Powell Tolner & Associates Ltd

FLOOD RISK ASSESSMENT & DRAINAGE STRATEGY

Project:	Image Business Park, Acornfield Road, Knowsley Site 3
PTA Project No:	9879
Document Ref:	9879-Site 3-FRA & Drainage Strategy
Status:	For Planning
Revision:	P01
Date:	August 2021
Client:	Knowsley (Image Business Park) Ltd

consultancy engineering business environment

Issued by

PTA
29 Red Lion Street
Chesham
Buckinghamshire
United Kingdom
HP5 1EJ
Tel: + 44 1494 772721
central@ptaconsult.co.uk

	Name	Position	Signature	Date
Prepared by:	George Westgarth	Project Engineer	GW	09.08.2021
Reviewed by:	Alex Herman	Director	AH	09.08.2021
For and on behalf of Powell Tolner & Associates Limited				

Revision	Date	Description	Prepared	Reviewed
P01	09.08.21	Issued for comment	GW	AH

This report has been produced by Powell Tolner & Associates Ltd for exclusive use by the client named on the document. This report may not be relied upon by any other party without written consent from Powell Tolner & Associates Ltd. Powell Tolner & Associates Ltd accept no liability for any costs, liabilities or loses arising as a result of the use or reliance upon the contents of this report by any person other than the named client.

All comments and conclusions in this report are based on our reliance on that the sourced data and Powell Tolner & Associates Ltd accept no liability for any inaccuracy in that information.

©This report is the copyright of PTA.
Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

TABLE OF CONTENTS

1 INTRODUCTION 1
2 DEVELOPMENT DESCRIPTION 2
2.1 Location 2
2.2 Existing Site 3
2.3 Proposals 3
2.4 Flood Vulnerability Classification 4
2.5 Flood Zone Compatibility 4
3 FLOOD RISK 5
3.1 Rivers 5
3.2 Tidal 5
3.3 Ground Water 5
3.4 Overland Flows 6
3.5 Sewers 8
3.6 Other Sources 8
3.7 Climate Change 9
4 FLOOD RISK MANAGEMENT 10
4.1 Floor Levels 10
4.2 Sustainable Drainage Techniques 10
4.2.1 Living Roofs 10
4.2.2 Basins and Ponds 11
4.2.3 Filter Strips and Swales 11
4.2.4 Infiltration Devices 11
4.2.5 Permeable Paving/Porous Asphalt 11
4.2.6 Rainwater Harvesting Systems 12
4.2.7 Exceedance Event 12
4.2.8 Surface Water Treatment 12
4.3 Surface Water Management 14
4.3.1 Greenfield Runoff Assessment 14
4.3.2 Post-Development Surface Water Run-off 14
4.3.3 Proposed Foul Water Drainage 15
5 OFFSITE IMPACT 16
6 MAINTENANCE STRATEGY 17
6.1 Manholes, Inspection Chambers, Pipe Work, Drainage Channels & Gullies 17
6.2 Vortex Flow Control (Hydrobrake) 18

6.3 Proprietary Surface Water Treatment Systems 19
7 CONCLUSION 19
APPENDICES 23
Appendix A – Topographical Survey Plan 24
Appendix B – Proposed Site Layout 25
Appendix C – Public Sewer Asset Plan 26
Appendix D – Exceedance Flow Path Plan 27
Appendix E – Existing Runoff Calculations 28
Appendix F – MicroDrainage Output Files 29
Appendix G – Proposed Drainage Strategy 30
Appendix H – Borehole Logs 31
Appendix I – Knowsley Proforma 32

1 INTRODUCTION

Powell Tolner and Associates Limited (PTA) have been commissioned by Knowsley (Image Business Park) Ltd to produce a Flood Risk Assessment (FRA) and drainage strategy report in order to support the planning application for a proposed industrial development onto a greenfield site at Acornfield Road, Knowsley.

The National Planning Policy Framework (NPPF) was published in March 2012, and updated in February 2019 by the Department of Communities and Local Government and replaced all planning policy statements including Planning Policy Statement 25 (PPS 25): Development and Flood Risk. The NPPF set out the Government's planning policies for England and how these are expected to be applied. The Planning Practice Guidance (PPG), provides additional guidance and retains key elements of the now superseded PPS 25.

An initial search on the Environment Agency's (EA) website has identified the development site to be located within Flood Zone 1 and is considered to be very low risk of flooding.

The purpose of this report is to provide details of the site Flood Risk and provide a drainage strategy to cope with surface water runoff generated by the proposed development and mitigate any potential downstream impacts.

2 DEVELOPMENT DESCRIPTION

2.1 Location

The site is located within an industrial zone area of Knowsley at OS Grid SJ 43767 98801 (E:343767, N:398801) and sits between Acornfield Road and Perimeter Road, as shown in Figure 1. The northern site boundary is bounded by an existing access road, which provides entry to other industrial units, and the south boundary is aligned with existing industrial units as shown on the aerial map in Figure 2. The site has a plan area of 2.246ha (22,457m^2).



Figure 1: Site Location (Google Maps © Bluesky 2021)

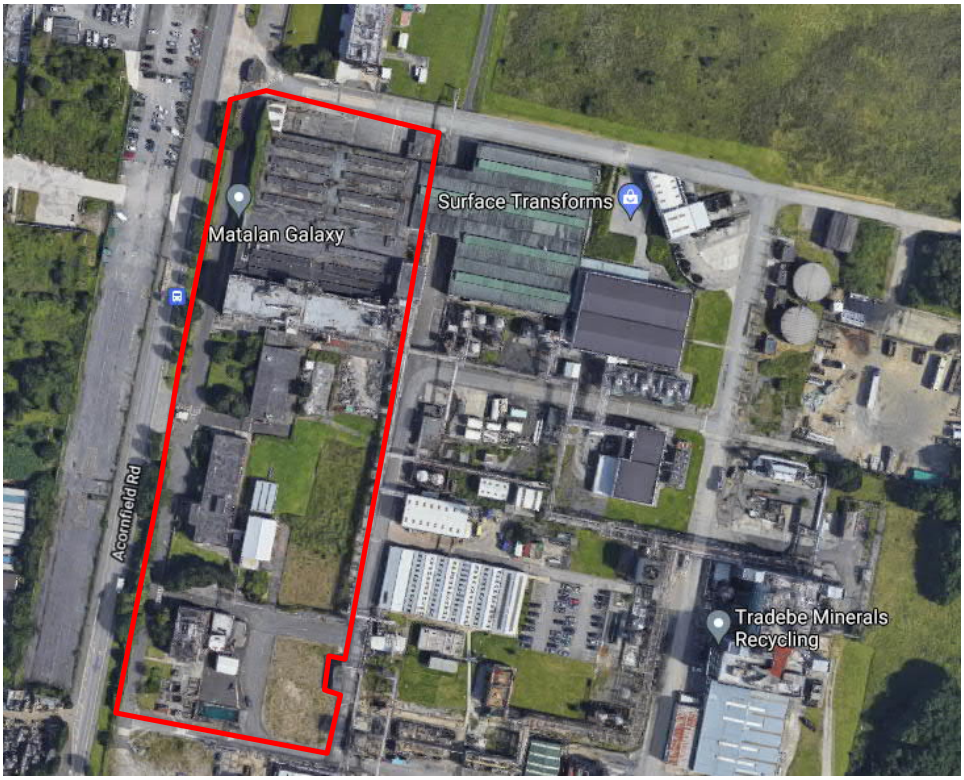


Figure 2: Aerial Photo (Google Maps © Bluesky 2021)

2.2 Existing Site

A pre-development topographical survey was carried out by Survey & Engineering Projects ref. S15946-T, dated April 2018. Based on the survey the site slopes towards the north-western corner, with a highpoint to the north-eastern side. Since the existing structure was demolished, the area mainly consists of the former building slab, associated hardstanding and a small green area. The site topographical survey is shown in Appendix A.

Existing Site Area	
Roof	7,299m^2
Hard Landscaping Area	10,546m^2
Soft Landscaping Area	4,612m^2
Total	22,457m^2

Table 1: Existing Areas

2.3 Proposals

The site covers an area of approximately 22,457m^2 of which 10,505m^2 is proposed to be roof area and 9,622m^2 is external hardstanding. The remaining areas will be soft landscaping. The

proposed development will be made up of an industrial unit as shown on Hale Architect drawing in Appendix B.

Proposed Site Area	
Roof	10,505m^2
Hard Landscaping Area	9,622m^2
Soft Landscaping Area	2,330m^2
Total	22,457m^2

Table 2: Proposed Areas

2.4 Flood Vulnerability Classification

The EA Flood risk map shows the site is located within Flood Zone 1, with a low probability of flooding. This is less than 1 in 1000 (<0.1%) annual probability of flooding from rivers and seas.

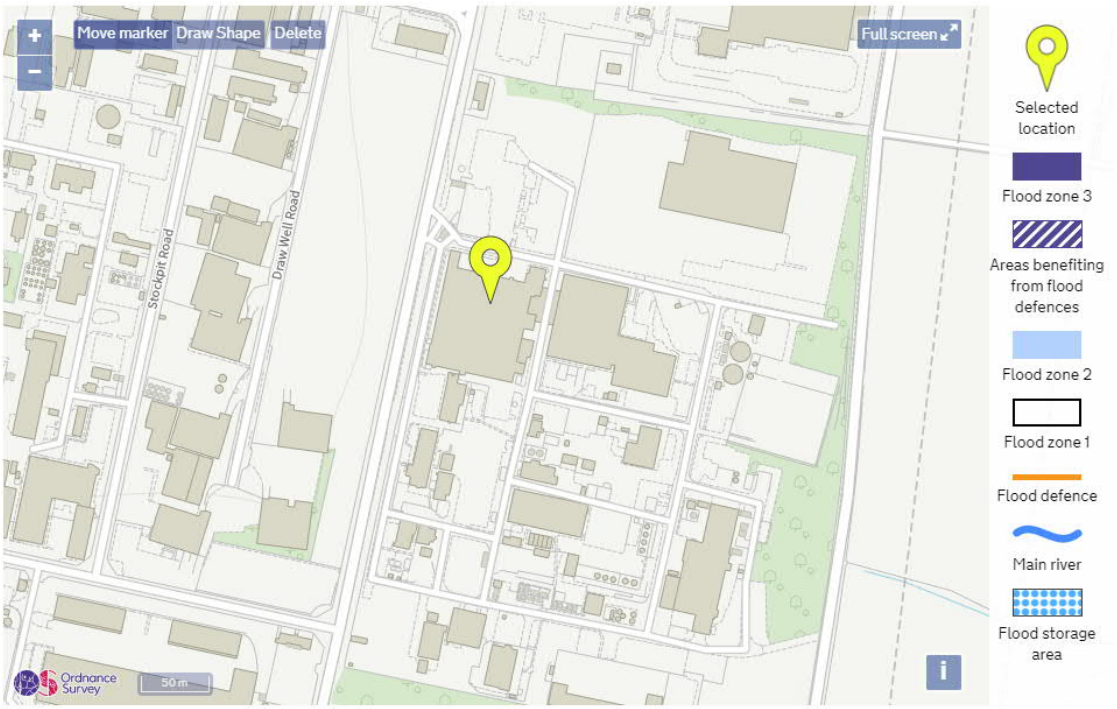


Figure 3: EA Flood Map

2.5 Flood Zone Compatibility

In accordance with the NPPF, there are no restrictions upon the type of development within Flood Zone 1. As such the proposed development is compatible within Flood Zone 1. Also, as the site is in Flood Zone 1 the need for an exception test is not required.

3 FLOOD RISK

In accordance with the NPPF and its Technical Guidance document, the risk of flooding from varying sources needs to be considered.

3.1 Rivers

The site is not within any watercourse influence. The closest recorded watercourse based on the EA maps is approximately 750m to the North away from the site and does not impose any flood risk to the proposed development.



Figure 4: Watercourse Location

3.2 Tidal

The site is not within the tidal influence.

3.3 Ground Water

Groundwater flooding is highly variable and dependant on local conditions. An investigation has been carried out through BGS borehole logs. Based on the boreholes results, the groundwater is at an average depth 2.0m from the existing surface. Boreholes logs are shown in Appendix H.

The figure 5 below shows the location of boreholes available within the site.

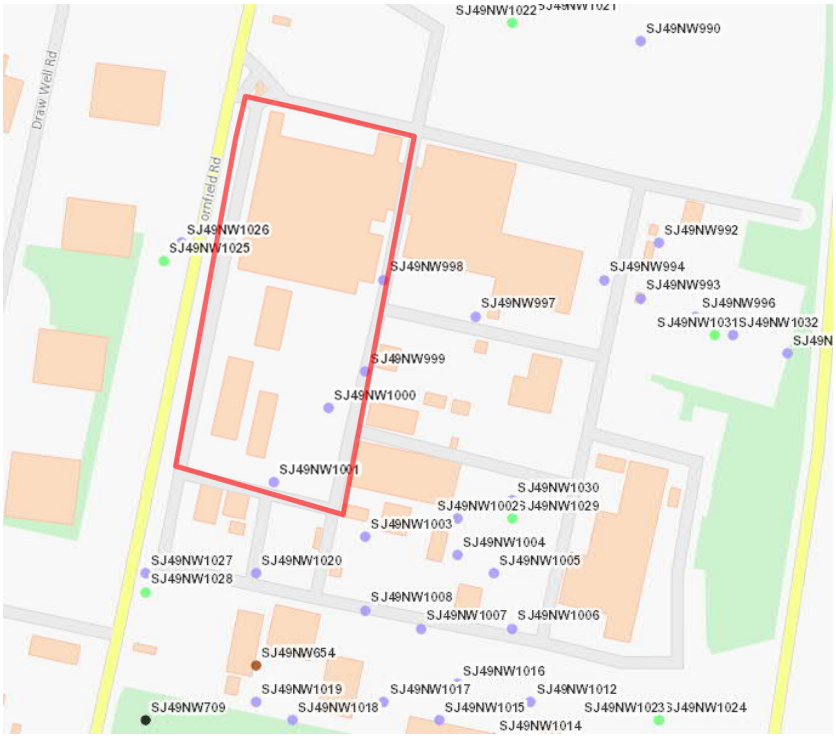


Figure 5: Boreholes' Location

Considering the above, the risk of flooding from groundwater is very low and if any groundwater flooding occurs, it would behave as overland flows and based on the proposed topography of the site it should be directed away from the proposed buildings toward the south boundary.

3.4 Overland Flows

Based on the topographical survey the site levels slope from a high point of 42.820m AOD to the north-east and falls to the south-west, with a low point of 41.390m AOD. The risk of flooding associated within the site areas are shown on the EA surface water flood risk map (Figure 6). The flood depth and velocities in all scenarios, including the high-risk scenario is considered to be very low or negligible as shown in Figures 6, 7 & 8 below.

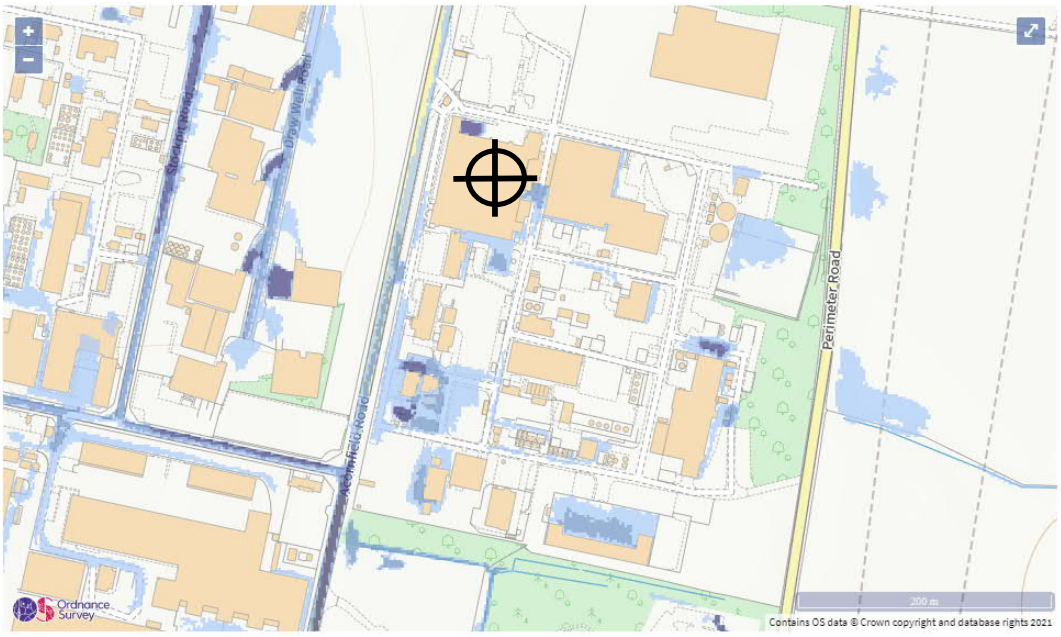


Figure 6: EA Surface Water Flood Risk Map

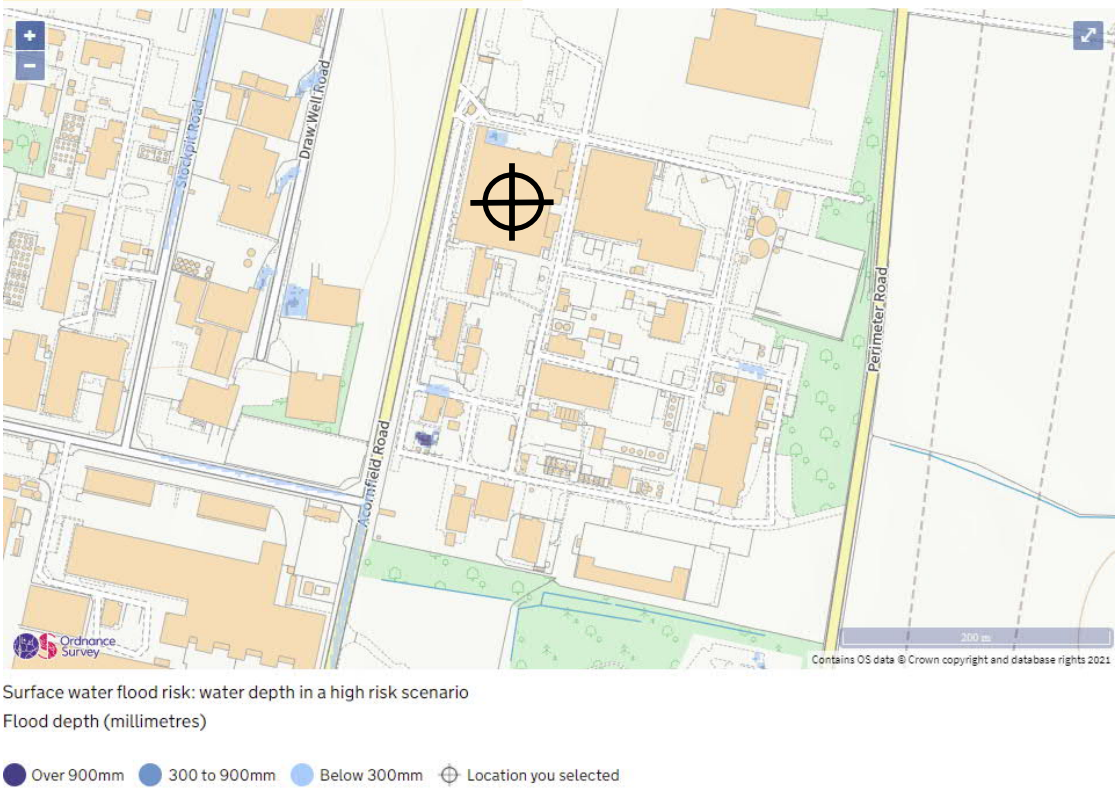


Figure 7: EA Surface Water Flood Risk Map - Flood Depth in High Risk Scenario

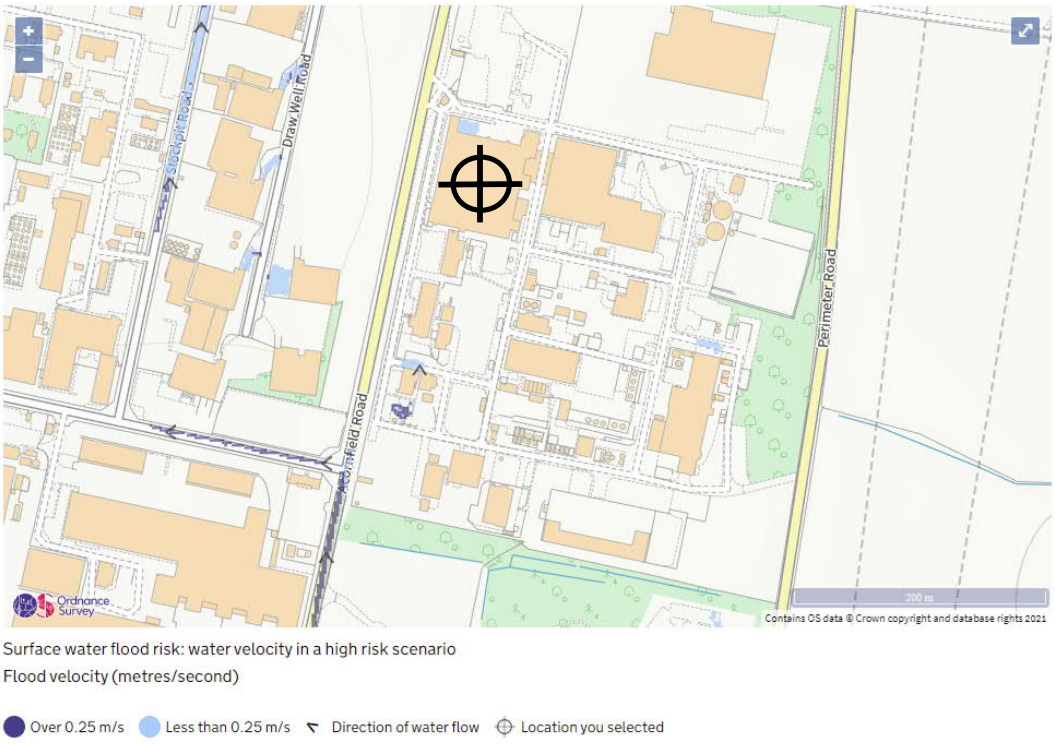


Figure 8: EA Surface Water Flood Risk Map - Flood Velocity in a High-Risk Scenario

3.5 Sewers

The United Utilities Sewer Records (Appendix C) shows no sewers running through the site. There are surface and foul drainage assets to the north-east of the site within Acornfield Road. As the site sees to reduce the existing brownfield area runoff, the risk of flooding from sewers is very low.

The residual risk when potential blockages within the sewer causes surcharging into the site. In this event of, the surface water exceedance would behave as overland flows, flowing mainly to the south of the site, avoiding the proposed buildings as shown in Appendix D.

3.6 Other Sources

As shown by the EA map below (Figure 9), there is no risk of flooding from reservoirs.
There are no other known sources of flooding within the vicinity of the site and the risk of flooding from other sources is considered very low.

