

Our ref: 7866_FCA

Flood Consequences Assessment
and Drainage Strategy

for

Upper Denbigh Road

St Asaph

Denbighshire

For : Castle Green Homes Ltd
Unit 20, St Asaph Business Park
St Asaph
Denbighshire
LL17 0LJ

11 November 2022

Flood Consequences Assessment and Drainage Strategy
for Land Off Upper Denbigh Road, St Asaph

Document Verification

| | |
|--|---|
| Project Title | Land Off Upper Denbigh Road, St Asaph |
| Project Number | 7866 |
| Document Title | Flood Consequences Assessment and Drainage Strategy |
| Document Number | 7866_FCA_Issue 3 |
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Checked and Approved




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Document Revision

| Report Reference | Date | Description | Prepared | Checked and Approved |
|-------------------------|-------------|-------------------------------|-----------------|-----------------------------|
| 7866_FCA | 11/11/2022 | Flood Consequences Assessment | A Jones | P R Sykes |

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**Flood Consequences Assessment and Drainage Strategy
for Land Off Upper Denbigh Road, St Asaph**

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Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

1.0 Introduction

Coopers (Chester) Ltd, (Coopers) have been appointed by Castle Green Homes Ltd to assess the risk of flooding and to provide a Drainage Strategy for a site off Upper Denbigh Road, St Asaph. Castle Green Homes Ltd are proposing a new housing development, comprising of approximately 140 No. dwellings.

Castle Green Homes Ltd are planning the construction of a mixture of semi-detached and detached residential properties with associated access road, parking, vehicular access and landscaping subject to conditions. It is understood the site does not currently benefit from any planning decision.

This flood consequences assessment (FCA) evaluates the proposals with regards to flood risk, identifying and appraising potential flood risk both to and from the whole site. Coopers have carried out the following:

- i. Assessment of the development potential of the site in line with the Welsh Government's Technical Advice Note 15: Development and Flood Risk (TAN15) and;
- ii. An assessment of surface water runoff and drainage strategy

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 properties or the construction area is more than 100m². The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

2.0 Site Characteristics

2.1 Site Location

The site is a parcel of agricultural land in St Asaph. The site is situated off Upper Denbigh Road at approximate grid reference SJ043735

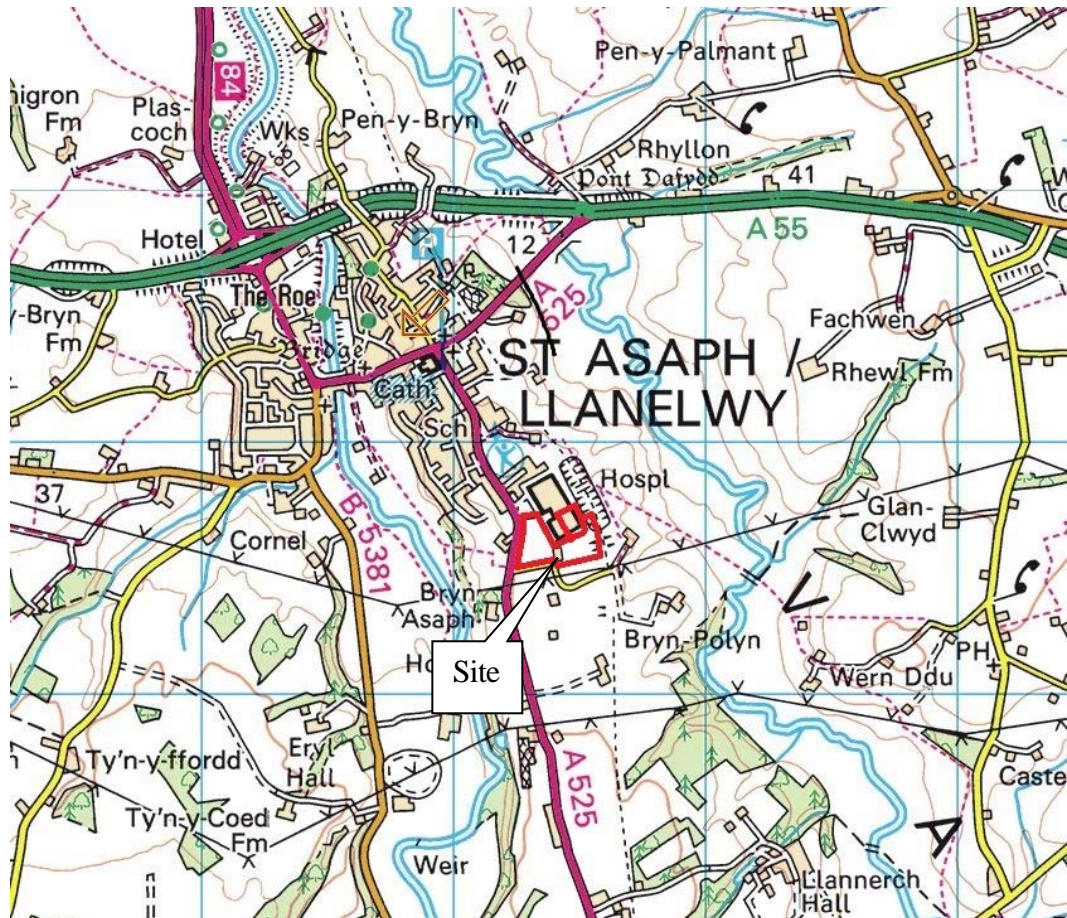


Figure 1 – Site Location

2.2 Site Description

The site covers an area of 5.53 Hectares and consists of two fields with a farmhouse and buildings separating the two. There is also an Ambulance HQ site within the northern end of the eastern portion of the site.

The topography of site varies from a highpoint of 48.5m AOD at the existing farmhouse in the center of the site, with falls to 45.0m AOD to the east and 41.0m AOD to the west. Refer to topographical survey in Appendix 1.

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

3.0 Sources of Flood Risk Information

3.1 The Welsh Government Development Advice Map

The Welsh Government Development Advice Map shows the site is located within Flood Zone A – an area considered to be at little or no risk of fluvial or tidal flooding, with a less than 1 in 1000 (0.1%) annual probability of flooding in any given year.

The proposed residential development is considered to be ‘highly vulnerable’ development in accordance with Figure 2 of the Welsh Governments Technical Advice Note 15. Highly vulnerable development is considered to be appropriate within Flood Zone A.

3.2 Natural Resources Wales

The NRW Flood Map shows the site is located within Flood Zone 1 – an area considered to have the lowest probability of fluvial flooding. It is assessed as having a less than 0.1% annual probability of flooding in any given year.

It should be noted that the Flood Map only covers flooding from rivers and the sea. Flooding can occur at any time and in any place from sources such as rising groundwater levels, burst water mains, blocked road drains, run-off from hillsides, sewer overflows, etc.



Figure 2 – Natural Resources Wales Flood Map for Planning (River and Sea)

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

The Natural Resources Wales long term flood risk maps indicate the site has a low risk of flooding from Surface Water.



Figure 3 – Natural Resources Wales Surface Water Flooding Map

3.3 Denbighshire LLFA

The Denbighshire Council Local Flood Risk Management Strategy (June 2014) contains no records of any flooding at or near to the site. We have contacted Denbighshire Council for confirmation of any known historical flooding within the vicinity of the site and are currently waiting for a response.

4.0 Sources of Flood Risk

4.1 Fluvial

Extreme fluvial flood events have the potential to cause rapid inundation of the site whilst posing a threat to welfare and users. As outlined in Section 3.2; the site is within Flood Zone 1 and is therefore not at risk from extreme fluvial or tidal flooding. Therefore, the risk from extreme fluvial flooding to the site is considered to be low.

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

4.2 Infrastructure Failure (Existing and Proposed)

The failure of infrastructure such as culverts or bridges could increase the risk of flooding at the site. The risk of flooding is considered as very low.

4.3 Overland Flow

Overland flow occurs when the infiltration capacity of the ground is exceeded in a storm event. This can result in water travelling as a sheet flow overland or excess water being conveyed from location to another via local road networks. Due to the topography of the site sloping to the southern end of the site and the road layout / proposed public open space, overland flow is not considered a significant risk. Overland flows from the site will be significantly reduced post development with the incorporation of positive drainage and an internal road network.

4.4 Sewer Flooding

If the capacity of the sewers is exceeded in an extreme event, or a blockage occurs, surcharging of the network can result in surface flooding. Welsh Water sewer plans which are included in Appendix 3, indicate that there are currently no existing adopted sewers located within the site boundary.

Welsh Water have confirmed that foul flows will be allowed to drain to the public foul sewer network to a 300mm diameter combined sewer in Upper Denbigh Road approximately 100m to the north of the site entrance at an unrestricted rate.

Welsh Water may have confirmed they have no records or any known flooding within the vicinity of the site. Refer to Appendix 3 for correspondence.

The overall risk from sewer flooding is considered as low.

4.5 Groundwater Flooding

Groundwater flooding occurs as a result of water rising up from the underlying superficial deposits, bedrock or from springs.

The site investigation trial pits have determined the site is underlain with clay. The trial pits were typically between 2.5 – 3.0m deep with no groundwater observed other than slight seepage.

The overall risk from groundwater flooding is considered as low.

4.6 Coastal Flooding

The site is not located in proximity of any tidal waterway or within close proximity to the sea and is therefore not at risk from tidal inundation.

4.7 Reservoirs

The site is not located in proximity of any reservoirs. Additionally, the NRW maps indicate the site is not at risk of flooding from reservoirs.

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

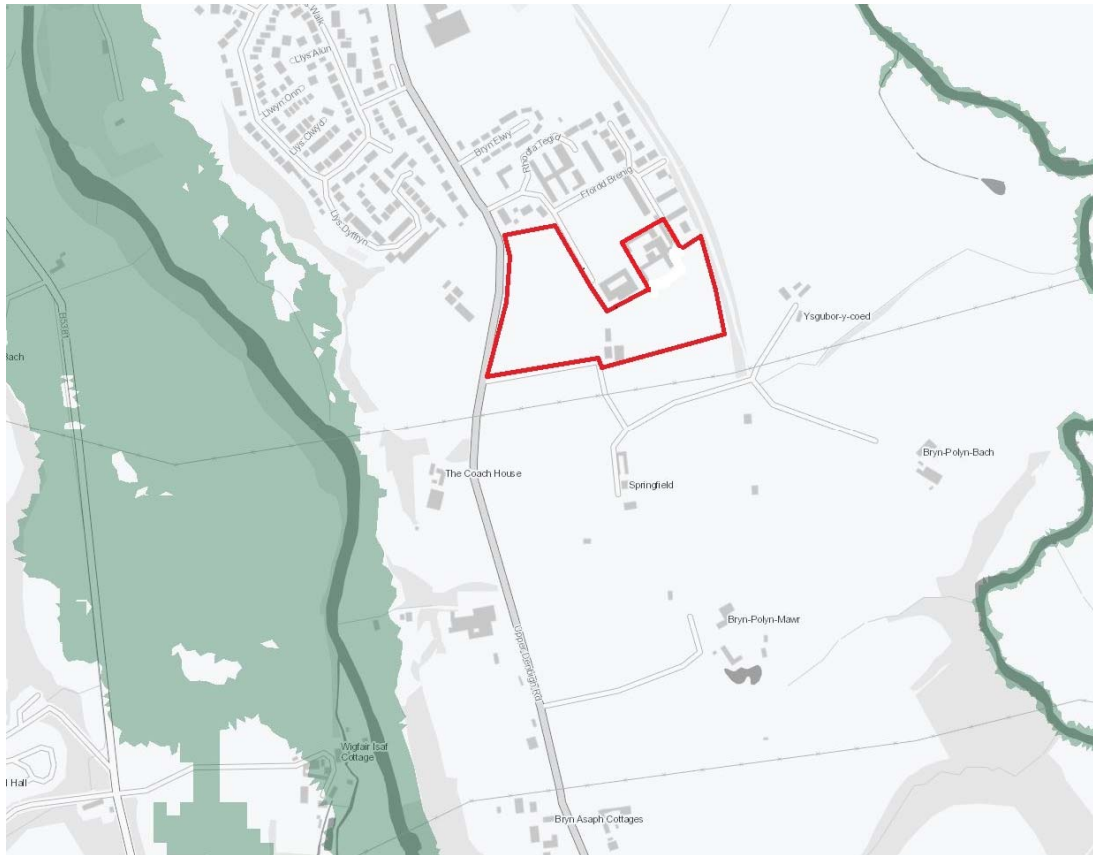


Figure 4 – Natural Resources Wales Reservoir Flooding Map

5.0 Surface Water Drainage

5.1 General

The design for a surface water drainage system for the proposed development will be guided by the principles set out in the Welsh Government’s ‘Recommended non-statutory standards for sustainable drainage (SuDS) in Wales – designing, constructing, operating and maintaining surface water drainage systems’ (2017)

The SuDS Standards Wales sets out the following hierarchy for surface water runoff destination:

- Priority Level 1: Surface water runoff is collected for use;
- Priority Level 2: Surface water runoff is infiltrated to ground;
- Priority Level 3: Surface water runoff is discharged to a surface water body;
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;
- Priority Level 5: Surface water runoff is discharged to a combined sewer.

