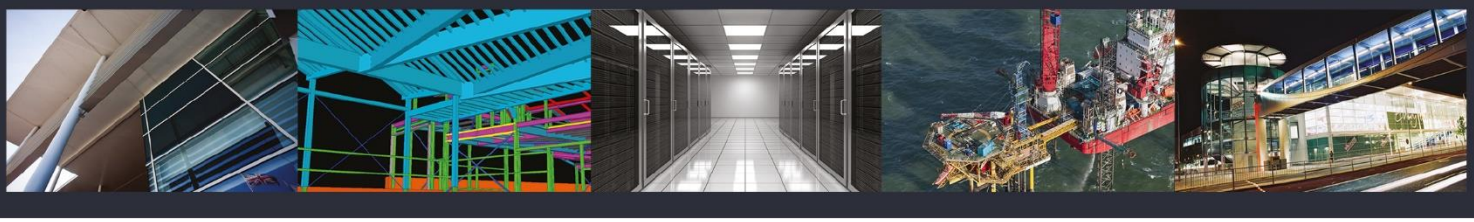
PINNACLE
CONSULTING ENGINEERS



Drainage Strategy Report

Peartree Lane Welwyn Garden City

Pinnacle Consulting Engineers

9 October 2019

Prepared for:

Saunders Architects

STRUCTURAL • CIVIL • DUE DILIGENCE • ENGINEERING MASTERPLANNING
FLOOD MANAGEMENT • INFRASTRUCTURE DESIGN
PRE-DEVELOPMENT ENGINEERING • BIM • TRANSPORTATION

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APPROVALS

	Name	Position	Date
Prepared by	Shohely Sultana	Civil Engineer	09.10.19
Reviewed by	Jawsy Jabbar	Associate	09.10.19
Approved by	David Meigh	Director	09.10.19

VERSIONS

Number	By	Date	Context
1.0	Shohely Sultana	03.10.19	For Comment
2.0	Shohely Sultana	09.10.19	Revised following comments

CONTENT

1 EXECUTIVE SUMMARY

The drainage strategy for the proposed development has incorporated the following:

- The proposed 0.671ha development is consist of hostel and maintenance/office units with adjacent carparks. The scheme proposed 100 bed YMCA hostel and 43 residential dwellings with demolishment of existing development.
- The Development Site consist of net increase of 25% in proposed permeable area and 8.9% decrease of impermeable area.
- As a Brown Field Site, a well-defined surface and foul water sewer is identified in Utility Survey. Both are discharging to the public sewer network of Thames water in the vicinity of the development Site.
- Upon referencing the records held by the British Geological Society, the Development Site is found underlain with Lewes Nodular Chalk Formation and Seaford Chalk Formation. Soil Infiltration rates was assumed to be 1 x 10-5m/s.
- It is therefore recommended that Site Specific infiltration test to BRE 365 be conducted to assess the viability of this proposed surface water strategy
- Based on this infiltration rates, the proposed surface water strategy involves the division of the entire site into two catchment area and ultimately discharging the run-off via two separate cellular soakaway crates into underlying soil strata. For the rainfall event of a 1 in 100 return period plus allowable climate change, the proposal consists sub catchment A (0.23Ha) discharging to cellular storage crates volume of 216 cubic meter. Subbasement B (0.24Ha) discharging into storage cates of 228cubic meter. A plan showing the proposed drainage strategy can be found in Appendices G.
- Allowance for surface water overflow is proposed to be channelled and connected to public sewer in the vicinity of the Development Site.
- The proposal involves the foul water discharge 5.96l/s (peak flow). This is proposed to be connected to existing foul sewer in the vicinity of the Works. It can be assumed that the existing foul water sewer running along the site has sufficient capacity.
- It is therefore recommended that the Thames Water Development Enquires be engaged to determine the capacity and opportunities for the proposed connection to their asset

2 INTRODUCTION

Pinnacle Consulting Engineers Ltd have been commissioned by Saunders Architects on behalf of YMCA to carry out a Drainage Strategy report for a proposed development of a site off Peartree Lane Welwyn Garden City AL7 3UL. A site location plan is enclosed in Appendix A.

The purpose of this report is to propose a viable and sustainable strategy for the management of foul water and surface water runoff (with climate change allowances). This will also require devising a feasible discharge location for both networks and ensuring the networks have the capacity to accommodate the proposed discharge rates.

2.1 Site description

The proposed 0.671ha development is centred on National Grid Reference (NGR) TL244125 (524409mE, 212593mN) at Peartree Lane Welwyn Garden City AL7 3UL within a predominantly residential/commercial area. The existing brownfield site comprises 1 and 2 storey buildings with car parking at north of the site.

The site can be accessed from Peartree Lane. The site is bound to the North East by Peartree Farm, to North West by Carpark of other territory, to the South West by Landscaping and Peartree Lane runs along its south western boundary.

There are no fluvial features in the vicinity of the site. The nearest river Lea is approximately 2.1km to the South Western part of the site.

Figure 1 – Aerial View of the existing development site (approximate site boundary edged red)

2.2 Topography

The development site has a relatively shallow slope falling in the centre of the site. The highest level is 85.80m AOD and the lowest level is 82.20m AOD.no uniform sloping of the site is observed.

Details of existing development site levels are enclosed in Appendix B.

2.3 Geological ground conditions

The Geological conditions at the site detailed below are based on available records provided by the British Geological Survey (BGS) website.

Formation	Description
Artificial Ground (Made Ground)	No artificial deposits have been delineated on the BGS site maps.
Superficial Deposits (Drift Deposits)	Lowestoft Formation - Diamicton. Superficial Deposits formed up to 2 million years ago in the Quaternary Period. Local environment previously dominated by ice age conditions (U). ice age conditions (U). These sedimentary deposits are glacigenic in origin. They are detrital, created by the action of ice and meltwater, they can form a wide range of deposits and geomorphologies associated with glacial and inter-glacial periods during the Quaternary.
Bedrock	Lewes Nodular Chalk Formation and Seaford Chalk Formation (undifferentiated) - Chalk. Sedimentary Bedrock formed approximately 84 to 94 million years ago in the Cretaceous Period. Local environment previously dominated by warm chalk seas. These sedimentary rocks are shallow-marine in origin. They are biogenic and detrital, generally comprising carbonate material (coccoliths), forming distinctive beds of chalk.

Table 2.2 – Geological Ground Conditions

The reference to the BGS website did not observe recorded ground water level (Piezometric level). Likewise, the reference to the website did not observe the presence of Rock Head.

2.4 Proposed Development

The scheme proposes 100 bed YMCA hostel and 43 residential dwellings with the demolishment of existing development. The proposed development plans are enclosed in Appendix C respectively.

3 EXISTING DRAINAGE MANAGEMENT

3.1 Existing surface water management

A utility survey of the existing infrastructure within the site was conducted by Malcolm Hughes Charted Land Surveyors on the 9th of August 2019. Utility survey records are attached in Appendix E of this report; the records delineate all observed surface water networks within the site.

Surface water sewer operated/manages by Thames water runs along Peartree farm/ Peartree lane to the north-east. It appears this surface water sewer picks ups the run-off from the carparks and existing hostel buildings.

For the office units in the front of the site, the surface water runoff is infiltrated through Soakaway situated in the front of the site with existing Landscaping. Another surface water network is delineated for the north-western part of the building, but the outfall of this network is non-identified.

The existing finishing across the site was largely comprised of a large impermeable area with landscaping and vegetations roughly following its perimeter. The existing impermeable area which drained by the existing surface water sewers is approximately 5,083m². As part of the proposal, the impermeable area is expected to reduce to 4,667m². which is an overall reduction of 416m² (8.2%). An existing and proposed impermeable areas plan is included as Appendix D.

The Environmental Agency's Flood map for planning indicates that the site is in Flood Zone 1 - little or no risk, with an annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000-year rainfall event). The nearest river (River Lea) is approximately 2.1km to the south-west of the site.

3.2 Existing foul water management

The utility survey conducted by Malcolm Hughes Charted Land Surveyors also delineates the location of existing private foul water sewer. There are three separate foul water sewers identified discharging to the Thames water foul network runs along the North-eastern part of the site. For the existing buildings and Carpark, the foul sewer is connected to the public sewer via Ø150mm pipe same goes for the existing hostel and office units to the other part of the site. For the existing development to the south-east of the site, the foul sewer is connected via Ø100mm pipe to the public sewer system runs along its south-eastern part.

4 PROPOSED SITE DRAINAGE

4.1 Surface Water Discharge

Traditional approaches to urban drainage have comprised of underground tanks and pipe networks. More recently, the benefits and opportunities to use Sustainable Drainage Systems (SuDS) have been realised and encouragement to use such systems is promoted throughout Flood Risk Management policy at all levels. SuDS is a term which encompasses a variety of approaches to managing surface water in a way which is more sympathetic to the natural and human environment than conventional piped drainage systems. Management of surface water is an essential element for reducing flood risk and SuDS techniques are often designed to achieve this in a way that mimics the natural environment.

The Building Regulations (H3) states the priority for discharging surface water runoff from a development is as follows:

1. Infiltration into the ground;

2. Discharge into a watercourse;

3. Discharge into a sewer.

As the existing bedrock has chalk formation and there is already a functioning soakaway within the site, it is viable to form new soakaways to drain the development runoff, subject to infiltration tests to BRE digest 365, winter ground water level monitoring and the availability of good infiltration media at the proposed soakaway locations.

If the site-specific infiltration test results show a poor infiltration media, then a combination of infiltration into the ground and the limited discharge rate (minimum of 5l/s) into the existing Thames Water public sewer can be explored.

If the site-specific infiltration test results show a good infiltration media, then infiltration soakaways can be installed to drain the surface water runoff together with an outflow into the existing Thames Water public sewer.

In the absence of site-specific infiltration test results, this report assumes an infiltration rate of 10^{-5} m/s.

4.2 Local Constraints and Planning Policies

The information provided below is an extract from Welwyn Hatfield Council was produced in 2005 found on the council website.

Policy R7 - Protection of Ground and Surface Water

Planning permission will not be granted for development which poses a threat to the quality of both surface and/or groundwater. Where proposals are acceptable the use of sustainable drainage systems will be encouraged, dependent on local site and underlying groundwater considerations.

Development on Floodplains and Flood Prevention

Floodplains act as storage and conveyancing areas for floodwater and may also have high environmental and amenity value. Floodplains therefore need safeguarding from inappropriate development. Any development, including raising the floor of the floodplain, may affect its storage capacity. This results in an increased risk of flooding and may affect other parts of the interconnected water system. The Environment Agency has identified the floodplains in the district, the majority of which are in the Green Belt. The Council will resist proposals after consultation with the Environment Agency for new development in these areas.