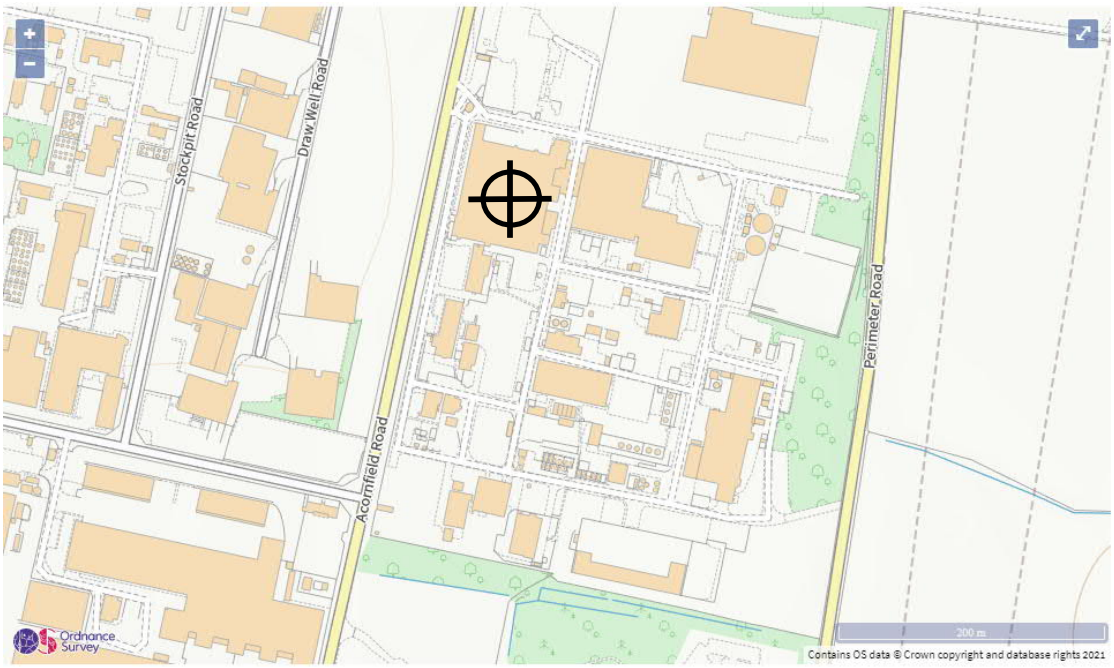


Figure 9: EA Reservoirs Flood Risk Map

3.7 Climate Change

The projected effects of climate change are expected to lead to increased rainfall, increased river flows, raised sea level and tidal fluctuations. The only increases pertinent to this development are from increased rainfall, its effect on drainage systems and potential overland flows.

The EA, as the government's expert on flood risk, has updated these climate change allowances. Following the above, a 40% increase in the peak rainfall intensity (Upper-end category) should be used considering the proposed development lifetime (50 -100 years) and the flood risk due to surface water runoff.

Furthermore, the extreme storm of a 1 in 100-year storm event with a 40% increase in rainfall shall be safely contained on-site, thus preventing any increase in flood risk to adjacent & downstream properties.

As a result of climate change, there would be a slight increase in the risk of flooding by overland flows and sewers; however, the risk would remain low.

4 FLOOD RISK MANAGEMENT

4.1 Floor Levels

To mitigate the flood risk due to surface water, the proposed development levels should be designed to provide flood flow routes within the site away from proposed buildings and access routes in the event of surface water drainage malfunction or during extreme rainfall events falling outside of the design requirements.

4.2 Sustainable Drainage Techniques

The use of various sustainable drainage techniques has been investigated with respect to their potential to be used within the development to control stormwater as close to the source as possible and reduce the potential increased flood risk from the development. They are reviewed in order of Most to Least Sustainable based upon the SuDS Hierarchy table from the EA.

	SUDS technique	*Flood Reduction*	*Pollution Reduction*	*Landscape & Wildlife Benefit*
Most Sustainable	**Living roofs**	✔	✔	✔
↑	**Basins and ponds** - Constructed wetlands - Balancing ponds - Detention basins - Retention ponds	✔	✔	✔
	Filter strips and swales	✔	✔	✔
	Infiltration devices - soakaways - infiltration trenches and basins	✔	✔	✔
↓	**Permeable surfaces and filter drains** - gravelled areas - solid paving blocks - porous paviors	✔	✔	
Least Sustainable	**Tanked systems** - over-sized pipes/tanks - storms cells	✔		

Table 3: SuDS Hierarchy

4.2.1 Living Roofs

Living / Green roofs are not recommended for this development due to the severe implications of adopting these systems on an industrial warehouse:

- Structural: Even an extensive green roof system with a 100mmm thick growing media will impose considerable loading to a typical lightweight roof system used on these units. Thus, increasing substantially the overall structural requirements.
- Slope: Green roofs are typically installed on flat roofs. The proposed lightweight roof system has a significant slope, and as such specific proprietary systems cannot be implemented.
- Maintenance: Any regular or irregular maintenance to the proposed units high roofs are likely to require the mobilization of elevated platforms and trained personnel.
- Damage & leaks: Although these systems are waterproof, extreme weather factors or human error can result in a leak in the roof. In these restricted conditions, finding and repairing such failure in a complex roof system will be a challenging process.

Although a green roof should always be considered, on this development, the complexity and disadvantages of implementing a green roof are far greater than the potential benefits.

4.2.2 Basins and Ponds

The existing and proposed development layouts have a high percentage coverage of hard landscaping and building plan area, the remaining available land would not be large enough to propose a basin or pond feature.

4.2.3 Filter Strips and Swales

The site layout and the proposed arrangement does not allow for the implementation of swales as these systems require a free large soft landscape area.

4.2.4 Infiltration Devices

Based on the borehole data the underlaying sub strata is Clays. Therefore, the use of infiltration techniques is not a feasible option for the site.

4.2.5 Attenuation Tank

The use of an attenuation tank will be required on site to the north. The storage volume required from this is 525m^3 and will allow the sites discharge rate drop significantly.

4.2.6 Permeable Paving/Porous Asphalt

The site includes a series of car parking areas that may be suitable for the use of porous asphalt. Storage could be provided within the sub-grade material prior to controlled discharge to the public sewer network.

The provision of storage within the sub-grade material would only be feasible in areas with a proposed gradient of less than 1 in 20 as detailed within CIRIA RP992/28 (Design Assessment Checklists for Permeable/Porous Pavement). The amount of storage provided within the drainage blanket is subject to sub-grade depth.

4.2.7 Rainwater Harvesting Systems

The use of rainwater to provide water for re-use within the proposed unit has been reviewed and ruled out as being not feasible for the following reasons;

- The demand for rainwater re-use on a building of this type is extremely low compared to the potential yield generated. Prolonged storage of rainwater can also lead to water "quality" issues in a holding tank, leading to coloration.
- There is an associated significant increase in CO_2 emissions from the rainwater harvesting systems because of the need to pump stored water from a lower level to different parts of the building at higher levels. This is in conflict with the primary objectives of a sustainable system.

4.2.8 Exceedance Event

Storage will be provided for the 1 in 100 years plus 40% CC event. Storm events in excess of the 1 in 100 years plus 40% CC event should be permitted to produce shallow depth flooding within landscaped areas or adjacent to an attenuation feature. Site levels should be designed to ensure that exceedance flooding is contained on-site to eventually drain back into the drainage system. In the event of rainfall intensities and durations outside of the modelled extreme scenarios or in the case of the drainage system malfunction, the exceedance flows will overflow toward the Southern site boundary as shown on the Exceedance Flow Route Drawing– Appendix D.

4.2.9 Surface Water Treatment

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), other roofs (non-residential) have a 'low' pollution hazard level. Roofs are considered to impose a low risk of pollution to the receiving ground and do not require any sort of specific water treatment other than capturing sediments in the catchpit manholes.

For the yard and carpark areas, treatment of the surface water runoff will be provided by proprietary treatment systems.

The delivery / industrial yard is considered to have a medium pollution hazard level which equates to following pollution hazard indices:

Table 4 below shows the pollution hazard indices for each land use.

Pollution Hazard Indices Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs	Low	0.3	0.2	0.05
Industrial/delivery yard	Medium	0.7	0.6	0.7

Table 4: SuDS Pollution Indices

(Table extract is taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2
** Indices values range from 0-1.)*

The runoff will be directed to permeable paving where practical (subject to site gradients).

Table 5 below demonstrates that permeable paving provides sufficient treatment to runoff.

Type of SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavements	0.7	0.6	0.7
Swale	0.5	0.6	0.6
Pond	0.7	0.7	0.5

Table 5: SuDS Mitigation Indices

(Table extract is taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.3

** Indices values range from 0-1)*

4.3 Surface Water Management

4.3.1 Existing Site Runoff

The existing brownfield site's runoff rate has been calculated using the modified rational method, as can be seen below in Table 6.

Site Area	Existing Run-Off Rates			
	1 in 1 Year Storm Event	1 in 30 Year Storm Event	1 in 100 Year Storm Event	1 in 100 + 40% CC Year Storm Event
Brownfield (2.246ha)	185.06 l/s	453.73 l/s	586.20 l/s	820.68 l/s

Table 6: Existing Flow Rates

4.3.2 Post-Development Surface Water Run-off

The nature of the proposed development means that there will be an increase in the impermeable areas of the site, resulting in an increase in both volume and the peak rates of run-off of flows when unrestricted. The proposed impermeable area covers approximately 91% of the site.

The on-site surface water drainage network will be split into two separate drainage systems (north and south of the site) such that surface water runoff from building roof and service yard will be collected and discharged separately from runoff from the carpark area.

The proposed network relies on the use of drainage sumps, pipework, catchpits, tank, manholes, petrol interceptor and a vortex flow control system to discharge the surface water.

The north network treats the roof area and service yard, a tanked system is proposed to store approximately 525m^3 of storage. Surface water from the tank and petrol interceptor will the flow to the vortex flow control unit, which will discharge the surface water at a rate of 90 l/s.

The south network treats the carpark area only. Surface water will flow through a permeable paving system which creates 285m^3 of storage. Water from the permeable paving will flow through diffuser blocks out of the site via an orifice at 8 l/s.

This system results in a total discharge rate of 98 l/s. Below in Table 7 a comparison can be seen between the existing and proposed situation.

Return Period	Run-off Rate		Betterment
	Existing (unmitigated)	Proposed	
Q_1	185.06 l/s	90 l/s	51.37%
Q_{30}	453.73 l/s	90 l/s	80.16%
Q_{100}	586.20 l/s	90 l/s	84.65%
$Q_{100+40\%}$	820.68 l/s	90 l/s	89.03%

Table 7: Existing and Proposed Discharge Rates

The proposed new surface water drainage system has been designed using current MicroDrainage analysis software, ensuring all planning requirements, Lead Local Flood Authorities (LLFA) and EA guidelines are satisfied to prevent uncontrolled flooding of the site and surrounding areas. Microdrainage calculations for the design of the surface water network and attenuation requirements on site are included in Appendix F.

The surface water drainage system proposed for the site is shown in Appendix G. The system shall be designed not to flood for the critical 1 in 100 year design storm plus 40% Climate Change.

4.3.3 Proposed Foul Water Drainage

The proposed foul water will discharge by gravity through private drainage into the existing foul water network on site.

A Pre-Planning Enquiry Application to United Utilities would be required to confirm the sewer capacity for the proposed development.

5 OFFSITE IMPACT

The proposed redevelopment of this site results in approximately the same impermeable area as its current use. To reduce the offsite impact, the surface water drainage network will be designed to cater for up to and including the 1 in 100 year return period storm event, with allowances for climate change (40% increase in rainfall). To minimise the risk to downstream properties the runoff from the critical storm event will be kept on the site.

As all the surface water is being controlled and attenuated onsite, the offsite impact is very low.

6 MAINTENANCE STRATEGY

6.1 Manholes, Inspection Chambers, Pipe Work, Drainage Channels & Gullies

The surface water drainage system should be inspected and maintained periodically, primarily to check for silt sedimentation within the system or ingress of any detritus or debris which would decrease system performance. Table 8 sets out the recommended maintenance actions and frequency.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove manhole and chamber covers to sewers and flow control on network– inspect to ensure water is flowing freely and that the water flow route is unobstructed. Remove debris and silt as required.	Half Yearly Undertake one of these inspections after leaf fall in autumn
Occasional Maintenance	None required	
Remedial Actions	Re-line or replace pipework if unable to clear blockages by jetting.	As required
Monitoring	Inspect chambers for build-up of silt and debris	Half yearly

Table 8: Operation & maintenance requirements for pipe network, manholes & inspection chambers, drainage channels & gullies.

6.2 Vortex Flow Control (H*ydrobrake)*

The vortex flow control relies typically on its shape to create a vortex within the unit to control the flows to a design point.

These systems have a larger cross-sectional area than that of a comparable orifice that is sized for the same design point, reducing the risk of blockage.

The product specified to be installed is a *Hydrobrake MD-SHE-0363-9000-2200-9000 .*

Table 9 sets out the recommended maintenance actions and frequency, refer appendix A for manufacture guidance notes.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect and identify if it is not operating correctly. If required, take remedial action.	Initially monthly for 3 months, then half yearly.
Remedial Actions	Repair/rehabilitate flow control.	As required.
Monitoring	Inspect chambers for build-up of silt and debris	Half yearly

Table 9 – Operation & maintenance requirements for vortex flow controls

6.3 Proprietary Surface Water Treatment Systems

These are manufactured products to provide a treatment to the surface water by removing specific pollutants.

Table 10 sets out the recommended maintenance actions and frequency. Manufacturer guidance/recommendations should always be used when available.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation.	Monthly for 3 months, then annually.
	Change the filter media.	As recommended by manufacturer.
	Remove sediment, oil grease and floatables.	As necessary – indicated by system inspections or immediately following significant spill.
Remedial Actions	Replace malfunctioning parts or structures.	As required.
Monitoring	Inspect for evidence of poor operation.	Biannually
	Inspect filter media and establish appropriate replacement frequencies.	Biannually
	Inspect sediment accumulation rates and establish removal frequencies.	Monthly during first half year of operation, then every six months.

Table 10 – Operation & maintenance requirements for proprietary surface water treatment systems - Based on CIRIA SuDS Manual 2015

6.4 Attenuation Tank

Geocellular attenuation tanks are proposed, they are modular storage systems made with plastic units. These units can be assembled to achieve the required volume and usually on multiple layers.

Generally, the units have 95% of voids content and are used to create an efficient below ground structure to store surface water.

Table 11 sets out the recommended maintenance actions and frequency.

Maintenance schedule	Required action	Typical frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually.
	Remove debris form the catchment surface (where it may cause risks to performance).	Monthly.
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockages by sediment, algae or other matter; remove and replace surface infiltration medium as required.	Annually.
	Remove sediments from pre-treatment structures and/or internal forebays.	Annually, or as required.
Remedial Actions	Repair/rehabilitate inlets, outlets, overflows and vents.	As required.
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary.	Every 5 years or as required.

Table 11 – Operation & maintenance requirements for attenuation storage tanks – Based on CIRIA SuDS Manual 2015

6.5 Porous Paved Area

The following Table 12 sets out the recommended maintenance actions and frequency for porous paved area.

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 surfaces from adjacent impermeable areas as this are 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 50mm of the level of the surface.	As required
	Remedial works to any depressions, rutting and cracked 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	Inspect for evidence of poor operation and/or weed growth -if required, take remedial action	Three-monthly, 48 hours after large storms in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
	Monitor inspection chambers	Annually

Table 12 – Operation & maintenance requirements for Porous Paved Area - Based on CIRIA SuDS Manual 2015

7 CONCLUSION

The FRA & Drainage Strategy has considered the potential flood risk to the proposed development and its potential impact on flood risk:

- The development is located in Flood Zone 1.
- The site flood risk is considered low or very low from all sources.
- The development drainage system and levels are designed to accommodate the 100-year rainfall event with a 40% allowance for climate change.
- The proposed development's drainage regime will reduce the onsite and offsite flood risk by having a more resilient surface water drainage system and reducing the peak surface water runoff rates.

Therefore, the FRA & Drainage Strategy concludes that overall this development has a low flood risk both on and offsite.

APPENDICES

Appendix A – Topographical Survey Plan

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (01495) 729855 F. (01495) 725566 W. www.sephd.com E. info@sephd.com

N

PLAN GRID NORTH

File Name: S15946-T_2D.dwg

LEGEND

AV	AIR VALVE
BB	BELLMAN BEACON
BH	BOREHOLE
BH	BORE HOLE
BM	BENCH MARK
BO	BOLLARD
BT	BT INSPECTION COVER
CB	CONTROL BOX
CBP	CAR PARK MACHINE POST
CCTV	CCTV
CGW	COMMUNICATIONS COVER
CH	CHIMNEY STACK
CC	CRANAGE CHANNEL
DP	DOWN PIPE
EB	ELECTRIC
EC	ELEC INSPECTION COVER
EL	EAVES LEVEL
ER	EARTH ROD
EB	EARTH BOSS
FH	FIRE HYDRANT POLE
FFL	FINISHED FLOOR LEVEL
FP	FLAG POLE
FP	FUEL POST
G	GULLY
GL	GARAGE LIGHT
GP	GATE POST
GW	GAS TAP
GV	GAS VALVE
IC	INSPECTION COVER
IL	INVERT LEVEL
LP	LAMP POST
LD	LADDER
LP	LAMP DOWN
LT	LAMP TOWN
M	MAST
P/M	PALISADE
R/W	WIRE MESH
P/W	POST AND WIRE
C/F	CLOSE PANEL
P/W	POST AND WIRE
P/R	POST AND RAIL
C/R	RISK RAIL
C/B	CLOSE BOARDED
P/R	POST AND RAIL
RWP	TOP OF FEATURE
SA	SATS
SP	SIGN POST
SW	SOAKAWAY
	BATTER
LBY	LIFEBUOY
MH	MANHOLE
MK	MARKER
MS	MILE STONE
MP	MOORING POST
NP	NOTICE BOARD
NP	NAME PLATE
PB	POST BOX
PB	POST OFFICE BOX
PC	PCC
PP	PETROL PUMP
PT	PIVOT
RE	RANGING EYE
RL	RIDGE LEVEL
RS	ROAD SIGN
RW	RETAINING WALL
RWP	RAINWATER PIPE
SAP	SAPLING
SH	SHRUB
SLV	SOFFIT LEVEL
TB	TELEPHONE BOX
TB	TRAFFIC BOLLARD
TC	TELEPHONE CALL BOX
TE	TIE RODS
TL	TRAFFIC LIGHT
TP	TELEPHONE POLE
TM	TICKET MACHINE
TP	TELEGRAPH POLE
TP	TREE PROTECTION
VP	VENT PIPE
WM	WATER METER
WT	WATER TANK
WT	WATER STOP TAP
WV	WATER VALVE ONLINE
WT	TREE WITH GIRTH
WT	TREE MULTI-GIRTH
	HEDGE
	WATER COURSE
	FENCE
	SURFACE CHANGE
	TOP BANK
	BOTTOM BANK
	BUILDING
	BUILDING LIGNOR
	OVER HEAD ELECTRICAL
	OVER HEAD TELECOM

NOTES:

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref. DSLTY107.

SURVEY STATIONS

Name	Easting	Northing	Height
JR1	344042.076	398782.582	45.138
JR2	344048.312	398884.698	45.773
JR3	343767.982	398900.098	42.934
JR4	343747.980	398855.588	41.852
JR5	343744.732	398965.585	41.852
JR6	343750.483	398940.527	41.812
JR7	343744.732	398965.585	41.852
JR8	343788.170	398928.441	42.844
JR9	343831.356	398883.236	44.727
JR10	343792.155	398861.141	42.833
JR99	343762.705	398883.141	42.833
MT1	343713.705	398755.815	41.975
MT2	343744.780	398850.074	42.49
MT3	343819.181	398828.315	42.578
MT4	343744.780	398850.074	42.49
MT5	343788.178	398868.243	43.105
MT6	343773.673	398821.983	41.684
SEPP	343744.780	398850.074	42.49
SEPP	343819.525	398936.370	41.482
SEPB	343707.741	398715.212	41.883



0 2m 4m 8m 12m 16m
SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	01	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (0151) 729855 F. (0151) 7255666 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T_2D.dwg

LEGEND

AV	AIR VALVE	LBY	LIFEBUOY
BB	BELOW BEACON	MH	MANHOLE
BH	BOREHOLE	MO	MOORING
BW	BOWL HOLE	MS	MILE STONE
BM	BENCH MARK	MP	MOORING POST
BO	BOLLARD	NP	NEWSPAPER STAND
BT	BT INSPECTION COVER	NP	NAME PLATE
CB	CONTROL BOX	PB	POST BOX
CBTV	CONTROL BOX WITH POST	PB	POST OFFICE BOX
COL	COLUMN	PC	PIER
COM	COMMUNICATIONS COVER	PP	PETROL PUMP
CP	CONCRETE POST	PT	PYLON
DC	DRAINAGE CHANNEL	RE	RANGING EYE
DP	DOWN PIPE	RL	RIDGE LEVEL
EB	ELEC BOX	RS	ROAD SIGN
EC	ELEC INSPECTION COVER	RW	RETAINING WALL
EL	EAVES LEVEL	SAP	SAMARITAN PIPE
ELL	ELEC LIGHT	SAP	SAPLING
ER	EARTH ROD	SH	SHRUB
FB	FLOWER BED/VASE	SOF	SOFFIT LEVEL
FFL	FINISHED FLOOR LEVEL	SP	SIGN POST
FH	FIRE HYDRANT	TB	TRAFFIC BOLLARD
FP	FUEL POST	TC	TRAFFIC CALL BOX
G	GULLY	TE	TE WIRE
GL	GROUND LIGHT	TL	TRAFFIC LIGHT
GP	GATE POST	TP	TELEPHONE BOX
GSP	GAS TAP	TM	TICKET MACHINE
GV	GAS VALVE	TP	TELEGRAPH POLE
IC	INSPECTION COVER	UP	UTILITY POLE
IL	INVERT LEVEL	VP	VENT PIPE
LA	LAMP ARM	WM	WATER METER
LAD	LADDER	WO	WASTE OUT
LD	LAMP DOWN	WT	WATER STOP TAP
LP	LAMP POST	WV	WATER VALVE ON LINE
LU	LAMP UP	WW	WATER WELL
		YP	TREE SPOT HEIGHT
PAL	PALISADE		TREE MULTI-SPOT
W/M	WIRE MESH		WATER COURSE
C/F	CHAIN LINK FENCE		KERB
C/P	CLOSE PANEL		FENCE
P/W	POST AND WIRE		SURFACE CHANGE
R/F	POST AND RAIL		CLIFF
R/W	RISK RAIL		TOP/ BANK
C/B	CLOSE BOARDED		BOTTOM/ BANK
T/H	TOP OF HEDGE		CANOPY
FAS BO	TOP OF FEATURE		BUILDING CANOPY
GATE	GATE		OVER HEAD ELECTRICAL
HDGE	HEDGE		OVER HEAD TELECOM
BOREHOLE			
BATTER			

NOTES:

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref. DSLTY027

SURVEY STATIONS

Name	Easting	Northing	Height
A1	344042.076	398782.562	45.138
A2	344048.312	398864.418	45.773
A3	343767.982	398950.098	42.834
A4	343744.882	398945.583	41.852
A5	343744.732	398943.583	41.852
A6	343750.483	398940.527	41.812
A7	343780.665	398852.641	42.844
A8	343785.170	398928.641	42.844
A9	343831.356	398883.236	44.727
A10	343762.705	398883.341	42.843
A99	343762.705	398883.341	42.843
MT1	343713.706	398755.815	41.975
MT2	343734.780	398855.075	42.49
RP2	343734.780	398855.075	42.49
RP3	343819.181	398828.315	42.079
RP4	343768.178	398848.245	42.105
RP5	343768.178	398848.245	42.105
RP6	343773.673	398621.983	41.684
SEP6	343773.673	398621.983	41.684
SEP7	343819.525	398556.370	41.482
SEP8	343707.741	398715.212	41.883



0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	02	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (0151) 729855 F. (0151) 7255666 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T-3D.dwg