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

Note that Priority Level 1 is the preferred (highest priority) and that 4 and 5 should only be used in exceptional circumstances.

5.2 Existing Surface Water Drainage

The greenfield portion of the site does not benefit from any existing drainage and will rely on limited infiltration and surface water run-off to dispose of surface water flows. The flows will follow topography so as the centre of the site is the highpoint there will be a portion of the site flowing towards the east and a portion to the west. Both the eastern and western end of the development site are bounded by highways so the overland flows will flow onto the highway surface and ultimately into the highway drainage systems.

5.3 Existing Site Runoff

The greenfield run-off rates for the site has been calculated using the HR Wallingford Greenfield runoff rate estimation tool. As the site drains in 2 directions this has been calculated separately for the east and west

| | |
|-----------------|--------------------|
| Western portion | = 13.88 l/s QBAR . |
| Eastern portion | = 10.66 l/s QBAR . |

Refer to Appendix 4 for calculations

The northeast portion of the development is brownfield covering an area of 0.63ha. This is a former Ambulance HQ centre. Drainage surveys have confirmed surface water flows are unrestricted and discharge to the Pure Development drainage network to the north of the site. We understand the Pure development surface water network is attenuated with a flow restriction and flows ultimately discharge into the public combined sewer.

The brownfield flow rate has been calculated at 87.50 l/s based on a rainfall intensity of 50mm/hr. Refer to Appendix 1, Drg 7866 SK103 for existing flow rates.

5.4 Proposed Surface Water Drainage and Runoff Rates

Priority Level 1

Whilst rainwater harvesting has been considered for the proposed development it should be noted that any device enabling water re-use cannot be taken into account when sizing attenuation as the storage facility may be full when a storm event occurs. Therefore, an overflow to an infiltration device (where ground conditions allow) or to a watercourse / sewer will be required.

Castle Green are not proposing to incorporate rainwater harvesting within the development; however, they are proposing to install a water butt to each dwelling which will allow for water collection for garden re-use.

Priority Level 2

Site investigation has determined the site is underlain with clay and is therefore unsuitable for infiltration to dispose of surface water flows. However, the infiltration tests did observe a drop in level in all 3 tests and whilst these slow rates will not be good enough to drain the site during a 100-year

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

storm event they will potentially provide for slow infiltration SUDS components to deal with low flow events and provide for 5mm interception. Permeable paving (partial infiltration) and bioretention components such as tree pits and raingardens can be considered appropriate.

Priority Level 3

The nearest main rivers are the River Elwy approximately 230m west of the development site and the River Clwyd located approximately 530m east of the development site.

There are no watercourses within the vicinity of the site. The nearest ordinary watercourse allowing for a gravity connection is located approximately 100m south east of the site boundary. It is noted a connection into this watercourse would require third party consent.

Priority Level 4

A highway drain has been identified in Upper Denbigh Road to the west of the site. A drainage survey has confirmed this continues for approximately 130m south, then continues to flow west before ultimately discharging into the River Elwy.

Castle Green Homes Ltd have approached Denbighshire Highways for a potential connection into the highway asset which has been confirmed as an acceptable outfall with a flow rate of 13.8l/s agreed. Therefore, a drainage strategy has been development on this basis.

The surface water flow rate has been restricted to 13.8l/s. This is the greenfield rate for the western portion of the site only as it mimics the existing situation. It is appreciated the greenfield eastern portion of the site currently drains via overland flows to the east of the site so including this portion of the site within the calculation would potentially increase run-off into the highway drain.

This proposal will also significantly reduce the surface water flows being discharged from the brownfield portion of the site (former Ambulance HQ) into the Pure Development to the north of the site and will provide betterment on the receiving combined sewers.

5.5 SuDS Approval Bodies

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 properties or the construction area is more than 100m². The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

Every SuDS application should go to every attempt to satisfy the Principles and Standards of the legislation. When vetting an application, the SAB officer will look at the clear red line boundary area of the site when considering space for SuDS and water management features and not the space that's left on the proposed site layout.

Flood Consequences Assessment and Drainage Strategy for Land Off Upper Denbigh Road, St Asaph

The principles are as follows:

SuDS schemes should aim to:

1. *manage water on or close to the surface and as close to the source of the runoff as possible;*
2. *treat rainfall as a valuable natural resource;*
3. *ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it;*
4. *manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development;*
5. *take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep;*
6. *use the SuDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single “end of pipe” feature, such as a pond, to serve the whole development);*
7. *maximise the delivery of benefits for amenity and biodiversity;*
8. *seek to make the best use of available land through multifunctional usage of public spaces and the public realm;*
9. *perform safely, reliably and effectively over the design life of the development considering the need for reasonable levels of maintenance;*
10. *avoid the need for pumping where possible; and*
11. *be affordable, considering both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.*

Applicants seeking SAB Approval must demonstrate how they have complied with these principles or provide justification for any departure.

The surface water strategy presented in Appendix 1 is providing all attenuation within a SUDS basin at the end of the network with a hydro brake flow control device to restrict the flows. This is considered to be a ‘end of pipe solution’ and whilst it complies with standards for quantity it provides limited compliance to other criteria such as water quality, amenity and biodiversity. Therefore, incorporation of additional source control SUDS components such as water butts, permeable paving and bio retention (tree pits and rain gardens) will need to be considered further at detailed design stage.

5.6 Foul Drainage

Welsh Water have responded to a pre-planning enquiry and have stated that foul flows can be accommodated within the 300mm diameter gravity combined public sewer in Upper Denbigh Road to the north of the development.

Topography and proposed site levels design will allow for a gravity network to serve the entire development without any need for a pumping station.

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6.0 Conclusions and Recommendations

The site is located in Flood Zone 1 and has been shown to be at low risk of flooding from rivers, surface water, groundwater, sewers and climate change. Therefore, mitigation measures are not considered necessary for any future development at the site.

All potential sources of flooding have been considered as part of this report. There are no known records of historical flooding at the site.

The infiltration tests undertaken as part of the site investigation report have determined that the underlying soils have potentially low infiltration characteristics across the site. Therefore, surface water run-off from highways, roof and private drives will not discharge into the ground via infiltration techniques.

The development will increase the impermeable area of the site. This results in an increase in surface water runoff rates and volumes. In order to ensure the increase in runoff will not have an impact elsewhere flow restrictions and on-site attenuation will be incorporated into the design.

All surface water run-off from highways, roof and private drives will be collected into gravity piped networks, temporarily stored in a SUDS basin and will discharge at a restricted rate into the highway drain in Upper Denbigh Road at restricted flow rates.

The provision of trapped highway gullies, the SUDS detention basin and additional source control components will provide adequate treatment to surface water flows prior to discharge to the watercourse.

All foul sewers should be designed in accordance with Sewers for Adoption 7th Edition / Welsh Ministers Standards and will be subject to S104 Agreement.

A SuDS Maintenance and Management Plan should be produced to outline the activity and frequency of inspections and maintenance works required on any SuDS components subject to SAB Approval / Adoption.

This Flood Consequences Assessment and Drainage Strategy should be submitted to the Local Planning Authority in support of the planning application.

Since January 7th, 2019, all new developments will require sustainable drainage for surface water if there are at least 2 properties or the construction area is more than 100m². The surface water drainage systems must be designed and built to meet Welsh Government standards for sustainable drainage.

These systems must be approved by the local authority acting in its SuDS Approving Body (SAB) role before construction work begins. The SAB will have a duty to adopt compliant systems.

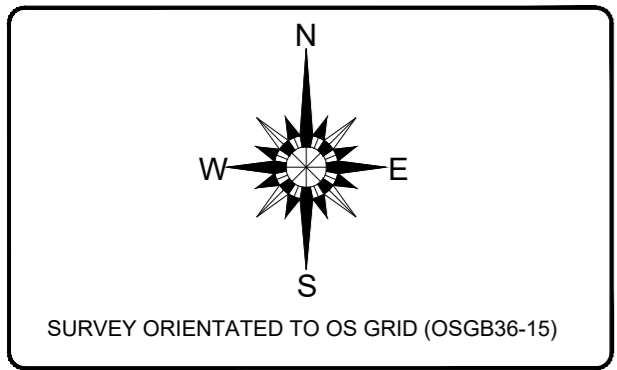
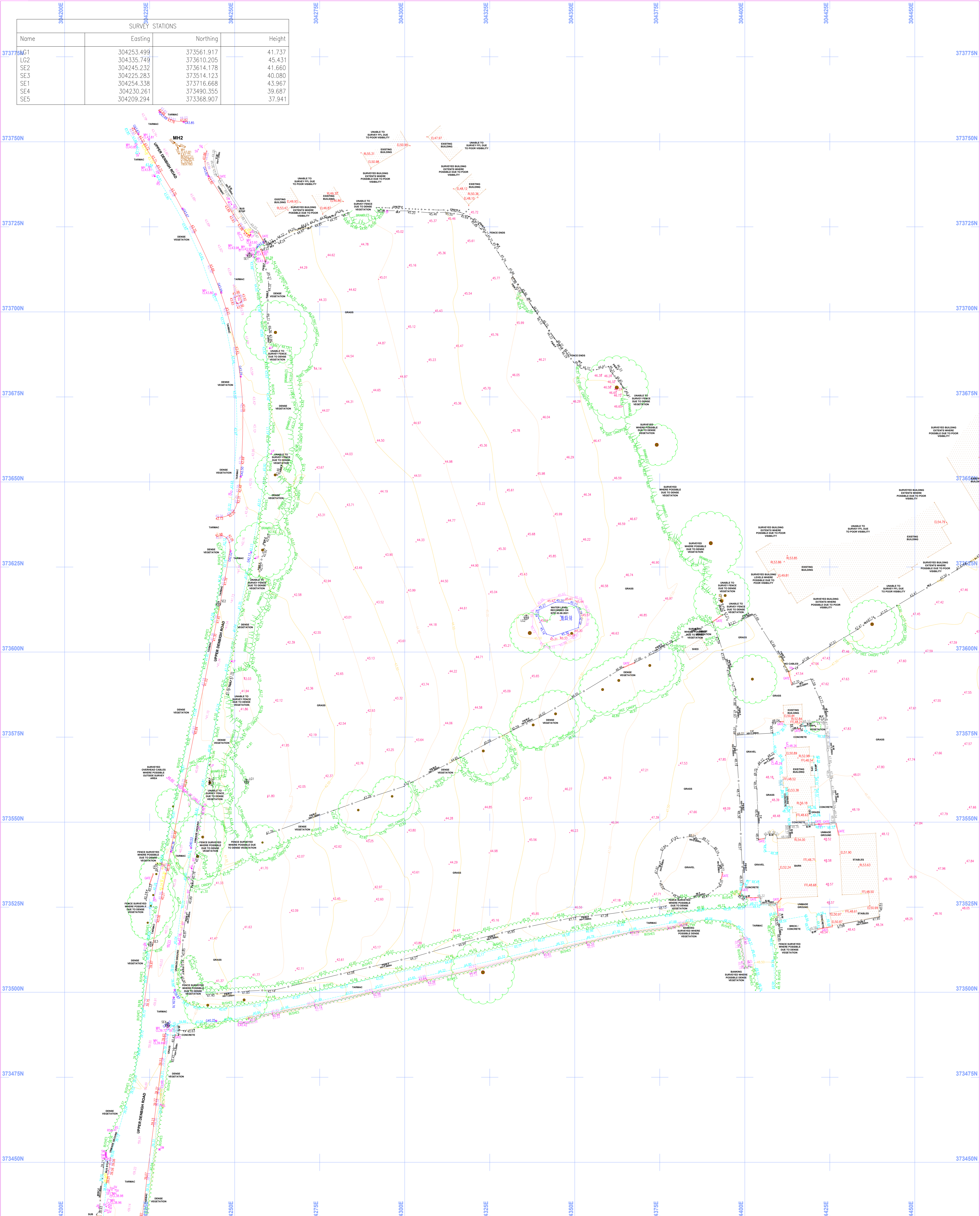
Flood Consequences Assessment and Drainage Strategy
for Land off Upper Denbigh Road, St Aspah