New development outside floodplains can result in increased problems of flooding downstream because of an increase in run-off from impermeable surfaces. There may be ways however of ameliorating the problem by the use of sustainable drainage systems including, for example, balancing ponds, swales and porous pavements. These techniques will require appropriate design and siting. The suitability of certain infiltration techniques will also depend on site specific groundwater considerations. There may also be opportunities for increasing biodiversity with sustainable drainage techniques. The Council will not allow development, after consultation with the Environment Agency, that would increase the risk of flooding downstream because of increased surface run-off.

Policy R8 - Floodplains and Flood Prevention

Within the floodplains identified on the Proposal Map, planning permission for development will not be granted where proposals would;

(i) Decrease the capacity of the floodplain to store flood water; or

(ii) Impede the flow of water; or

(iii) Increase the number of people and properties at risk from flooding. Planning permission for new development outside floodplains will not be granted where the proposals would result in an increase in flooding downstream because of increased run-off. The use of sustainable drainage systems will be encouraged, dependent on local site and underlying groundwater considerations.

Proposals for development necessary to prevent an increase in flooding will be considered in terms of their impact on biodiversity, the landscape and recreation."

The proposed site falls into the Flood Zone 1 and therefore not affecting any floodplains.

Policy R10 – Water Conservation Measures

New development will be expected to incorporate water conservation measures wherever applicable, including sustainable drainage systems, water storage systems, soft landscaping and permeable surface to help reduce surface water run-off.

Sustainable drainage measures have been proposed such as permeable paving at the car parking bays, soft landscaping features and infiltration soakaways.

4.3 Proposed Development Surface Water Drainage Strategy

The proposed development plan necessitates demolishment of existing structures and construction of new development. The surface water runoff from the proposed 4,667m² of impermeable areas will be collected into two separate networks (please refer to Appendix H for the catchment plan) and infiltrated into the ground via associated two cellular soakaway storage unit volume of 216 m^3 and 228 m^3.

For controlling the overflow from both proposed soakaways, the sewer system is connected to the existing Thames Water surface water sewer running along the north eastern boundary of the site.

For Soakaway Designs, site-specific infiltration tests need to be carried out in accordance with BRE Digest 365. Winter groundwater table monitoring needs to be carried out to determine the suitability of the soakaway depth. If the infiltration test and groundwater table monitoring prove the non-viability of the infiltration discharge method, then 5 l/s limited discharge into the Thames Water surface water sewer from the attenuation tanks to be implemented. It is also noteworthy to mention there is a significant increase in permeable areas from 1,633m² to 2,049m² (over 25%).

Based on the site geology gullies are proposed for the carparks connecting to the main sewer and infiltrating through soakaways.

The storage capacities of the soakaway units are calculated giving suitable consideration to the infiltration rates (taken from the SuDS manual as 10^{-5} m/s for chalk formation in the absence of infiltration test) the related impermeable areas and the units were designed to support all rainfall events up to 1 in 100 year event with a mark-up of 30% to account for climate change.

The Surface water runoff from the proposed surface finishing will be collected using an assortment of various devices including road gullies, drainage channels, rainwater down pipes, etc.; the configuration of which is to be specified later. The surface water runoff collected will be conveyed through a gravity piped network that will be filtered through petrol interceptors and discharged into existing Thames Water's network. Refer to Appendix G for the proposed drainage plan.

The volumes to be stored by the proposed soakaway units for the proposed development have been modelled in MicroDrainage using the 'Quick Storage Estimate' programme. The results of the calculations are designed to meet the storage demand for all events up to and including a 1 in 100 year + climate change event (30%). Variables and results of the calculations are shown in Appendix F.

Further verification as to the suitability of infiltration as the ideal mode of surface water management is provided in Appendix I, which comprises of calculations of the "Half Drain Time" for the proposed soakaway devices. The "Half Drain Time" for 1 in 100-year events a plus 30% allowance for climate change for the entire site as well as the individual catchment areas are less than the 24-hour requirement set in BRE Digest 365.

4.4 Proposed Development Foul Water Drainage Strategy

As presented in Appendix F- Foul water discharge calculation, the proposed development consists of 100 unit of hostel units and 43 of residential schemes. The peak and average flow for hostel units are 4.167l/s and 0.6945l/s. The residential units were estimated as 1.792l/s and 0.2987l/s respectively. The total peak flow discharge from the development site is 5.958l/s.

Following the Utility Survey for the existing development and the planning decision comment, it can be assumed that existing public foul water sewer adjacent to site has enough capacity to accommodate the proposed discharge.

4.3 Maintenance Requirements

It is anticipated that a private management company will be employed to maintain the completed drainage network for the development incorporating the following activities and frequency for each SuDS component.

4.3.1 Gullies/Channels/Pipes/Manholes

All components are to be periodically cleaned of foreign particles and silt accumulation, on a quarterly basis. Components located in unadopted areas will be maintained by the landowner. Those located in adopted areas will be maintained by the adopting authority.

4.3.2 Oil Separators/ Petrol Interceptors

Units are to be inspected at least every six months in accordance with the manufacturer's recommendations. A log should be kept detailing the depth of oil found, any oil volume and silt removed, or cleaning carried out. Alarm probes should be removed and cleaned at each inspection.

4.3.3 Proprietary Systems

Proprietary systems will require routine maintenance by the owner to ensure continuing operation to design performance standards. A typical maintenance schedule is detailed below in table 14.2 from the CIRIA SuDS manual.

TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	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	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

4.3.4 Cellular Soakaway Storage Unit

The proposed Geolight (or equivalent) Soakaway unit includes a perforated/ slotted distribution pipe surrounded by granular material providing filtration and treatment for surface water flows. This will be installed with an associated filtration device (petrol interceptor, sponge gulley or other) to prevent the intake of debris and the treatment of hydrocarbon mixed in the surface water runoff. Size of the soakaway units must be appropriate for the scale and nature of the development. A typical maintenance schedule is detailed below in table 13.1 from the CIRIA SuDS manual.

Refer to Appendix G for proposed the proposed drainage layout.

TABLE 13.1 Operation and maintenance requirements for soakaways

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

5 CONCLUSION

The development proposal consist of 100 bed YMCA hostel and 43 residential dwellings with the demolishment of existing development. The proposed development contributes to a significant increase (over 25%) in permeable areas from 1,633m² to 2,049m².

The development site has a relatively shallow slope falling in the centre of the site. The highest level is 85.80m AOD and the lowest level is 82.20m AOD.

The Environmental Agency's Flood map for planning indicates that the site is in Flood Zone 1 - little or no risk, with an annual probability of flooding from rivers and the sea of less than 0.1% (1 in 1000-year rainfall event). The nearest river (River Lea) is approximately 2.1km to the south-west of the site.

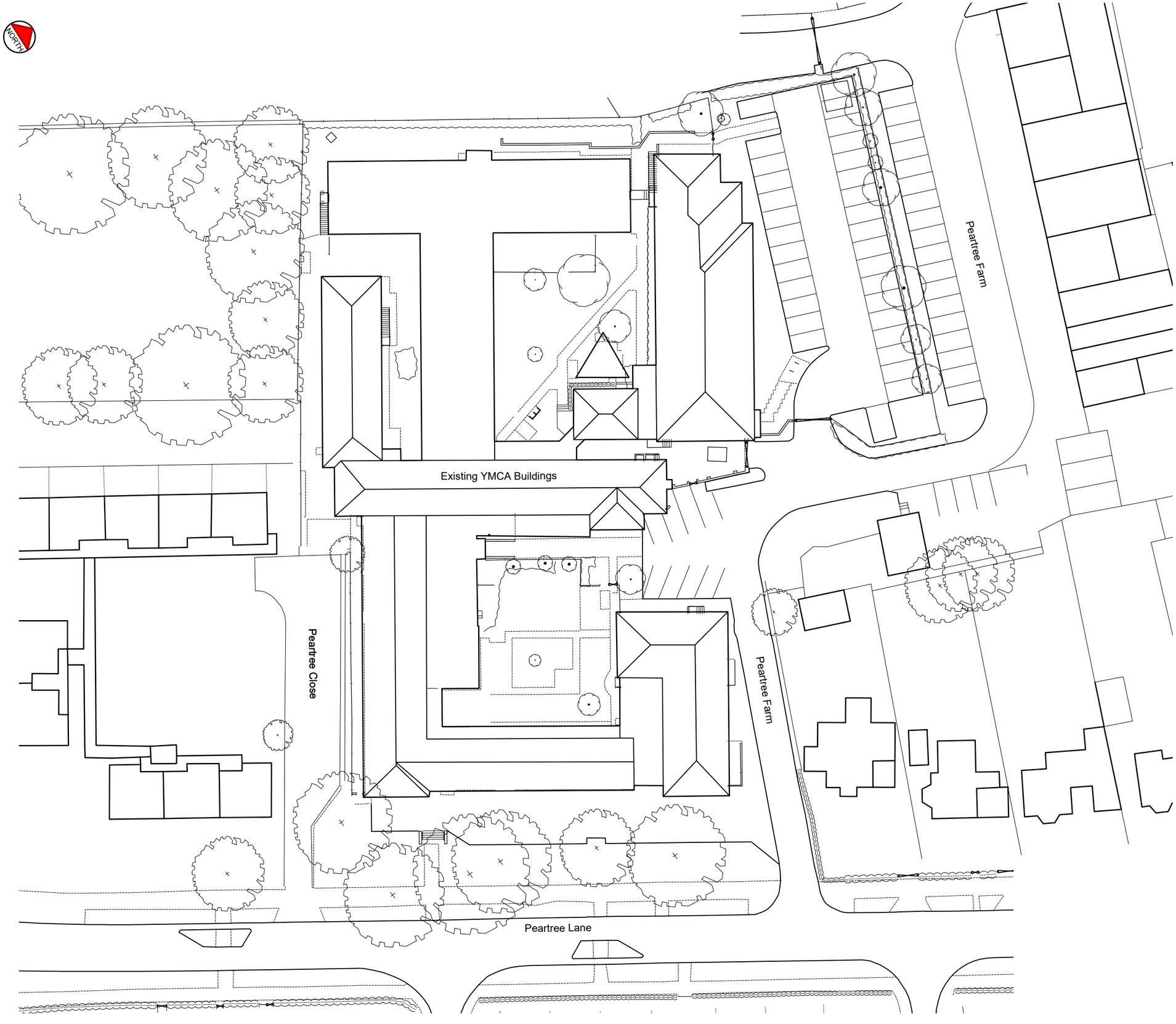
In accordance to the Welwyn Hatfield Council Planning policy and the dictates of Building Regulation H3; The proposed Surface Water Strategy consist of Sustainable Urban Drainage System by focusing on infiltration of resulting run-off into the ground.

