowner regularly cleans and inspects any gullies, linear drainage channels and permeable paving, where located within their curtilage as a preventative measure to minimise the ingress of detritus into the storm water system.

It is suggested that new homeowners are informed of such responsibilities and the use and function of the surface water system in their welcome packs or within their conveyance documentation.

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

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 glyphosate 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 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)

9023-107A DRAINAGE LAYOUT PLAN

Code	Length	Height	Weight
1	2400-2600	1000-1200	1.2-1.5
2	2400-2600	1000-1200	1.2-1.5
3	2400-2600	1000-1200	1.2-1.5



- ALL EXTERNAL DRAINAGE WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH 'CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY' 5th EDITION, B.S.E.N.752 & 'SEWERAGE SECTOR GUIDANCE FOR ADAPTABLE DRAINAGE, AND TO THE RELEVANT PROJECT SPECIFICATION AS DIRECTED BY THE ENGINEER FOR PRIVATE DRAINAGE.
- PIPE MATERIAL SHALL BE AS FOLLOWS:
100^{mm} TO 225^{mm} - CLAYWARE TO BS EN 295 300^{mm} AND ABOVE - CONCRETE TO BS EN 5911.
NB. PVC-U PIPES TO BS EN 1401-1:1998 MAY BE USED SUBJECT TO THE APPROVAL OF THE ENGINEER.
- CLAY AND CONCRETE PIPES SHALL BE BEDDED ON CLASS S BEDDING UNLESS COVER IS LESS THAN 1.2m IN TRAFFICKED AREAS, THEN CLASS A BEDDING.
- UPVC PIPES SHALL BE BEDDED ON CLASS P BEDDING UNLESS COVER IS LESS THAN 1.2m IN TRAFFICKED AREAS, THEN CLASS Q BEDDING.
- BACKFILL TO TRENCHES MAY BE SUITABLE EXCAVATED MATERIAL IN LANDSCAPED AREAS. TYPE 1 GRANULAR MATERIAL TO BE USED UNDER STANDINGS AND ROADS.
- GULLY CONNECTIONS SHALL BE 150mm DIAMETER AND WITH CLASS Z BEDDING.
- GULLIES SHALL BE TRAPPED 450mm DIAMETER x 900mm DEEP WITH CLASS D400 FRAME AND GRATING TO BS EN 124 UNLESS OTHERWISE STATED.
- DESIGN OF THE DRAINAGE CHANNELS WHERE SHOWN IS INDICATIVE ONLY. DETAILED DESIGN SHALL BE UNDERTAKEN BY THE CHANNEL MANUFACTURER/SUPPLIER. DESIGN & SUPPORTING CALCULATIONS SHALL BE SUPPLIED TO THE ENGINEER FOR APPROVAL.
- ALL MANHOLE AND DRAINAGE CHANNEL COVERS SHALL COMPLY WITH BS EN 124. MANHOLE COVERS WITHIN BLOCK PAVED AREAS & BUILDINGS SHALL BE RECESSED. COVER STRENGTHS TO BE:
CLASS E600 IN AREAS SUBJECT TO HIGH POINT LOADS (E.G. FORKLIFTS)
CLASS D400 IN HEAVY TRAFFICKED AREAS (ACCESS ROADS, SERVICE YARDS ETC.)
CLASS C250 IN LIGHTLY TRAFFICKED AREAS (CAR PARKS ETC.)
CLASS B125 (WITH MIN. 100mm DEEP FRAME) IN LANDSCAPE & NON-TRAFFICKED AREAS (PLANTING, PEDESTRIAN AREAS ETC.).
- VENTILATION SHALL BE PROVIDED AT THE HEAD OF FOUL DRAINAGE RUNS.
- ACCESS FOR RODDING/JETTING SHALL BE PROVIDED TO ALL SOIL AND RAINWATER DOWNPIPES ABOVE FINISHED FLOOR LEVEL.
- FOR DETAILS OF MANHOLE TYPES AND PIPE BEDDING ETC., SEE STANDARD DETAIL DRAWING(S).
- COVER LEVELS SHOWN ARE APPROXIMATE. COVER LEVELS FOR MANHOLES WITHIN LANDSCAPED AREAS SHOULD BE CHECKED WITH THE LANDSCAPE ARCHITECTS. COVERS SHOULD BE ADJUSTED TO MATCH SURROUNDING FINISH LEVELS.
- THE CONTRACTOR IS TO PROTECT EXISTING BURIED PIPES (PARTICULARLY SHALLOW PIPES) AND TREE ROOTS FROM DAMAGE CAUSED BY LOADS IMPOSED BY CONSTRUCTION PLANT.