Appendix 1

Reference Drawings

| <u>Drawing No.</u> | <u>Revision</u> | <u>Title</u> |
|--------------------|-----------------|---|
| CGH.TS.06 | A | Topographical survey (main site – 3 sheets) |
| B495-00 | - | Topographical survey (Ambulance HQ Site) |
| 7866 / L1 | - | Site Location Plan |
| 7866 / SK111 | - | Drainage Strategy |
| 7866 / SK103 | A | Existing Surface Water Run-off |

| SURVEY STATIONS | | | |
|-----------------|------------|------------|--------|
| Name | Easting | Northing | Height |
| 373775G1 | 304253.499 | 373561.917 | 41.737 |
| LG2 | 304335.749 | 373610.205 | 45.431 |
| SE2 | 304245.232 | 373614.178 | 41.660 |
| SE3 | 304225.283 | 373514.123 | 40.080 |
| SE1 | 304254.338 | 373716.668 | 43.967 |
| SE4 | 304230.261 | 373490.355 | 39.687 |
| SE5 | 304209.294 | 373368.907 | 37.941 |



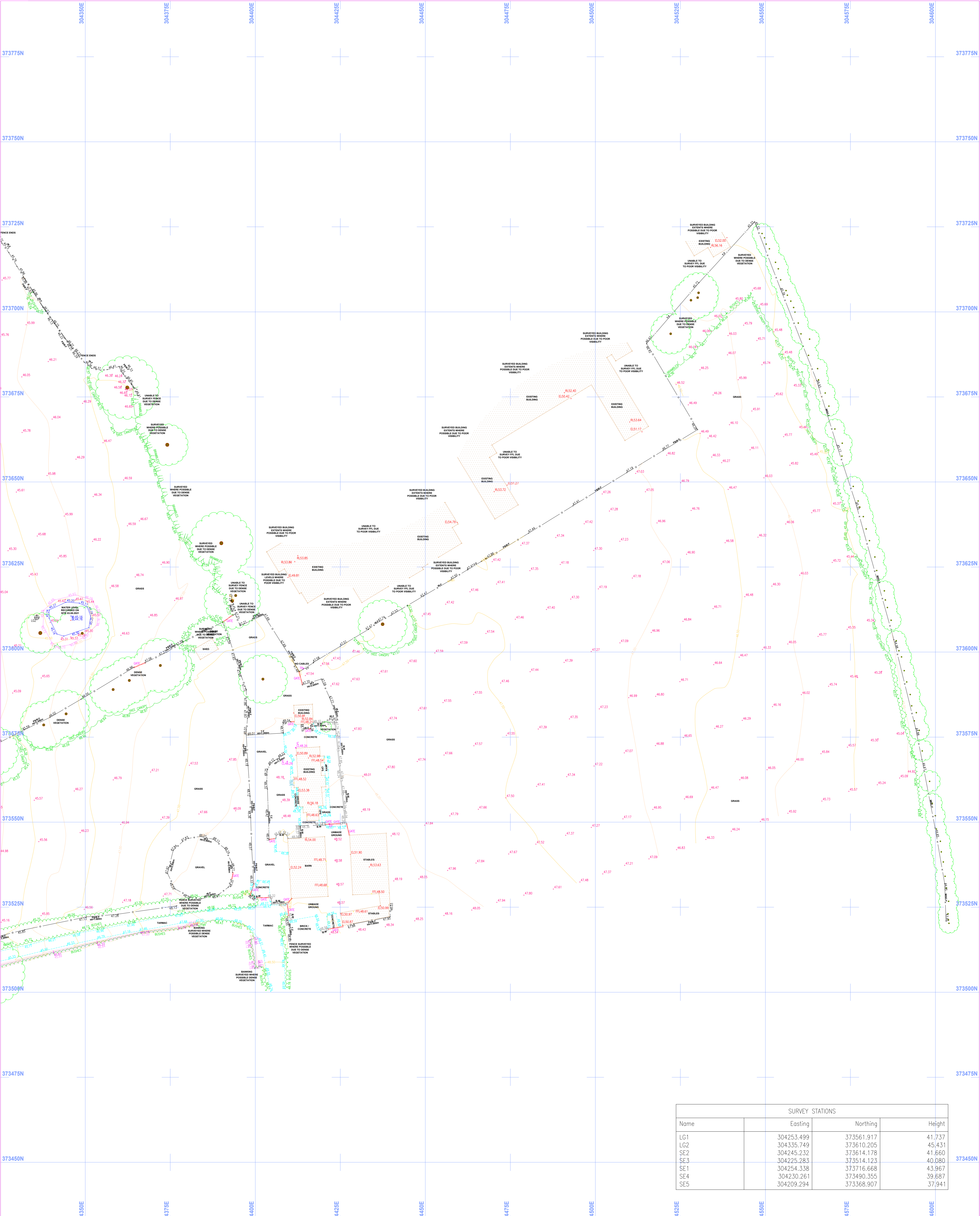
SURVEY NOTES
 ALL LEVELS ARE RELATED TO O.S DATUM (OSGB36-15)
 ESTABLISHED AT SE1 USING THE LEICA SMARTNET GPS NETWORK

| SURVEY LEGEND | | | |
|-----------------|-----------------------------|---------------------------------|---------------------------------|
| FEATURES | BOUNDARY ANNOTATIONS | LEVEL PREFIX ANNOTATIONS | GEOTECHNICAL INFORMATION |
| TOP OF BANK | BARB WIRE FENCE | ASL ARCH SPRING LEVEL | TRIAL HOLE / PIT |
| BOTTOM OF BANK | CHAIN LINK FENCE | BL BED LEVEL | BORE HOLE |
| SURVEY STATION | CONC POST AND PANEL | BD BACK DROP | WINDOW SAMPLE |
| TREE | CONC POST TIMB PANEL | CL COVER LEVEL | MONITORING POINT |
| HEDGE | ELECTRIC FENCE | DM TOP OF DOOR | |
| TREE CANOPY | HERAS FENCE | DTC DEPTH TO CROWN | |
| BUSHES | IRON RAIL FENCE | PFL FINISHED FLOOR LEVEL | |
| VEGETATION | KNEE RAIL FENCE | | |
| | MISCELLANEOUS FENCE | | |
| | POST AND WIRE FENCE | | |
| | RANCH STYLE FENCE | | |
| | SECURITY FENCE | | |
| | TIMBER FENCE | | |
| | BRICK WALL | | |
| | BLOCK WALL | | |
| | CONCRETE WALL | | |
| | GABION WALL | | |
| | MISCELLANEOUS WALL | | |
| | RETAINING WALL | | |
| | RETAINING LOG WALL | | |
| | STONE WALL | | |

| SURVEY ANNOTATIONS | |
|---------------------------|------------------------------|
| AV AIR VALVE | OHC OVERHEAD CABLES |
| BS BUS STOP | PB POST BOX |
| BT BRITISH TELECOM IC | PM PARKING METER |
| CPS CONCRETE PAVING SLABS | PS POST |
| CP CATCH PIT | PYL ELECTRICITY PYLON |
| DR DRAIN | RE RODDING EYE |
| EB ELECTRIC CONTROL BOX | RS ROAD SIGN |
| EL ELECTRICAL IC | RWP RAIN WATER PIPE |
| EP ELECTRICITY POLE | ST STOP TAP |
| ER EARTH ROD | SM SERVICE MARKER |
| FH FIRE HYDRANT | SP SIGN POST |
| FP FLAG POLE | SV STOP VALVE / SLUICE VALVE |
| G GULLY | SVP SOIL VENT PIPE |
| GH GREENHOUSE | TB TELEPHONE BOX |
| GP GATE POST | TL TRAFFIC LIGHTS |
| GV GAS VALVE | TM TELEPHONE MAST |
| IB JUNCTION BOX | TP TELEGRAPH POLE |
| JW JAPANESE KNOT WEED | TPS TACTILE PAVING SLABS |
| KO KERB OUTLET | VP VENT PIPE |
| LA LAMP HOLE | WM WATER METER |
| LP LAMP POST/LIGHT COLUMN | WO WASH OUT |
| MH MANHOLE | UTL UNABLE TO LIFT |
| MP MONITOR POINT | UTS UNABLE TO SURVEY |
| NP NAME PLATE | |

| | | | | | | | | | | |
|--|--|---------------------------|----------------------|---|----------|----|-------------|-----|------|------|
| CLIENT CASTLE GREEN HOMES | PROJECT ENGINEER AS | DATE 21.07.2021 | | | | | | | | |
| PROJECT TITLE UPPER DENBIGH ROAD, ST ASAPH | DRAWN DH | SCALE 1:500@A1 | | | | | | | | |
| DRAWING DETAIL TOPOGRAPHICAL LAND SURVEY SHEET 1 OF 3 | <table border="1"> <tr> <td>TOPO SURVEY EXTENDED</td> <td>A</td> <td>05.08.21</td> <td>AP</td> </tr> <tr> <td>DESCRIPTION</td> <td>REV</td> <td>DATE</td> <td>DRWN</td> </tr> </table> | | TOPO SURVEY EXTENDED | A | 05.08.21 | AP | DESCRIPTION | REV | DATE | DRWN |
| TOPO SURVEY EXTENDED | A | 05.08.21 | AP | | | | | | | |
| DESCRIPTION | REV | DATE | DRWN | | | | | | | |
| DRAWING NUMBER CGH.TS.06 | REVISION A | | | | | | | | | |

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| | | 14 GREEN MILL, WEST THROUGHTON, BOLTON, LANCAS, BL6 3GE TEL: 0800 772 3040 MOB: 07850099923 info@surveyeng.co.uk |
|--|--|---|



| SURVEY STATIONS | | | |
|-----------------|------------|------------|--------|
| Name | Eastings | Northing | Height |
| LG1 | 304253.499 | 373561.917 | 41.737 |
| LG2 | 304335.749 | 373610.205 | 45.431 |
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| SE3 | 304225.283 | 373514.123 | 40.080 |
| SE1 | 304254.338 | 373716.668 | 43.967 |
| SE4 | 304230.261 | 373490.355 | 39.687 |
| SE5 | 304209.294 | 373368.907 | 37.941 |

SURVEY NOTES

ALL LEVELS ARE RELATED TO O.S DATUM (OSGB36-15)
ESTABLISHED AT SE1 USING THE LEICA SMARTNET GPS NETWORK

| SURVEY LEGEND | | | |
|----------------|--|----------------------|--------|
| FEATURES | | BOUNDARY ANNOTATIONS | |
| TOP OF BANK | | BARB WIRE FENCE | B.W.F |
| BOTTOM OF BANK | | CHAIN LINK FENCE | C.L.F |
| SURVEY STATION | | CONC POST AND PANEL | CP&P |
| TREE | | CONC POST TIMB PANEL | CP&T.P |
| HEDGE | | ELECTRIC FENCE | E.L.F |
| TREE CANOPY | | IRON RAIL FENCE | I.R.F |
| BUSHES | | KNEE RAIL FENCE | K.R.F |
| VEGETATION | | MISCELLANEOUS FENCE | MISC.F |
| | | POST AND WIRE FENCE | P&W.F |
| | | RANCH STYLE FENCE | R.S.F |