In absence if site specific infiltration tests (BRE Digest). Assumption was made on the probable infiltration co-efficient of underlying soil strata. Records of the British Geology Survey reflects the underlying bedrock of the site to be Lewes Nodular Chalk Formation/Seaford Chalk formation. Infiltration was assumed to be 10^{-5} m/s.

The strategy proposed the use of two Cellular Soakaways as detailed in Appendix F of the Report. Allowance for surface water overflow is proposed to be channelled and connected to public sewer in the vicinity of the Development Site.

Foul water emanating from the Development Site is estimated at a peak value of 5.98l/s. It is intended to drain the foul water via gravity connection to the existing public sewer. It is there recommend that Thames Water Development Enquiry will be engaged to determine the capacity and opportunities for the proposed connection to their assets.

Appendix A – Existing Site Plan



NOTES

This drawing to be read in accordance with the specification/Bills of Quantities and related drawings. No Dimensions to be scaled from this drawing. All stated dimensions to be verified on site and the Architect notified of any discrepancies.

0 50

Scale bar 50mm at 1:1

FOR PLANNING

REV	DATE	NOTE	IN

Project

YMCA
PEARTREE LANE
WELWYN GARDEN CITY

Title

EXISTING SITE PLAN

Scale	Date
1:500 @A3	SEPT 19
Drawn	Checked
AE	MB

Drawing Number 8057 / P010

Revision -

Saunders
Architecture + Urban Design

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Appendix B – Topographic Survey Records

Survey Notes

Grid: Local, plane, metric fixed to National Grid fixed at Stn SC5

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin
Passage
Wall with Height
Retaining Wall

FENCE STYLES AND DESCRIPTIONS

Close Boarded
Corrugated Iron
Chestnut Paling
Chainlink
Hoarding
Interwoven
Iron Railings
Lattice
Miscellaneous
Palisade
Post & Chain
Post & Rail
Post & Wire
Post & Barbed Wire
Wire mesh
Stile
Gate
Fence Breakpie

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing
Track
Footpath

STREET FURNITURE

Bollard/ Beacon
Bus Stop
Bollard
Cats Eye
Coal Chute
Crowd Circuit TV
Drain
Electricity Pole
Flood Light
Flag Staff
Lamp Post
Letter Box
Name Plate (street)
Mooring Ring
Mix Post or Mooring Post
Service Worker
Mile Stone
Post
Parking Meter
Reflector Post
Rodding Eye
Road Sign
Speed Camera
Information Sign
Stop
Traffic Light
Telegraph Pole
Traffic Light Push Button Post
Traffic Light Control

INSPECTION CHAMBERS AND PIPES

Inspection Cover
Inspection Cover (Elec)
Manhole
British Telecom Cover
Inspection Cover (Comms)
Cable TV
Inspection Cover Traffic Signals
Gully
Kerb Outlet
Vent Pipe
Down Pipe
Rain Water Pipe
Soil Pipe
Gas Pipe
Unable to lift cover
Stop Tap
Stop Valve
Lamphole
Hydrant
Earth Rod
Gas Valve
Water Meter
Washout
Rodding Eye

GEOTECHNICAL INFORMATION

Borehole
Trial Pit
Monitor Pits
Probe Hole
Window Sample

GENERAL INFORMATION

Petrol Pump
Basement Light
Footbridge
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving
Crash Barrier
Column
Stanchion
Car Vacuum
Offset Fill
Air Valve
Trough
Chimney
Telephone Call Box

OVERHEAD FEATURES

Electricity Pylon
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

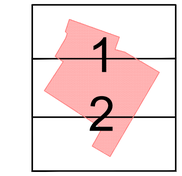
LEVEL AND HEIGHT INFORMATION

Standard Spot Height
Precidele Spot Height
Bed Level
Meter Level
Soffit Level
Threshold Level
Cover Level
Invert Level
Pipe Soffit Level
Floor Level
Finished Floor Level
Top of Tank Level
Eave Level
Ridge Level
Roof Hip Level
Flat Roof Level
Top of Canopy Level
Underside of Canopy Level
Window Sill Level
Window Head Level
Springing Level
Arch Level
Cable Level
Top of Wall Level
Underside of Beam Level
General Height

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

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Accreditations

Client
SAUNDERS PARTNERSHIP
STUDIO FOUR, 37 BROADWATER ROAD
WELWYN GARDEN CITY, AL7 3AX

Project
ONE YMCA, PEARTREE LANE
WELWYN GARDEN CITY
AL7 3UL

Drawing Title
TOPOGRAPHICAL SURVEY

Drawn By		Survey Date	
CPT	28/07/19	June 2019	
Checked by		Scale	
SC	28/07/19	1:200 @ A0	

Drawing No: 53948-2
Revision:

Survey Notes:

Grid: Local, plane, metric fixed to National Grid fixed at Stn SCS

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Passage
Wall with Height
Retaining Wall (R/W)

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven INW
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Treestyle

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Bollards/ Beacon + BB
Bus Stop + BS
Bollard + B
Cats Eye + CE
Coal Chute + CC
Closed Circuit TV + CCTV
Drain + DR
Electricity Pole + EP
Flood Light + FL
Flag Staff + FS
Lamp Post + LP
Letter Box LB
Name Plate (street) NP
Mooring Ring + MR
Mile Post or Mooring Post + MP
Service Worker + MK
Mile Stone + MS
Post + P
Parking Meter + PM
Reflector Post + RP
Rodding Eye + RE
Road Sign + RS
Speed Camera + S/CAM
Information Sign + SIGN
Stay + SY
Traffic Light + TL
Telegraph Pole + TP
Traffic Light Push Button Post + TLP
Traffic Light Control + TLC/P
Control Box C/BOX
British Telecom Box BT BOX
Electricity Box EL BOX
Gas Box GAS BOX

INSPECTION CHAMBERS AND PIPES

Inspection Cover IC
Inspection Cover (Elec) IC/EL
Manhole MH
British Telecom Cover BT
Inspection Cover (Comms) IC/COM
Cable TV CATV
Inspection Cover Traffic Signals IC/TL
Gully G
Kerb Outlet KO
Vent Pipe + VP
Down Pipe + DP
Rain Water Pipe + RWP
Soil Pipe + SVP
Gas Pipe + G-PIPE
Unable to lift cover UNCL
Stop Tap + ST
Stop Valve + SV
Lamphole + LH
Hydrant + HYD
Earth Rod + ER
Gas Valve + GV
Water Meter + WM
Washout + WO
Rodding Eye + RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pits + MON
Probe Hole + PH
Window Sample + WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Footbridge FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Crash Barrier C/BR
Column COL
Stanchion STAN
Car Vacuum VAC
Offset FB + OF
Air Valve + AV
Trough TR
Chimney CHY
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon (EP/ELON)
Electricity (EL)
Telephone (TEL)

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring + SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump + STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

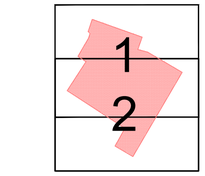
LEVEL AND HEIGHT INFORMATION

Standard Spot Height + 123.45
Prevailed Spot Height + 123.456
Bed Level + BL23.892
Water Level + WL34.562
Soffit Level + SL25.892
Threshold Level + TH35.98
Cover Level + CL26.45
Invert Level + IL25.15
Pipe Soffit Level + PSL5.00
Floor Level + FL6.00
Finished Floor Level + FFL6.00
Top of Tank Level + TT7.00
Eave Level + EL7.00
Ridge Level + RL8.00
Roof Hip Level + RHL8.50
Flat Roof Level + FRL7.00
Top of Canopy Level + TOP/CT.00
Underside of Canopy Level + SOF/CSL00
Window Sill Level + WSL8.00
Window Head Level + WHL8.00
Springing Level + SPL8.50
Arch Level + ALT.00
Cobble Level + CHTB.55
Top of Wall Level + TWL10.00
Underside of Beam Level + UBL8.55
General Height + HTS.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
65 Cross Street, Sale, Manchester
M33 7HF, Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations

Client
SAUNDERS PARTNERSHIP
STUDIO FOUR, 37 BROADWATER ROAD
WELWYN GARDEN CITY, AL7 3AX

Project
ONE YMCA, PEARTREE LANE
WELWYN GARDEN CITY
AL7 3UL

Drawing Title
TOPOGRAPHICAL SURVEY

Drawn By	CPT 28/07/19	Survey Date	June 2019
Checked by	SC 28/07/19	Scale	1:200 @ A0
Drawing No	53948-1	Revision	

Appendix C – Proposed Site Plans

NOTES ©

This drawing to be read in accordance with the specification/Bills of Quantities and related drawings. No Dimensions to be scaled from this drawing. All stated dimensions to be verified on site and the Architect notified of any discrepancies.