LEGEND

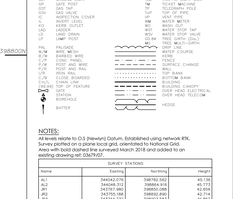
AV	AIR VALVE
BB	BELLMAN BEACON
BH	BOREHOLE
BW	BOMB WALL
BY	BOLLARD
BM	BENCH MARK
CH	CATCH PIT
CI	BT INSPECTION COVER
CB	CONTROL BOX
CCTV	CCTV CAMERA MOUNTED POST
COL	COLUMN
COM	COMMUNICATIONS COVER
CP	CONCRETE POST
CC	CROSSING CHANNEL
DP	DOWN PIPE
DT	DRAIN
EC	ELEC INSPECTION COVER
EL	GAVEL LEVEL
EP	ELECTRIC POLE
ER	EARTH ROD
FH	FIRE HYDRANT COVER
FFL	FINISHED FLOOR LEVEL
FG	FLOOD GULLY
FP	FUEL POST
G	GULLY
GL	GROUND LIGHT
GP	GATE POST
GW	GAS TAP
GV	GAS VALVE
IC	INSPECTION COVER
IL	INVERT LEVEL
KO	KERB OUTLET
LAD	LADDER
LP	LAMP COLUMN
LT	LAMP TAP
MH	MANHOLE
M/W	WIRE MESH
P/W	PALISADE FENCE
C/W	CHAIN LINK FENCE
P/W	POST AND WIRE
R/W	RAIL FENCE
K/W	KICK RAIL
C/B	CLOSE BOARDED
R/W	RAILWAY
TOS	TOP OF FEATURE
TP	TRIAL PIT
TR	TREE
TS	TOPSOIL
BATTER	
LBY	LIFEBUOY
MH	MANHOLE
MP	MOORING POST
MR	MILL STONE
MT	MOORING TURNING
NP	NOTICE POST
NP	NAME PLATE
PC	POST OFFICE
PB	POST OFFICE BOX
PL	PILLAR
PP	PETROL PUMP
PT	PIVOT
RE	RANGING EYE
RL	RIDGE LEVEL
RS	ROAD SIGN
RW	RETAINING WALL
SMP	SWANNATA PIPE
SAP	SAPLING
SP	SIGN POST
SOF	SOFFIT LEVEL
SV	SCAFFOLD POLE
TB	TRAFFIC BOLLARD
TC	TRAFFIC CALL BOX
TE	TE WIRE
TL	TRAFFIC LIGHT
TM	TRAFFIC MAST BOX
TM	TICKET MACHINE
TP	TELEGRAPH POLE
UP	UTILITY POLE
VP	VENT PIPE
WM	WATER METER
WT	WATER TAP
WT	WATER STOP TAP
WV	WATER STOP VALVE
WP	TREE WITH SPREAD
	TREE MULTI-SPRD
RAIL	RAILINGS
WALL	WATER COURSE
	FENCE
	SURFACE CHANGE
	TOP BANK
	BOTTOM BANK
	CANOPY
	BUILDING CANOPY
	OVER HEAD ELECTRICAL
	OVER HEAD TELEFLOW
	HEDGE

NOTES:

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref. DSLTY107

SURVEY STATIONS

Name	Easting	Northing	Height
A1	344042.076	398782.502	45.138
A2	344048.312	398884.418	45.773
A3	343767.982	398950.098	42.604
A4	343744.732	398915.583	41.852
A5	343744.732	398965.583	41.852
A6	343750.483	398940.527	41.812
A7	343780.483	398940.527	41.812
A8	343788.115	398928.441	42.844
A9	343831.355	398885.236	44.727
A10	343831.355	398885.236	44.727
A99	343762.705	398965.341	42.843
MT1	343713.705	398755.813	41.975
MT2	343713.705	398855.813	41.975
RP2	343754.780	398850.570	42.491
RP3	343819.181	398828.315	42.579
RP4	343768.178	398868.243	42.100
RP5	343768.178	398868.243	42.100
RP6	343773.673	398621.983	41.684
SEP8	343819.525	398566.570	41.482
SEP7	343819.525	398566.570	41.482
SEP8	343707.741	398715.212	41.883



0 2m 4m 8m 12m 16m
SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	03	A0	--



© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (01495) 729855 F. (01495) 725566 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T-2D.dwg

LEGEND

AV	AIR VALVE	LBY	LIFEBUOY
BB	BOLLARD BEACON	MH	MANHOLE
BH	BOREHOLE	MP	MOORING POST
BH	BORE HOLE	MS	MILE STONE
BM	BENCH MARK	MT	MOORING TWIN
BO	BOLLARD	NP	NAVIGATION PILE
BT	BT INSPECTION COVER	NP	NAME PLATE
CB	CONTROL BOX	PB	POST OFFICE BOX
CBTV	CCTV CAMERA MAST/ POST	PL	PILE
COL	COLUMN	PP	PETROL PUMP
COM	COMMUNICATIONS COVER	PT	PYLON
CP	CONCRETE POST	SE	SIGHTING EYE
DC	DRAINAGE CHANNEL	RL	ROAD LEVEL
DP	DOWN PIPE	RS	ROAD SIGN
EB	ELEC BOX	RW	RETAINING WALL
EC	ELEC INSPECTION COVER	RWP	RAINWATER PIPE
EL	EAVES LEVEL	SAP	SAPLING
ES	ELEC SERVICE	SP	SOIL PIPE
ER	EARTH ROD	SPT	SPOT LEVEL
FB	FLOWER BED/ STATUE	ST	STUMP
FFL	FINISHED FLOOR LEVEL	TB	TRAFFIC BOLLARD
FH	FIRE HYDRANT	TC	TRAFFIC CALL BOX
FP	FLAG POLE	TR	TIE ROPE
G	GULLY	TL	TRAFFIC LIGHT
GL	GROUND LIGHT	TP	TELEPHONE BOX
GP	GATE POST	TM	TICKET MACHINE
GSP	GAS TAP	TP	TELEGRAPH POLE
GV	GAS VALVE	TS	TREE STUMP
IC	INSPECTION COVER	VP	VENT PIPE
IL	INVERT LEVEL	WM	WATER METER
LC	LIGHT COLUMN	WL	WELL
LD	LADDER	WT	WATER STOP TAP
LP	LAMP POST	WV	WATER VALVE
		WS	TREE SPREAD DELEAF
		WM	TREE MULTI-CONFER

NOTES:
All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref. DSLTY107.

SURVEY STATIONS

Name	Easting	Northing	Height
A1	344062.076	398782.562	45.138
A2	344048.312	398854.818	41.773
A3	343767.980	398950.098	42.934
A4	343744.662	398913.588	41.852
A5	343744.662	398943.583	41.852
A6	343750.483	398940.527	41.812
A7	343781.455	398940.527	41.812
A8	343788.170	398928.441	42.844
A9	343831.355	398885.236	44.727
A10	343831.355	398885.236	44.727
A99	343762.705	398866.341	42.823
MT1	343713.705	398755.813	41.975
MT2	343713.705	398755.813	41.975
RP2	343754.780	398850.075	42.491
RP3	343819.181	398828.315	42.076
RP4	343768.178	398868.243	42.100
RP5	343768.178	398868.243	42.100
RP6	343773.673	398821.993	41.684
SEP2	343819.520	398821.993	41.684
SEP7	343819.520	398856.070	41.482
SEP8	343707.741	398715.212	41.883



0 2m 4m 8m 12m 16m
SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	04	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (01495) 729805 F. (01495) 725566 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T_2D.dwg

LEGEND

AV	AIR VALVE	LBY	LITTERBUOY
BB	BELLMAN BEACON	MH	MANHOLE
BH	BOREHOLE	MK	MARKER
BW	BOMB VALVE	MS	MILE STONE
CB	CATCHPIT	MV	MOORING VALVE
DM	DEMOUNTABLE	NP	NEWSPAPER STALL
EO	EXT. INSPECTION COVER	NT	NAME PLATE
GB	GRAVITY BOX	PB	POST BOX
GC	CONTROL BOX	PB	POST OFFICE BOX
GP	GUARD POST WITH POST	PC	PIER
GTS	TELEMETRY	PP	PETROL PUMP
GW	COMMUNICATIONS COVER	PT	PILOT
HC	HANDRAIL CHANNEL	RE	RAILWAY SIGNAL
HC	HANDRAIL CHANNEL	RL	RIDGE LEVEL
DP	DOWN PIPE	RS	ROAD SIGN
IC	INLET	RW	RETAINING WALL
IEO	FLOO INSPECTION COVER	SMP	SEAMASTER PIPE
EL	EAVES LEVEL	SAP	SAPLING
FB	FLOWER BED	SP	SPOT LEVEL
EB	EARTH BOND	SW	SOFFIT LEVEL
FG	FINISHED GROUND LEVEL	TB	TRAFFIC BOLLARD
FFL	FINISHED FLOOR LEVEL	TB	TRAFFIC BOLLARD
FH	FIRE HYDRANT	TC	TELEPHONE CALL BOX
FP	FUEL POST	TE	TE WIRE
G	GULLY	TL	TRAFFIC LIGHT
GL	GROUND LIGHT	TP	TELEPHONE POLE
GP	GATE POST	TM	TOILET MACHINE
GW	GAS TAP	TP	TELEGRAPH POLE
HP	HAND RAIL	UP	UTILITY POLE
IC	INSPECTION COVER	VP	VENT PIPE
IL	INVERT LEVEL	WM	WATER METER
LB	LAMP BRACKET	WP	WIRE POST
LD	LADDER	WT	WATER STOP TAP
LP	LAMP POST	WT	WATER TANK ON STILTS
LT	LAMP TOWER	WW	TREE WITH WIRE GUARD
		WW	TREE WITH GUARD
PAL	PALISADE		
R/W	WIRE MESH		
C/W	CHAIN LINK		
C/W	CHAIN FABRIC		
P/W	POST AND WIRE		
W/R	WIRE RAIL		
R/R	RISK RAIL		
C/B	CLOSE BOARDED		
T/B	TIMBER		
TOP	TOP OF FEATURE		
GATE	GATE		
BOL	BOLLARD		
SHR	SHORELINE		
	BATTER		

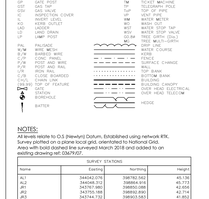
	KERB
	WATER COURSE
	FENCE
	SURFACE CHANGE
	TOP BANK
	BOTTOM BANK
	BUILDING
	BUILDING CANOPY
	OVER HEAD ELECTRICAL
	OVER HEAD TELECOM
	HEDGE

NOTES:

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref. DSLTY07.

SURVEY STATIONS

Name	Easting	Northing	Height
A1	344042.076	398782.592	45.138
A2	344048.312	398864.698	45.773
A3	343767.982	398950.098	42.606
A4	343744.980	398913.588	42.414
A5	343744.1	398903.583	41.852
A6	343750.483	398940.527	41.812
A7	343760.443	398965.241	41.844
A8	343788.170	398928.681	42.844
A9	343831.355	398883.236	44.727
A10	343797.104	398861.1	42.833
A99	343762.705	398856.741	42.833
MT1	343713.705	398755.813	41.975
MT2	343734.781	398803.075	42.49
MT3	343734.780	398850.075	42.491
MT4	343819.181	398828.315	42.578
MT5	343768.178	398868.243	42.103
MT6	343768.178	398868.243	42.103
MT7	343773.673	398821.993	41.684
MT8	343773.673	398821.993	41.684
SEP7	343819.501	398766.070	41.482
SEP8	343707.741	398713.212	41.883



0 2m 4m 8m 12m 16m
SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	05	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited
without the prior permission of Survey & Engineering Projects Ltd.
T. (0151) 729835 F. (0151) 7255666 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T-2D.dwg

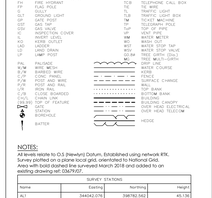
LEGEND

AV	AIR VALVE	LBY	LIFEBUOY
BB	BELISHA BEACON	MH	MANHOLE
BH	BOREHOLE	MP	MARKER POST
BH	BORE HOLE	MS	MILD STONE
BM	BENCH MARK	MV	MOORING POST
BT	BT MANHOLE	NTL	NOT TO LEVEL
BTI	BT INSPECTION COVER	OP	OVERHEAD PIPE
CB	CAPSTAN BOLT	PB	POST BOX
CB	CONTROL BOX	PO	POST OFFICE BOX
CBP	CONCRETE BOLLARD POST	PP	POWER POLE
CCTV	CCTV	PUMP	PETROL PUMP
COM	COMMUNICATIONS COVER	RT	RODDING EYE
CP	CONCRETE POST	RE	RODDING EYE
CC	CROSSING CHANNEL	RL	RIDGE LEVEL
DP	DOWN PIPE	RS	ROAD SIGN
DP	DRAIN PIPE	RW	RETAINING WALL
EC	ELEC INSPECTION COVER	SAP	SAMARITAN PIPE
EL	EAVES LEVEL	SAP	SAPLING
EM	ELEC METER	SC	SHRUB
ER	EARTH ROD	SL	SOFFIT LEVEL
FC	FLOOR CHANGE	SP	SIGN POST
FFL	FINISHED FLOOR LEVEL	TB	TRAFFIC BOLLARD
FH	FIRE HYDRANT	TC	TRAFFIC CALL BOX
FP	FUEL POST	TE	TE MHD
GL	GULLY	TL	TRAFFIC LIGHT
GL	GROUND LIGHT	TP	TELEPHONE POST BOX
GP	GATE POST	TM	TICKET MACHINE
GW	GAS TAP	TP	TELEGRAPH POLE
GV	GAS VALVE	UP	UTILITY POLE
IC	INSPECTION COVER	VP	VENT PIPE
IL	INVERT LEVEL	WM	WATER METER
LP	LAMP POST	WP	WOOD POST
LR	LADDER	WT	WATER STOP TAP
LT	LIGHT TOWER	WV	WATER VALVE
LP	LAMP POST	WW	TREE WITH WOOD
		WW	TREE MULTI-GIRTH
PAL	PALISADE		TREE LINE
R/W	WIRE MESH		WATER COURSE
C/W	CHAIN LINK		FENCE
C/W	CLOSE TIMBER		FENCE
P/W	POST AND WIRE		SURFACE CHANGE
P/R	POST AND RAIL		KERB
S/W	IRON RAIL		TOP /BANK
C/B	CLOSE BOARDED		BOTTOM /BANK
T/H	TRIM HEDGE		BUILDING
TOP	TOP OF FEATURE		BUILDING CANOPY
GATE	GATE		OVER HEAD ELECTRICAL
SHED	SHED		OVER HEAD TELECOM
	BATTER		HEDGE

NOTES:

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref. DSLTY027

SURVEY STATIONS			
Name	Easting	Northing	Height
A1	344042.076	398782.562	45.126
A2	344048.312	398864.698	45.773
A1	343767.982	398950.098	42.606
A2	343761.746	398867.962	41.959
A3	343744.732	398563.585	41.852
A4	343750.483	398540.527	41.812
A5	343760.483	398515.527	41.812
A6	343788.115	398526.641	42.844
A7	343831.355	398683.236	44.727
A8	343797.155	398811.141	45.126
A9	343762.105	398950.141	42.843
MT1	343713.705	398755.815	41.975
MT2	343734.780	398755.075	42.497
RP2	343734.780	398850.075	42.497
RP3	343819.051	398828.315	42.079
RP4	343788.178	398668.243	42.520
RP5	343788.178	398568.243	42.520
RP6	343773.673	398621.993	41.684
SEP3	343773.673	398621.993	41.684
SEP7	343819.525	398566.075	41.482
SEP8	343707.741	398715.012	41.883



0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	06	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited
without the prior permission of Survey & Engineering Projects Ltd.
T. (01495) 729855 F. (01495) 725566 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T-2D.dwg

LEGEND

AV	AIR VALVE	LBY	LITTERBUOY
BB	BELLMAN BEACON	MH	MANHOLE
BH	BOREHOLE	MP	MARKER POST
BH	BORE HOLE	MS	MILL STONE
BM	BENCH MARK	MT	MOORING TIE
BT	BT MANHOLE	NTL	NATIONAL TRUST, WALL
BT	BT INSPECTION COVER	NW	NAME PLATE
CB	CONTROL BOX	PB	POST BOX
CBTV	CCTV CAMERA MAST/ POST	PB	POST OFFICE BOX
CL	CLEAR	PO	PETROL PUMP
COM	COMMUNICATIONS COVER	PT	PIVOT
CP	CONCRETE POST	RE	RODDING EYE
DC	DRAINAGE CHANNEL	RL	RIDGE LEVEL
DP	DOWN PIPE	RS	ROAD SIGN
EB	ELEC BOX	RW	RETAINING WALL
EC	ELEC INSPECTION COVER	SAP	SAMARITAN PIPES
EL	EAVES LEVEL	SAP	SAPLING
ES	ELEC SERVICE	SC	SHRUB
ER	EARTH ROD	SIP	SOFFIT LEVEL
FB	FLOWER BED/ STATE	SP	SIGN POST
FFL	FINISHED FLOOR LEVEL	TB	TRAFFIC BOLLARD
FH	FIRE HYDRANT	TC	TRAFFIC CONTROL CALL BOX
FP	FUEL POST	TE	TIE WIRE
G	GULLY	TL	TRAFFIC LIGHT
GAP	GAS VALVE/ LIGHT	TP	TELEPHONE POLE/ BOX
GP	GATE POST	TM	TO MET MACHINE
GSP	GAS TAP	TP	TELEGRAPH POLE
GV	GAS VALVE	UP	UTILITY POINT
IC	INSPECTION COVER	VP	VIEW POINT
IL	INVERT LEVEL	WM	WATER METER
LB	LETTER BOX	WP	WOOD POST
LD	LADDER	WT	WATER STOP TAP
LP	LAMP STANDARD	WV	WATER VALVE/ SHAFT
LP	LAMP POST	YB	YARD BOLLARD
		YP	YARD POST/ SIGN
PAL	PALISADE		TREE MULTI-TRUNK
W/M	WIRE MESH		TREE SINGLE
C/W	CHAIN LINK FENCE		WATER COURSE
C/W	CLOSE PANEL FENCE		FENCE
P/W	POST AND WIRE		SURFACE CHANGE
W/R	POST AND RAIL		TOP BANK
C/B	CLOSE BOARDED		BOTTOM BANK
TOP	TOP OF BANK		BUILDING
TOP	TOP OF FEATURE		BUILDING CANOPY
GATE	GATE		OVER HEAD ELECTRICAL
SHED	SHED		OVER HEAD TELECOM
	BOREHOLE		
	BATTER		HEDGE

NOTES:
All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing survey ref. DSLTY107

SURVEY STATIONS

Name	Easting	Northing	Height
A1	344042.076	398782.582	45.138
A2	344048.302	398864.698	45.773
A3	343767.980	398950.098	42.604
A4	343744.882	398913.588	42.852
A5	343744.732	398903.583	41.852
A6	343750.483	398940.527	41.812
A7	343781.665	398926.641	42.844
A8	343781.115	398926.641	42.844
A9	343831.355	398883.236	44.727
A10	343831.355	398883.236	44.727
A99	343782.105	398886.141	42.853
M1	343713.705	398755.813	41.975
M2	343713.705	398755.813	41.975
M3	343724.780	398850.075	42.491
M4	343819.051	398828.315	42.079
M5	343819.051	398828.315	42.079
M6	343768.178	398868.243	43.100
M7	343773.673	398621.903	41.684
M8	343773.673	398621.903	41.684
SEP7	343819.525	398566.070	41.482
SEP8	343707.741	398715.212	41.883



0 2m 4m 8m 12m 16m
SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	07	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. (01695) 729835 F. (01695) 725566 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-T_2D.dwg

LEGEND

AV	AIR VALVE	LBY	LIFEBUOY
BB	BRUSHA BEACON	MH	MANHOLE
BOL	BOLLARD	MKR	MARKER
BH	BOREHOLE	MS	MARK STONE
BIN	BIN	MP	MOORING POINT
BM	BENCH MARK	MW	MONITORING WELL
BS	BUS STOP	NP	NUMIC PLATE
BT	BT INSPECTION COVER	OP	OUTFALL PIPE
CB	CONTROL BOX	PB	POST OFFICE BOX
CCTV	CCTV CAMERA POST	PN	PYLON
CH	CATCH	PU	PETROL PUMP
COM	COMMUNICATIONS COVER	PT	PIT
CTV	CABLE TV COVER	RE	RODDING EYE
DC	DRAINAGE CHANNEL	RL	RIDGE LEVEL
DP	DOWN PIPE	RS	ROAD SIGN
DR	DRAIN	RTW	RETAINING WALL
EIC	ELEC INSPECTION COVER	RWP	RAINWATER PIPE
EL	EAVES LEVEL	SAP	SAPLING
ELB	ELECTRIC BOX	SP	SIGN POST
EM	EM MARKER	SSP	SUMP LEVEL
EP	ELECTRICITY POLE	SV	STOP VALVE
FFL	FINISHED FLOOR LEVEL	TB	TRAFFIC BOLLARD
FH	FIRE HYDRANT	TCB	TELEPHONE CALL BOX
FP	FLAG POLE	TIE	TIE WIRE
G	GULLY	TL	TRAFFIC LIGHT
GLT	GROUND LIGHT	TLB	TRAFFIC LIGHT BOX
GP	GUARD POST	TP	TELEGRAPH POLE
GST	GAS TAP	TT	TELEPHONE POLE
GSV	GAS VALVE	ToP	TOP OF PIPE
IC	INSPECTION COVER	VP	VENT PIPE
IL	INVERT LEVEL	WM	WATER METER
KO	KERB OUTLET	WO	WASH OUT
LAD	LADDER	WST	WATER STOP TAP
LD	LAND DRAIN	WSV	WATER STOP VALVE
LP	LAMP POST	GIRTH	TREE GIRTH (Dia.)
		MEASURED GIRTH	TREE GIRTH
PAL	PALISADE		DRIP LINE
W/M	WIRE MESH		WATER COURSE
B/W	BARBED WIRE		KERB
C/P	CONC PANEL		FENCE
P/W	POST AND WIRE		SURFACE CHANGE
P/R	POST AND RAIL		WALL
T/W	TIMBER		TOP OF BANK
C/B	CLOSE BOARDED		BOTTOM BANK
CH/L	CHAIN LINK		BUILDING
(99.99)	TOP OF FEATURE		BUILDING CANOPY
	GATE		OVER HEAD ELECTRICAL
	STATION		OVER HEAD TELECOM
	BOREHOLE		
	BATTER		HEDGE

NOTES:

All levels relate to O.S (Newlyn) Datum. Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.
Area with bold dashed line surveyed March 2018 and added to an existing drawing ref; 03679/07.