STORM PIPE LEGEND:

PERFORATED TWINWALL PIPE IN SWALE
SOLID TWINWALL PIPE

PERMEABLE PAVEMENTS:

Area to be used as storage

SERVICE CORRIDOR
1.8m wide to multiple properties
1.0m wide to individual properties

SOAKAWAY & GULLY PROTECTION:
Please ensure that during the construction phase all soakaways, gullies and gully laterals are protected from the ingress of silt or grit from the site. Placing a fine heavy duty geotextile under the gully grating, between it and the frame should suffice.

The first manhole upstream from the connection to the (existing) public sewer should, when constructed, be fitted with a screen in order to prevent debris entering the public sewer. The screen should not be removed until immediately prior to the occupation of premises to be served by the sewer.

Anglian Water Notes

All S.104 adoptable drainage shall conform to the Design and construction guidance for foul and surface sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England.

All covers and frames on adoptable AW sewers are to be D400, intermarked and be badged 'FW' or 'SW' accordingly. Suppliers shall be Stanton, Paul Savage, Norinco or Wrekin.

Adoptable pipework shall be to the following specification:

Clayware: BS EN 295-1 and BS65
150 dia. Crushing Strength 34kN/m
225 dia. Class 160

Concrete: BS EN 1916 and BS 5911-1
≥300 dia. Class 120

PRINCIPAL OUTSTANDING HAZARDS

This schedule is provided to assist the principle contractor to determine appropriate working practices & plant requirements during the construction phase & should be included in the Health & Safety Plan File.

The schedule indicates the principle hazards that could not be wholly eliminated during the design phase or that are inherent in the layout of the construction.

This schedule should not be considered as an exhaustive list of hazards - It has been assumed an appropriately experienced contractor with a fully trained labour force will be appointed to carry out the work. Hazards implicit in the nature of construction (safe use of tool/plant & appropriate PPE) are assumed. Compliance with relevant legislation (Health and Safety at Work Act etc.) has been assumed.

The notes given here relate to work shown on this drawing ONLY - (Please note that other items may occur on other drawings.)

Ref. No.	IDENTIFIED HAZARD
1.	DRAINAGE WORKS DRAIN LAYING AND ASSOCIATED WORKS IS REQUIRED TO BE UNDERTAKEN IN OPEN EXCAVATIONS AND STABILITY OF TRENCHES PRESENTS POTENTIAL COLLAPSE HAZARD - TRENCH SUPPORT REQUIRED
2.	OPEN TRENCHES PRESENT HAZARD OF FALLING TO PERSONNEL AND PLANT - PROTECTION/BARRIERS REQD.
3.	SOME WORK REQUIRED ON EXISTING, LIVE DRAINAGE - HAZARD OF CONTAMINATION/ STORM FLOWS - PPE REQUIRED/ WORK TO BE CARRIED OUT BY EXPERIENCED PERSONNEL
4.	EXCAVATED MATERIALS POTENTIALLY CONTAMINATED (FILL) - REFER TO SITE INVESTIGATION INFO.
5.	HEAVY DRAINAGE COMPONENTS ARE SPECIFIED - SUITABLE LIFTING EQUIPMENT REQUIRED
6.	CEMENTITIOUS MATERIALS REQUIRED - HAZARD OF CONTACT WITH AGGRESSIVE MATERIALS
7.	WORKS REQUIRED IN ACTIVE HIGHWAYS - SUITABLE TRAFFIC CONTROL REQUIRED
8.	WORK IN POTENTIALLY CONFINED SPACES (MANHOLES) - COMPLETE MHS BEFORE INSTALLING COVER SLABS - USE EXPERIENCED PERSONNEL

NOTES:
All dimensions must be checked on site and not scaled from this drawing.

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PRIVATE DRAINAGE NOTES:

Pipework to be 110mm dia. PVC-U Hepworth PlastDrain or similar approved, unless otherwise stated.
Generally laid to falls of 1:50 on the foul drain and 1:60 on the surface water drain, minimum 1:80 on both.
160mm dia. pipework to be laid at a min. fall of 1:130.

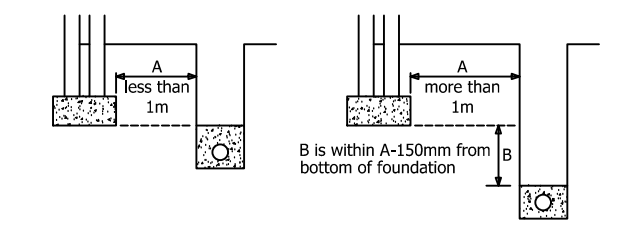
The Specification and installation of the drainage systems are to comply with the Building Regulations Approved Document H & British Standard 8301 Building Drainage current at the time of construction and also the manufacturers recommendations. All connections are to be soffit to soffit.