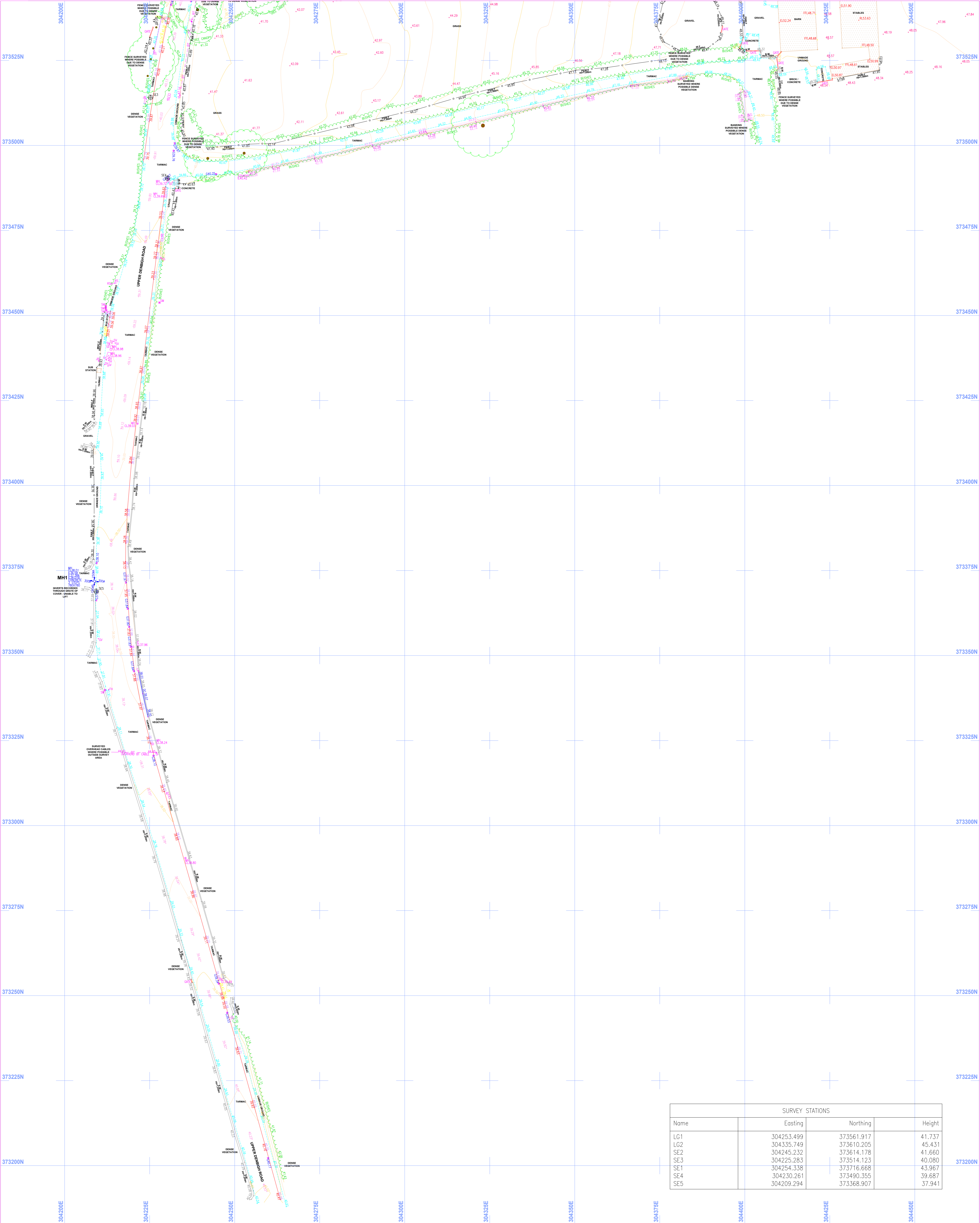
| SURVEY ANNOTATIONS | | | |
|--------------------|------------------------|-----|---------------------------|
| AV | AIR VALVE | OHC | OVERHEAD CABLES |
| B | BOLLARD | PB | POST BOX |
| BS | BUS STOP | PM | PARKING METER |
| BT | BRITISH TELECOM IC | PS | POST |
| CPS | CONCRETE PAVING SLABS | PYL | ELECTRICITY PYLON |
| CP | CATCH PIT | RE | RODDING EYE |
| DR | DRAIN | RS | ROAD SIGN |
| EB | ELECTRIC CONTROL BOX | RWP | RAIN WATER PIPE |
| EL | ELECTRIC IC | ST | STOP TAP |
| EP | ELECTRICITY POLE | SM | SERVICE MARKER |
| ER | EARTH ROD | SP | SIGN POST |
| FH | FIRE HYDRANT | SV | STOP VALVE / SLUICE VALVE |
| FP | FLAG POLE | SVP | SOIL VENT PIPE |
| G | GULLY | TB | TELEPHONE BOX |
| GH | GREENHOUSE | TL | TRAFFIC LIGHTS |
| GP | GATE POST | TP | TELEPHONE MAST |
| GV | GAS VALVE | TP | TELEGRAPH POLE |
| IC | INSPECTION COVER | TMS | TACTILE PAVING SLABS |
| JB | JUNCTION BOX | VP | VENT PIPE |
| JW | JAPANESE KNOT WEED | WM | WATER METER |
| KO | KERB OUTLET | WO | WASH OUT |
| LH | LAMP HOLE | UTL | UNABLE TO LIFT |
| LP | LAMP POST/LIGHT COLUMN | UTS | UNABLE TO SURVEY |
| MH | MANHOLE | | |
| MP | MONITOR POINT | | |
| NP | NAME PLATE | | |

| LEVEL PREFIX ANNOTATIONS | | | |
|--------------------------|----------------------|-----|------------------|
| ASL | ARCH SPRING LEVEL | IL | INVERT LEVEL |
| BL | BED LEVEL | PL | PARAPET LEVEL |
| BD | BACK DROP | RL | ROOF/RIDGE LEVEL |
| CL | COVER LEVEL | SL | SOFFIT LEVEL |
| DH | DEPTH TO DOOR | TF | TOP OF FENCE |
| DT | DEPTH TO CROWN | TF | TOP OF PIPE |
| TFL | FINISHED FLOOR LEVEL | TOW | TOP OF WALL |
| | | THR | TREE HEIGHT |
| | | THR | THRESHOLD LEVEL |
| | | WL | WATER LEVEL |
| | | WS | WINDOW SILL |
| | | WSF | WINDOW SOFFIT |

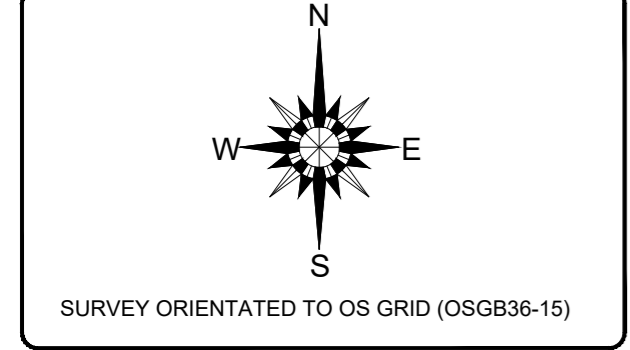
| GEOTECHNICAL INFORMATION | |
|--------------------------|------------------|
| TH | TRIAL HOLE / PIT |
| BH | BORE HOLE |
| WS | WINDOW SAMPLE |
| MP | MONITORING POINT |

| | | | | | | | | | | |
|--|--|---------------------------|----------------------|---|----------|----|-------------|-----|------|------|
| CLIENT CASTLE GREEN HOMES | PROJECT ENGINEER AS | DATE 21.07.2021 | | | | | | | | |
| PROJECT TITLE UPPER DENBIGH ROAD, ST ASAPH | DRAWN DH | SCALE 1:500@A1 | | | | | | | | |
| DRAWING DETAIL TOPOGRAPHICAL LAND SURVEY SHEET 2 OF 3 | <table border="1"> <tr> <td>TOPO SURVEY EXTENDED</td> <td>A</td> <td>05.08.21</td> <td>AP</td> </tr> <tr> <td>DESCRIPTION</td> <td>REV</td> <td>DATE</td> <td>DRWN</td> </tr> </table> | | TOPO SURVEY EXTENDED | A | 05.08.21 | AP | DESCRIPTION | REV | DATE | DRWN |
| TOPO SURVEY EXTENDED | A | 05.08.21 | AP | | | | | | | |
| DESCRIPTION | REV | DATE | DRWN | | | | | | | |
| DRAWING NUMBER CGH.TS.06 | REVISION A | | | | | | | | | |

| | | |
|--|--|--|
| | | 14 GREEN MILL, WESTHOUGHTON, BOLTON, LANCASHIRE, BL5 3GE TEL: 0800 772 3040 MOB: 07850099923 info@surveyeng.co.uk |
|--|--|--|



| SURVEY STATIONS | | | |
|-----------------|------------|------------|--------|
| Name | Easting | Northing | Height |
| LG1 | 304253.499 | 373561.917 | 41.737 |
| LG2 | 304335.749 | 373610.205 | 45.431 |
| SE2 | 304245.232 | 373614.178 | 41.660 |
| SE3 | 304225.283 | 373514.123 | 40.080 |
| SE1 | 304254.338 | 373716.668 | 43.967 |
| SE4 | 304230.261 | 373490.355 | 39.687 |
| SE5 | 304209.294 | 373368.907 | 37.941 |



SURVEY NOTES
 ALL LEVELS ARE RELATED TO O.S DATUM (OSGB36-15)
 ESTABLISHED AT SE1 USING THE LEICA SMARTNET GPS NETWORK

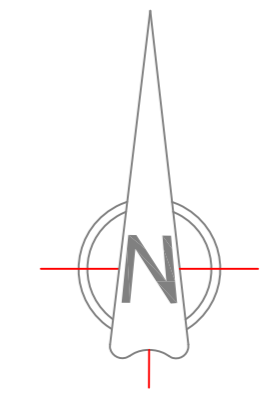
| SURVEY LEGEND | | | |
|----------------|--|----------------------|--------|
| FEATURES | | BOUNDARY ANNOTATIONS | |
| TOP OF BANK | | BARB WIRE FENCE | B.W.F |
| BOTTOM OF BANK | | CHAIN LINK FENCE | CL.F |
| SURVEY STATION | | CONC POST AND PANEL | CP&P |
| TREE | | CONC POST TIMB PANEL | CP&TP |
| HEDGE | | ELECTRIC FENCE | EL.F |
| TREE CANOPY | | HERAS FENCE | HER.F |
| BUSHES | | IRON RAIL FENCE | IR.F |
| VEGETATION | | KNEE RAIL FENCE | KR.F |
| | | MISCELLANEOUS FENCE | MISC.F |
| | | POST AND WIRE FENCE | P&W.F |
| | | RANCH STYLE FENCE | RS.F |
| | | SECURITY FENCE | SEC.F |
| | | TIMBER FENCE | T.F |
| | | BLOCK WALL | B.W |
| | | CONCRETE WALL | BL.W |
| | | GABION WALL | C.W |
| | | MISCELLANEOUS WALL | G.W |
| | | RETAINING LOG WALL | R.W |
| | | RETAINING WALL | RL.W |
| | | STONE WALL | S.W |

| LEVEL PREFIX ANNOTATIONS | | GEOTECHNICAL INFORMATION | |
|--------------------------|----------------------|--------------------------|----|
| ASL | ARCH SPRING LEVEL | TRIAL HOLE / PIT | TH |
| BL | BED LEVEL | BORE HOLE | BH |
| BD | BACK DROP | WINDOW SAMPLE | WS |
| CL | COVER LEVEL | MONITORING POINT | MP |
| CH | TOP OF CHOOH | | |
| DTC | DEPTH TO CROWN | | |
| TFL | FINISHED FLOOR LEVEL | | |
| IL | INVERT LEVEL | | |
| PL | PARAPET LEVEL | | |
| RL | ROOF/RIDGE LEVEL | | |
| THR | TREE HEIGHT | | |
| THR | THRESHOLD LEVEL | | |
| WL | WATER LEVEL | | |
| WS | WINDOW SILL | | |
| WSF | WINDOW SOFFIT | | |