SURVEY STATIONS

Name	Easting	Northing	Height
AL1	344042.076	398782.562	45.136
AL2	344048.312	398864.916	45.773
JR1	343767.980	398850.088	42.656
JR2	343755.188	398892.890	42.714
JR3	343744.732	398903.583	41.852
JR4	343750.483	398940.527	41.812
JR5	343760.941	398932.069	42.783
JR6	343786.115	398926.641	42.844
JR7	343831.355	398883.239	44.727
JR8	343787.544	398873.147	42.754
JR99	343782.705	398850.341	42.693
MP1	343713.700	398753.813	41.675
RP1	343727.764	398841.179	41.761
RP2	343759.780	398850.015	42.491
RP3	343819.161	398826.315	42.679
RP4	343782.972	398752.566	42.384
RP5	343788.176	398686.243	43.100
RP6	343713.873	398621.593	41.684
SEP5	343761.408	398574.351	41.818
SEP7	343679.531	398592.015	41.462
SEP8	343707.741	398713.212	41.883



SHEET LAYOUT

0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Topographical Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
D.Fleming	D.Wright	R.Critchley

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Apr 18	S15946-T	08	A1	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
t. 01695 729969 f. 01695 729566 w. www.sepltd.com e. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-U-A.dwg

LEGEND

AV	AIR VALVE	BT	CABLE DUCT
BT	BT INSPECTION COVER	BT	OVERHEAD TV
C	CATCH PIT	CCTV	CCTV
CCTV	CCTV CAMERA POST	TELECOMS	TELECOMS
COM	COMMUNICATIONS COVER	ELECTRIC	ELECTRIC STRIP
D	DRAINAGE CHANNEL	ELECTRIC	ELECTRIC
DP	DOWN PIPE		
E	ELECTRIC	FUEL	FUEL LINE
ES	ELEC. INSPECTION COVER	FUEL	FUEL DETECTION LINE
EB	ELECTRIC BOX	GAS	GAS
ER	EARTH ROD	MAINS WATER	MAINS WATER
FL	FLOOD LIGHT	SEWER	SEWER
FFL	FINISHED FLOOR LEVEL	SEWER TM	SEWER TM
FH	FIRE HYDRANT	SEWER VP	SEWER VP
G	GULLY	UNDERGROUND CABLE	UNDERGROUND CABLE
G.S	GROUND LIGHT	UNIDENTIFIED TRACE	UNIDENTIFIED TRACE
GST	GAS TAP	UNIDENTIFIED CABLE	UNIDENTIFIED CABLE
GV	GAS VALVE	UNIDENTIFIED PIPE	UNIDENTIFIED PIPE
IC	INSPECTION COVER	VEHICLE DETECTION CABLE	VEHICLE DETECTION CABLE
IL	INVERT LEVEL	SURVEY BOUNDARY	SURVEY BOUNDARY
L	LAMP POST		
LP	LAMP POST		
MH	MANHOLE		
OP	OUTFALL PIPE		
P	PIPE		
PP	PETROL PUMP		
RP	RODDING POINT		
RWP	RAINWATER PIPE		
SOF	SOFFIT LEVEL		
TC	TRAFFIC CONE		
TCB	TELEPHONE CALL BOX		
TL	TRAFFIC LIGHT		
TP	TELEPHONE POLE BOX		
TP	TELEGRAPH POLE		
WM	WATER METER		
WP	WATER POST		
WST	WATER STOP TAP		
WV	WATER STOP VALVE		
EOT	END OF TRACE		
OSA	OUT OF SURVEY AREA		
U/L	UNABLE TO LIFT		
U/S	UNABLE TO SURVEY		
U/T	UNABLE TO TRACE		
S/L	SIGNAL LOSS		
S/S	SOIL STACK		
WPS	NO FURTHER GPR CONTACTS		
BD	BACKDROP PIPE		
SP	SPOT HEIGHT		
TOP	TOP OF DROP		
⌴	EOT SYMBOL		

BT-A	BT-A
DG-A	DG-A
CCTV-A	CCTV-A
TEL-A	TEL-A
ELEC-A	ELEC-A
FL-A	FL-A
FUEL-A	FUEL-A
MW-A	MW-A
WW-A	WW-A
GAS-A	GAS-A
SEWER-A	SEWER-A
UNK-A	UNK-A
UNK-A	UNK-A
UNK-A	UNK-A
VD-A	VD-A
BOUNDARY	BOUNDARY

QUALITY LEVEL

A – Verification

B1 – Horizontal/Vertical location using multiple techniques

B2 – Horizontal/Vertical location using a single technique

B3 – Horizontal location using a single technique

B4 – Assumed route

C – Site Reconnaissance

D – Desktop utility records search

NOTES

All levels relate to O.S (Newlyn) Datum. Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.

This Underground Utilities survey was conducted in compliance with the BSI PAS128:2014 standard.
Lines are labelled with a code indicating first an abbreviation of the services' function (eg. EL = Electric Cable) followed by the Quality Level to which that service was located (eg. B4 = Assumed route).
Lines annotated as GPR were located using only the Ground Penetrating Radar and should be considered as Quality Level B2.

Quality Level descriptions shown in the above legend are for reference purposes only and are not intended as detailed descriptions.
For full information on Quality Levels, please consult the BSI PAS128:2014 standards document.

DISCLAIMER:

All SEP we use skilled and experienced staff, modern up to date techniques and top of the range electromagnetic and radar technology to locate and trace sub-surface utilities. However the performance of the equipment employed in non-invasive surveys can be adversely affected by factors outside the control of SEP. Therefore SEP cannot guarantee that all utilities present on site have been located. It is the responsibility of the Client to consult regional authority records and undertake trial digs where appropriate.

Where similar services run in close proximity it may be impossible to separately trace individual services as the trace signal can experience interference; in such cases, services will be shown as a single, annotated line. The displayed depth will refer to the shallowest detected utility.

Successful tracing of non-conductive materials may be limited. Drainage gulleys are dye tested where possible to prove connectivity but it is not always possible to introduce the sonde due to narrow pipe and/or accumulated silt.

Depth information of underground services/features are generally accurate to within +/- 10% (i.e. a pipe at 2m deep may be accurate to +/-200mm) but this cannot be guaranteed. Depths shown usually refer to the top of the service. Gravity sewer and drain depths are usually to invert (base of drainage channel) unless otherwise stated.

Some above ground features may have been obscured at time of survey. It is not always possible to operate the Ground Penetrating Radar in areas including, but not limited to, dense vegetation, rubble, debris and/or rough/uneven ground.

Existing record information that was made available to SEP by the Client or by the statutory utility provider should be regarded only as an indication and cannot be guaranteed.

Excavation in the vicinity of services shown should be carried out with due diligence (Ref. HSG47).

SHEET LAYOUT

0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Utility Survey of Land at:
Acomfield Road
Liverpool
L33

Surveyed	Drawn	Checked
M.Forsyth	D.Wright	M.Forsyth

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Mar 18	S15946-U	01	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. 01695 729969 F. 01695 729566 W. www.sepltd.com E. info@sepltd.com

NOTE:– Insufficient GPR penetration in this area. Possibly due to poor ground conditions.

NOTE:– Unable to pull beyond this point

PLAN GRID NORTH

File Name: S15946-U-A.dwg

LEGEND

AV	AIR VALVE	BT	BT-A BT-A
BT	BT INSPECTION COVER	CABLE DUCT	DD-A DD-A
C	CONCRETE	CATV	CA-A CA-A
CCTV	CCTV CAMERA POST	CCTV	CA-A CA-A
COM	COMMUNICATIONS COVER	TELECOMS	TC-A TC-A
D	DRAIN COVER	TELECOMS STRIP	TC-A TC-A
DC	DRAINAGE CHANNEL	ELECTRIC	EL-A EL-A
DP	DOWN PIPE	ELECTRIC	EL-A EL-A
EC	ELEC. CONTROL	FUEL LINE	FL-A FL-A
EIC	ELEC. INSPECTION COVER	GAS PROTECTION LINE	GP-A GP-A
ER	ELECTRIC RISER	GAS	GA-A GA-A
ER	EARTH ROD	MAINS WATER	WA-A WA-A
FF	FINISHED FLOOR	WATER STRIP	WA-A WA-A
FFL	FINISHED FLOOR LEVEL	SEWER FW	FW-A FW-A
FH	FIRE HYDRANT	SEWER SW	SW-A SW-A
G	GULLY	UNDERGROUND CABLE	UC-A UC-A
G.S	GROUND LIGHT	UNIDENTIFIED TRACE	U-A U-A
GST	GAS TAP	UNIDENTIFIED CABLE	UC-A UC-A
GV	GAS VALVE	UNIDENTIFIED PIPE	UP-A UP-A
IC	INSPECTION COVER	VEHICLE DETECTION CABLE	VD-A VD-A
IL	INVERT LEVEL	SURVEY BOUNDARY	
L	LAMP POST		
LT	LAMP POST		
MH	MANHOLE		
OP	OIL VENT		
OP	OUTFALL PIPE		
P	POST		
PP	PETROL PUMP		
PW	PUMP WELL		
RWP	RAINWATER PIPE		
SOF	SOFFIT LEVEL		
TC	TRAFFIC CONE		
TCB	TELEPHONE CALL BOX		
TL	TRAFFIC LIGHT		
TP	TELEPHONE POLE		
TP	TELEGRAPH POLE		
WM	WATER METER		
WP	WATER POST		
WST	WATER STOP TAP		
WV	WATER VALVE		
EOT	END OF TRACE		
OOA	OUT OF SURVEY AREA		
U/L	UNABLE TO LIFT		
U/O	UNABLE TO OPEN		
U/T	UNABLE TO TRACE		
S/L	SIGNAL LOSS		
M	MANHOLE		
NFA	NO FURTHER GPR CONTACTS		
BD	BACKDROP PIPE		
SP	SOIL VENT PIPE		
TOP	TOP OF DROP		
⌴	EOT SYMBOL		

QUALITY LEVEL

A – Verification

B1 – Horizontal/Vertical location using multiple techniques

B2 – Horizontal/Vertical location using a single technique

B3 – Horizontal location using a single technique

B4 – Assumed route

C – Site Reconnaissance

D – Desktop utility records search

NOTES

All levels relate to O.S (Newlyn) Datum, Established using network RTK. Survey plotted on a plane local grid, orientated to National Grid.

This Underground Utilities survey was conducted in compliance with the BSI PAS128:2014 standard.
Lines are labelled with a prefix indicating first an abbreviation of the services' function (eg. EL = Electric Cable) followed by the Quality Level to which that service was located (eg. B4 = Assumed route). Lines annotated as GPR were located using only the Ground Penetrating Radar and should be considered as Quality Level B2.

Quality Level descriptions shown in the above legend are for reference purposes only and are not intended as detailed descriptions.
For full information on Quality Levels, please consult the BSI PAS128:2014 standards document.

DISCLAIMER:

At SEP we use skilled and experienced staff, modern up to date techniques and top of the range electromagnetic and radar technology to locate and trace sub-surface utilities. However the performance of the equipment employed in non-invasive surveys can be adversely affected by factors outside the control of SEP. Therefore SEP cannot guarantee that all utilities present on site have been located. It is the responsibility of the Client to consult regional authority records and undertake trial digs where appropriate.

Where similar services run in close proximity it may be impossible to separately trace individual services as the trace signal can experience interference. In such cases, services will be shown as a single, annotated line. The displayed depth will refer to the shallowest detected utility.

Successful tracing of non-conductive materials may be limited. Drainage gulleys are dye tested where possible to prove connectivity but it is not always possible to introduce the sonde due to narrow pipe sizes and/or accumulated silt.

Depth information of underground services/features are generally accurate to within +/- 10% (i.e. a pipe at 3m deep may be accurate to +/-300mm) but this cannot be guaranteed. Depths shown usually refer to the top of the service. (Gravity sewer and drain depths are usually to invert (base of drainage channel) unless otherwise stated.

Some above ground features may have been obscured at time of survey. It is not always possible to operate the Ground Penetrating Radar in areas including, but not limited to, dense vegetation, rubble, debris and/or rough/uneven ground.

Existing record information that was made available to SEP by the Client or by the statutory utility provider should be regarded only as an indication and cannot be guaranteed.

Excavation in the vicinity of services shown should be carried out with due diligence (Ref. HSG47).



SHEET LAYOUT

0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Utility Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
M.Forsyth	D.Wright	M.Forsyth

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Mar 18	S15946-U	02	A0	--

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T. 01695 729969 F. 01695 729566 W. www.sepltd.com E. info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-U-A.dwg

LEGEND

AV	AIR VALVE	BT	BT-A BT-A BT-A
BT	BT INSPECTION COVER	CABLE DUCT	DD-A DD-A DD-A
CB	CATCH PIT/GULLY	CATV	CATV-A CATV-A CATV-A
CCTV	CCTV CAMERA POST	CCTV	CCTV-A CCTV-A CCTV-A
COM	COMMUNICATIONS COVER	TELECOMS	TEL-A TEL-A TEL-A
D	DRAIN MANHOLE	DRAINAGE / KERB STRIP	DR-A DR-A DR-A
DC	DRAINAGE CHANNEL	ELECTRIC	EL-A EL-A EL-A
DP	DOWN PIPE	FIBRE	FI-A FI-A FI-A
EC	ELEC. CABINET	FUEL LINE	FL-A FL-A FL-A
EIC	ELEC. INSPECTION COVER	FUEL DETECTION LINE	FD-A FD-A FD-A
EP	ELECTRIC POLE	GAS	GM-A GM-A GM-A
ER	EARTH ROD	MAINS WATER	WM-A WM-A WM-A
FC	FIBRE OPTIC CHAT	SEWER	FW-A FW-A FW-A
FFL	FINISHED FLOOR LEVEL	SEWER FM	SW-A SW-A SW-A
FH	FIRE HYDRANT	SEWER VP	SW-A SW-A SW-A
G	GULLY	UNDERGROUND CABLE	LD-A LD-A LD-A
GL	GROUND LIGHT	UNIDENTIFIED TRACE	UT-A UT-A UT-A
GST	GAS TAP	UNIDENTIFIED CABLE	UD-A UD-A UD-A
GV	GAS VALVE	UNIDENTIFIED PIPE	UP-A UP-A UP-A
IC	INSPECTION COVER	VEHICLE DETECTION CABLE	VD-A VD-A VD-A
IL	INVERT LEVEL	SURVEY BOUNDARY	
LC	LAMP COLUMN		
LP	LAMP POST		
MH	MANHOLE		
OP	OPTICAL POST		
OP	OUTFALL PIPE		
PC	PEDESTAL		
PP	PETROL PUMP		
RE	RODDING EYE		
RWP	RAINWATER PIPE		
SOF	SOFFIT LEVEL		
TC	TRAFFIC CONTROL		
TCB	TELEPHONE CALL BOX		
TL	TRAFFIC LIGHT		
TP	TELEPHONE POST BOX		
TP	TELEGRAPH POLE		
WB	WATER BOOSTER		
WM	WATER METER		
WST	WATER STOP TAP		
WV	WATER STOP VALVE		
EOT	END OF TRACE		
OSA	OUT OF SURVEY AREA		
UTL	UNABLE TO LIFT		
UTP	UNABLE TO PROBE		
UTT	UNABLE TO TRACE		
SLA	SIGNAL LOSS		
TOT	TOP OF TANK		
WPA	NO FURTHER GPR CONTACTS		
BD	BACKDROP PIPE		
SP	SUMP PUMP PIPE		
TOP	TOP OF DROP		
	EOT SYMBOL		

QUALITY LEVEL

A – Verification

B1 – Horizontal/Vertical location using multiple techniques

B2 – Horizontal/Vertical location using a single technique

B3 – Horizontal location using a single technique

B4 – Assumed route

C – Site Reconnaissance

D – Desktop utility records search

NOTES

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.

This Underground Utilities survey was conducted in compliance with the BSI PAS128:2014 standard.
Lines are annotated with a prefix indicating first an abbreviation of the services' function (eg. EL = Electric Cable) followed by the Quality Level to which that service was located (eg. B4 = Assumed route).
Lines annotated as GPR were located using only the Ground Penetrating Radar and should be considered as Quality Level B2.

Quality Level descriptions shown in the above legend are for reference purposes only and are not intended as detailed descriptions.
For full information on Quality Levels, please consult the BSI PAS128:2014 standards document.

DISCLAIMER:

All SEP we use skilled and experienced staff, modern up to date techniques and top of the range electromagnetic and radar technology to locate and trace sub-surface utilities. However the performance of the equipment employed is frequently affected by ground conditions governed by factors outside the control of SEP. Therefore SEP cannot guarantee that all utilities present on site have been located. It is the responsibility of the Client to consult regional authority records and undertake trial digs where appropriate.

Where similar services run in close proximity it may be impossible to separately trace individual services as the trace signal can experience interference. In such cases, services will be shown as a single, annotated line. The displayed depth will refer to the shallowest detected utility.

Successful tracing of non-conductive materials may be limited. Drainage gullies are also tested where possible to prove connectivity but it is not always possible to introduce the sonde due to narrow pipe sizes and/or accumulated silt.

Depth information of underground services/features are generally accurate to within +/- 10% (i.e. a pipe at 2m deep may be accurate to +/-200mm) but this cannot be guaranteed. Depths shown usually refer to the top of the service, (Chiefly sewer and drainage runs are usually to invert (base of drainage channel) unless otherwise stated).

Some above ground features may have been obscured at time of survey. It is not always possible to operate the Ground Penetrating Radar in areas including, but not limited to, dense vegetation, rubble, debris and/or rough/uneven ground.

Existing record information that was made available to SEP by the Client or by the statutory utility provider should be regarded only as an indication and cannot be guaranteed.

Excavation in the vicinity of services shown should be carried out with due diligence (Ref. HSG47).



SHEET LAYOUT

0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Utility Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
M.Forsyth	D.Wright	M.Forsyth

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Mar 18	S15946-U	03	A0	--

DISCLAIMER:

At SEP we use skilled and experienced staff, modern up to date techniques and top of the range electromagnetic and radar technology to locate and trace sub-surface utilities. However the performance of the equipment employed in non-invasive surveys can be adversely affected by factors outside the control of SEP. Therefore SEP cannot guarantee that all utilities present on site have been located. It is the responsibility of the Client to consult regional authority records and undertake trial digs where appropriate.

Where similar services run in close proximity it may be impossible to separately trace individual services as the trace signal can experience interference. In such cases, services will be shown as a single, annotated line. The displayed depth will refer to the shallowest detected utility.

Successful tracing of non-conductive materials may be limited. Drainage gulleys are dye tested where possible to prove connectivity but it is not always possible to introduce the sonde due to narrow pipe sizes and/or accumulated silt.

Depth information of underground services/features are generally accurate to within +/- 10% (i.e. a pipe at 2m deep may be accurate to +/-200mm) but this cannot be guaranteed. Depths shown usually refer to the top of the service. Gravity sewer and drain depths are usually to invert (base of drainage channel) unless otherwise stated.

Some above ground features may have been obscured at time of survey. It is not always possible to operate the Ground Penetrating Radar in areas including, but not limited to, dense vegetation, rubble, debris and/or rough/uneven ground.

Existing record information that was made available to SEP by the Client or by the statutory utility provider should be regarded only as an indication and cannot be guaranteed.

Excavation in the vicinity of services shown should be carried out with due diligence (Ref. HSG47).

© Survey & Engineering Projects Ltd. 2018
Reproduction in whole or in part by any means is prohibited without the prior permission of Survey & Engineering Projects Ltd.
T: (01495) 729833 F: (01495) 725566 W: www.sepltd.com E: info@sepltd.com

N

PLAN GRID NORTH

File Name: S15946-U-A.dwg

LEGEND

AV	AIR VALVE	BT	BT-A / BT-A
BT	BT INSPECTION COVER	CD	CD-A / CD-A
CB	CONTROL BOX	CA	CA-A / CA-A
CCTV	CCTV CAMERA POST	CC	CC-A / CC-A
COM	COMMUNICATIONS COVER	TC	TC-A / TC-A
CP	CONCRETE POST	ES	ES-A / ES-A
DC	DRAINAGE CHANNEL	EL	EL-A / EL-A
DP	DOWN PIPE	FO	FO-A / FO-A
DR	DRAIN	FL	FL-A / FL-A
EIC	ELEC INSPECTION COVER	GPR	GPR DETECTION LINE
ELB	ELECTRIC BOX	GM	GM-A / GM-A
ER	EARTH ROD	MW	MW-A / MW-A
EP	ELECTRIC TV POLE	SW	SW-A / SW-A
FFL	FINISHED FLOOR LEVEL	FW	FW-A / FW-A
FH	FIRE HYDRANT	SW	SW-A / SW-A
G	GRILLE	TS	TS-A / TS-A
GLT	GROUND LIGHT	UI	UI -A / UI -A
GST	GAS TAP	UD	UD-A / UD-A
GSV	GAS VALVE	UP	UP-A / UP-A
IC	INSPECTION COVER	VP	VP-A / VP-A
IL	INVERT LEVEL		
LO	LAMP OUTLET		
LP	LAMP POST		
MH	MANHOLE		
MKR	MARKER		
OP	OUTFALL PIPE		
PN	PYLON		
PP	PETROL PUMP		
RWP	RAIN WATER PIPE		
SSF	SAFETY LEVEL		
SV	STOP VALVE		
TCB	TELEPHONE CALL BOX		
TL	TRAFFIC LIGHT		
TLB	TRAFFIC LIGHT BOX		
TP	TELEGRAPH POLE		
WM	WATER METER		
WP	WATER POST		
WST	WATER STOP TAP		
WSV	WATER STOP VALVE		
EOT	END OF TRACE		
OSA	OUT OF SURVEY AREA		
UTL	UNABLE TO LIF		
UTS	UNABLE TO SONDE		
UTT	UNABLE TO TRACE		
S/L	SIGNAL LOSS		
BLK	BLOCKED		
NFH	NO FURTHER GPR CONTACTS		
BD	BACKDROP PIPE		
NVP	NO VISIBLE PIPE		
ToP	TOP OF PIPE		
␣	EOT SYMBOL		

BT-A	BT-A
DU-A	DU-A
CA-A	CA-A
CC-A	CC-A
TC-A	TC-A
ES-A	ES-A
EL-A	EL-A
FO-A	FO-A
FL-A	FL-A
GPR	GPR
GM-A	GM-A
MW-A	MW-A
SW-A	SW-A
FW-A	FW-A
SW-A	SW-A
TS-A	TS-A
UI -A	UI -A
UD-A	UD-A
UP-A	UP-A
VP-A	VP-A

SURVEY BOUNDARY

QUALITY LEVEL

A – Verification

B1 – Horizontal/Vertical location using multiple techniques

B2 – Horizontal/Vertical location using a single technique

B3 – Horizontal location using a single technique

B4 – Assumed route

C – Site Reconnaissance

D – Desktop utility records search

NOTES:

All levels relate to O.S (Newlyn) Datum, Established using network RTK.
Survey plotted on a plane local grid, orientated to National Grid.

This Underground Utilities survey was conducted in compliance with the BSI PAS128:2014 standards.
Services linetypes display text indicating first an abbreviation of the services' function (eg. EL = Electric Cable) followed by the Quality Level to which that service was located (eg. B4 = Assumed route).
Lines annotated as GPR were located using only the Ground Penetrating Radar and should be considered as Quality Level B2.

Quality Level descriptions shown in the above legend are for reference purposes only and are not intended as detailed descriptions.
For full information on Quality Levels, please consult the BSI PAS128:2014 standards document.



SHEET LAYOUT

0 2m 4m 8m 12m 16m

SCALE BAR

REV	DATE	DESCRIPTION

SURVEY & ENGINEERING PROJECTS

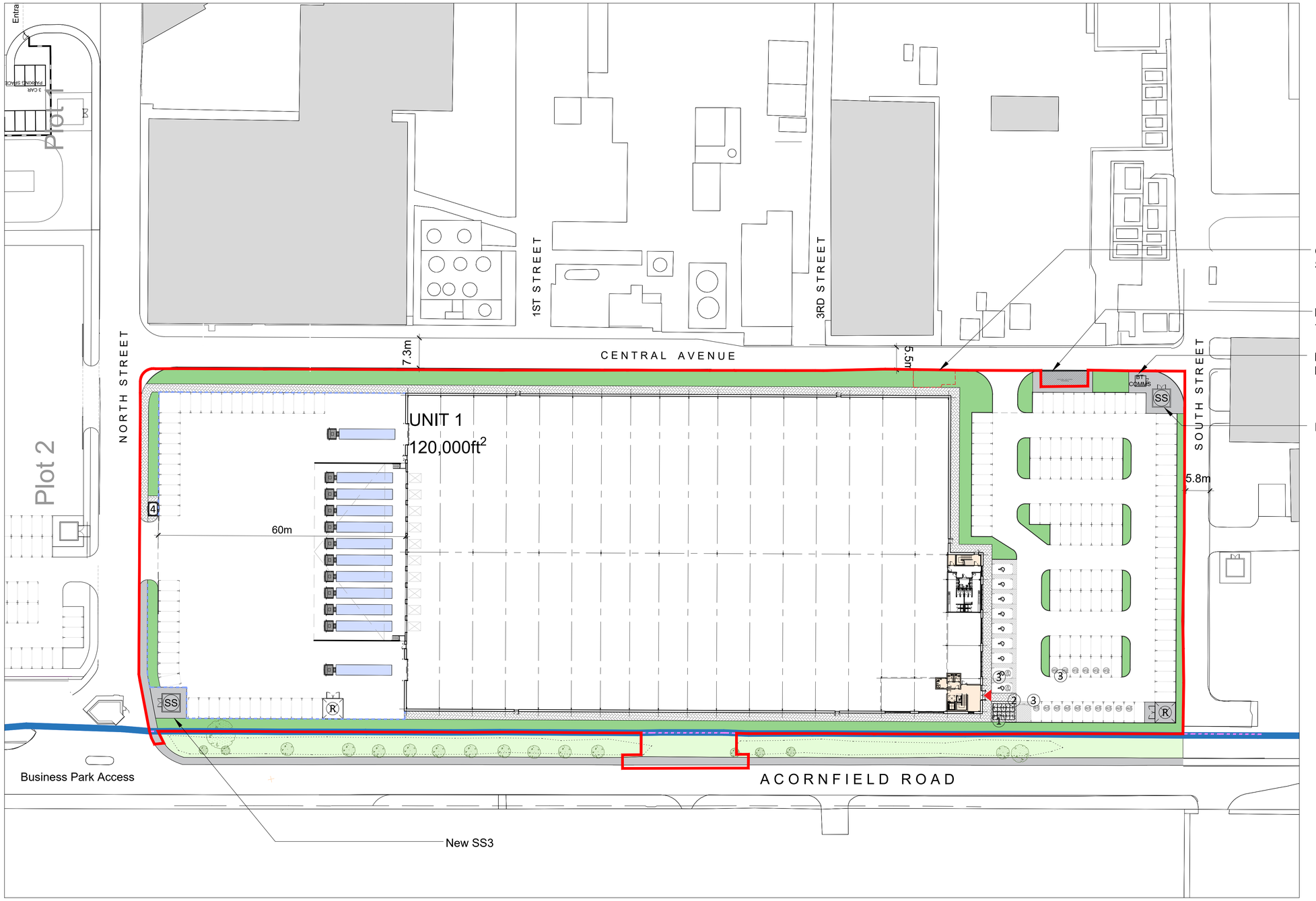
Client
Hale
198a Providence Square
Jacob Street
London
SE1 2DZ

Project Title
Utility Survey of Land at:
Acornfield Road
Liverpool
L33

Surveyed	Drawn	Checked
M.Forsyth	D.Wright	M.Forsyth

Scale	Date	Drawing Ref.	No.	Size	Rev
1:200	Mar 18	S15946-U	04	A1	--

Appendix B – Proposed Site Layout



01 Proposed Site Plan
1:500@ A1 / 1:1000 @ A3

Disclaimer:
Subject to survey.