- House Type
FFL Level
- Foul (Mini chamber <0.6m [1 side connection])
Foul (PPIC chamber <1.2m [2 side connections])
Foul (Telescopic PPIC Chamber 1.2-3.0m)
Foul (Tegra Chamber 1.20-5.0m)
Surface (Mini chamber <0.6m [1 side connection])
Surface (Telescopic PPIC Chamber 1.2-3.0m)
Surface (Tegra Chamber 1.20-5.0m)
Backdrop on SW Chamber
Backdrop on FW Chamber
FW MH with invert level
SW MH with invert level
Rodding eye with Invert Level
Soil vent pipe [SVP]
Rainwater outlet [RWP]
Trench soakaway [ED=Effective Depth]
i.e. depth of trench below lowest invert.
Dished drainage channel with gully.
ACO channel or similar.
Permeable Drives; Base gradients generally 1:500 or 1:1000 for longer drives
Distribution diffuser grate with invert level.
Gully
Road Gully [with 150mm dia. lateral]

Cover levels generally to be 150mm below slab levels.
Private pipework under adopted areas to be laid as min. 150mm dia. Extra Strength Clayware at minimum fall of 1:130.
Pipework under drives and other areas likely to be trafficked shall be backfilled with Type 2 material. Where depth of cover less than 900mm pipe to have 175mm thick reinforced [A393] concrete slab over. Both treatments to extend a minimum of 1m behind kerb-face.
Foul sewers serving more than 10 dwellings should have a minimum diameter of 150mm.

A Soil Vent Pipe [SVP] must be added at the head of any foul drainage system. Air Admittance Valves [AAV] can be used in other locations if required.

Please Note: Where the bottom of a drainage trench is below foundation level, the trench should be filled with concrete as shown below.



Date	Revisions
07-11-22	Drawing updated to suit latest site layout.

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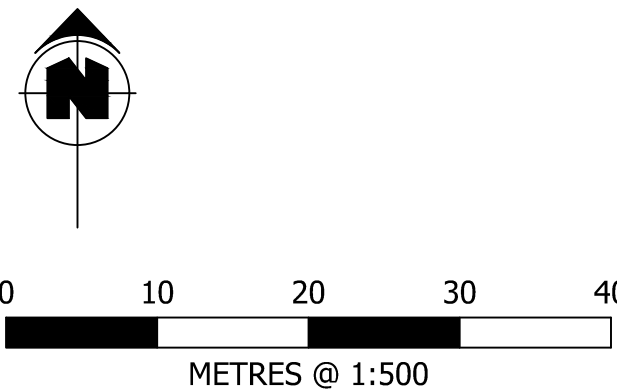
Job Title
Land off Low Gate
Tydd St Mary
Lincolnshire
PE13 5QS

Drawing Title
Drainage Strategy Plan

Date OCT 2022 Scale @ A1 1:500 Drawn IAC

Drg.No. 9023-107 Rev. A

**PRELIMINARY
DRAWING**



9023-109A DRAINAGE AREAS

Area of roads [to HW Drain]:	434m ²	0.043 ha
Area of roads, swale & pond:	2768m ²	0.277 ha
Area of roofs:	1888m ²	0.189 ha
Area of drives:	1783m ²	0.178 ha
Total impermeable area:	6873m ²	0.687 ha
Total impermeable area +6% urban creep:	7285m ²	0.729 ha

Page	Location	Northings	Eastings
11	154384.282	471817.079	42.377
12	154387.490	471868.249	42.381
13	154390.693	471869.721	42.438



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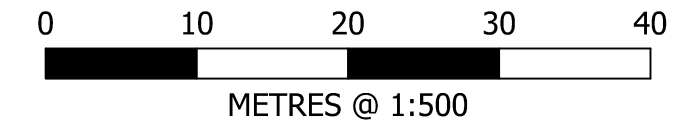
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Client

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Land off Low Gate
Tydd St Mary
Lincolnshire
PE13 5QS

Drawing Title
Drainage Areas

Date	OCT 2022	Scale @ A1	1:500	Drawn	IAC
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Drg.No.	9023-109	Rev.	A
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PRELIMINARY
DRAWING

BAG IT & BIN IT

DO NOT FLUSH IT, BAG IT AND BIN IT



Pet Faeces



Paint



Engine Oil



Bandages



Cotton Wool



Condoms



Medicines



Nappies/incontinence products



Needles



Rags



Cooking Fat



Kitchen Waste



Razor Blades