| SURVEY ANNOTATIONS | |
|--------------------|---------------------------|
| AV | AIR VALVE |
| B | BOLLARD |
| BS | BUS STOP |
| BT | BRITISH TELECOM IC |
| CPS | CONCRETE PAVING SLABS |
| CP | CATCH PIT |
| DR | DRAIN |
| EB | ELECTRIC CONTROL BOX |
| EL | ELECTRICITY POLE |
| EP | EARTH ROD |
| ER | ELECTRICITY POLE |
| FP | FIRE HYDRANT |
| G | GULLY |
| GH | GREENHOUSE |
| GP | GATE POST |
| GV | GAS VALVE |
| IC | INSPECTION COVER |
| JB | JUNCTION BOX |
| KW | JAPANESE KNOT WEED |
| KO | KORB OUTLET |
| LH | LAMP HOLE |
| LP | LAMP POST/LIGHT COLUMN |
| MH | MANHOLE |
| MP | MONITOR POINT |
| NP | NAME PLATE |
| OHC | OVERHEAD CABLES |
| PI | POST BOX |
| PM | PARKING METER |
| PS | POST |
| PYL | ELECTRICITY PYLON |
| RE | RODDING EYE |
| RS | ROAD SIGN |
| RWP | RAIN WATER PIPE |
| ST | STOP TAP |
| SM | SERVICE MARKER |
| SP | SIGN POST |
| SV | STOP VALVE / SLUICE VALVE |
| SVP | SOIL VENT PIPE |
| TB | TELEPHONE BOX |
| TL | TRAFFIC LIGHTS |
| TM | TELEPHONE MAST |
| TP | TELEGRAPH POLE |
| TPS | TACTILE PAVING SLABS |
| VP | VENT PIPE |
| WM | WATER METER |
| WO | WASH OUT |
| UTL | UNABLE TO LIFT |
| UTS | UNABLE TO SURVEY |

| | | |
|---|------------------------------------|---------------------------|
| CLIENT CASTLE GREEN HOMES | PROJECT ENGINEER AS | DATE 21.07.2021 |
| PROJECT TITLE UPPER DENBIGH ROAD, ST ASAPH | DRAWN DH | SCALE 1:500@A1 |
| DRAWING DETAIL TOPOGRAPHICAL LAND SURVEY SHEET 3 OF 3 | DRAWING NUMBER CGH.TS.06 | |
| | REVISION A | |

| | |
|--|---------------------|
| TOPO SURVEY EXTENDED DESCRIPTION REV DATE DRWN APPR | A 05.08.21 AP |
| SurveyEng Ltd Land Surveyors & Engineers <small>14 GREEN MILL, WES THOUGHTON, BOLTON, LANCAS, BL5 3GE, TEL: 0800 772 3040, MOB: 07850069923, info@surveyeng.co.uk</small> | |



| Station | Easting | Northing | Level |
|---------|------------|------------|--------|
| 1 | 304452.317 | 373677.042 | 47.216 |
| 2 | 304458.745 | 373690.910 | 47.142 |
| 3 | 304454.146 | 373698.110 | 47.091 |
| 4 | 304472.266 | 373632.987 | 47.484 |
| 5 | 304494.353 | 373649.907 | 47.274 |
| 6 | 304523.921 | 373665.425 | 46.965 |
| 7 | 304512.591 | 373681.183 | 46.974 |
| 8 | 304426.171 | 373707.724 | 46.867 |
| 9 | 304427.739 | 373714.043 | 46.927 |
| 10 | 304458.101 | 373728.995 | 46.907 |
| 11 | 304476.750 | 373735.365 | 46.594 |
| 12 | 304489.631 | 373742.274 | 46.649 |
| 13 | 304494.310 | 373715.622 | 46.774 |

Abbreviations/Symbols (Measured Building Surveys):

| | |
|------|-------------------------|
| C: | Window Cill Height |
| H: | Window Head Height |
| BH: | Beam Height |
| DH: | Door Height |
| COL: | Column |
| SVP: | Soil Vent Pipe |
| FL: | Floor Level |
| TH: | Threshold Level |
| FC: | Floor to Ceiling Height |
| | Vaulted Ceiling |

Line types

| | |
|--|-----------------------------|
| | Hedge Lines |
| | Drainage Runs |
| | Overhead Electricity Cables |
| | Overhead Telephone Cables |

Symbols

| | |
|--|-----------------|
| | Tree/Bush |
| | Control Station |
| | Borehole |
| | Trial Hole |
| | Glass House |
| | Osbn |

Abbreviations (Topographic Survey):

| | | | |
|------|-------------------------|---------|-------------------------|
| AB | AIR BRICK | OHC | OVERHEAD CABLE |
| AV | AIR VALVE | OS | ORDNANCE SURVEY |
| B | BOLLARD | OSR | OPEN STEEL RAILINGS |
| BB | BELISHA BEACON | P | PILE |
| BDY | BOUNDARY | PB | PILAR BOX |
| BH | BOREHOLE | PM | PARKING METER |
| BL | BED LEVEL | PO | POST |
| BRK | BRICKWORK | PRF | POST & RAIL FENCE |
| BS | BUS STOP | PTM | PARKING TICKET MACHINE |
| BM | BENCH MARK | PWF | POST & WIRE FENCE |
| BW | BRICK WALL | RE | RODDING EYE |
| BWF | BARBED WIRE FENCE | RS | ROAD SIGN |
| CBF | CLOSE BOARDED FENCE | RTW | RETAINING WALL |
| CIF | CORRUGATED IRON FENCE | RWP | RAINWATER PIPE |
| CL | COVER LEVEL | SC | STOP COCK |
| CLF | CHAIN LINK FENCE | SDP | STAND PIPE |
| CONC | CONCRETE | SK | SOAKAWAY |
| CPC | CONCRETE POST | SL | SOFFIT LEVEL |
| CPF | CHESTNUT PALING FENCE | SMH | SURFACE WATER MANHOLE |
| CR | CYCLE RACK | SMP | SHEET METAL PILING |
| CTV | CABLE T.V. MANHOLE | SP | SIGN POST |
| CUL | CULLVERT | STN | STATION |
| DK | DROP KERB | SV | SUICIDE VALVE |
| DL | DECK LEVEL | SVP | SOIL VENT PIPE |
| DP | DOWNPIPE | SWF | SHEEP WIRE FENCE |
| DPC | DAMP PROOF COURSE | TBM | TEMPORARY BENCH MARK |
| DR | DRAIN | TCB/ICP | TELEPHONE BOX/POST |
| DWB | DOGS WASTE BIN | TC | TELECOM CABINET |
| EA | ENVIRONMENT AGENCY | TMH | TELECOM MANHOLE |
| EB | ELECTRICITY BOX | THL | THRESHOLD LEVEL |
| ECF | ELECTRIC CABLE FENCE | TL | TRAFFIC LIGHT |
| ECP | ELECTRICITY CABLE PIT | TLB | TRAFFIC LIGHT BOX |
| EMH | ELECTRICITY MANHOLE | TP | TELEGRAPH POLE |
| EP | ELECTRICITY POLE | TRS | TIMBER RUBBING STRIP |
| ER | EARTHING ROD | TS | TREE STUMP |
| ETL | ELECT TRANSMISSION LINE | TSS | TURBULAR STEEL RAILINGS |
| FB | FLOWER BED | VP | VENT PIPE |
| FBR | FOOTBRIDGE | WB | WASTE BIN |
| FH | FIRE HYDRANT | WL | WATER LEVEL/WATER LINE |
| FHM | FIRE HYDRANT MARKER | WM | WATER METER |
| FL | FLOOR LEVEL | WMF | WIRE MESH FENCE |
| FP | FENCE POST | WP | WOODEN POST |
| FWM | FOUL WATER MANHOLE | WPR | WOOD POST & RAIL FENCE |
| G | GULLY | WV | WATER VALVE |
| GL | GROUND LEVEL | YG | YARD GULLY |
| GP | GATE POST | | |
| GM | GAS MARKER | | |
| GV | GAS VALVE | | |
| HW | HEAD WALL | | |
| IC | INSPECTION CHAMBER | | |
| IL | INVERT LEVEL | | |
| IRF | IRON RAILING FENCE | | |
| IWF | INTERWOVEN FENCE | | |
| JB | JUNCTION BOX | | |
| KIG | KERB INLET GULLY | | |
| LB | LEFT BANK | | |
| LES | LITERACY | | |
| LP | LAMP POST | | |
| MB | MOORING BOLLARD | | |
| MF | MISCELLANEOUS FENCING | | |
| MH | MANHOLE | | |
| MKR | MARKER | | |
| MP | MOORING PILE | | |
| MBF | METAL RAILING FENCE | | |
| MS | MILESTONE | | |
| NB | NOTICE BOARD | | |

Survey Notes:
Coordinates and Levels related to Ordnance Survey Datum - GPS OSG836 NG

| Revision | Date | Description |
|----------|------|-------------|
| | | |
| | | |
| | | |
| | | |

Carl Williams Land Surveys Ltd
The Studio
15 Millfield
Neston
Cheshire
CH64 3TF
www.cwlandsurveys.com e:info@cwlandsurveys.com

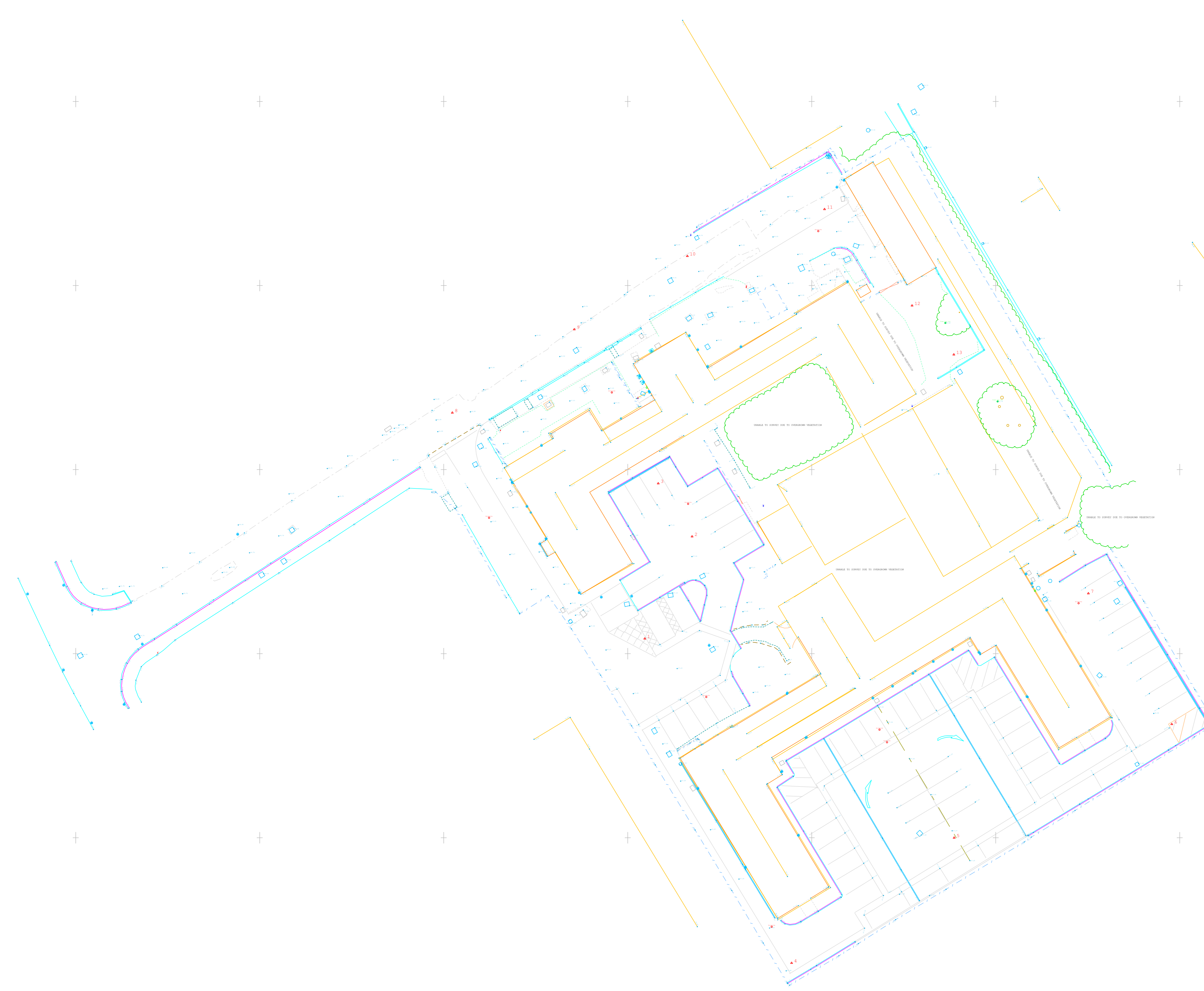
Client: **Castle Green Homes**

Project: **The Old Ambulance Station, Denbigh
Topographic Site Survey**

Scale: To Fill Surveyed By: CW Date: 04.09.22

Drawing No.: B495-00 Checked By: VW Date: 05.09.22

Drawn By: CW Date: 05.09.22



| | |
|--------|------------|
| SCALE | 1:25000@A4 |
| DATE | 08.07.21 |
| DRAWN | OS |
| CHEK'D | AW |

Upper Denbigh Road,
St Asaph.