Notes:

KEY

- Image Business Park
- Site Boundary Line (22,457m²/ 5.55acres/ 2.25ha)

AREA SCHEDULE(GIA)

UNIT 1 (GIA)	**120,000ft²**
Warehouse (Incl. office Undercroft)	110,700ft²
Office (FF Only)	4,650ft²
Office (SF Only)	4,650ft²
Car parking spaces	*180*
Level Loading Doors	*2*
Dock Level Doors	*10*
Cycle Spaces	*28*

EXTERNAL MATERIALS:

- In-situ concrete
- Concrete block paving
- Permeable paving
- Soft Landscaping - Low maintenance grass
- Existing black chain link fence
- 2.6m Proposed Black paladin fence

(1) Bicycle Stands
(2) Motorcycle Parking
(3) EV Charging
(4) Security Hut
(R) Refuse Area
(SS) Substations

DRAFT

Rev:	Notes:	Date:	Dwn:	Iss:
E	Landscaping North & Car Parking	20.08.21	HT	HA
D	SS Moved/ Car P arrangement	09.08.21	HT	HA
C	Increased Yard Size	26.07.21	HT	HA
B	Unit flipped	22.07.21	HT	HA
A	SS/BT comms relocation	19.07.21	HT	HA
-	Draft Issue	08.07.21	HT	HA

Client:
SEYBOURNE

hale
ARCHITECTURE | DESIGN MANAGEMENT
22c Leathermarket Street, London, SE1 3HP

Project:
Imagination 03
Image Business Park, Knowsley

Drawing Title:
Site 3
Proposed Site Plan

Project No: 21066
Scale @ A1/A3: 1:500 / 1:1000
Drawing No: 21066 - PL1102
Revision: E

Appendix C – Public Sewer Asset Plan

United Utilities
helping life flow smoothly

How to contact us:

United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

Powell Tolner & Associates Ltd

29
Red Lion Street,
Chesham, Buckinghamshire
HP5 1EJ

FAO:

Your Ref: Image Business Park
Our Ref: UUPS-ORD-113061
Date: 18/07/2019

Dear Sirs

Location: Image Business Park Acornfield Road, Liverpool, L33 7TQ

I acknowledge with thanks your request dated 16/07/2019 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. http://www.unitedutilities.com/work-near-asset.aspx .

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please contact us .

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

United Utilities Water Limited
Registered In England & Wales No. 2366678
Registered Office Haweswater House, Lingley Mere Business Park,
Lingley Green Avenue, Great Sankey, Warrington, WA5 3LP



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
5502	40.41	FO	37.1	225			VC	67.91171	1 in 158
6503	41.92	FO	38.32	225			VC	71.84706	1 in 167
5810		FO		450			VC	3.00643	
5504		SW	0	900			CO	59.08811	
6005		SW	0	675			CO	38.83298	
6005		SW	0	675			CO	38.83298	
5804	39.36	SW	35.78	900			CO	102.8397	1 in 321
7801		SW	0	675			CO	112.5877	
6009		FO	0	225			VC	46.29207	
6009		FO	0	225			VC	46.29207	
5602		FO	0	225			VC	66.16386	
6502	41.7	SW	38.95	750			CO	24.64854	1 in 176
6001		SW	0	675			CO	18.43909	
6001		SW	0	675			CO	18.43909	
5801		FO	0	225			VC	76.47493	
5003	39.48	FO	34.55	225			VC	78.26238	1 in 301
5003	39.48	FO	34.55	225			VC	78.26238	1 in 301
5002	39.56	FO	34.59	225			VC	15.13275	1 in 378
5002	39.56	FO	34.59	225			VC	15.13275	1 in 378
6505		SW	0	600			CO	9.846159	
5801	39.47	SW	36.14	675			CO	70.83079	1 in 443
7002	40.64	SW	37.99	675			CO	8.062258	1 in 269
7002	40.64	SW	37.99	675			CO	8.062258	1 in 269
6011		SW		150			VC	7.419901	
6011		SW		150			VC	7.419901	
6802		SW	0	600			CO	76.06067	
6701		SW	0	600			CO	115.7325	
4601	40.07	SW	36.59	600			CO	82.49211	
5812		FO		150			VC	15.96032	
5702		FO	0	225			VC	73.65572	
4502		SW	0	600			CO	76.99537	
6003	39.68	FO	35.68	225			VC	12.9363	
6003	39.68	FO	35.68	225			VC	12.9363	
7001	40.42	SW	37.9	675			CO	101.214	
7001	40.42	SW	37.9	675			CO	101.214	
5503	40.89	FO	37.87	225			VC	68.24954	1 in 96
6002	39.66	FO	36.03	300			VC	12.04159	1 in 30
6002	39.66	FO	36.03	300			VC	12.04159	1 in 30
6403		SW	0	525			CO	12.36932	
6902		SW	0	600			CO	74.64614	
5501		SW	0	900			CO	9.306325	
6504	41.79	FO	38.59	225			VC	9.219544	1 in 49
6006	39.91	FO	35.63	375			VC	141.0142	1 in 141
6006	39.91	FO	35.63	375			VC	141.0142	1 in 141
4502		SW	0	1500			CO	34.46893	
5704		FO		150			VC	54.32478	
6904		SW	0	600			CO	72.86465	
6904		SW	0	600			CO	72.86465	
6507	41.78	SW	0	600			CO	57.27129	
6509		SW	0	900			CO	64.1744	
5812		FO		450			VC	20.89925	
6007	39.81	SW	36.56	450			CO	8.062258	
6007	39.81	SW	36.56	450			CO	8.062258	
7802		FO	0	300			VC	178.5385	
6402	42.25	SW	39.39	750			CO	11.6619	1 in 146
5903	39.46	SW	35.45	900			CO	73.44706	1 in 253
5903	39.46	SW	35.45	900			CO	73.44706	1 in 253
6901		FO	0	225			VC	73.89912	
6401	41.74	SW	39.3	750			CO	74.52516	1 in 233
6601		SW	0	525			CO	112.3788	
6501	41.44	SW	38.78	750			CO	35.50312	
6903		FO	0	225			VC	53.35269	
6903		FO	0	225			VC	53.35269	
5703		SW	0	525			CO	72.92583	
4002	39.15	FO	34.29	225			VC	27.65863	1 in 213
4002	39.15	FO	34.29	225			VC	27.65863	1 in 213
5601		SW	0	450			CO	66.64401	
7901		SW	0	675			CO	95.56673	
7901		SW	0	675			CO	95.56673	
5902	39.52	FO	35.39	450			VC	87.09765	1 in 109
5902	39.52	FO	35.39	450			VC	87.09765	1 in 109
7006	40.43	SW		225				95.07891	
7006	40.43	SW		225				95.07891	
6004	69.72	FO	35.02	225			VC	31.04835	1 in 72
6004	69.72	FO	35.02	225			VC	31.04835	1 in 72
5701		SW	0	600			CO	66.70832	
7004		FO		300			VC	100.6628	
7004		FO		300			VC	100.6628	
6404	41.91	FO	38.92	225			VC	96.10411	1 in 343
6008		SW	0	675			CO	17.14565	
6008		SW	0	675			CO	17.14565	
6002	39.66	FO	35.88	300			VC	13.60147	1 in 68
6002	39.66	FO	35.88	300			VC	13.60147	1 in 68
5807		FO		450			VC	26.22167	
5811		FO	0	450			VC	28.82133	
5802		FO	0	450			VC	87.66413	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned | Foul | Surface Water | Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:

red - combined blue - surface water
brown - foul **purple - overflow**

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Image Business Park Acornfield Road,
Liverpool,
L33 7TQ

OS sheet Number: SJ4398NE
Scale: 1:1250 **Date:** 18/07/2019
Nodes: 86
Sheet: 1 of 3

Printed by: Property Searches

SEWER RECORDS

United Utilities
Helping life flow smoothly

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.



Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned	Foul	Surface Water	Combined	
				Public Sewer
				Private Sewer
				Section 104
				Rising Main
				Sludge Main
				Overflow
				Water Course
				Highway Drain

All point assets follow the standard colour convention:

red - combined **blue - surface water**
brown - foul **purple - overflow**

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Image Business Park Acornfield Road,
Liverpool,
L33 7TQ

OS sheet Number: SJ4498NW
Scale: 1:1250 **Date:** 18/07/2019
Nodes: 0
Sheet: 2 of 3

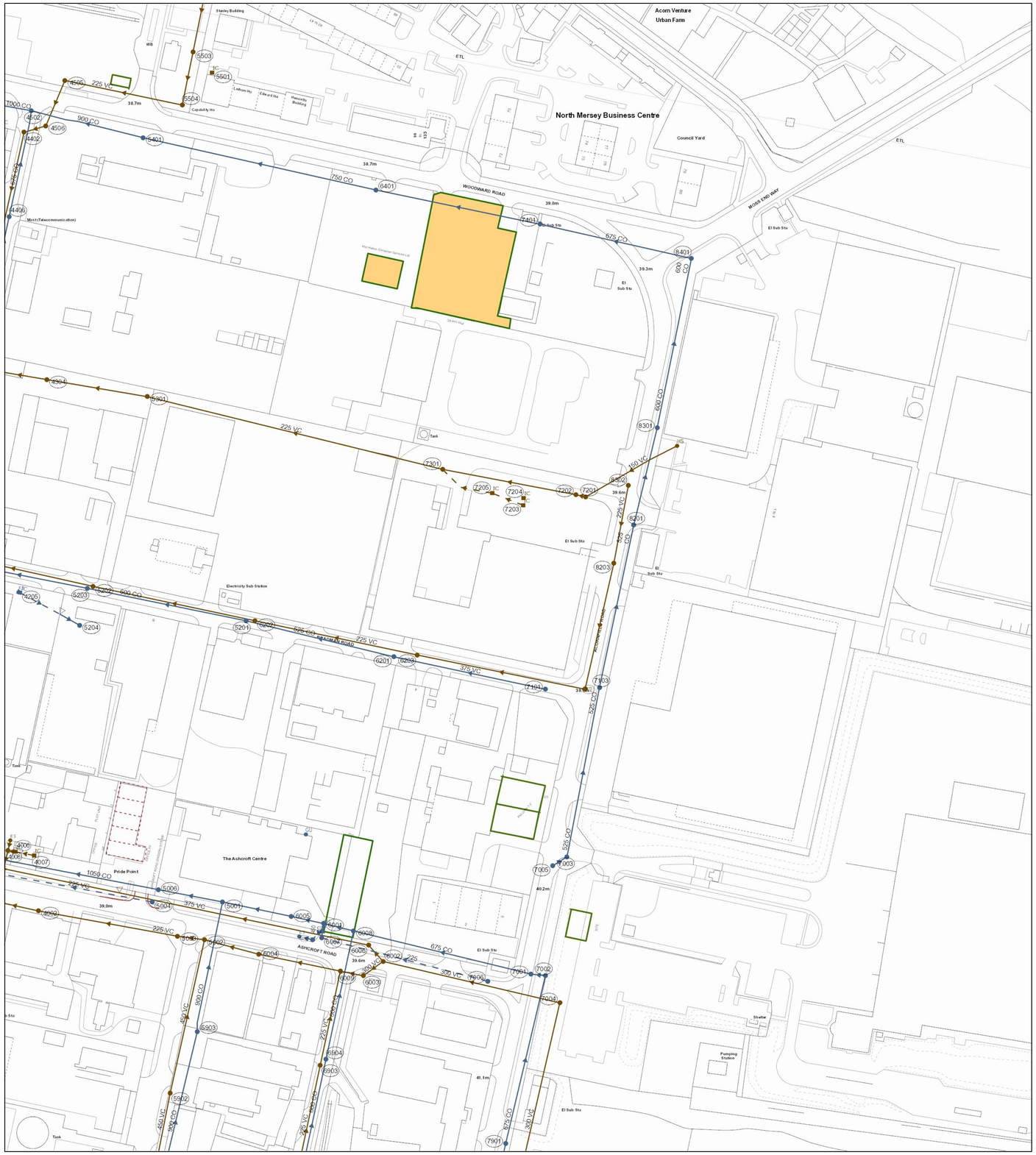
Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.



The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

Crown copyright and database rights 2017 Ordnance Survey 100022432. Unauthorised reproduction will infringe these copyrights.

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad
4008		FO		300			VC	10.42219	
7201	39.41	FO	37.11	150			VC	5.488055	1 in 30
7201	39.41	FO	36.92	225			VC	75.29861	1 in 184
5504		FO	0	225			VC	66.46816	
6005		SW	0	675			CO	38.83298	
6005		SW	0	675			CO	38.83298	
5201	39.81	SW	36.87	600			CO	89.82204	1 in 998
5804	39.36	SW	35.78	900			CO	102.8397	1 in 321
7801		SW	0	675			CO	112.5877	
6202	39.85	FO	36.05	225			VC	91.73416	1 in 74
6009		FO	0	225			VC	46.29207	
6009		FO	0	225			VC	46.29207	
6302	39.66	FO	37.24	225			VC	43.73785	1 in 151
5203	39.52	SW	36.71	600			CO	77.46612	1 in 456
6201	40.14	SW	37.23	525			CO	84.40379	1 in 234
6001		SW	0	675			CO	18.43909	
6001		SW	0	675			CO	18.43909	
5003	39.48	FO	34.55	225			VC	78.26238	1 in 301
5003	39.48	FO	34.55	225			VC	78.26238	1 in 301
5002	39.56	FO	34.59	225			VC	15.13275	1 in 378
5002	39.56	FO	34.59	225			VC	15.13275	1 in 378
5401	38.42	SW	35.62	900			CO	63.8259	1 in 266
7005	40.19	SW	37.99	525			CO	9.433981	
5001	39.27	SW	35.16	1050			CO	36.22005	1 in 398
5301	39.45	FO		225			VC	56.5396	
4505		FO		225			VC	27.34521	
7002	40.64	SW	37.99	675			CO	8.062258	1 in 269
7002	40.64	SW	37.99	675			CO	8.062258	1 in 269
6011		SW		150			VC	7.419901	
6011		SW		150			VC	7.419901	
7102	39.75	FO	36.62	225			VC	94.92102	
8203	39.82	FO	36.95	225			VC	71.80529	1 in 232
6003	39.68	FO	35.68	225			VC	12.9363	
6003	39.68	FO	35.68	225			VC	12.9363	
7001	40.42	SW	37.9	675			CO	101.214	
7001	40.42	SW	37.9	675			CO	101.214	
6002	39.66	FO	36.03	300			VC	12.04159	1 in 30
6002	39.66	FO	36.03	300			VC	12.04159	1 in 30
6902		SW	0	600			CO	74.64614	
4506	38.37	FO	35.12	225			VC	12.55601	1 in 628
5202	39.5	FO	34.79	225			VC	91.46816	1 in 158
4402	38.31	FO	35.05	225			VC	84.53681	1 in 92
6006	39.91	FO	35.63	375			VC	141.0142	1 in 141
6006	39.91	FO	35.63	375			VC	141.0142	1 in 141
6904		SW	0	600			CO	72.86465	
6904		SW	0	600			CO	72.86465	
7103	39.65	SW	0	525			CO	91.9837	
6203	40.12	FO	0	225			VC	91.9837	
6007	39.81	SW	36.56	450			CO	8.062258	
6007	39.81	SW	36.56	450			CO	8.062258	
7802		FO	0	300			VC	178.5385	
5903	39.46	SW	35.45	900			CO	73.44706	1 in 253
5903	39.46	SW	35.45	900			CO	73.44706	1 in 253
6901		FO	0	225			VC	73.89912	
5001	39.27	SW	35.16	1050			CO	91.0631	1 in 285
7101	39.57	SW	37.7	375			VC	85.90693	1 in 187
8301	39.57	SW	36.91	600			CO	95.90099	
7301	39.24	FO	36.47	225			VC	168.6408	1 in 208
5301	39.45	FO	35.66	225			VC	30.95056	
6903		FO	0	225			VC	53.35269	
6903		FO	0	225			VC	53.35269	
4002	39.15	FO	34.29	225			VC	27.65863	1 in 213
4002	39.15	FO	34.29	225			VC	27.65863	1 in 213
7901		SW	0	675			CO	95.56673	
7901		SW	0	675			CO	95.56673	
5902	39.52	FO	35.39	450			VC	87.09765	1 in 109
5902	39.52	FO	35.39	450			VC	87.09765	1 in 109
4502	38.46	SW	35.38	1000			CO	34.52535	
7006	40.43	SW		225				95.07891	
7006	40.43	SW		225				95.07891	
6004	69.72	FO	35.02	225			VC	31.04835	1 in 72
6004	69.72	FO	35.02	225			VC	31.04835	1 in 72
8401		SW	0	675			CO	86.12201	
5503		FO	0	225			VC	30.1297	
7401	39.32	SW	36.24	750			CO	92.96236	1 in 443
8201		SW	0	600			CO	55.54278	
7004		FO		300			VC	100.6628	
7004		FO		300			VC	100.6628	
7003	40.42	SW	0	525			CO	95.70789	
6008		SW	0	675			CO	17.14565	
6008		SW	0	675			CO	17.14565	
6401	38.63	SW	35.95	750			CO	132.2195	1 in 427
5004	39.24	SW		225			VC	88.45903	
6002	39.66	FO	35.88	300			VC	13.60147	1 in 68
6002	39.66	FO	35.88	300			VC	13.60147	1 in 68
5802		FO	0	450			VC	87.66413	

Refno	Cover	Func	Invert	Size x	Size y	Shape	Matl	Length	Grad

LEGEND

Abandoned · Foul · Surface Water · Combined

- Public Sewer
- Private Sewer
- Section 104
- Rising Main
- Sludge Main
- Overflow
- Water Course
- Highway Drain

All point assets follow the standard colour convention:
red - combined · blue - surface water
brown - foul · purple - overflow

- Manhole
- Head of System
- Extent of Survey
- Rodding Eye
- Inlet
- Discharge Point
- Vortex
- Penstock
- Washout Chamber
- Valve
- Air Valve
- Non Return Valve
- Soakaway
- Gully
- Cascade
- Flow Meter
- Hatch Box
- Oil Interceptor
- Summit
- Drop Shaft
- Orifice Plate
- Side Entry Manhole
- Outfall
- Screen Chamber
- Inspection Chamber
- Bifurcation Chamber
- Lamp Hole
- T Junction / Saddle
- Catchpit
- Valve Chamber
- Vent Column
- Vortex Chamber
- Penstock Chamber
- Network Storage Tank
- Sewer Overflow
- Ww Treatment Works
- Ww Pumping Station
- Septic Tank
- Control Kiosk
- Change of Characteristic

MANHOLE FUNCTION

FO	Foul
SW	Surface Water
CO	Combined
OV	Overflow

SEWER SHAPE

CI	Circular	TR	Trapezoidal
EG	Egg	AR	Arch
OV	Oval	BA	Barrel
FT	Flat Top	HO	HorseShoe
RE	Rectangular	UN	Unspecified
SQ	Square		

SEWER MATERIAL

AC	Asbestos Cement
BR	Brick
PE	Polyethylene
RP	Reinforced Plastic Matrix
CO	Concrete
CSB	Concrete Segment Bolted
CSU	Concrete Segment Unbolted
CC	Concrete Box Culverted
PSC	Plastic / Steel Composite
GRC	Glass Reinforecd Plastic
DI	Ductile Iron
PVC	Polyvinyl Chloride
CI	Cast Iron
SI	Spun Iron
ST	Steel
VC	Vitrified Clay
PP	Polypropylene
PF	Pitch Fibre
MAC	Masonry, Coursed
MAR	Masonry, Random
U	Unspecified

Address or Site Reference:

Image Business Park Acornfield Road,
Liverpool,
L33 7TQ

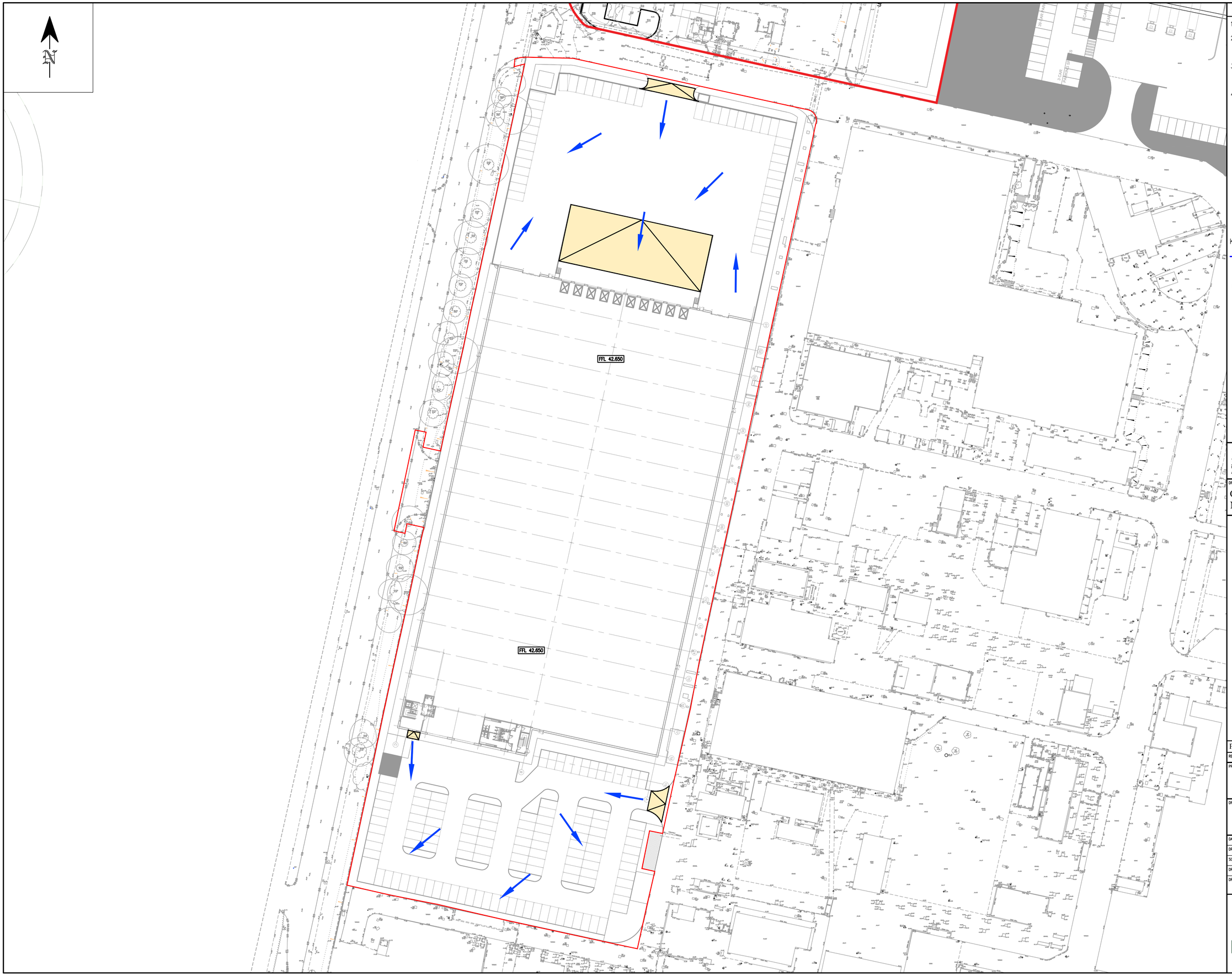
OS sheet Number: SJ4399SE
Scale: 1:1250 **Date:** 18/07/2019
Nodes: 86
Sheet: 3 of 3