0 50

Scale bar 50mm at 1:1

FOR PLANNING

REV	DATE	NOTE	IN

Project

YMCA
PEARTREE LANE
WELWYN GARDEN CITY

Title

PROPOSED SITE LAYOUT

Scale	Date
1:500 @A3	SEPT 2019
Drawn	Checked
SD	AL

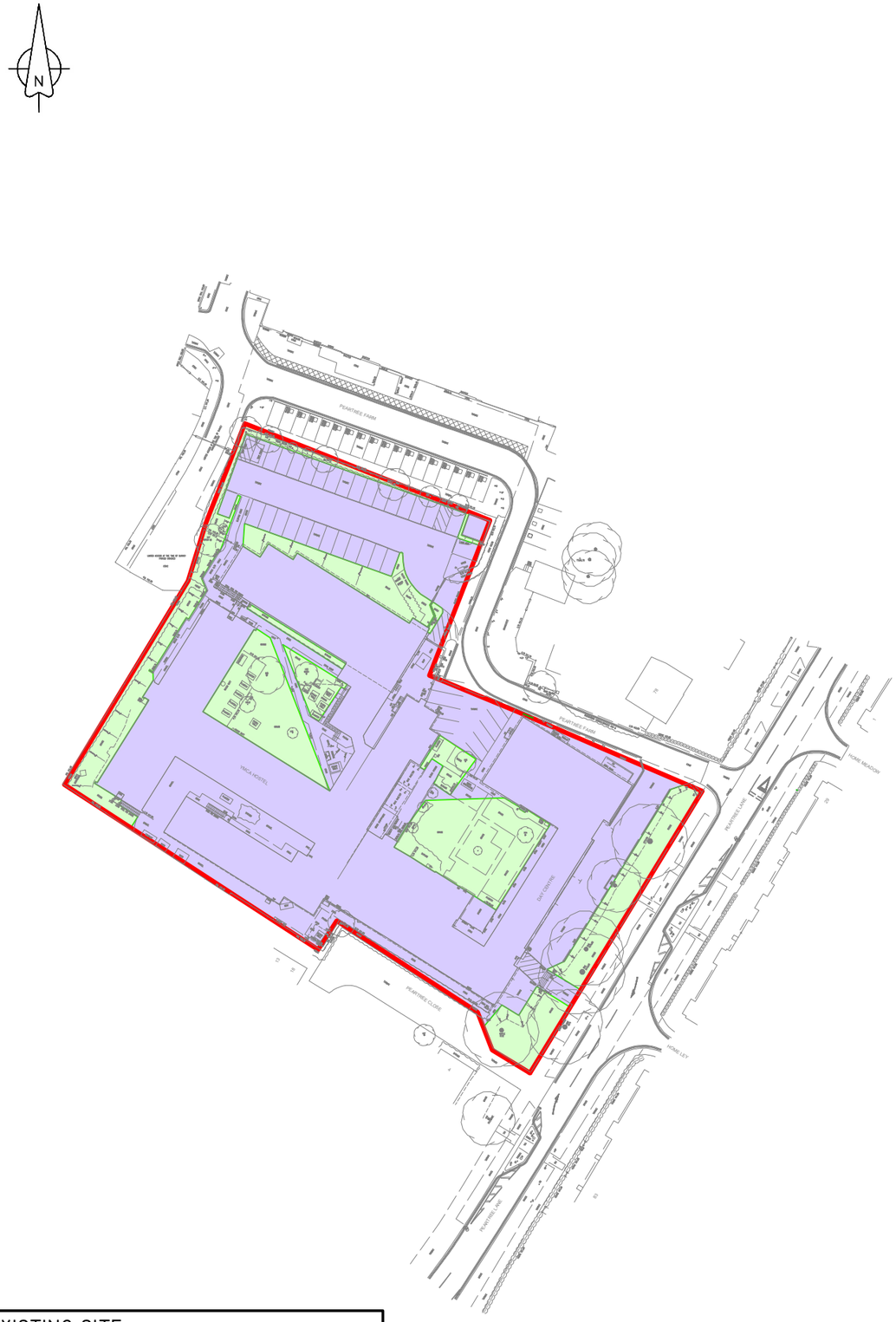
Drawing Number: 8057 / P101

Revision: -

Saunders
Architecture + Urban Design

saundersarchitects.com | 01707 385300 | London | Manchester | Bristol | Welwyn

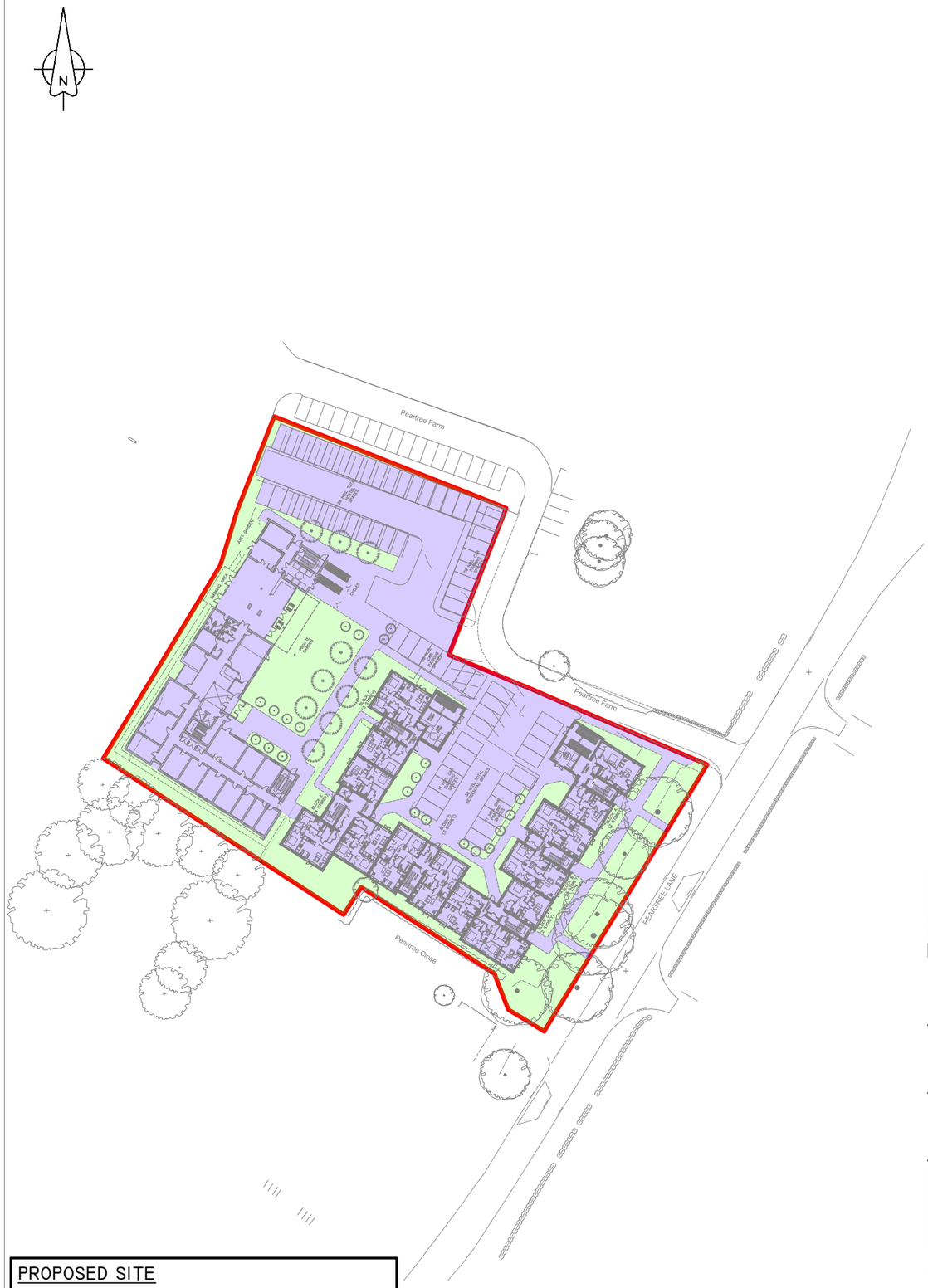
Appendix D – Existing & Proposed Impermeable Areas



EXISTING SITE

TOTAL IMPERMEABLE AREA = 5,083 M²

TOTAL PERMEABLE AREA = 1633 M²



PROPOSED SITE

TOTAL IMPERMEABLE AREA = 4,667 M²

TOTAL PERMEABLE AREA = 2,049 M²

GENERAL NOTES

1. DO NOT SCALE THIS DRAWING. WORK ONLY TO FIGURED DIMENSIONS.
2. FOR ALL RELEVANT NOTES, REFER TO STRUCTURAL AND CIVIL ENGINEERING PERFORMANCE SPECIFICATION.
3. ANY DISCREPANCIES ARE TO BE REPORTED TO PINNACLE CONSULTING ENGINEERS IMMEDIATELY.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SUB-CONTRACTORS DRAWINGS AND DETAILS.

LEGEND

SITE BOUNDARY

PERMEABLE AREA

IMPERMEABLE AREA

0 50MM ON A1 DWG. 50

REV	DESCRIPTION	BY	CHK	DATE
P02	ISSUED FOR PLANNING	SS	JJ	09.10.2019
P01	INFRMATION	SS	JJ	03.10.19

CLIENT

SAUNDERS ARCHITECTS ON BEHALF OF YMCA

PROJECT

WGC- ONE YMCA
PEARTREE LANE

DRAWING TITLE

EXISTING AND PROPOSED IMPERMEABLE AREAS

PINNACLE CONSULTING ENGINEERS

ALCHEMY,
BESSEMER ROAD,
WELWYN GARDEN CITY,
HERTS,
AL7 1HE. TELEPHONE: 01707 527 630

NORWICH | LONDON | DUBLIN | THE HAGUE

DRAWING STATUS			
INFORMATION			
SCALE @ A1	DATE	DRAWN BY	CHECKED
1:500	OCT'19	SS	JJ
DRG NO.			REVISION
C190906-PIN-XX-XX-DR-C-0205			P02

REF: P190906

Appendix E – Utilities Survey Records

Survey Notes

Grid: Local, plane, metric fixed to National Grid fixed at Stn SC5

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

UNDERGROUND SERVICES KEY

- Abandoned
- Acid drain
- British telecom
- Cable TV
- Communication cables
- Sewer combined
- Sewer surface water
- Sewer foul
- Ducting
- Electric cables
- Effluent pipes
- Fuel line
- Fuel gauge line
- Fuel vent line
- Gas pipes
- Heating pipes
- Traffic light cables
- Vapour recovery pipes
- Water pipes
- Unidentified GPR or electro location trace
- Rising main
- Soar trace
- Alarm cables
- CCTV cables
- Chemical pipes
- Compressed air pipes
- Culvert
- Sewer combined overflow
- Electric HV cables
- Electric pilot cables
- Earth cables
- Fibre optic cables
- LPG pipes
- Oil pipes
- Sludge main
- Telemetry cables
- Vehicle detection pad
- Wash water pipes
- End of trace
- Group of services representation
- Taken from records (Not proven on site)
- Assumed route
- Services survey boundary

AR	Assumed Route
BD	Backdrop
CR	Cable Riser
d	Depth
PR	Pipe Riser
OF	Offset Fill
T	Tank
VR	Vapour Recovery Point
UTL	Unable To Lift

GPR	Ground Penetrating Radar
TFR	Taken From Records
PE	Polyethylene Pipe
UTS	Unable To Survey
UR	Unable To Rod
UT	Unable To Trace
NVP	No Visible Pipes

DISCLAIMER

Electromagnetic and ground penetrating radar techniques have been used in the location of underground services shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to to confirm identification, location and depth of services where these are critical.

Please note that not all buried pipes, cable and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities.

All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.

NOTES

Where services are non-metallic or not proven on site, positions are taken from records, trench scars & surface detail.

Where stated, depth estimations are typically to the centre or top of the service. Depths to gravity sewers and drains are typically to invert levels, unless otherwise stated.

Where Ground Penetrating Radar (GPR) is quoted the depth is recorded to the assumed external crown of the feature.

The diagram below describes the depth information in more detail.

Where the precise position or depths of these features are critical to the design or sitworks they must be verified by the use of trial excavations.

Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as TFR (Taken From Records) have not been proven on site.

The CAD layering may contain further information.