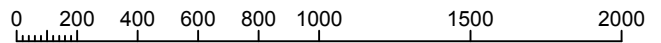
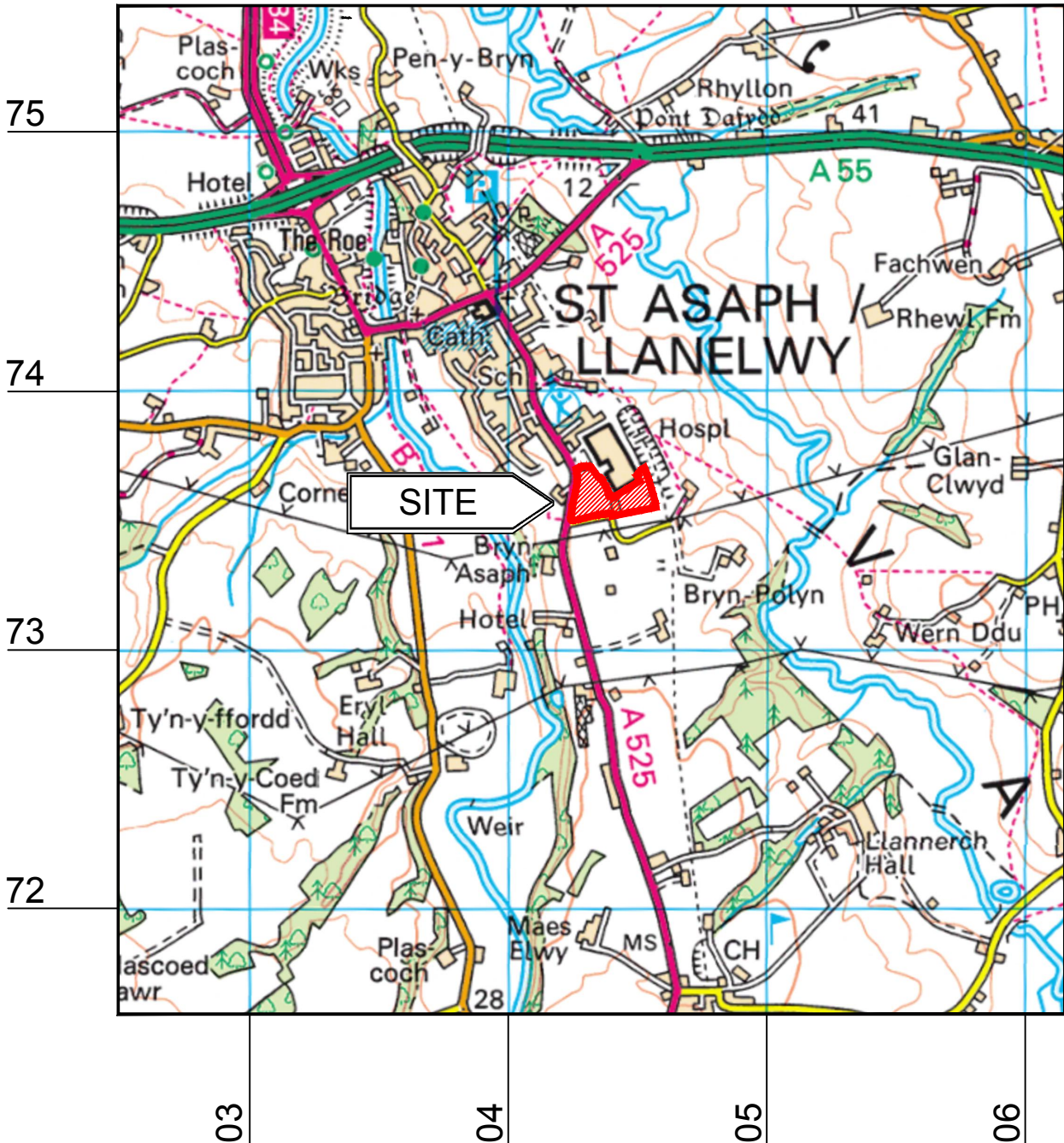
SITE LOCATION PLAN

Drg No: 7866 / L1

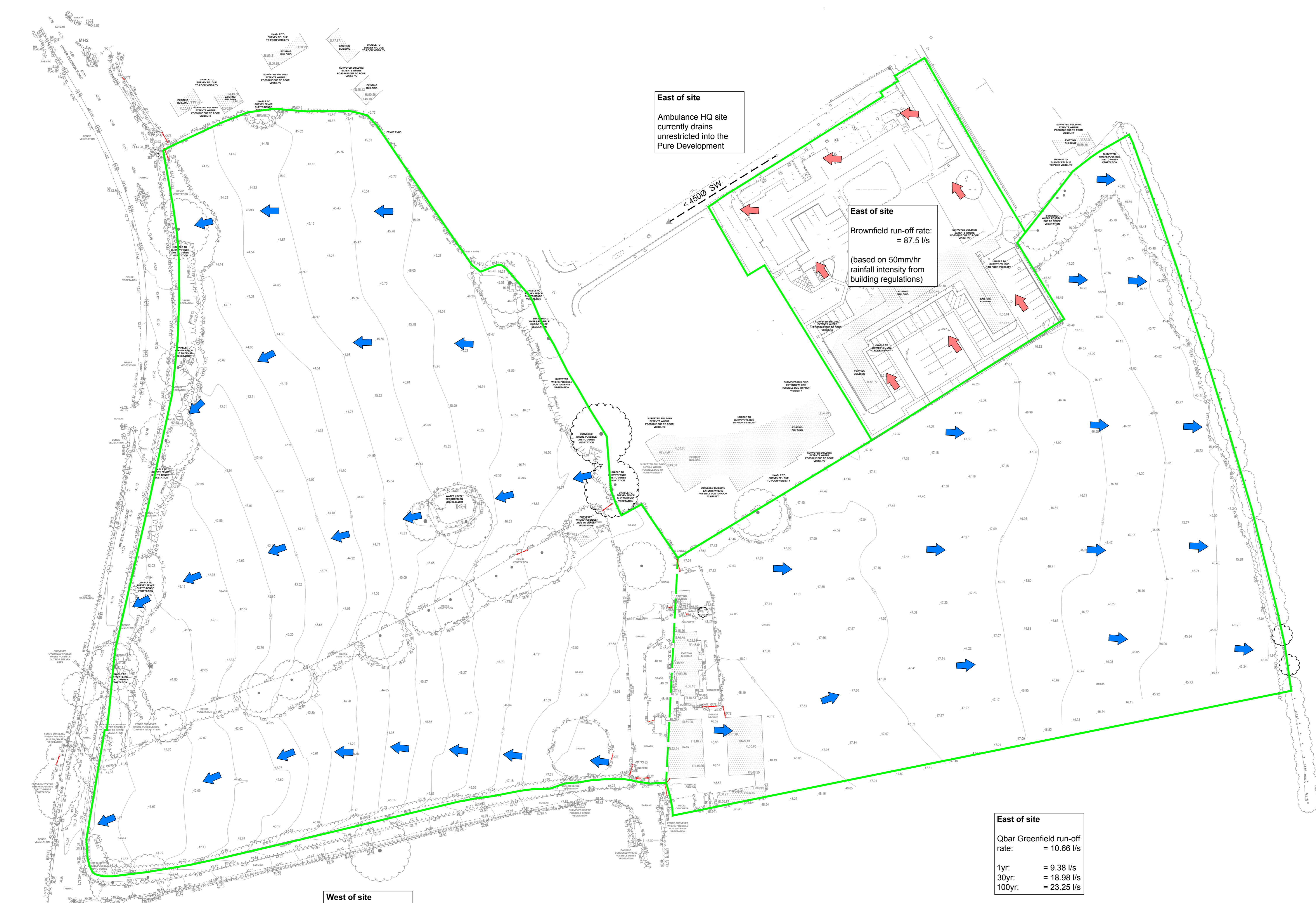


National Grid reference
of the proposed site.



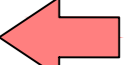
SJ 043 735



SCALE BAR (m)



Legend

-  Site Boundary
-  Direction of SW Run Off (Greenfield)
-  Direction of SW Run Off (Brownfield)

STRATEGY

| | | | | |
|------|----------|-------------------------------|----|-------|
| Rev. | Date | Revision | By | Appd. |
| A | 11.11.22 | Ambulance HQ site flows added | AJ | AJ |



Tel: 01244 684910
 Email: admin@coopers.co.uk
 Web: http://coopers.co.uk

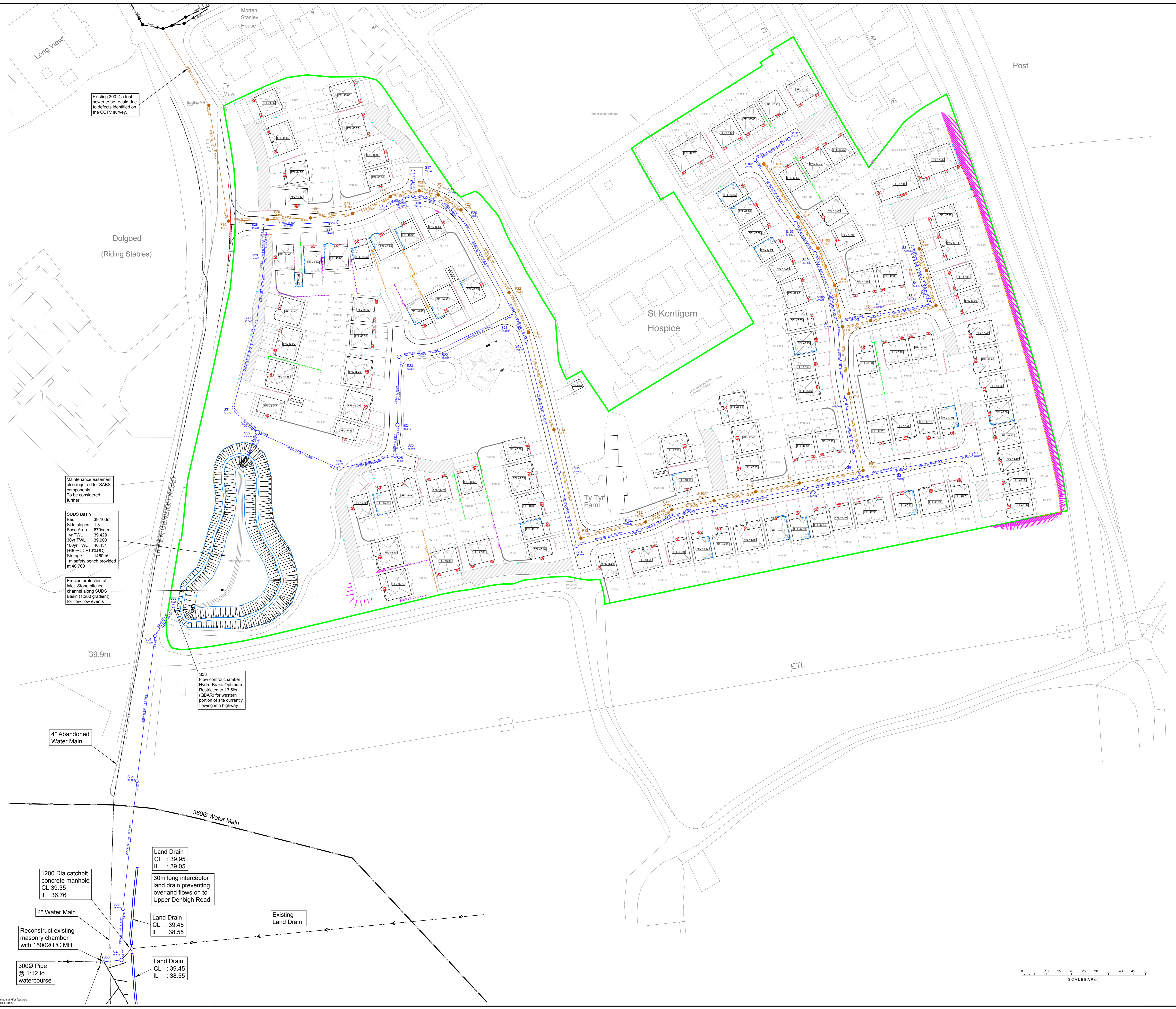
Park House
 Sandpiper Court
 Chester Business Park
 Chester
 CH4 9JL



Project: Upper Denbigh Road, St Asaph

Title: Existing SW Run Off

| | | |
|----------------|-------------|----------|
| DRAWING NUMBER | SCALE at A0 | 1:500 |
| 7866 / SK103 | DATE | 17.09.21 |
| | DRAWN | PW |
| | CHECKED | AJ |
| | REVISION | A |



Existing 300 Dia foul sewer to be re-laid due to defects identified on the CCTV survey.