Printed by: Property Searches

SEWER RECORDS

United Utilities
helping life flow smoothly

Appendix D – Exceedance Flow Path Plan



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

Overland Flood Exceedance Flow Route

Raised Areas

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS

COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D
P01	First Issue	GW	09.08.21	AH

PROJECT TITLE

Image Business Park
Knowsley Site 3

DRAWING TITLE

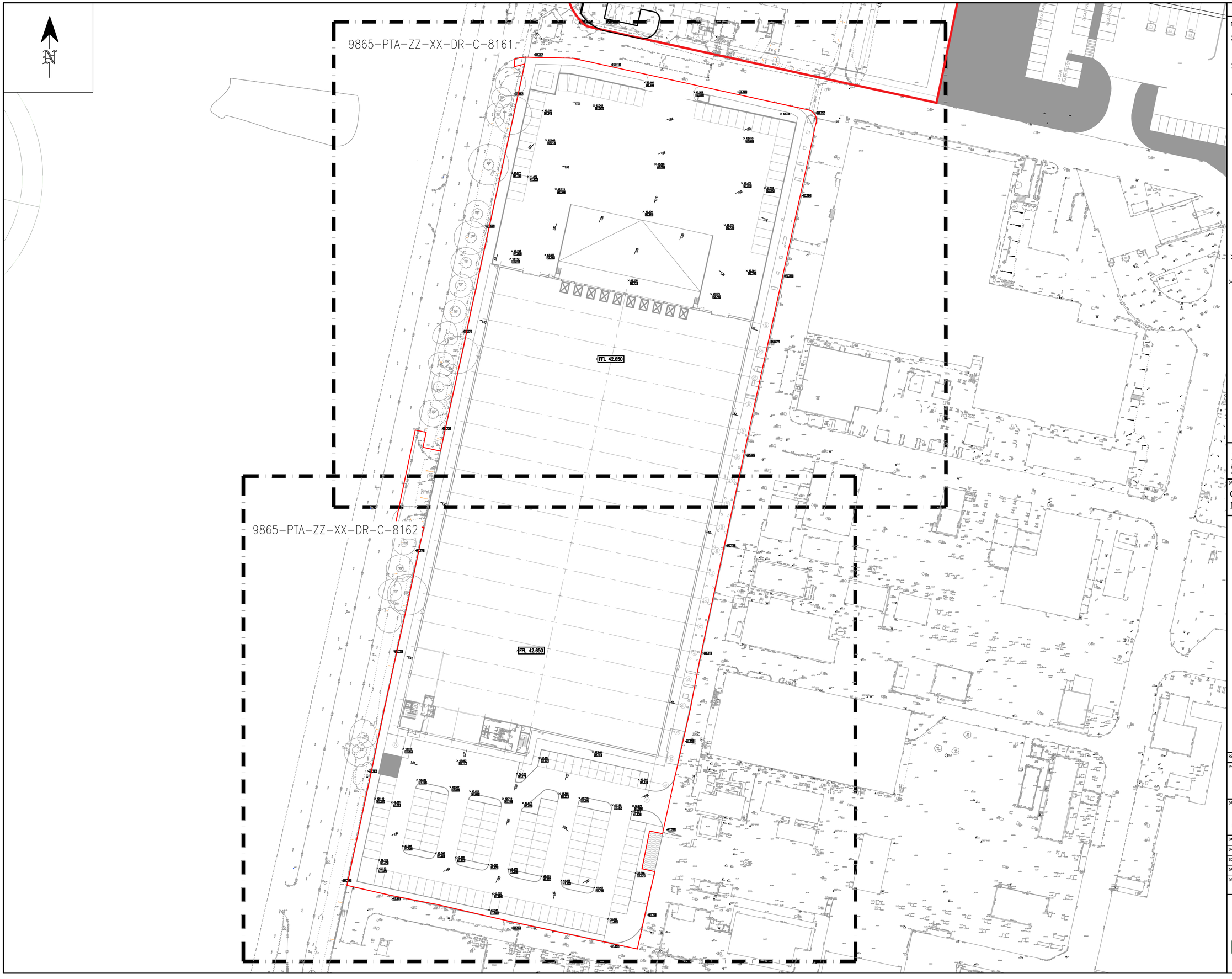
Exceedance Route

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No 9879
DRAWN	GW		REVISION P01
SCALE	1:500		
DRG SIZE	A1		

DRAWING No

9879-PTA-ZZ-XX-DR-C-8150

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks.
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

× 42.00 Proposed Site Level

× 42.00 Existing Site Level

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS
COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D

PROJECT TITLE
Image Business Park
Knowsley Site 3

DRAWING TITLE
Levels Plan
Overview

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No 9879
DRAWN	GW		REVISION P01
SCALE	1:500		
DRG SIZE	A1		

DRAWING No
9879-PTA-ZZ-XX-DR-C-8160

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks.
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

× 42.00 Proposed Site Level

× 42.00 Existing Site Level

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS
COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D

PROJECT TITLE
Image Business Park
Knowsley Site 3

DRAWING TITLE
Levels Plan
Sheet 1 of 2

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No 9879
DRAWN	GW		REVISION P01
SCALE	1:250		
DRG SIZE	A1		

DRAWING No
9879-PTA-ZZ-XX-DR-C-8161

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

× 42.00 Proposed Site Level

× 42.00 Existing Site Level

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS
COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D

PROJECT TITLE
Image Business Park
Knowsley Site 3

DRAWING TITLE
Levels Plan
Sheet 2 of 2

DATE	June 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No 9879
DRAWN	GW		
SCALE	1:250		REVISION P01
DRG SIZE	A1		

DRAWING No
9879-PTA-ZZ-XX-DR-C-8162

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks.
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk

Appendix E – Existing Runoff Calculations

Pre-development 1-year Peak Rainfall

CC Allowance = [ ] %

From Wallingford Procedure, Volume 3 - Maps

Rainfall Depths (M5 - 60minutes) — *M5-60* = 19.6 mm

Rainfall Ratio (r) — *r* = 0.396

Design Storm Return Period — *P* = 1 years

Time of concentration — T_c = 15 mins

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 0.615

Therefore M1-15 = 7.6 mm

Therefore, average point intensity = 30.4 mm/hr

Site Area = 22,457 m^2

C_v = 0.75

$Q_p = 3.61 \times C_v \times i \times A$

Therefore, Qp = 3.61 x 0.75 x 30.4366309333333 x 22457

= 185.06 litres/sec

Volume during storm = 171 m^3

Pre-development 1-year Peak Rainfall

CC Allowance = [ ] %

From Wallingford Procedure, Volume 3 - Maps

Rainfall Depths (M5 - 60minutes)	*M5-60* =	*19.6 mm*
Rainfall Ratio (r)	*r* =	*0.396*
Design Storm Return Period	*P* =	*30 years*
Time of concentration	T_c =	15 mins
	Therefore, Z_1 =	0.632
	Therefore M5-15 =	12.4 mm
	Therefore, Z_2 =	1.507
	Therefore M30-15 =	18.7 mm
	Therefore, average point intensity =	74.6 mm/hr

Site Area = 22,457 m^2

C_v = 0.75

$Q_p = 3.61 \times C_v \times i \times A$

Therefore, Qp = 3.61 x 0.75 x 74.6240556444444 x 22457

= 453.73 litres/sec

Volume during storm = 419 m^3

Pre-development 1-year Peak Rainfall

CC Allowance = [ ] %

From Wallingford Procedure, Volume 3 - Maps

Rainfall Depths (M5 - 60minutes) — *M5-60* = 19.6 mm

Rainfall Ratio (r) — *r* = 0.396

Design Storm Return Period — *P* = 100 years

Time of concentration — T_c = 15 mins

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 1.947

Therefore M100-15 = 24.1 mm

Therefore, average point intensity = 96.4 mm/hr

Site Area = 22,457 m^2

C_v = 0.75

$Q_p = 3.61 \times C_v \times i \times A$

Therefore, Qp = 3.61 x 0.75 x 96.4107274666667 x 22457

= 586.20 litres/sec

Volume during storm = 541 m^3

Pre-development 1-year Peak Rainfall

CC Allowance = 40 %

From Wallingford Procedure, Volume 3 - Maps

Rainfall Depths (M5 - 60minutes) — *M5-60* = 19.6 mm

Rainfall Ratio (r) — *r* = 0.396

Design Storm Return Period — *P* = 100 years

Time of concentration — T_c = 15 mins

Therefore, Z_1 = 0.632

Therefore M5-15 = 12.4 mm

Therefore, Z_2 = 1.947

Therefore M100-15 = 33.7 mm

Therefore, average point intensity = 135.0 mm/hr

Site Area = 22,457 m^2

C_v = 0.75

$Q_p = 3.61 \times C_v \times i \times A$

Therefore, Qp = 3.61 x 0.75 x 134.975018453333 x 22457

= 820.68 litres/sec

Volume during storm = 758 m^3

Appendix F – MicroDrainage Output Files

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 44 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	40.836	0.947	0.0	89.9	89.9	315.0	O K
30 min Summer	41.018	1.129	0.0	89.9	89.9	375.4	O K
60 min Summer	41.042	1.153	0.0	89.9	89.9	383.3	O K
120 min Summer	40.947	1.058	0.0	89.9	89.9	351.9	O K
180 min Summer	40.813	0.924	0.0	89.9	89.9	307.4	O K
240 min Summer	40.673	0.784	0.0	89.9	89.9	260.6	O K
360 min Summer	40.420	0.531	0.0	89.9	89.9	176.5	O K
480 min Summer	40.223	0.334	0.0	89.9	89.9	111.0	O K
600 min Summer	40.082	0.193	0.0	89.4	89.4	64.0	O K
720 min Summer	39.985	0.096	0.0	87.9	87.9	31.8	O K
960 min Summer	39.891	0.002	0.0	85.1	85.1	0.8	O K
1440 min Summer	39.889	0.000	0.0	62.2	62.2	0.0	O K
2160 min Summer	39.889	0.000	0.0	44.9	44.9	0.0	O K
2880 min Summer	39.889	0.000	0.0	35.6	35.6	0.0	O K
4320 min Summer	39.889	0.000	0.0	25.7	25.7	0.0	O K
5760 min Summer	39.889	0.000	0.0	20.3	20.3	0.0	O K
7200 min Summer	39.889	0.000	0.0	16.9	16.9	0.0	O K
8640 min Summer	39.889	0.000	0.0	14.6	14.6	0.0	O K
10080 min Summer	39.889	0.000	0.0	12.8	12.8	0.0	O K
15 min Winter	40.987	1.098	0.0	89.9	89.9	365.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	134.653	0.0	399.8	17
30 min Summer	88.595	0.0	530.1	31
60 min Summer	55.544	0.0	660.9	52
120 min Summer	33.648	0.0	802.8	84
180 min Summer	24.762	0.0	889.3	118
240 min Summer	19.801	0.0	947.0	150
360 min Summer	14.390	0.0	1027.7	214
480 min Summer	11.476	0.0	1096.4	272
600 min Summer	9.622	0.0	1145.3	326
720 min Summer	8.328	0.0	1192.7	382
960 min Summer	6.625	0.0	1263.6	490
1440 min Summer	4.792	0.0	1371.4	0
2160 min Summer	3.460	0.0	1485.4	0
2880 min Summer	2.744	0.0	1570.4	0
4320 min Summer	1.975	0.0	1696.1	0
5760 min Summer	1.563	0.0	1789.6	0
7200 min Summer	1.303	0.0	1864.5	0
8640 min Summer	1.122	0.0	1927.4	0
10080 min Summer	0.989	0.0	1981.7	0
15 min Winter	134.653	0.0	450.5	17

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	41.215	1.326	0.0	89.9	89.9	441.0	O K
60 min Winter	41.261	1.372	0.0	89.9	89.9	456.2	O K
120 min Winter	41.131	1.242	0.0	89.9	89.9	412.9	O K
180 min Winter	40.921	1.032	0.0	89.9	89.9	343.0	O K
240 min Winter	40.692	0.803	0.0	89.9	89.9	266.9	O K
360 min Winter	40.310	0.421	0.0	89.9	89.9	139.8	O K
480 min Winter	40.052	0.163	0.0	89.1	89.1	54.3	O K
600 min Winter	39.911	0.022	0.0	85.9	85.9	7.3	O K
720 min Winter	39.889	0.000	0.0	78.1	78.1	0.0	O K
960 min Winter	39.889	0.000	0.0	62.2	62.2	0.0	O K
1440 min Winter	39.889	0.000	0.0	45.0	45.0	0.0	O K
2160 min Winter	39.889	0.000	0.0	32.5	32.5	0.0	O K
2880 min Winter	39.889	0.000	0.0	25.7	25.7	0.0	O K
4320 min Winter	39.889	0.000	0.0	18.5	18.5	0.0	O K
5760 min Winter	39.889	0.000	0.0	14.7	14.7	0.0	O K
7200 min Winter	39.889	0.000	0.0	12.2	12.2	0.0	O K
8640 min Winter	39.889	0.000	0.0	10.5	10.5	0.0	O K
10080 min Winter	39.889	0.000	0.0	9.3	9.3	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	88.595	0.0	589.8	31
60 min Winter	55.544	0.0	744.3	58
120 min Winter	33.648	0.0	899.8	92
180 min Winter	24.762	0.0	988.3	130
240 min Winter	19.801	0.0	1054.6	162
360 min Winter	14.390	0.0	1150.3	224
480 min Winter	11.476	0.0	1224.1	276
600 min Winter	9.622	0.0	1284.7	320
720 min Winter	8.328	0.0	1334.7	0
960 min Winter	6.625	0.0	1415.7	0
1440 min Winter	4.792	0.0	1536.0	0
2160 min Winter	3.460	0.0	1663.7	0
2880 min Winter	2.744	0.0	1758.9	0
4320 min Winter	1.975	0.0	1899.7	0
5760 min Winter	1.563	0.0	2004.3	0
7200 min Winter	1.303	0.0	2088.3	0
8640 min Winter	1.122	0.0	2158.7	0
10080 min Winter	0.989	0.0	2219.5	0

©1982-2020 Innovyze

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Shortest Storm (mins)	15
Ratio R	0.396	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 1.590

Time (mins) From:	To:	Area (ha)
0	4	1.590

©1982-2020 Innovyze

Model Details

Storage is Online Cover Level (m) 42.400

Cellular Storage Structure

Invert Level (m) 39.889 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	350.0	0.0	1.501	0.0	0.0
1.500	350.0	0.0			

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0363-9000-2200-9000
Design Head (m)	2.200
Design Flow (l/s)	90.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	363
Invert Level (m)	39.500
Minimum Outlet Pipe Diameter (mm)	375
Suggested Manhole Diameter (mm)	Site Specific Design (Contact Hydro International)

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.200	90.0	Kick-Flo®	1.506	74.9
Flush-Flo™	0.694	89.9	Mean Flow over Head Range	-	76.8

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	10.4	1.200	85.5	3.000	104.6	7.000	158.1
0.200	36.4	1.400	80.2	3.500	112.7	7.500	163.5
0.300	68.0	1.600	77.1	4.000	120.3	8.000	168.8
0.400	85.5	1.800	81.6	4.500	127.4	8.500	173.8
0.500	88.3	2.000	85.9	5.000	134.1	9.000	178.8
0.600	89.6	2.200	90.0	5.500	140.5	9.500	183.6
0.800	89.6	2.400	93.8	6.000	146.6		
1.000	88.0	2.600	97.6	6.500	152.5		

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Half Drain Time : 269 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	41.714	0.214	0.0	7.7	7.7	121.8	Flood Risk
30 min Summer	41.779	0.279	0.0	7.8	7.8	159.1	Flood Risk
60 min Summer	41.838	0.338	0.0	7.9	7.9	192.7	Flood Risk
120 min Summer	41.877	0.377	0.0	8.0	8.0	214.9	Flood Risk
180 min Summer	41.882	0.382	0.0	8.0	8.0	218.0	Flood Risk
240 min Summer	41.874	0.374	0.0	8.0	8.0	213.0	Flood Risk
360 min Summer	41.852	0.352	0.0	8.0	8.0	200.5	Flood Risk
480 min Summer	41.835	0.335	0.0	7.9	7.9	190.7	Flood Risk
600 min Summer	41.819	0.319	0.0	7.9	7.9	181.8	Flood Risk
720 min Summer	41.803	0.303	0.0	7.9	7.9	173.0	Flood Risk
960 min Summer	41.774	0.274	0.0	7.8	7.8	155.9	Flood Risk
1440 min Summer	41.717	0.217	0.0	7.7	7.7	123.8	Flood Risk
2160 min Summer	41.644	0.144	0.0	7.6	7.6	82.3	O K
2880 min Summer	41.588	0.088	0.0	7.5	7.5	49.9	O K
4320 min Summer	41.518	0.018	0.0	7.4	7.4	10.5	O K
5760 min Summer	41.500	0.000	0.0	6.9	6.9	0.0	O K
7200 min Summer	41.500	0.000	0.0	5.7	5.7	0.0	O K
8640 min Summer	41.500	0.000	0.0	4.9	4.9	0.0	O K
10080 min Summer	41.500	0.000	0.0	4.3	4.3	0.0	O K
15 min Winter	41.743	0.243	0.0	7.8	7.8	138.3	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	134.653	0.0	127.9	18
30 min Summer	88.595	0.0	171.5	33
60 min Summer	55.544	0.0	217.3	62
120 min Summer	33.648	0.0	265.2	122
180 min Summer	24.762	0.0	293.5	180
240 min Summer	19.801	0.0	313.3	224
360 min Summer	14.390	0.0	342.3	282
480 min Summer	11.476	0.0	364.4	344
600 min Summer	9.622	0.0	381.9	412
720 min Summer	8.328	0.0	396.9	482
960 min Summer	6.625	0.0	420.8	616
1440 min Summer	4.792	0.0	455.3	880
2160 min Summer	3.460	0.0	491.5	1256
2880 min Summer	2.744	0.0	517.8	1612
4320 min Summer	1.975	0.0	555.4	2252
5760 min Summer	1.563	0.0	582.3	0
7200 min Summer	1.303	0.0	602.3	0
8640 min Summer	1.122	0.0	618.2	0
10080 min Summer	0.989	0.0	631.2	0
15 min Winter	134.653	0.0	144.7	18

©1982-2020 Innovyze

Summary of Results for 100 year Return Period (+40%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
30 min Winter	41.817	0.317	0.0	7.9	7.9	180.8	Flood Risk
60 min Winter	41.886	0.386	0.0	8.0	8.0	220.2	Flood Risk
120 min Winter	41.936	0.436	0.0	8.1	8.1	248.4	Flood Risk
180 min Winter	41.948	0.448	0.0	8.1	8.1	255.5	Flood Risk
240 min Winter	41.944	0.444	0.0	8.1	8.1	253.4	Flood Risk
360 min Winter	41.918	0.418	0.0	8.1	8.1	238.0	Flood Risk
480 min Winter	41.894	0.394	0.0	8.0	8.0	224.5	Flood Risk
600 min Winter	41.872	0.372	0.0	8.0	8.0	212.0	Flood Risk
720 min Winter	41.849	0.349	0.0	8.0	8.0	199.1	Flood Risk
960 min Winter	41.804	0.304	0.0	7.9	7.9	173.1	Flood Risk
1440 min Winter	41.718	0.218	0.0	7.7	7.7	124.2	Flood Risk
2160 min Winter	41.611	0.111	0.0	7.5	7.5	63.5	O K
2880 min Winter	41.536	0.036	0.0	7.4	7.4	20.4	O K
4320 min Winter	41.500	0.000	0.0	6.3	6.3	0.0	O K
5760 min Winter	41.500	0.000	0.0	5.0	5.0	0.0	O K
7200 min Winter	41.500	0.000	0.0	4.1	4.1	0.0	O K
8640 min Winter	41.500	0.000	0.0	3.6	3.6	0.0	O K
10080 min Winter	41.500	0.000	0.0	3.1	3.1	0.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
30 min Winter	88.595	0.0	193.4	33
60 min Winter	55.544	0.0	244.3	62
120 min Winter	33.648	0.0	298.4	120
180 min Winter	24.762	0.0	329.6	176
240 min Winter	19.801	0.0	352.5	230
360 min Winter	14.390	0.0	385.0	324
480 min Winter	11.476	0.0	409.8	372
600 min Winter	9.622	0.0	429.0	448
720 min Winter	8.328	0.0	445.8	524
960 min Winter	6.625	0.0	472.3	672
1440 min Winter	4.792	0.0	511.7	950
2160 min Winter	3.460	0.0	553.3	1320
2880 min Winter	2.744	0.0	582.8	1640
4320 min Winter	1.975	0.0	625.7	0
5760 min Winter	1.563	0.0	656.0	0
7200 min Winter	1.303	0.0	679.2	0
8640 min Winter	1.122	0.0	697.8	0
10080 min Winter	0.989	0.0	713.1	0

©1982-2020 Innovyze

Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	19.600	Shortest Storm (mins)	15
Ratio R	0.396	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.546

Time (mins) From:	To:	Area (ha)
0	4	0.546

©1982-2020 Innovyze

Model Details

Storage is Online Cover Level (m) 42.000

Porous Car Park Structure

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	190.0
Membrane Percolation (mm/hr)	1000	Length (m)	10.0
Max Percolation (l/s)	527.8	Slope (1:X)	0.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	41.500	Membrane Depth (m)	0