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC	APPROX. DEPTH TO INVERT	APPROX. DEPTH TO EXTERNAL CROWN

Topographical Survey Legend

BUILDING AND WALLS

Building; Building Open Sided; Ruin; Passage; Wall with Height; Retaining Wall

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B; Corrugated Iron C/I; Chestnut Paling C/P; Chainlink C/L; Handrail H/R; Interwoven INW; Iron Railings I/R; Lattice L/T; Miscellaneous Misc; Palisade PAL; Post & Chain P/C; Post & Rail P/R; Post & Wire P/W; Post & Barbed Wire B/W; Wire mesh W/M; Stile; Gate; Fence Breakpie

ROADS

Kerbs; Edge of Surfacing; Pedestrian Crossing; Track; Footpath

STREET FURNITURE

Bollards Beacon; Bus Stop; Bollard; Cats Eye; Coal Chute; Closed Circuit TV; Drain; Electricity Pole; Flood Light; Flag Staff; Lamp Post; Letter Box; Name Plate (street); Mooring Ring; Mile Post or Mooring Post; Service Worker; Mile Stone; Post; Parking Meter; Reflector Post; Reading Eye; Road Sign; Speed Camera; Information Sign; Stay; Traffic Light; Telegraph Pole; Traffic Light Push Button Post; Traffic Light Control

INSPECTION CHAMBERS AND PIPES

Inspection Cover; Inspection Cover (Elec); Manhole; British Telecom Cover; Inspection Cover (Comms); Cable TV; Inspection Cover Traffic Signals; Gully; Kerb Outlet; Vent Pipe; Down Pipe; Rain Water Pipe; Soil Pipe; Gas Pipe; Unable to lift cover; Stop Tap; Stop Valve; Lamphole; Hydrant; Earth Rod; Gas Valve; Water Meter; Washout; Rodding Eye

GEOTECHNICAL INFORMATION

Borehole; Trial Pit; Monitor Pits; Probe Hole; Window Sample

GENERAL INFORMATION

Petrol Pump; Basement Light; Footbridge; Dish Type Channel; Slot Type Channel; Grate Type Channel; Tactile Paving; Crash Barrier; Column; Stanchion; Cor Vacuum; Offset Fill; Air Valve; Trough; Chimney; Telephone Call Box

OVERHEAD FEATURES

Electricity Pylon; Electricity; Telephone

WATER FEATURES

Canal; Stream; Ditch; Weir; Culvert; Drip (Land Drain); Spring

RELIEF AND VEGETATION

Hedge; Edge of wood/Bushes; Stump; Individual Tree; Slopes with Height Greater than 1m; Cliff Face; Marsh; Reeds

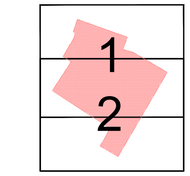
LEVEL AND HEIGHT INFORMATION

Standard Spot Height; Prov/elec Spot Height; Bed Level; Meter Level; Soffit Level; Threshold Level; Cover Level; Invert Level; Pipe Soffit Level; Floor Level; Finished Floor Level; Top of Tank Level; Eave Level; Ridge Level; Roof Hip Level; Flat Roof Level; Top of Canopy Level; Underside of Canopy Level; Window Sill Level; Window Head Level; Springing Level; Arch Level; Cable Level; Top of Wall Level; Underside of Beam Level; General Height

SURVEY INFORMATION SIGNS

Permanent Ground Marker; O.S. Trig Station; O.S. Bench Mark

Sheet Index



Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
65 Cross Street, Sale, Manchester M33 7HF. Tel: 0161 905 1295
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations: RICS; The Survey Association; RICS; RICS; FIG

Client

SAUNDERS PARTNERSHIP
STUDIO FOUR, 37 BROADWATER ROAD
WELWYN GARDEN CITY, AL7 3AX

Project

ONE YMCA, PEARTREE LANE
WELWYN GARDEN CITY
AL7 3UL

Drawing Title

UTILITY SURVEY

Drawn By	CPT 09/08/19	Survey Date	August 2019
Checked by	DJ 09/08/19	Scale	1:200 @ A0

Drawing No: 53948/UG1 — Revison:

UNDERGROUND SERVICES KEY

Abandoned	AR Assumed Route	GPR Ground Penetrating Radar
Acid drain	BD Backdrop	TFR Taken From Records
British telecom	CR Cable Riser	PE Polyethylene Pipe
Cable TV	d Depth	UTS Unable To Survey
Communication cables	PR Pipe Riser	UR Unable To Rod
Sewer combined	OF Offset Fill	UT Unable To Trace
Sewer surface water	T Tank	NVP No Visible Pipes
Sewer foul	VR Vapour Recovery Point	
Ducting	UTL Unable To Lift	
Electric cables		
Effluent pipes		
Fuel line		
Fuel gauge line		
Fuel vent line		
Gas pipes		
Heating pipes		
Traffic light cables		
Vapour recovery pipes		
Water pipes		
Unidentified GPR or electro location trace		
Rising main		
Scar trace		
Alarm cables		
CCTV cables		
Chemical pipes		
Compressed air pipes		
Culvert		
Sewer combined overflow		
Electric HV cables		
Electric pilot cables		
Earth cables		
Fibre optic cables		
LPG pipes		
Oil pipes		
Sludge main		
Telemetry cables		
Vehicle detection pad		
Wash water pipes		
End of trace		
Group of services representation		
Taken from records (Not proven on site)		
Assumed route		
Services survey boundary		

DISCLAIMER

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The diagram below describes the depth information in more detail

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Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available.

Services shown as TFR (Taken From Records) have not been proven on site.

The CAD layering may contain further information.

TYPICAL FEATURE DEPTH ANNOTATION

ELECTRO-MAGNETIC DETECTION	GRAVITY DRAIN (VISUAL OBSERVATION)	GROUND PENETRATING RADAR
APPROX. DEPTH TO CENTRE — CABLE/FIBRE OPTIC	APPROX DEPTH TO INVERT	APPROX. DEPTH TO EXTERNAL CROWN

Survey Notes

Grid: Local, plane, metric fixed to National Grid fixed at Stn SC5

Levels: OS datum from GNSS positioning converted using the National Geoid Model OSGM15

Notes

Topographical Survey Legend

BUILDINGS AND WALLS

Building
Building Open Sided
Ruin (RUIN)
Passage
Wall with Height
Retaining Wall (RW)

FENCE STYLES AND DESCRIPTIONS

Close Boarded C/B
Corrugated Iron C/I
Chestnut Paling C/P
Chainlink C/L
Handrail H/R
Interwoven INW
Iron Railings I/R
Lattice L/T
Miscellaneous Misc
Palisade PAL
Post & Chain P/C
Post & Rail P/R
Post & Wire P/W
Post & Barbed Wire B/W
Wire mesh W/M
Stile
Gate
Fence Breakpie

ROADS

Kerbs
Edge of Surfacing
Pedestrian Crossing (PC)
Track
Footpath

STREET FURNITURE

Bollards/ Beacon BB
Bus Stop BS
Bollard B
Cats Eye CE
Coal Chute CC
Closed Circuit TV CCTV
Drain DR
Electricity Pole EP
Flood Light FL
Flag Staff FS
Lamp Post LP
Letter Box LB
Name Plate (street) NP
Mooring Ring MR
Mile Post or Mooring Post MP
Service Worker MH
Mile Stone MS
Post P
Parking Meter PM
Reflector Post RP
Rodding Eye RE
Road Sign RS
Speed Camera S/CAM
Information Sign SIGN
Stop SY
Traffic Light TL
Telegraph Pole TP
Traffic Light Push Button Post TLP
Traffic Light Control TLC/P
Floor Level (C/BOX)
British Telecom Box BT BOX
Electricity Box EL BOX
Gas Box GAS BOX

INSPECTION CHAMBERS AND PIPES

Inspection Cover IC
Inspection Cover (Elec) IC/EL
Manhole MH
British Telecom Cover BT
Inspection Cover (Comms) IC/COM
Cable TV CATV
Inspection Cover Traffic Signals IC/TL
Gully G
Kerb Outlet KO
Vent Pipe VP
Down Pipe DP
Rain Water Pipe RWP
Soil Pipe SVP
Gas Pipe G-PIPE
Unable to lift cover UTL
Stop Tap ST
Stop Valve SV
Lamphole LH
Hydrant HYD
Earth Rod ER
Gas Valve GV
Water Meter WM
Washout WO
Rodding Eye RE

GEOTECHNICAL INFORMATION

Borehole BH
Trial Pit TP
Monitor Pit MON
Probe Hole PH
Window Sample WS

GENERAL INFORMATION

Petrol Pump PP
Basement Light BL
Footbridge FB
Dish Type Channel
Slot Type Channel
Grate Type Channel
Tactile Paving TAC
Crash Barrier C/BR
Column COL
Stanchion STAN
Car Vacuum VAC
Offset Fill OF
Air Valve AV
Trough TR
Chimney CHY
Telephone Call Box TCB

OVERHEAD FEATURES

Electricity Pylon E.PYLON
Electricity
Telephone

WATER FEATURES

Canal
Stream
Ditch
Weir
Culvert
Drip (Land Drain)
Spring SPR

RELIEF AND VEGETATION

Hedge
Edge of wood/Bushes
Stump STUMP
Individual Tree
Slopes with Height Greater than 1m
Cliff Face
Marsh
Reeds

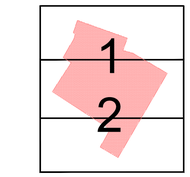
LEVEL AND HEIGHT INFORMATION

Standard Spot Height +123.45
Predicted Spot Height +123.45M
Bed Level +BL23.92
Water Level +WL94.82
Soffit Level +SL25.92
Threshold Level +THS5.98
Cover Level +CL26.45
Invert Level +IL25.15
Pipe Soffit Level +PSL5.00
Floor Level +FL6.00
Finished Floor Level +FFL6.00
Top of Tank Level +TT7.00
Eave Level +EL7.00
Ridge Level +RL8.00
Roof Hip Level +RHL8.50
Flat Roof Level +FRL7.00
Top of Canopy Level +TOP/CT7.00
Underside of Canopy Level +SOF/CSL6.00
Window Sill Level +WSL9.00
Window Head Level +WHL8.00
Springing Level +SPL8.50
Arch Level +ACT.00
Cable Level +CHTB.55
Top of Wall Level +TWL10.00
Underside of Beam Level +UBL8.55
General Height +HTS.00

SURVEY INFORMATION SIGNS

Permanent Ground Marker
O.S. Trig Station
O.S. Bench Mark

Sheet Index



Rev.	Date	Description

MALCOLM HUGHES
CHARTERED LAND SURVEYORS
65 Cross Street, Sale, Manchester M33 7HF. Tel: 0161 905 1265
www.malcolmhughes.co.uk
survey@mhls.co.uk