Maintenance easement also required for SABS components. To be considered further.

SUDS Basin
Bed : 39.100m
Side slopes : 1:3
Base Area : 670sq.m
1y TWL : 39.429
30y TWL : 39.903
100y TWL : 40.431
(+30% CC+10%UC)
Storage : 1450m³
1m safety bench provided at 40.700

Erosion protection at inlet. Stone pitched channel along SUDS Basin (1:200 gradient) for flow flow events

S33 Flow control chamber Hydro-Brake Optimum Restricted to 13.5l/s (GBAR) for western portion of site currently flowing into highway

4" Abandoned Water Main

3500 Water Main

Land Drain
CL : 39.95
IL : 39.05

30m long interceptor land drain preventing overland flows on to Upper Denbigh Road.

Land Drain
CL : 39.45
IL : 38.55

Land Drain
CL : 39.45
IL : 38.55

1200 Dia catchpit concrete manhole
CL 39.35
IL 36.76

4" Water Main

Reconstruct existing masonry chamber with 1500Ø PC MH
300Ø Pipe @ 1:12 to watercourse

Legend

- Site Boundary
- Existing Combined Sewer
- Proposed Adoptable Surface Water Sewer
- Proposed Adoptable Foul Sewer
- Slab Level (FFL 47.40)
- Root Protection Area
- Wall
- Flag on Edge
- Underbuild
- Tanking
- Depth of fill (existing to proposed)

Note: Retention of 300mm and above has been shown for strategy stage. Small retaining features and underbuild of up to 225mm will also be required at other locations and will be shown at detailed design stage

STRATEGY

| Rev. | Date | Revision | By | Appd. |
|--|------|----------|----|-------|
| coopers chartered consulting engineers | | | | |

Tel: 01244 684910
 Email: admin@coopers.co.uk
 Web: http://coopers.co.uk

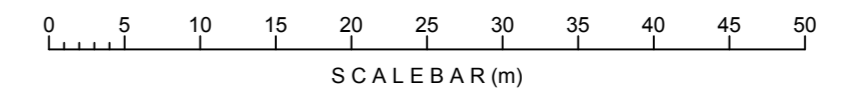
Park House
 Sandpaper Court
 Chester Business Park
 Chester
 CH4 9JL

Client: **Castle Green**

Project: **Upper Denbigh Road, St Asaph**

Title: **Proposed Drainage Strategy**

| | | |
|----------------|-------------|----------|
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| 7866 / SK111 | DATE | 06.11.22 |
| | DRAWN | AJ |
| | CHECKED | AJ |

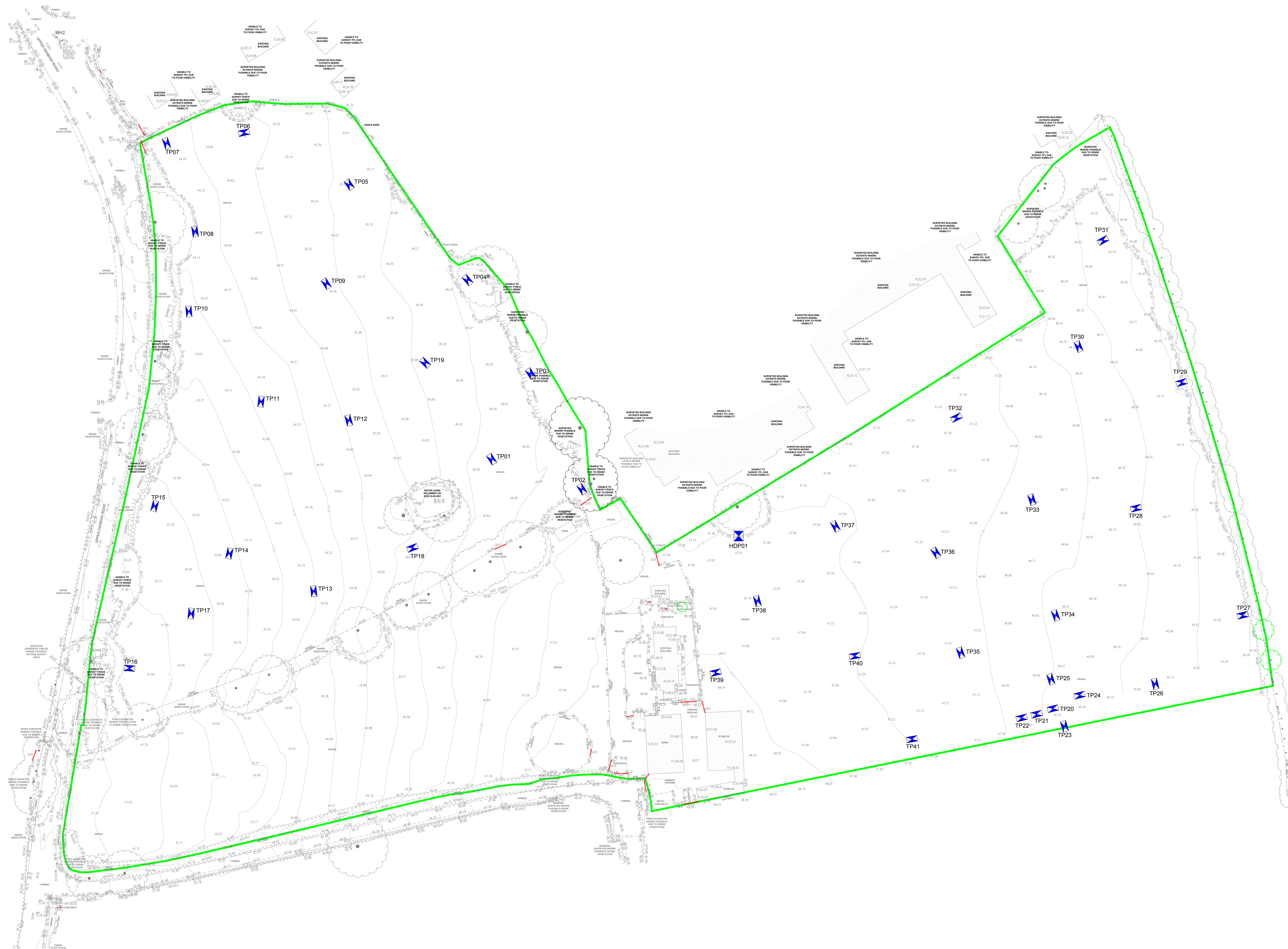


Flood Consequences Assessment and Drainage Strategy
for Land off Upper Denbigh Road, St Aspah

Appendix 2

Infiltration Consideration

Coopers Trial Pit Information



DRAFT



Tel: 01244 684910
 Email: admin@coopers.co.uk
 Web: http://coopers.co.uk

Park House
 Sandpiper Court
 Chester Business Park
 Chester
 CH4 9JL



Client
CASTLE GREEN

Project
Upper Denbigh Road,
St Asaph

Title
Site Investigation
Trial Pit Locations



| | | |
|----------------|-------------|----------|
| DRAWING NUMBER | SCALE at A0 | 1:500 |
| 7866 / SK104 | DATE | 17.09.21 |
| | DRAWN | PW |
| | CHECKED | AJ |
| | REVISION | - |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.90m | Ground Level (mOD) | Client Castle Green Homes Ltd | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|--|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | B | | | | 0.30 | Stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | SV 110kPa | | | | | | | |
| 1.00 | SV 140kPa | | | | | | | |
| 2.00 | SV | | | | (2.60) | | | |
| 2.50 | SV >250kPa | | | | | | | |
| 2.70 | B | | | | 2.90 | | | |
| | | | | | | Complete at 2.90m | | |







| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.80 | SV >250kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 1.00 | B | | | | | | | |
| 1.50 | B | | | | (2.50) | | | |
| 2.20 | B | | | | 2.80 | Complete at 2.80m | | |


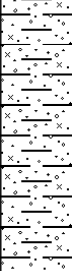

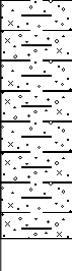
| | | | | | | |
|---|---|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Clay friable from 0.30-2.80m, unable to record shear vane as too stiff/friable. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 138kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 | B | | | | | |  | |
| 1.00 | SV >250kPa | | | | | At 0.80m: Ceramic land drain, approximately 75mm in diameter, orientated ?? to ?? Dry |  | |
| 1.50 | B | | | | (2.50) | |  | |
| | | | | | 2.80 | Complete at 2.80m |  | |








| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Friable from 0.30m. Unable to take shear vanes below 0.40m as stiff and friable. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

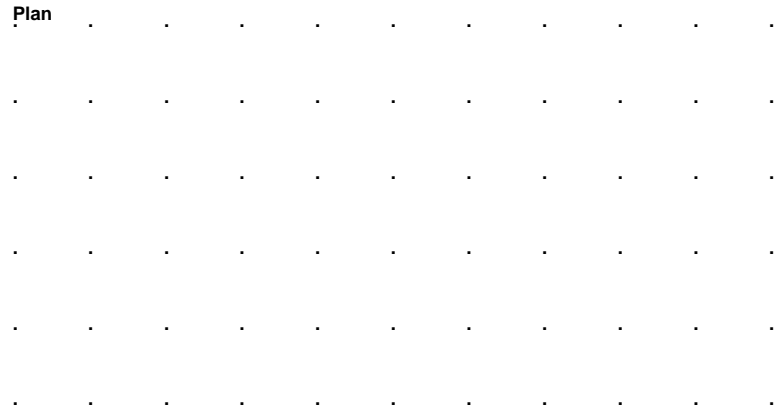
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.90m | Ground Level (mOD) | Client Castle Green Homes Ltd | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|--------------|----------------|-----------------|---------------|-------------|-----------------------|--|---|-------|
| 0.10 | B | | | | (0.20) 0.20 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 0.70 | SV 160kPa B | | | | | |  | |
| 1.20 | SV >250kPa | | | | | |  | |
| 1.40 | B | | | | (2.70) | |  | |
| 2.80 | B | | | | 2.90 | Complete at 2.90m | | |







| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

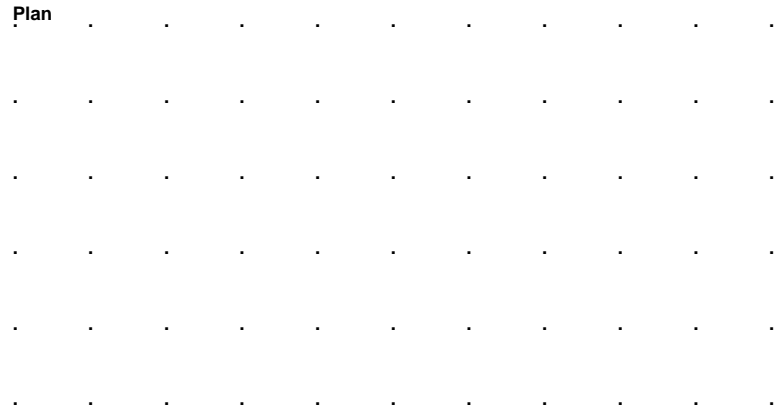
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.90m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.20 | B | | | | 0.30 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 162kPa | | | | | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 | B | | | | | |  | |
| 1.00 | SV 210kPa | | | | | |  | |
| 1.20 | B | | | | | |  | |
| 1.50 | SV >250kPa | | | | (2.60) | |  | |
| 2.60 | B | | | | 2.90 | Complete at 2.90m |  | |






| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|--|---|-------|
| 0.10 | B | | | | (0.20) 0.20 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | B | | | | | Very stiff, reddish brown mottled grey, slightly gravelly, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | SV 125kPa | | | | | | | |
| 1.00 | SV 200kPa | | | | | At 0.80m: Slightly sandy |  | |
| 1.40 | B | | | | | |  | |
| 1.50 | SV 240kPa | | | | (2.80) | | | |
| 2.00 | SV >250kPa | | | | | |  | |
| 2.80 | B | | | | 3.00 | Complete at 3.00m |  | |



| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV >250kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.70 | B | | | | | At 0.60m: Ceramic land drain, approximately 75mm in diameter, orientated ?? to ??. |  | |
| 1.50 | B | | | | (2.50) | |  | |
| 2.70 | B | | | | 2.80 | Complete at 2.80m |  | |