Orifice Outflow Control

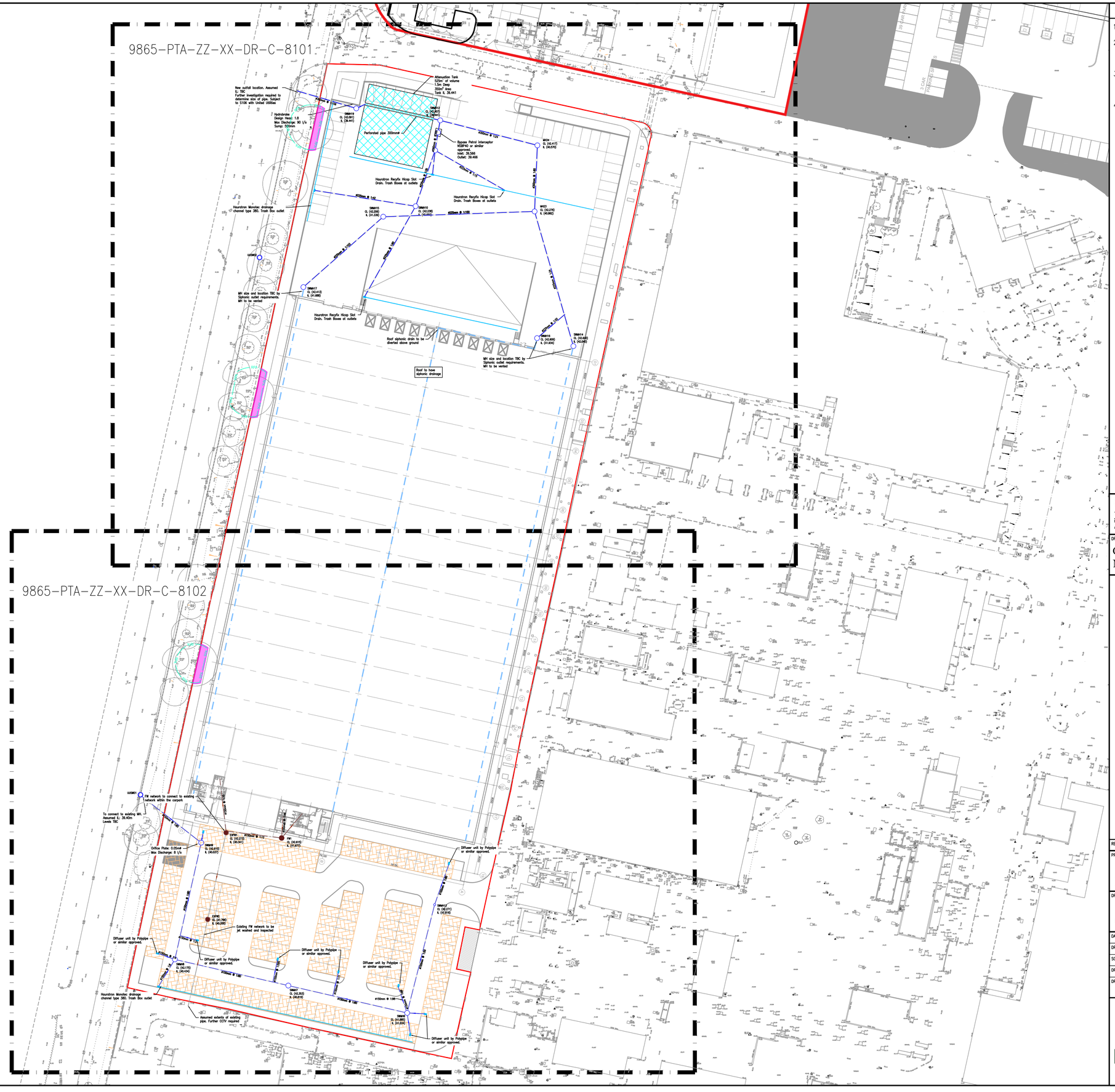
Diameter (m) 0.050 Discharge Coefficient 0.600 Invert Level (m) 39.500

©1982-2020 Innovyze

Appendix G – Proposed Drainage Strategy

9865-PTA-ZZ-XX-DR-C-8101

9865-PTA-ZZ-XX-DR-C-8102



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

- Proposed SW Drainage
- Existing SW Drainage
- Proposed FW Drainage
- Existing FW Drainage
- Attenuation Tank
- Permeable Paving
- Diffuser Block
- Drain Channel
- Site Boundary
- RPA RPA Root Protection Area
- Area of Cellweb or similar required

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS
COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D

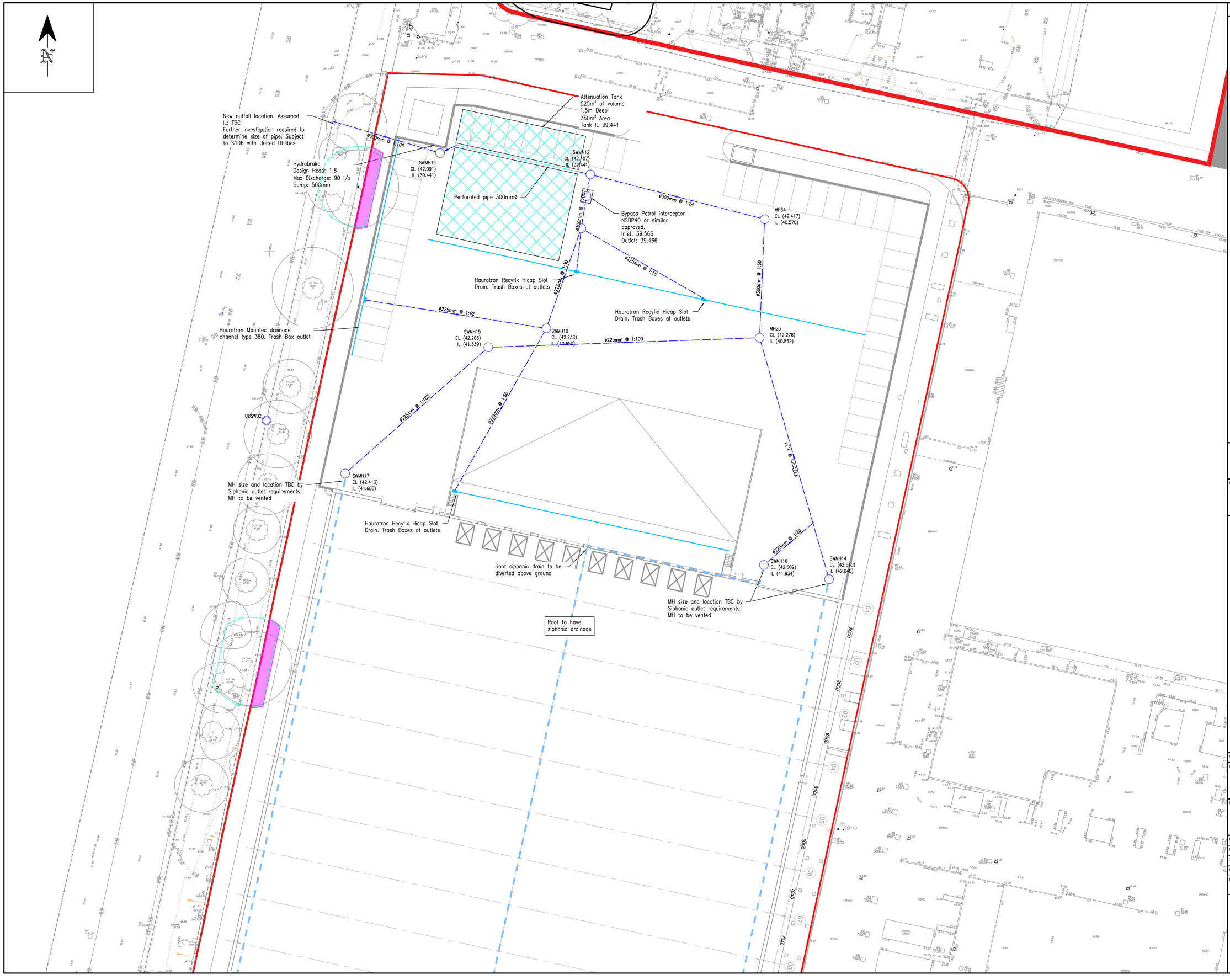
PROJECT TITLE
Image Business Park
Knowsley Site 3

DRAWING TITLE
Drainage Strategy
Overview

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No 9879
DRAWN	GW		REVISION P01
SCALE	1:500		
DRG SIZE	A1		

DRAWING No
9879-PTA-ZZ-XX-DR-C-8100

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks.
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

- Proposed SW Drainage
- Existing SW Drainage
- Proposed FW Drainage
- Existing FW Drainage
- Attenuation Tank
- Permeable Paving
- Diffuser Block
- Drain Channel
- Site Boundary
- Root Protection Area
- Area of Cellweb or similar required

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS
COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D

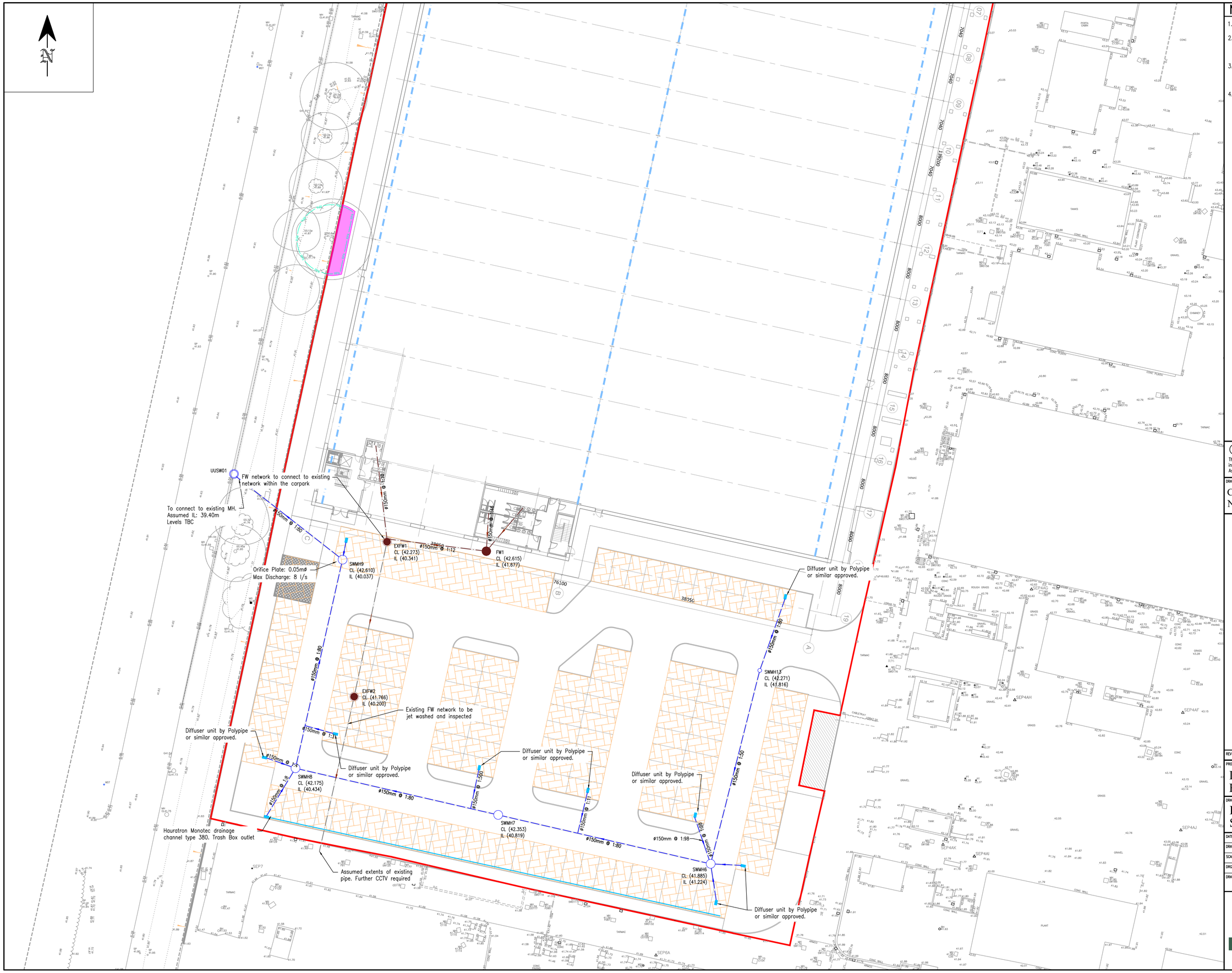
PROJECT TITLE
Image Business Park
Knowsley Site 3

DRAWING TITLE
Drainage Strategy
Sheet 1 of 2

DATE	August 2021	This drawing is issued only for the purposes described in the drawing status box.	PTA PROJ No 9879
DRAWN	GW		REVISION P01
SCALE	1:250		
ORG SIZE	A1		

DRAWING No
9879-PTA-ZZ-XX-DR-C-8101

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk



Notes:

1. Do not scale from this drawing.
2. In case of any discrepancies in drawings, details or bills, refer to engineers for clarification: unilateral decisions by the Contractor will not be accepted.
3. This drawing is to be read in conjunction with all related Architects, Consultants & Sub-Contractors drawings and specifications.
4. The Contractor is advised that all design drawings and information are to be read concurrently and any discrepancies or omissions reported directly to PTA's Civil Engineering Department.

Key:

- Proposed SW Drainage
- Existing SW Drainage
- Proposed FW Drainage
- Existing FW Drainage
- Attenuation Tank
- Permeable Paving
- Diffuser Block
- Drain Channel
- Site Boundary
- Root Protection Area
- Area of Cellweb or similar required

© Powell Tolner & Associates Ltd.
The contents of this drawing may not be reproduced in whole or in part without the prior written permission of Powell Tolner & Associates.

DRAWING STATUS
COSTING
NOT FOR CONSTRUCTION

REV	DESCRIPTION	BY	DATE	CHK'D

PROJECT TITLE
Image Business Park
Knowsley Site 3

DRAWING TITLE
Drainage Strategy
Sheet 2 of 2

DATE	June 2021
DRAWN	GW
SCALE	1:250
DRG SIZE	A1

This drawing is issued only for the purposes described in the drawing status box.

PTA PROJ No 9879
REVISION P01

DRAWING No
9879-PTA-ZZ-XX-DR-C-8102

Consulting Civil & Structural Engineers
pta
29 Red Lion Street
Chesham
Bucks.
HP5 1EJ
Tel. 01494 772721
www.ptaconsult.co.uk

Appendix H – Borehole Logs

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No: **19-0654.02** | Hole ID: **BH1** | Page: **1 of 2**

Project: **Image Business Park, Knowsley (Plot B)**

Rotary Core Borehole Log

Date: **25/06/2019** | Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Core Recovery: Run (m)	Core Recovery: TCR% SCR% RQD%	Core Recovery: Min. FI Av. FI Max. FI	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results	Backfill
Grass over MADE GROUND: Dark brown slightly gravelly sand with abundant roots. Gravel is fine to medium angular brick and quartzite. (TOPSOIL)		0.20	(0.20)	44.81						0.40	ES 1	0.40	PID=0.2ppmv	
MADE GROUND: Medium dense light brown slightly silty gravelly sand with occasional pockets of soft sandy clay. Gravel is fine to coarse angular to subrounded brick, concrete, slag, plastic, quartzite. Rare cobbles of concrete and metal pole.		1.40	(1.20)	43.61								1.20	SPT(S) N=12 (1,3/4,4,2,2)	
Becoming slightly clayey below 1.20 m bgl.										1.60	D 2	1.60	PID=0.0ppmv	
Medium dense light brown locally black slightly gravelly medium to coarse SAND. Gravel is fine to medium quartzite. (SHIRDLEY HILL SAND FORMATION)		2.20	(0.80)	42.81								2.00	SPT(S) N=17 (4,2/3,4,5,5)	
Stiff reddish brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded quartzite. (GLACIAL TILL)		2.50	(0.30)	42.51						2.40	D 3	2.40	PID=0.1ppmv	
Medium dense light brown locally black slightly gravelly medium to coarse SAND. Gravel is fine to medium subrounded quartzite. (GLACIAL TILL)												3.00	SPT(S) N=12 (3,2/3,3,3,3)	
Poor recovery between 3.00 m and 4.00 m bgl.		4.00	(1.50)	41.01								4.00	SPT(S) N=10 (1,1/2,2,3,3)	
Stiff reddish brown slightly gravelly sandy CLAY. Gravel is fine to coarse subangular to subrounded quartzite and sandstone. (GLACIAL TILL)										4.40	D 4	4.40	PID=0.2ppmv	
Poor recovery between 4.50 m and 5.00 m bgl.												5.00	SPT(S) N=29 (3,6/7,7,8,7)	
		6.00	(2.00)	39.01								6.00	SPT(S) N=39 (5,6/7,9,11,12)	
Reddish brown slightly clayey SAND (Drillers Description) (WEATHERED CHESTER SANDSTONE FORMATION)												6.00	PID=0.1ppmv	
			(2.70)									7.50	SPT(S) N=50 (12,5/50 for 230mm)	

Remarks:
1. Hand dug service avoidance pit to 1.20 m bgl. 2. Borehole advanced to 5.00 m bgl using dynamic sampling techniques with rotary openhole follow on to 9.00 m bgl and rotary coring to 15.00 m bgl. 2. Borehole terminated at 15.00 m bgl. 3. Groundwater encountered at 8.70 m bgl. 4. Borehole installed with gas and groundwater standpipe as indicated above.

Water Level Observations					Flush	
Date	Time	Strike	Duration	Standing	Depth (m)	Return
26/06/2019		8.70 m	20 min	8.50 m	9.00 - 10.50	90

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E344018.10 N398882.02	**45.01**	**Delta Drilling**	**Comacchio GEO 300**	**BHO**	**MY**		**1:40**

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No:	Hole ID:	Page:
19-0654.02	BH1	2 of 2

Project: **Image Business Park, Knowsley (Plot B)**

Rotary Core Borehole Log

Date: **25/06/2019** | Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Core Recovery: Run (m)	Core Recovery: TCR% SCR% RQD%	Core Recovery: Min. FI Av. FI Max. FI	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results	Backfill
Reddish brown slightly clayey SAND (Drillers Description) (WEATHERED CHESTER SANDSTONE FORMATION)						8.50 ▽ 8.70 ▼								
		8.70		36.31										
Strong red SANDSTONE. (Drillers Description) (CHESTER SANDSTONE FORMATION)			(0.30)											
		9.00		36.01								9.00	SPT(S) 50 (25 for 75mm/50 for 70mm)	
Weak to medium strong dark reddish brown medium grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)			(1.60)				1.5	68 58 44		9.70 - 10.00	C 5			
Bands of coarse sandstone gravel between 10.50 m and 10.60 m bgl		10.60		34.41								10.50	SPT(S) 50 (25 for 30mm/50 for 30mm)	
Weak to medium strong dark reddish brown medium to coarse grained thinly laminated SANDSTONE with occasional greenish grey fine to medium grained sandstone bands. (CHESTER SANDSTONE FORMATION)			(1.40)				1.5	100 30 10		11.80 - 12.00	C 6			
		12.00		33.01								12.00	SPT(S) 50 (25 for 25mm/50 for 30mm)	
Weak light greenish grey fine to medium grained SANDSTONE. (CHESTER SANDSTONE FORMATION)		12.05		32.96										
Medium strong dark reddish brown medium to coarse grained thinly laminated SANDSTONE with occasional bands of weak greenish grey fine to medium grained sandstone. (CHESTER SANDSTONE FORMATION)			(1.75)				1.5	84 62 47		12.55 - 12.70	C 7			
		13.80		31.21								13.50	SPT(S) 50 (25 for 30mm/50 for 40mm)	
Medium strong greenish grey fine to medium grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)		13.95		31.06										
Strong dark reddish brown medium to coarse grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)			(1.05)				1.5	60 49 68		14.40 - 14.50	C 8			
		15.00		30.01								15.00	SPT(S) 50 (5,10/50 for 45mm)	
Poor recovery between 14.50 m and 15.00 m bgl.														
Borehole complete at 15.00 m bgl.														

Remarks:
1. Hand dug service avoidance pit to 1.20 m bgl. 2. Borehole advanced to 5.00 m bgl using dynamic sampling techniques with rotary openhole follow on to 9.00 m bgl and rotary coring to 15.00 m bgl. 2. Borehole terminated at 15.00 m bgl. 3. Groundwater encountered at 8.70 m bgl. 4. Borehole installed with gas and groundwater standpipe as indicated above.

Water Level Observations					Flush	
Date	Time	Strike	Duration	Standing	Depth (m)	Return
26/06/2019		8.70 m	20 min	8.50 m	9.00 - 10.50	90

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E344018.10 N398882.02	45.01	Delta Drilling	Comacchio GEO 300	BHO	MY		1:40

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No: **19-0654.02** | Hole ID: **BH2** | Page: **1 of 2**

Project: **Image Business Park, Knowsley (Plot B)**

Rotary Core Borehole Log

Date: **25/06/2019** | Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Core Recovery: Run (m)	Core Recovery: TCR% SCR% RQD%	Core Recovery: Min. FI Av. FI Max. FI	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results	Backfill
Grass over MADE GROUND: Dark brown slightly gravelly sand with frequent roots. Gravel is fine to medium brick and quartzite. (TOPSOIL)		0.20	(0.20)	44.56						0.30	ES 1	0.30	PID=0.1ppmv	
MADE GROUND: Dark brown, locally yellowish brown, slightly clayey slightly gravelly sand with rare cobble of concrete. Gravel is fine to coarse brick, concrete, wood, glass, slag and quartzite.		1.50	(1.30)	43.26								1.20	SPT(S) N=7 (1,1/1,2,2,2)	
Firm to stiff reddish brown sandy CLAY with occasional coarse gravel of quartzite. (GLACIAL TILL)		1.70	(0.20)	43.06						1.60	D 2	1.60	PID=0.0ppmv	
Soft reddish brown sandy CLAY with occasional coarse gravel of quartzite. (GLACIAL TILL)		3.00	(1.30)	41.76								2.00	SPT(S) N=4 (1,1/1,1,1,1)	
Firm reddish brown sandy CLAY with occasional coarse gravel of quartzite. (GLACIAL TILL)		4.70	(1.70)	40.06						3.10	D 3	3.00 3.10	SPT(S) N=13 (2,2/2,3,3,5) PID=0.0ppmv	
												4.00	SPT(S) N=18 (2,2/3,6,4,5)	
Dense dark brown medium to coarse SAND with occasional coarse gravel of quartzite. (GLACIAL TILL)		5.00	(0.30)	39.76						4.80	D 4	4.80	PID=0.0ppmv	
Firm to stiff brown slightly gravelly CLAY. (Drillers Description) (GLACIAL TILL)			(3.90)									5.00	SPT(S) N=41 (6,10/10,11,10,10)	
												6.00	SPT(S) N=47 (5,6/10,11,12,14)	
												7.50	SPT(S) N=50 (5,6/50 for 280mm)	

Remarks:
1. Hand dug service avoidance pit to 1.20 m bgl. 2. Borehole advanced to 5.00 m bgl using dynamic sampling techniques with rotary openhole follow on to 9.00 m bgl and rotary coring to 15.00 m bgl. 2. Borehole terminated at 15.00 m bgl. 3. Groundwater encountered at 8.50 m bgl. 4. Borehole installed with gas and groundwater standpipe as indicated above.

Water Level Observations					Flush	
Date	Time	Strike	Duration	Standing	Depth (m)	Return
27/06/2019		8.50 m			13.50 - 15.00	90

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E343949.70 N398853.17	**44.76**	**Delta Drilling**	**Comacchio GEO 300**	**BHO**	**MY**		**1:40**

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No:	Hole ID:	Page:
19-0654.02	BH2	2 of 2

Project: **Image Business Park, Knowsley (Plot B)**

Rotary Core Borehole Log

Date: **25/06/2019**

Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Core Recovery: Run (m)	Core Recovery: TCR% SCR% RQD%	Core Recovery: Min. FI Av. FI Max. FI	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results	Backfill
Firm to stiff brown slightly gravelly CLAY. (Drillers Description) (GLACIAL TILL)						8.50 ▼								
		8.90		35.86								9.00	SPT(S) 50 (25 for 130mm/50 for 150mm)	
Weak reddish brown medium to coarse grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)										9.30 - 9.50	C 5			
Band of weak reddish brown medium to coarse grained sandstone gravel between 9.00 m and 9.20 m bgl.			(1.60)				1.5	46 33 28						
		10.50		34.26								10.50	SPT(S) 50 (25 for 20mm/50 for 25mm)	
Weak reddish brown medium to coarse grained thinly laminated SANDSTONE with bands of weak greenish grey fine to medium grained laminated sandstone. (CHESTER SANDSTONE FORMATION)							1.5	33 4 0						
Band of weak reddish brown medium to coarse grained sandstone gravel between 10.50 m and 10.70 m bgl.												12.00	SPT(S) 50 (25 for -29mm/50 for 50mm)	
			(4.50)				1.5	43 16 0						
Band of weak reddish brown medium to coarse grained sandstone gravel between 13.50 m and 13.70 m bgl.												13.50	SPT(S) N=50 (25 for 15mm/50 for 25mm)	
							1.5	97 60 20		14.00 - 14.20	C 6			
		15.00		29.76								15.00	SPT(S) 50 (25 for 20mm/50 for 35mm)	
Borehole complete at 15.00 m bgl.														