Accreditations

Client

SAUNDERS PARTNERSHIP
STUDIO FOUR, 37 BROADWATER ROAD
WELWYN GARDEN CITY, AL7 3AX

Project

ONE YMCA, PEARTREE LANE
WELWYN GARDEN CITY
AL7 3UL

Drawing Title

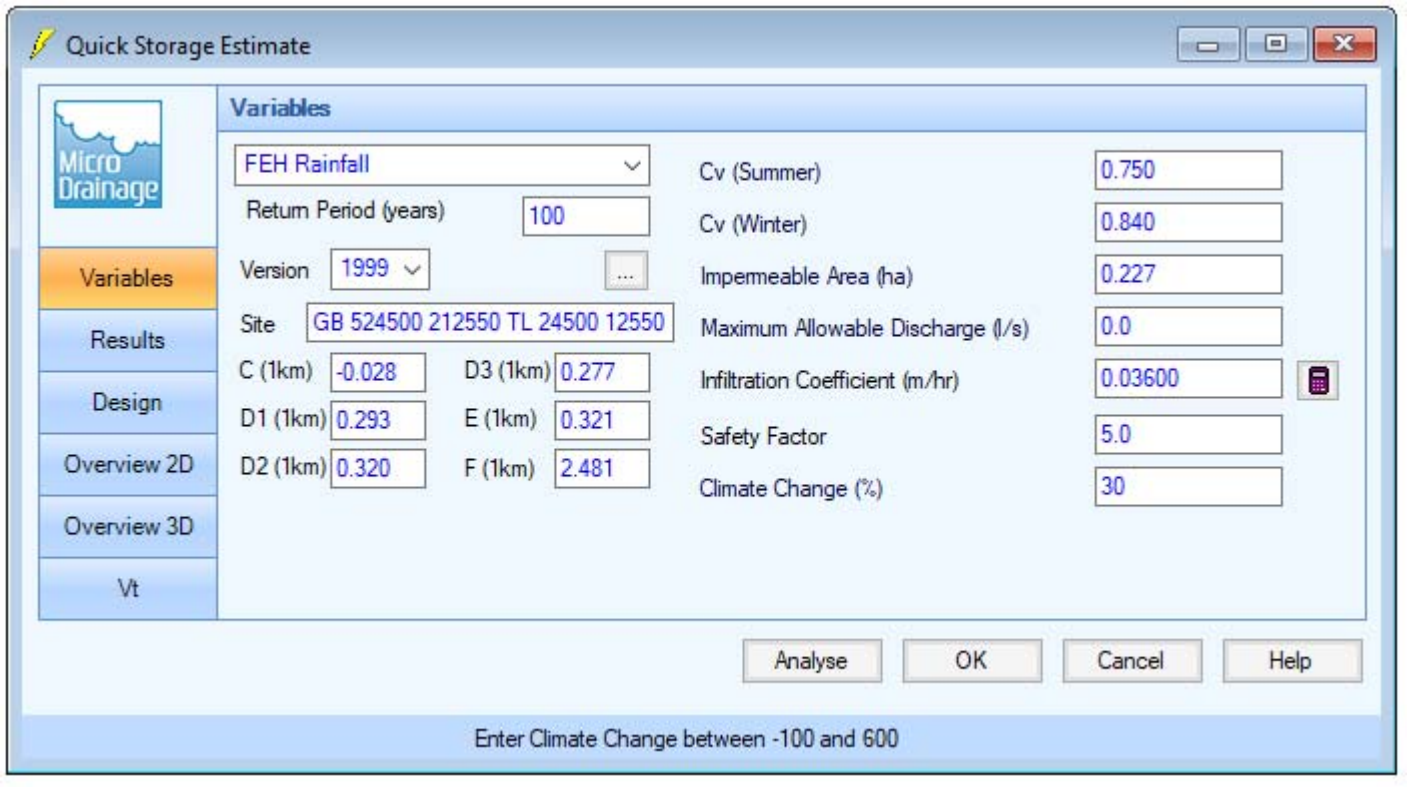
UTILITY SURVEY

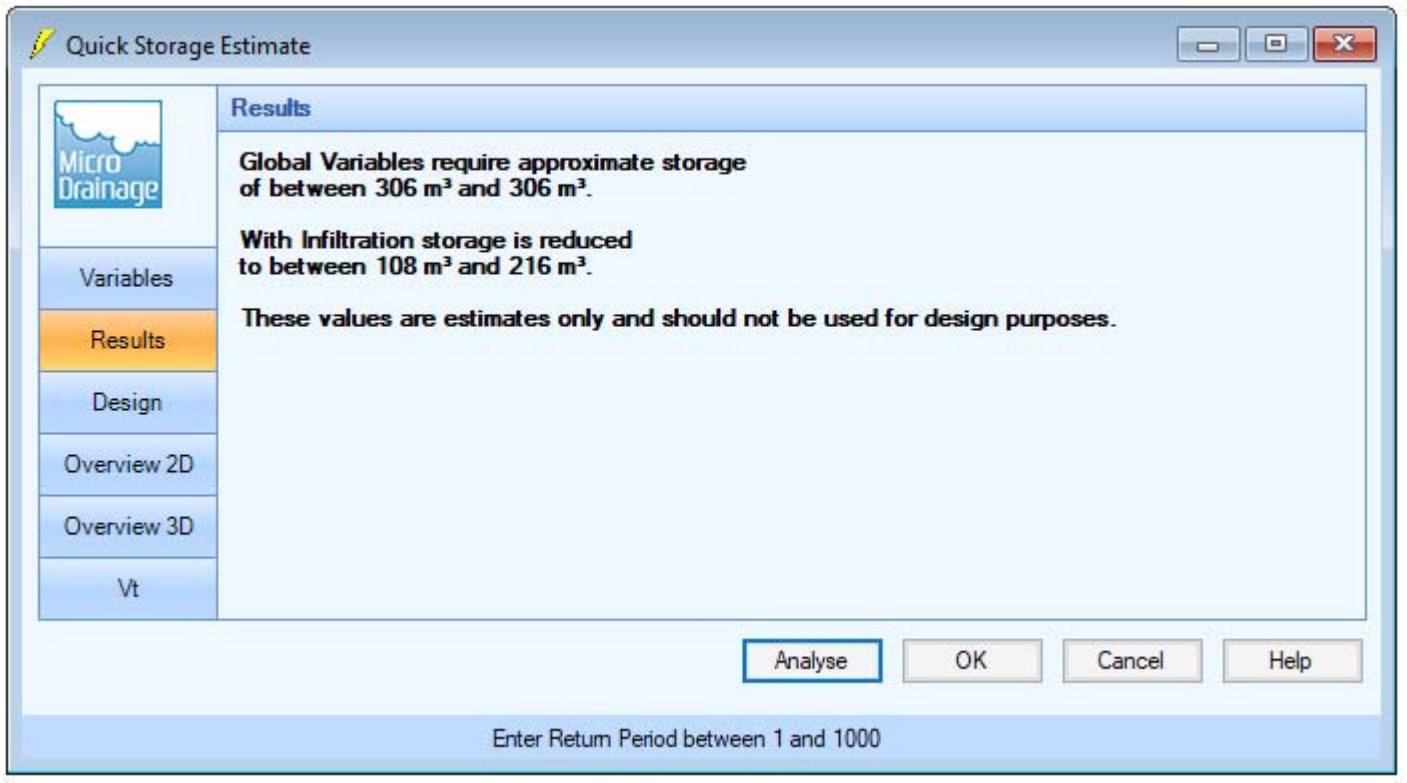
Drawn By		Survey Date	
CPT	09/08/19	August 2019	
Checked by		Scale	
DJ	09/08/19	1:200 @ A0	