Remarks:
1. Hand dug service avoidance pit to 1.20 m bgl. 2. Borehole advanced to 5.00 m bgl using dynamic sampling techniques with rotary openhole follow on to 9.00 m bgl and rotary coring to 15.00 m bgl. 2. Borehole terminated at 15.00 m bgl. 3. Groundwater encountered at 8.50 m bgl. 4. Borehole installed with gas and groundwater standpipe as indicated above.

Water Level Observations					Flush	
Date	Time	Strike	Duration	Standing	Depth (m)	Return
27/06/2019		8.50 m			13.50 - 15.00	90

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E343949.70 N398853.17	44.76	Delta Drilling	Comacchio GEO 300	BHO	MY		1:40

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No: 19-0654.02 | Hole ID: BH3 | Page: 1 of 2

Project: Image Business Park, Knowsley (Plot B)

Rotary Core Borehole Log

Date: 26/06/2019 | Client: Knowsley (Image Business Park) Ltd

Description of Strata	Legend	Strata Depth (m)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Core Recovery: Run (m)	Core Recovery: TCR% SCR% RQD%	Core Recovery: Min. FI Av. FI Max. FI	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results	Backfill
Grass over MADE GROUND: Dark brown slightly gravelly sand with frequent roots. Gravel is fine to medium brick and quartzite.			(1.40)							0.40	ES 1	0.40	PID=0.2ppmv	
		1.40		43.38										
MADE GROUND: Medium dense dark brown slightly clayey gravelly sand with rare cobble of brick. Rare glass and timber.			(3.60)									2.00	SPT(S) N=13 (2,2/3,3,4,3)	
										2.50	D 2	2.50	PID=0.0ppmv	
												3.00	SPT(S) N=12 (1,2/2,2,4,4)	
												4.00	SPT(S) N=19 (2,2/5,5,4,5)	
		5.00		39.78										
MADE GROUND: Brown sandy gravel with brick. (Drillers Description)			(1.00)									5.00	SPT(S) N=37 (5,6/6,10,11,10)	
		6.00		38.78										
Reddish brown slightly gravelly clayey fine SAND. (Drillers Description) (WEATHERED CHESTER SANDSTONE FORMATION)			(1.10)							6.00	D 3	6.00	SPT(S) N=50 (8,10/50 for 275mm)	
		7.10		37.68								6.00	PID=0.0ppmv	
Reddish brown slightly gravelly medium SAND. (Drillers Description) (WEATHERED CHESTER SANDSTONE FORMATION)												7.50	SPT(S) N=50 (10,13/50 for 170mm)	

Remarks:
1. Hand dug service avoidance pit to 1.20 m bgl. 2. Borehole advanced to 6.00 m bgl using dynamic sampling techniques with rotary openhole follow on to 10.50 m bgl and rotary coring to 15.00 m bgl. 2. Borehole terminated at 15.00 m bgl. 3. Groundwater encountered at 7.80 m bgl. 4. Borehole installed with gas and groundwater standpipe as indicated above.

Water Level Observations					Flush	
Date	Time	Strike	Duration	Standing	Depth (m)	Return
28/06/2019		7.80 m			7.50 - 9.00	90

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E343921.87 N398909.25	44.78	Delta Drilling	Comacchio GEO 300	BHO	MY		1:40

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No: **19-0654.02** | Hole ID: **BH3** | Page: **2 of 2**

Project: **Image Business Park, Knowsley (Plot B)**

Rotary Core Borehole Log

Date: **26/06/2019** | Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Core Recovery: Run (m)	Core Recovery: TCR% SCR% RQD%	Core Recovery: Min. FI Av. FI Max. FI	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results	Backfill
Reddish brown slightly gravelly medium SAND. (Drillers Description) (WEATHERED CHESTER SANDSTONE FORMATION)			(2.10)			7.80 ▼								
Poor recovery between 9.05 m and 10.50 m bgl due to obstruction.		9.20		35.58								9.00	SPT(S) N=50 (25 for 85mm/50 for 75mm)	
Reddish brown SANDSTONE. (Drillers Description) (CHESTER SANDSTONE FORMATION)			(1.30)				1.5	3 3 0						
		10.50		34.28								10.50	SPT(S) N=50 (25 for 60mm/50 for 40mm)	
Medium strong dark reddish brown medium to coarse grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)			(2.00)				1.5	76 58 46		11.10 - 11.35	C 4			
		12.50		32.28								12.00	SPT(S) N=50 (25 for 30mm/50 for 40mm)	
Medium strong to strong reddish brown medium to coarse grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)			(1.70)				1.5	92 70 38		12.50 - 12.60 12.70 - 12.95	C 5 6 C			
		14.20		30.58								13.50	SPT(S) N=50 (25 for 30mm/50 for 45mm)	
Medium strong reddish brown medium to coarse grained thinly laminated SANDSTONE. (CHESTER SANDSTONE FORMATION)			(0.80)				1.5	100 86 83		13.60 - 13.85 14.40 - 14.50	C 7 C 8			
		15.00		29.78								15.00	SPT(S) N=50 (25 for 25mm/50 for 30mm)	
Borehole complete at 15.00 m bgl.														

Remarks:
1. Hand dug service avoidance pit to 1.20 m bgl. 2. Borehole advanced to 6.00 m bgl using dynamic sampling techniques with rotary openhole follow on to 10.50 m bgl and rotary coring to 15.00 m bgl. 2. Borehole terminated at 15.00 m bgl. 3. Groundwater encountered at 7.80 m bgl. 4. Borehole installed with gas and groundwater standpipe as indicated above.

Water Level Observations					Flush	
Date	Time	Strike	Duration	Standing	Depth (m)	Return
28/06/2019		7.80 m			7.50 - 9.00	90

Coordinates:	Elevation (mAOD):	Drilled By:	Plant Used:	Logged:	Checked:	Approved:	Scale (m):
E343921.87 N398909.25	**44.78**	**Delta Drilling**	**Comacchio GEO 300**	**BHO**	**MY**		**1:40**

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No:	Hole ID:	Page:
19-0654.01	TP2	1 of 1

Project: **Image Business Park, Knowsley (Plot B)**

Trial Pit Log

Date: **25/06/2019**

Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details: Depth (m)	Sample Details: Type	Sample Details: Ref	Test Details: Depth (m)	Test Details: Results
Grass over MADE GROUND: Blackish brown slightly gravelly silty sand with frequent roots. Gravel is fine to coarse angular to subrounded brick, quartzite and sandstone. (TOPSOIL)		0.40	44.32						
MADE GROUND: Reddish brown slightly silty gravelly sand with occasional pockets of firm yellowish brown sandy clay and occasional cobbles of brick and concrete. Gravel is fine to coarse angular to subrounded brick, concrete, glass, plastic, clinker, quartzite and sandstone. Rare metal pole and timber.		1.40	43.32		0.50	ES	1	0.50	PID=0.00ppmv
					0.70 - 0.90	B	2		
Firm light grey mottled orangish brown slightly gravelly sandy CLAY. Gravel is fine to medium subrounded quartzite. (GLACIAL TILL)		1.60	43.12		1.50	D	3	1.50	PID=0.00ppmv
Firm reddish brown mottled orangish brown slightly gravelly slightly sandy CLAY with rare pocket of yellowish brown fine grained sand. Gravel is fine to medium subangular to rounded quartzite and sandstone. (GLACIAL TILL)									
		3.20	41.52		3.10	D	4	3.10	PID=0.00ppmv
Trial pit complete at 3.20 m bgl.									

Dimensions and Orientation:

Length = 3.10 m

Width = 0.85 m

Orientation:

Inclination:

Remarks:
1. Trial pit terminated at 3.20 m. 2. Groundwater was not encountered during excavation. 3. Trial pit sides stable. 4. Trial pit backfilled with arisings upon completion.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E343959.68 N398901.15	44.72	Boundary Plant Hire	13T Tracked Excavator	BHO	MY		1:30

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No: 19-0654.01 | Hole ID: TP3 | Page: 1 of 1

Project: Image Business Park, Knowsley (Plot B)

Trial Pit Log

Date: 26/06/2019 | Client: Knowsley (Image Business Park) Ltd

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results
Grass over MADE GROUND: Blackish brown slightly gravelly silty sand with frequent roots. Gravel is fine to coarse angular to subrounded brick, quartzite and sandstone. (TOPSOIL)		0.15	44.87					
MADE GROUND: Dark brown slightly clayey gravelly sand with occasional cobbles of brick and concrete and occasional pockets of yellowish brown medium to coarse sand. Gravel is fine to coarse angular to subrounded brick, concrete, glass, sandstone and quartzite.		1.30	43.72		0.50	ES 1	0.50	PID=0.20ppmv
Orangish brown slightly gravelly medium to coarse SAND. Gravel is fine to coarse subrounded to rounded quartzite. (SHIRDLEY HILL SAND FORMATION)		1.70	43.32		1.40 - 1.50	B 2	1.40	PID=0.00ppmv
Soft light grey mottled orangish brown slightly gravelly sandy CLAY. Gravel is fine to coarse subrounded to rounded quartzite. (GLACIAL TILL)		2.50	42.52	2.20 ▼				
Firm reddish brown slightly gravelly sandy CLAY. Gravel is fine to coarse subrounded to rounded quartzite. (GLACIAL TILL)		3.30	41.72		3.00	D 3	3.00	PID=0.00ppmv
Trial pit complete at 3.30 m bgl.								

Dimensions and Orientation:

Length = 3.20 m

Width = 0.90 m

Orientation:

Inclination:

Remarks:
1. Trial pit terminated at 3.30 m. 2. Slight groundwater seepage was encountered at 2.20 m bgl during excavation. 3. Trial pit sides stable. 4. Trial pit backfilled with arisings upon completion.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E344010.48 N398834.15	45.02	Boundary Plant Hire	13T Tracked Excavator	BHO	MY		1:30

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No:	Hole ID:	Page:
19-0654.01	TP4	1 of 1

Project: **Image Business Park, Knowsley (Plot B)**

Trial Pit Log

Date: **25/06/2019**

Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details: Depth (m)	Sample Details: Type	Sample Details: Ref	Test Details: Depth (m)	Test Details: Results
Grass over MADE GROUND: Blackish brown slightly gravelly silty sand with frequent roots. Gravel is fine to coarse angular to subrounded brick, quartzite and sandstone. (TOPSOIL)		0.50	44.23						
MADE GROUND: Dark brown slightly silty gravelly sand with occasional cobbles of brick and concrete. Gravel is fine to coarse angular to subrounded brick, concrete, ceramics, wood, sandstone and quartzite.		1.20	43.53		1.00 - 1.10	B	1	1.00	PID=0.00ppmv
Orangish brown slightly gravelly medium to coarse SAND. Gravel is fine to coarse subrounded to rounded quartzite. (SHIRDLEY HILL SAND FORMATION)		1.50	43.23						
Firm, locally stiff, grey slightly gravelly sandy CLAY. Gravel is fine to medium rounded quartzite. (GLACIAL TILL)		2.70	42.03		1.60	D	2	1.60	PID=0.00ppmv
Firm light grey mottled reddish brown slightly gravelly slightly sandy CLAY. Gravel is fine to coarse subrounded to rounded quartzite. (GLACIAL TILL)		3.50	41.23						
Trial pit complete at 3.50 m bgl.									

Dimensions and Orientation:

Length = 3.90 m

Width = 0.85 m

Orientation:

Inclination:

Remarks:
1. Trial pit terminated at 3.50 m. 2. Groundwater was not encountered during excavation. 3. Trial pit sides stable. 4. Trial pit backfilled with arisings upon completion.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E343988.81 N398808.07	44.73	Boundary Plant Hire	13T Tracked Excavator	BHO	MY		1:30

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No:	Hole ID:	Page:
19-0654.01	TP5	1 of 1

Project: **Image Business Park, Knowsley (Plot B)**

Trial Pit Log

Date: **25/06/2019**

Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details			Test Details	
					Depth (m)	Type	Ref	Depth (m)	Results
Grass over MADE GROUND: Blackish brown slightly gravelly silty sand with frequent roots. Gravel is fine to coarse angular to subrounded brick, quartzite and sandstone. Rare glass. (TOPSOIL)		0.40	44.26						
MADE GROUND: Dark brown slightly silty gravelly sand with occasional cobbles of brick and concrete. Gravel is fine to coarse angular to rounded brick, concrete, slag, sandstone and quartzite.		0.90	43.76		0.60	ES	1	0.60	PID=0.10ppmv
Greenish grey and orangish brown gravelly SAND. Gravel is fine to coarse subrounded to rounded quartzite. (SHIRDLEY HILL SAND FORMATION)		1.20	43.46		1.10	D	2	1.10	PID=0.00ppmv
Light grey locally orangish brown gravelly SAND. Gravel is fine to coarse subrounded to rounded quartzite. (SHIRDLEY HILL SAND FORMATION)		1.80	42.86						
Stiff, locally firm, reddish brown mottled greyish brown slightly sandy slightly gravelly CLAY. (GLACIAL TILL)		3.50	41.16		2.50	D	3	2.50	PID=0.10ppmv
Trial pit complete at 3.50 m bgl.									

Dimensions and Orientation:

Length = 3.90 m

Width = 0.90 m

Orientation:

Inclination:

Remarks:
1. Trial pit terminated at 3.50 m. 2. Groundwater was not encountered during excavation. 3. Instability in upper 1.00 m of Made Ground. 4. Trial pit backfilled with arisings upon completion.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E343949.17 N398839.03	44.66	Boundary Plant Hire	13T Tracked Excavator	BHO	MY		1:30

deltasimons
Environment - Health & Safety - Sustainability

Head Office
3 Henley Way, Doddington Road
Lincoln, LN6 3QR
Tel: +44 (0) 1522 882555
Email: info@deltasimons.com

Project No:	Hole ID:	Page:
19-0654.01	TP6	1 of 1

Project: **Image Business Park, Knowsley (Plot B)**

Trial Pit Log

Date: **26/06/2019**

Client: **Knowsley (Image Business Park) Ltd**

Description of Strata	Legend	Strata Depth (m)	Reduced Level (mAOD)	Water Strike (m)	Sample Details: Depth (m)	Sample Details: Type Ref	Test Details: Depth (m)	Test Details: Results
Grass over MADE GROUND: Blackish brown slightly gravelly silty sand with frequent roots. Gravel is fine to coarse angular to subrounded brick, quartzite and sandstone. Rare glass. (TOPSOIL)		0.30	44.55					
MADE GROUND: Dark brown slightly silty gravelly sand with occasional lenses of yellowish brown fine to medium sand and occasional pockets of soft dark brown sandy clay. Gravel is fine to coarse angular to subrounded brick, concrete, slag, coal, clinker, quartzite and sandstone. Rare timber and boulder of concrete.		1.30	43.55		0.60	ES 1	0.60	PID=0.10ppmv
Orangish brown slightly silty slightly gravelly SAND. Gravel is fine to coarse subrounded to rounded quartzite. (SHIRDLEY HILL SAND FORMATION)		1.80	43.05		1.50	D 2	1.50	PID=0.00ppmv
Greenish grey and orangish brown gravelly clayey SAND with occasional pockets of soft reddish brown clay. Gravel is fine to coarse subrounded to rounded quartzite and sandstone. (SHIRDLEY HILL SAND FORMATION)		2.00	42.85	1.90 ▼				
Soft, locally very soft, greenish grey mottled reddish brown slightly gravelly sandy CLAY with occasional pockets of greenish grey fine to medium sand. Gravel is fine to coarse subrounded to rounded quartzite. (Wet) (GLACIAL TILL)		3.50	41.35		3.40	D 3	3.40	PID=0.00ppmv
Trial pit complete at 3.50 m bgl.								

Dimensions and Orientation:

Length = 3.50 m

Width = 0.60 m

Orientation:

Inclination:

Remarks:
1. Trial pit terminated at 3.50 m. 2. Slight groundwater seepage was encountered at 1.90 m bgl during excavation. 3. Trial pit sides stable. 4. Trial pit backfilled with arisings upon completion.

Coordinates:	Elevation (mAOD):	Excavated By:	Plant Used:	Logged:	Checked:	Approved:	Scale:
E343886.60 N398837.44	44.85	Boundary Plant Hire	13T Tracked Excavator	BHO	MY		1:30

Appendix I – Knowsley Proforma

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

This pro-forma is a requirement of the Planning Validation Checklist. You **must complete all white boxes in full** and submit this pro-forma along with your supporting evidence to the Local Planning Authority for any application which seeks planning permission for major development (as defined in section 2 of Statutory Instrument 2015 No. 595).

This pro-forma supports developers and regulators in **summarising and confirming** how surface water from a development will be managed sustainably under current and future conditions. It should be completed in conjunction with the Council's 'Completing your Pro Forma' document and your sustainable drainage system should be designed in accordance with CIRIA The SuDS Manual C753.

The pro-forma follows Policy CS24 of Knowsley MBC's Local Plan, National Planning Policy Framework, House of Commons Written Statement (HWSW 161) on SuDS, Planning Practice Guidance and Defra's Non-Statutory Technical Standards for Sustainable Drainage Systems. It is supported by the Defra/EA Guidance on Rainfall Runoff Management and can be completed using freely available tools such as Tools for Sustainable Drainage Systems or approved Industry Standard surface water management design software. The Council's Sustainable Drainage & Surface Water Management Technical Guidance document also provides further information.

Section 1: Development Details

Development Name		Image Business Park, Knowsley Site 3			
Development Address *(including postcode)*		L33 7UF	**Planning Application Reference** *(if available)*	-	
Development Grid Reference	**Northings**	343767	**Expected lifetime of development** *(years)*	100	
	Eastings	398801	**Have you submitted a Flood Risk Assessment?**	Yes ☐ No ■	
Total Development Site Area (Ha)		2.246	**Type of Planning Application** (✓)	**Outline**	☐
Site area served by proposed drainage system (excluding open space) (Ha)*		2.246		**Full**	☑
Is your surface water drainage system designed to a *(tick all that apply)*:				**Hybrid**	☐
Greenfield Standard • *Site is undeveloped and a new drainage system will be installed; OR* • *Site is already developed and a new surface water drainage system will be installed to serve the new development.*		☐		**Reserved Matters**	☐
Previously Developed Standard • *Site is already developed and the entirety of the existing surface water drainage system will be used to serve the new development.*		☑			

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 2: Impermeable Area and Existing Drainage For outline or reserved matters applications, go to Section 3

	Existing (E)	Proposed (P)	Difference (P – E)	Evidence Checklist	
Impermeable Area (Ha)	2.2457	1.7845	0.4612	☑	Plans showing development layout of site with existing and proposed impermeable areas.
State Drainage Method	-	Hydrobrake, permeable paving and storage tanks	N/A	☑	Plans showing current and proposed locations of sustainable drainage system.
Are there existing sewers, watercourses, water bodies, highway drains, soakaways or filter drains on the site?			Yes ☐ No ■	☑	Plans showing existing layout to include: • Watercourses, open or culverted • Water bodies – ponds, swales etc. • Sewers, including manholes • Highway drains, include manholes • Soakaways, filter drains

Section 3: Surface Water Discharge Hierarchy – Planning Practice Guidance

Surface Water Discharge Method	Proposed?	If YES - Evidence Checklist		If NO - Evidence Checklist	
1. Infiltration to ground	Yes ☐ No ■	☐	Completed Infiltration Checklist from CIRIA The SuDS Manual C753 Appendix B *An editable version of this form is available on SusDrain website.*	☑	Geotechnical Survey, including Soil Permeability Testing stating Percolation Coefficient, in accordance with BRE 365 **AND** Statement providing justification in your Sustainable Drainage Strategy
2. Discharge to watercourse or surface water body *(Main River or Ordinary)*	Yes ☐ No ■	☐	Watercourse and/or Water Body Survey Report	☐	Plan showing nearby watercourses and water bodies **AND** Statement providing justification in your Sustainable Drainage Strategy
3. Discharge to surface water sewer	Yes ■ No ☐	☐	Water and Sewerage Company written agreement for the Right to Connect.	☑	Plan showing nearby sewers **AND** Statement providing justification in your Sustainable Drainage Strategy
4. Discharge to combined sewer	Yes ☐ No ■				

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 4: Calculate Peak Discharge Rates – Technical Standards S2 and S3 (unless S1 applies)

Rainfall Event	Existing Rate (l/s)	Greenfield Rate (l/s)	Proposed Rate (l/s) *Brownfield sites must reduce discharge rates by 50%*	Evidence Checklist	
Qbar		-		☑	MicroDrainage (or equivalent) calculations
1:1 Year Event	185.06	-	90		
1:30 Year Event	453.73	-	90		
1:100 Year Event	586.20	-	90		

Section 5: Calculate Discharge Volume – Technical Standards S4 and S6 (unless S1 applies)

Rainfall Event	Existing Volume (m^3)	Greenfield Volume (m^3)	Proposed Volume (m^3)	Evidence Checklist	
1:100 Year 6 Hour Event				☐	MicroDrainage (or equivalent) calculations

Section 6: Infiltration

Site Information	✓	Evidence Checklist	
Do your sustainable drainage proposals include any infiltration?	Yes ☐ No ▣ *If NO, please move on to Section 7*	☑	Proposed sustainable drainage plans
You should submit an alternative 'Plan B' sustainable drainage design utilising an alternative discharge method if site specific ground conditions are unknown at this stage. This will become the default design in the event infiltration proposals are not feasible upon site specific ground investigation. **Have you submitted an alternative 'Plan B' sustainable drainage design?**	Yes ☐ No ▣	☑	'Plan B' conceptual sustainable drainage plans and statement of approach

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Section 7: Storage – Technical Standards S7, S8 and S9

Storage Details	Details	Evidence Checklist	
State climate change allowance used (%)	40%	✔	State / use in MicroDrainage
State storage volume provided (m^3) *(excluding non-void spaces)* *Must include an allowance for climate change and urban creep.*	526.5m3	✔	Drainage plans showing location of attenuation and all flow control devices and any supporting calculations
Summarise how storage will be provided for 1:30 year event on site. *Storage must be designed to ensure that at no flooding occurs onsite in a 1 in 30 year event except in designed areas **and** no flooding occurs offsite in a 1 in 100 year (+ climate change allowance) event.*	Storage tank and permeable paving will hold the 1:30 storm storage.	✔	Plans showing size and location of storage and supporting calculations
Summarise how storage will be provided for 1:100 year (+ climate change) 6 hour event on site. *Where storage above the 1:30 year rainfall event is provided in designated areas designed to accommodate excess surface water volumes, plans showing storage locations and surface water depths and supported by MicroDrainage (or equivalent) calculations.*	Storage tank and permeable paving will hold the 1:30 storm storage.	✔	Plans showing size and location of storage and supporting calculations

Section 8: Operation and Maintenance – Technical Standard S12 and HCWS161

Consideration	Select ALL that apply (✓)		Evidence Checklist	
State how ALL components of the sustainable drainage system will be maintained for the design life of the development.	**Sustainable drainage features are at property level**	✔	✔	Statement provided within your Sustainable Drainage Strategy
	Sustainable drainage system to be adopted by Water and Sewerage Company through a Section 104 agreement *(Water Industry Act 1991)*	✔		
	Applicant to secure maintenance of sustainable drainage features by entering into a Section 106 agreement *(Town and Country Planning Act 1990)*	☐		

Knowsley Council

PRO-FORMA 1: Sustainable Drainage System: Planning Permission

Declaration and Submission

This pro-forma has been completed using evidence from information which has been submitted with my planning application.

The information submitted in the Sustainable Drainage Strategy and site-specific Flood Risk Assessment (FRA), where submitted, is proportionate to the site conditions, flood risks and magnitude of development and I agree that this information can be used as evidence to this sustainable drainage approach.

Submitter Details			
Form completed by	George Westgarth	**Email Address**	George.westgarth@ptaconsult.co.uk
		Daytime Telephone	01494 772 721
Form signed off by	George Westgarth	**Accreditation(s) and/or Qualification(s) of Signatory**	-
Date *(dd/mm/yyyy)*	31/08/21	**Company**	PTA
Client Details			
Name	-	**Company**	-

Knowsley Council