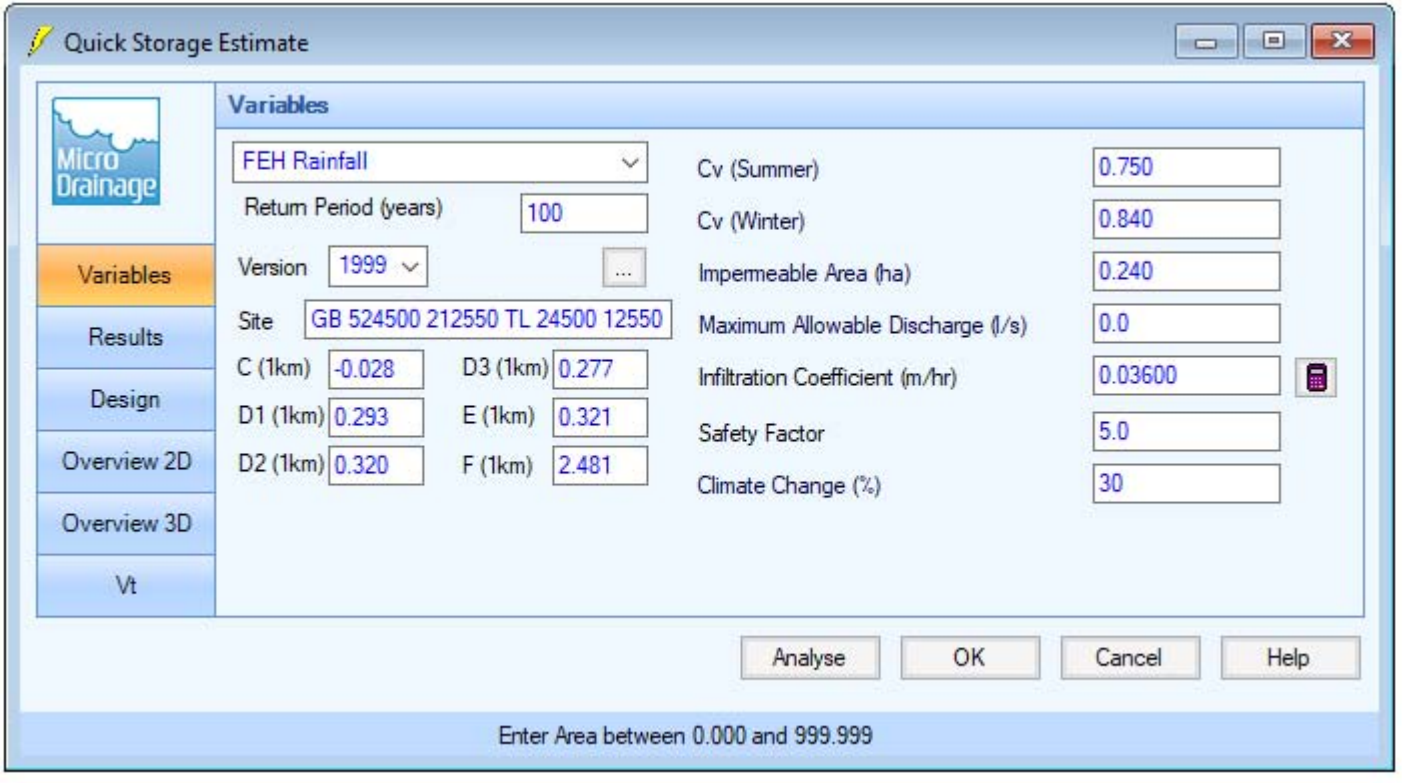
Drawing No: 53948/UG2

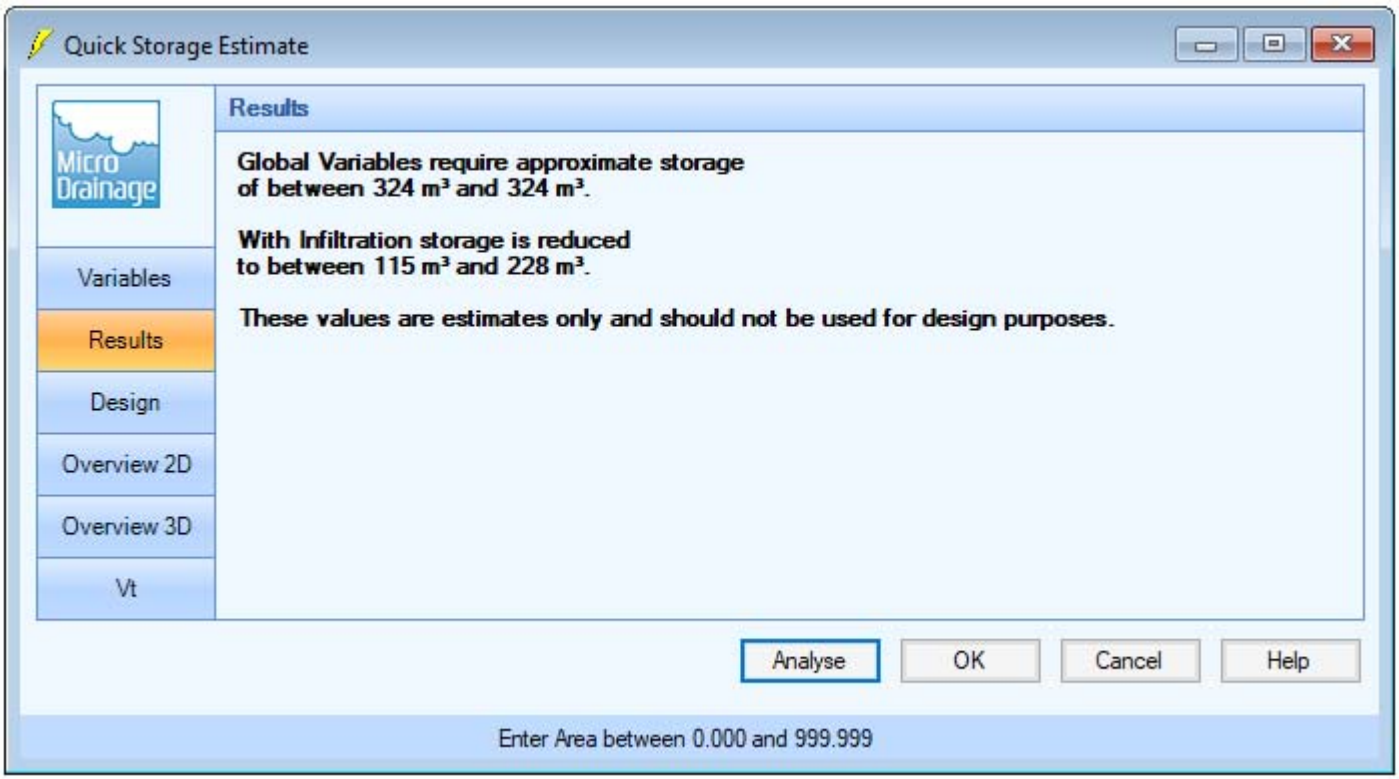
Revison:

Appendix F – Proposed Drainage Calculations


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 1999
...
Site GB 524500 212550 TL 24500 12550
C (1km) -0.028
D1 (1km) 0.293
D2 (1km) 0.320
D3 (1km) 0.277
E (1km) 0.321
F (1km) 2.481
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.227
Maximum Allowable Discharge (l/s) 0.0
Infiltration Coefficient (m/hr) 0.03600
Safety Factor 5.0
Climate Change (%) 30
Analyse
OK
Cancel
Help
Enter Climate Change between -100 and 600


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage
of between 306 m³ and 306 m³.
With Infiltration storage is reduced
to between 108 m³ and 216 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Return Period between 1 and 1000


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Variables
FEH Rainfall
Return Period (years) 100
Version 1999
...
Site GB 524500 212550 TL 24500 12550
C (1km) -0.028
D1 (1km) 0.293
D2 (1km) 0.320
D3 (1km) 0.277
E (1km) 0.321
F (1km) 2.481
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.240
Maximum Allowable Discharge (l/s) 0.0
Infiltration Coefficient (m/hr) 0.03600
Safety Factor 5.0
Climate Change (%) 30
Analyse
OK
Cancel
Help
Enter Area between 0.000 and 999.999


Quick Storage Estimate
Micro Drainage
Variables
Results
Design
Overview 2D
Overview 3D
Vt
Results
Global Variables require approximate storage of between 324 m³ and 324 m³.
With Infiltration storage is reduced to between 115 m³ and 228 m³.
These values are estimates only and should not be used for design purposes.
Analyse
OK
Cancel
Help
Enter Area between 0.000 and 999.999

PINNACLE
CONSULTING ENGINEERS

Alchemy	3 Meridian Way	Woolverstone House	Grosvenor Court	Business Suite 5.01 D-1
Bessemer Road	Norwich	61 Berners Street	67a Patrick Street	WTC The Hague
Welwyn Garden City	Norfolk	London	Dun Laoghaire	Prinses Margrietplantsoen 33
AL7 1HE	NR7 0TA	W1T 3NJ	Co Dublin	Netherlands
T: 01707 527 630	T: 01603 327 170	T: 0207 299 8299	T: +353 1231 1041	T: +31 70 240 0412

CLIENT / PROJECT	SHEET NO.	REVISION	PROJECT REF.
WGC-YMCA PEARTREE LANE	1	1	C190906
TITLE	PREPARED	CHECKED	DATE
FOUL WATER DESIGN FLOW RATES	SS	JJ	25.09.19

The reccomended basis for foul sewer design is 6DWF+10%. The multiplier "6" if used to estimate the conditions at peak flow. An additional 10% is factored into the DWF as a provision for infiltration; this is increased to an allowance of 20% in areas with a high water table.

Development	Flow Rates (l/day)			Number of Units	Provision for Infiltration	High Water Table	Peak Factor	Flow Rates (l/s)
Development 1								
General Housing	600	per	property	100	no	no	6	4.167
Development 2								
General Housing	600	per	property	43	no	no	6	1.792
Total:								**5.958**

Appendix G – Proposed Drainage Strategy

GENERAL NOTES

1. DO NOT SCALE THIS DRAWING. WORK ONLY TO FIGURED DIMENSIONS.
2. FOR ALL RELEVANT NOTES, REFER TO STRUCTURAL AND CIVIL ENGINEERING PERFORMANCE SPECIFICATION.
3. ANY DISCREPANCIES ARE TO BE REPORTED TO PINNACLE CONSULTING ENGINEERS IMMEDIATELY.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SUB-CONTRACTORS DRAWINGS AND DETAILS.

LEGEND

- SITE BOUNDARY
- PROPOSED SURFACE WATER
- PROPOSED FOUL WATER
- S — EXISTING SURFACE WATER
- F — EXISTING FOUL WATER
- PROPOSED PETROL INTERCEPTOR
- PROPOSED SURFACE WATER SOAKAWAY
- PROPOSED GULLY
- EXISTING GULLY TO BE RETAINED

0 50MM ON A1 DWG. 50

REV	DESCRIPTION	BY	CHK	DATE
P02	ISSUED FOR PLANNING	SS	JJ	09.10.2019
P01	PRELIMINARY	SS	JJ	03.10.2019

CLIENT
SAUNDERS ARCHITECTS ON BEHALF OF YMCA

PROJECT
WGC-ONE YMCA
PEARTREE LANE

DRAWING TITLE
PROPOSED DRAINAGE STRATEGY

PINNACLE CONSULTING ENGINEERS
ALCHEMY,
BESSEMER ROAD,
WELWYN GARDEN CITY,
HERTS.
AL7 1HE. TELEPHONE: 01707 527 630
NORWICH | LONDON | DUBLIN | THE HAGUE

DRAWING STATUS			
INFORMATION			
SCALE @ A1	DATE	DRAWN BY	CHECKED
1:250	OCT'19	SS	JJ
DRG NO.			REVISION
C190906-PIN-XX-XX-DR-C-0206			P02

Appendix H – Proposed Catchments Plan

GENERAL NOTES

1. DO NOT SCALE THIS DRAWING. WORK ONLY TO FIGURED DIMENSIONS.
2. FOR ALL RELEVANT NOTES, REFER TO STRUCTURAL AND CIVIL ENGINEERING PERFORMANCE SPECIFICATION.
3. ANY DISCREPANCIES ARE TO BE REPORTED TO PINNACLE CONSULTING ENGINEERS IMMEDIATELY.
4. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS, ARCHITECTS AND SUB-CONTRACTORS DRAWINGS AND DETAILS.

LEGEND

SITE BOUNDARY

0 50MM ON A1 DWG. 50

REV	DESCRIPTION	BY	CHK	DATE
P02	ISSUED FOR PLANNING	SS	JJ	09.10.2019
P01	PRELIMINARY	SS	JJ	03.10.2019

CLIENT
SAUNDERS ARCHITECTS ON BEHALF OF YMCA

PROJECT
WGC-ONE YMCA
PEARTREE LANE

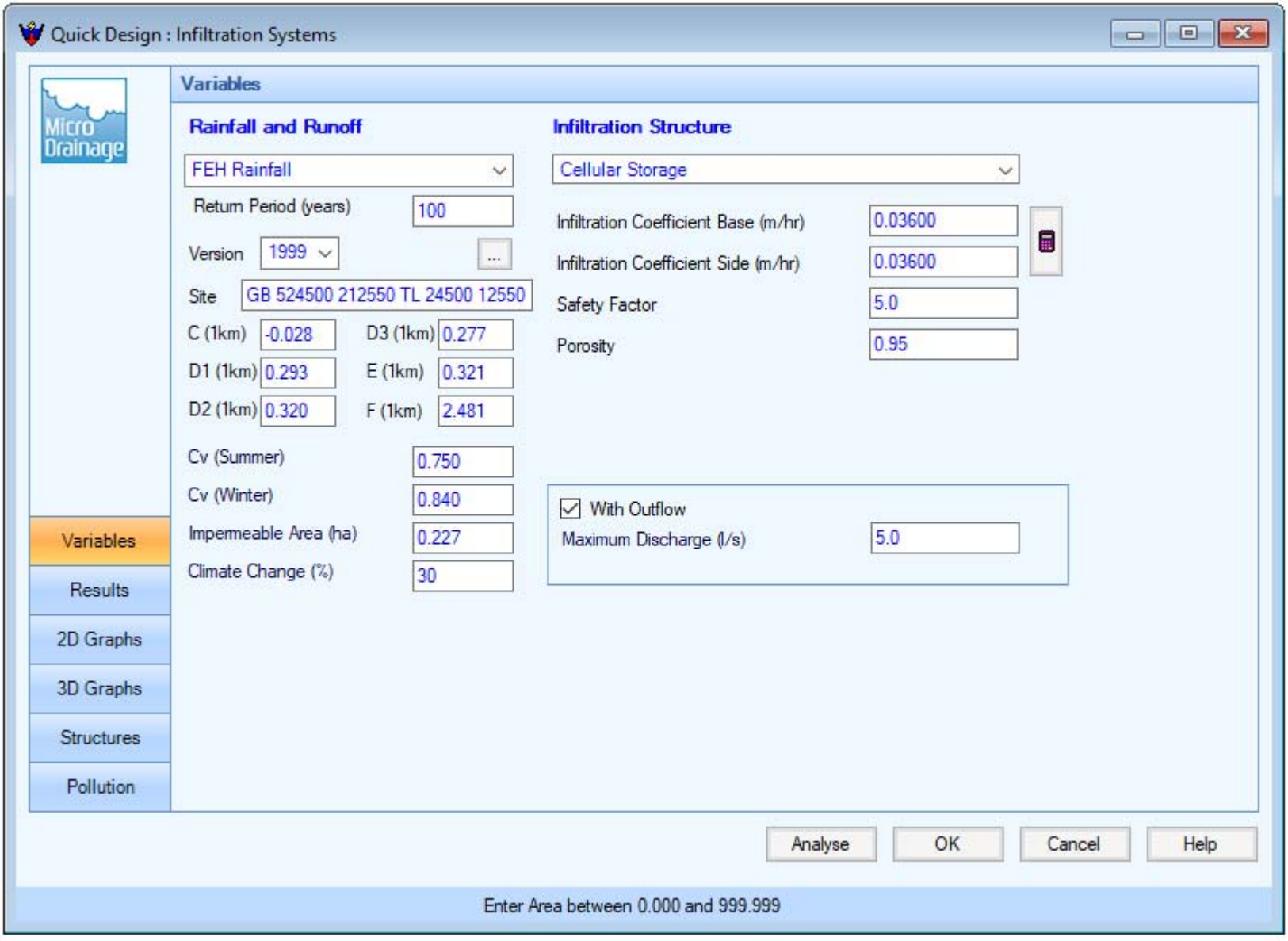
DRAWING TITLE
CATCHMENT AREAS

PINNACLE CONSULTING ENGINEERS
ALCHEMY,
BESSEMER ROAD,
WELWYN GARDEN CITY,
HERTS,
AL7 1HE. TELEPHONE: 01707 527 630
NORWICH | LONDON | DUBLIN | THE HAGUE

DRAWING STATUS			
INFORMATION			
SCALE @ A1	DATE	DRAWN BY	CHECKED
1:250	OCT'19	SS	JJ
DRG NO.			REVISION
C190906-PIN-XX-XX-DR-C-0207			P02

REF: 190906

Appendix I – Half Drain Time Calculations


Quick Design : Infiltration Systems
Micro Drainage
Variables
Rainfall and Runoff
FEH Rainfall
Return Period (years) 100
Version 1999
...
Site GB 524500 212550 TL 24500 12550
C (1km) -0.028
D3 (1km) 0.277
D1 (1km) 0.293
E (1km) 0.321
D2 (1km) 0.320
F (1km) 2.481
Cv (Summer) 0.750
Cv (Winter) 0.840
Impermeable Area (ha) 0.227
Climate Change (%) 30
Infiltration Structure
Cellular Storage
Infiltration Coefficient Base (m/hr) 0.03600
Infiltration Coefficient Side (m/hr) 0.03600
Safety Factor 5.0
Porosity 0.95
With Outflow
Maximum Discharge (l/s) 5.0
Variables
Results
2D Graphs
3D Graphs
Structures
Pollution
Analyse
OK
Cancel
Help
Enter Area between 0.000 and 999.999

Quick Design : Infiltration Systems

Micro Drainage

Variables
Results
2D Graphs
3D Graphs
Structures
Pollution

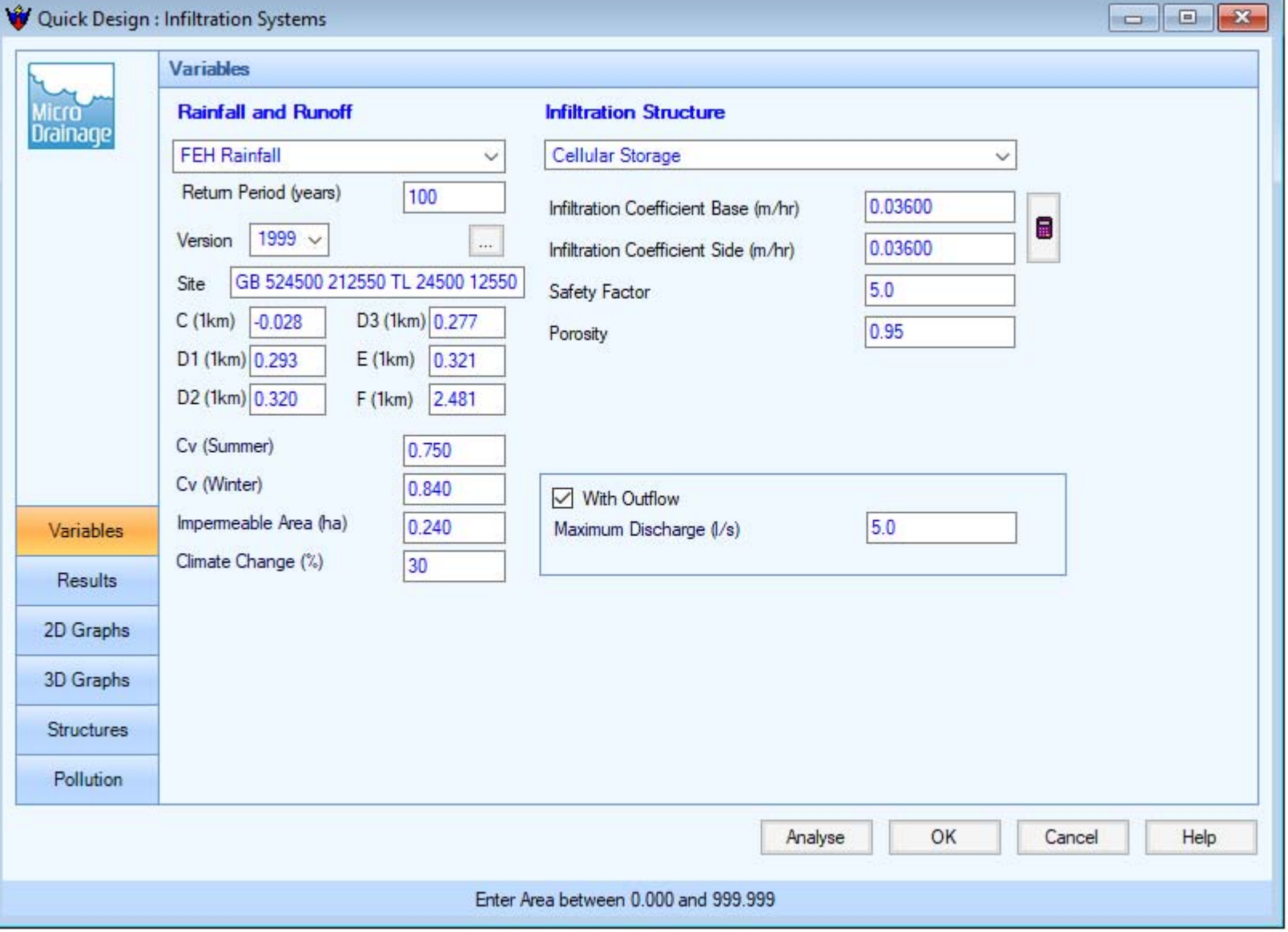
Results

Results are presented in paired rows. These represent maximum and minimum storage requirements for each size of structure.

Depth (m)	Net Vol (m^3)	Surface Area (m^2)	Ex/Fill Vol (m^3)	Half Drain (mins)
0.2	132.4	696.7	139.3	431
	107.1	563.8	112.8	152
0.3	132.6	465.1	139.5	482
	107.9	378.6	113.6	159
0.4	133.5	351.4	140.6	521
	108.4	285.2	114.1	164
0.6	135.4	237.5	142.5	576
	108.9	191.0	114.6	169
1.0	137.3	144.6	144.6	633
	109.3	115.1	115.1	174
1.5	138.2	97.0	145.5	667
	109.6	76.9	115.3	176
2.0	138.8	73.0	146.1	685
	109.7	57.7	115.4	177

Analyse | OK | Cancel | Help

Enter Area between 0.000 and 999.999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Quick Design : Infiltration Systems

Micro Drainage

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Results

Results are presented in paired rows. These represent maximum and minimum storage requirements for each size of structure.

Depth (m)	Net Vol (m^3)	Surface Area (m^2)	Ex/Fill Vol (m^3)	Half Drain (mins)
0.2	141.6	745.5	149.1	448
	114.3	601.3	120.3	161
0.3	141.8	497.7	149.3	504
	115.1	403.8	121.1	169
0.4	142.3	374.5	149.8	545
	115.6	304.2	121.7	174
0.6	144.3	253.1	151.9	604
	116.1	203.8	122.3	179
1.0	146.3	154.0	154.0	668
	116.6	122.8	122.8	185
1.5	147.5	103.5	155.3	706
	116.9	82.0	123.0	187
2.0	148.4	78.1	156.3	728
	117.0	61.6	123.1	189

Analyse | OK | Cancel | Help

Enter Area between 0.000 and 999.999

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