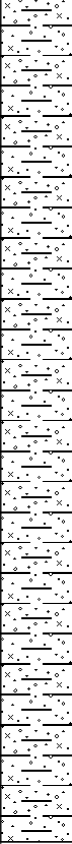
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. From 0.30-0.80m; friable, very stiff, cannot read shear vanes. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

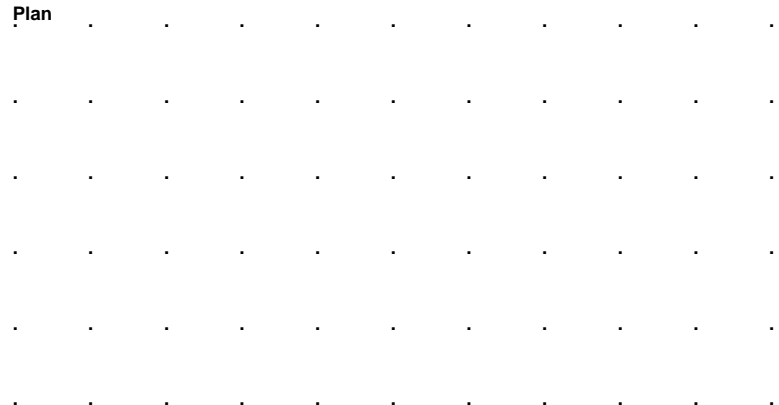
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | SV >250kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | B | | | | | | | |
| 1.50 | B | | | | (2.50) | | | |
| 2.80 | B | | | | 2.80 | Complete at 2.80m | | |


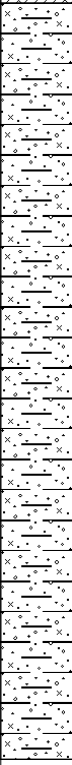
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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. From 0.40-2.80m; friable, too stiff to ??. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

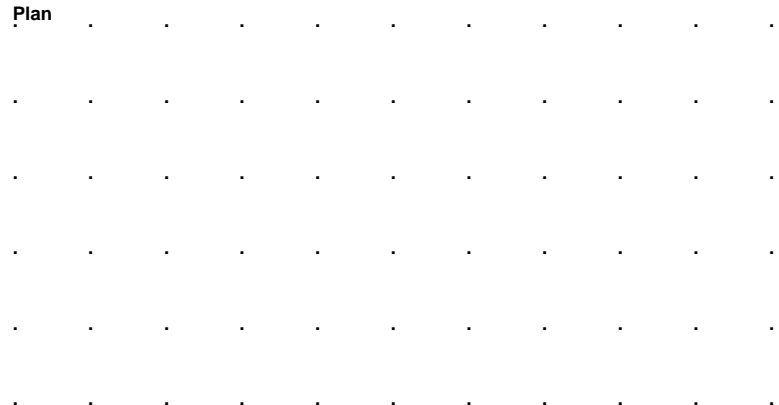
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.20 | B | | | | 0.20 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | SV 160kPa | | | | | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | B | | | | | | | |
| 1.00 | SV 202kPa | | | | | | | |
| 1.50 | SV 228kPa | | | (2.80) | | | | |
| 1.70 | B | | | | | | | |
| 2.00 | SV >250kPa | | | | | | | |
| 2.50 | B | | | | | | | |
| | | | | | 3.00 | Complete at 3.00m | | |









| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
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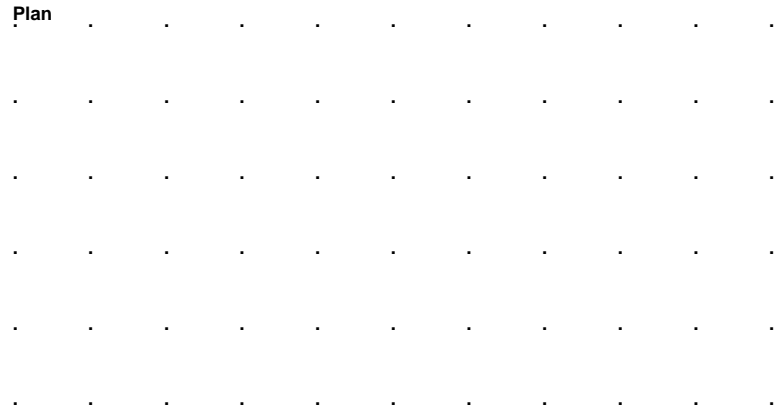
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | B | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | SV 160kPa | | | | | | | |
| 1.00 | SV 230kPa | | | | | | | |
| 1.40 | B | | | | | | | |
| 1.50 | SV >250kPa | | | | (2.50) | Below 1.50m: Low boulder content, measured example approximately 400mm diameter | | |
| 2.80 | B | | | | 2.80 | Complete at 2.80m | | |






| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

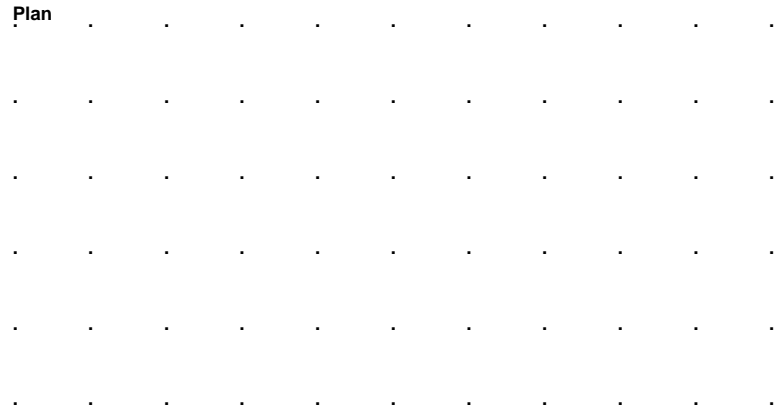
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.20m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.40 | SV 128kPa | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 | B | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 1.00 | SV 140kPa | | | | | |  | |
| 1.50 | SV 186kPa | | | | | |  | |
| 1.60 | B | | | | (2.90) | |  | |
| 2.00 | SV 210kPa | | | | | |  | |
| 2.50 | SV >250kPa | | | | | |  | |
| 3.00 | B | | | | | |  | |
| | | | | | 3.20 | Complete at 3.20m | | |




| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

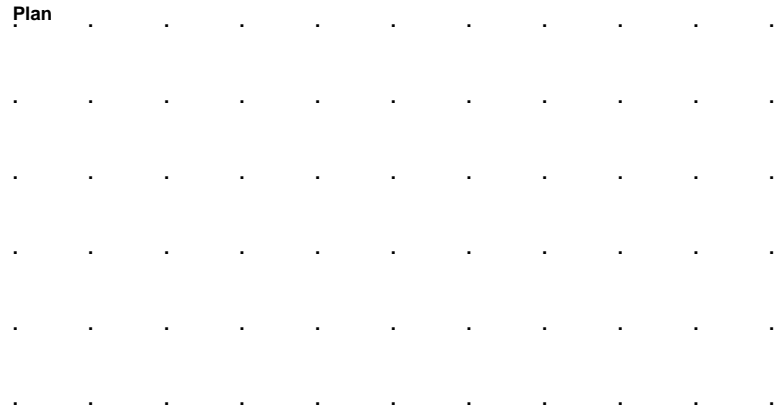
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.70m | Ground Level (mOD) | Client Castle Green Homes Ltd | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.20 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 176kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. At 0.60m: Ceramic land drain, approximately 75mm in diameter, orientated north east to south west. Dry |  | |
| 0.70 | B | | | | | |  | |
| 1.00 | SV 210kPa | | | | | |  | |
| 1.50 | SV >250kPa | | | | (2.40) | |  | |
| | | | | | 2.70 | Complete at 2.70m | | |


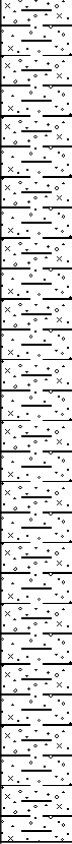
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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

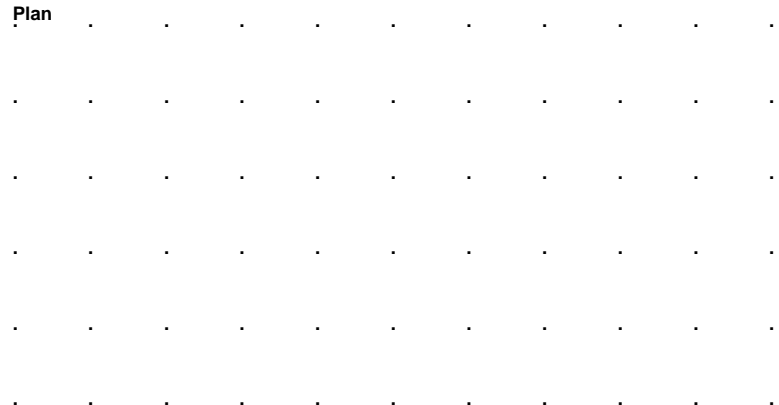
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | SV 158kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | B | | | | | | | |
| 1.00 | SV 220kPa | | | | | |  | |
| 1.50 | SV >250kPa | | | | | | | |
| 1.70 | B | | | | (2.70) | | | |
| 3.00 | B | | | | 3.00 | Complete at 3.00m | | |









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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
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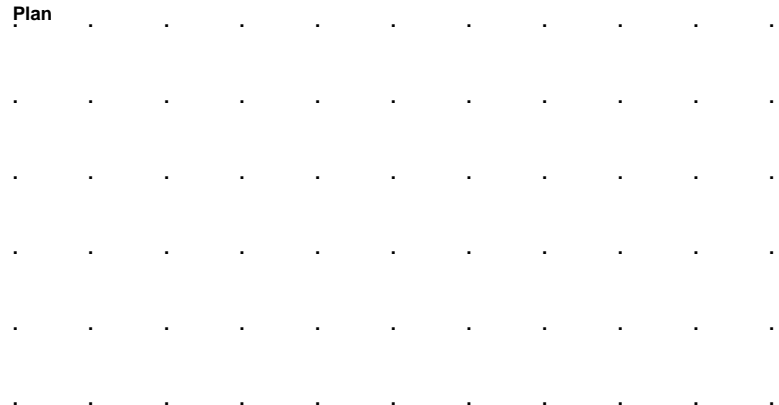
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|--------------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | 0.20 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 190kPa | | | | | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 | B | | | | | | | |
| 1.00 | SV | | | | | | | |
| 1.40 1.50 | B SV | | | (2.80) | | | | |
| 2.50 | B | | | | 3.00 | Complete at 3.00m | | |



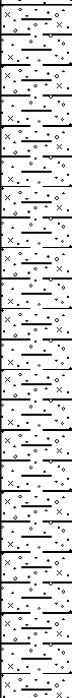
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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 142kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 | B | | | | | |  | |
| 1.00 | SV 190kPa | | | | | At 0.80m: Ceramic land drain, approximately 75mm in diameter, orientated north east to south west. Dry |  | |
| 1.50 | SV 240kPa | | | | | |  | |
| 1.70 | B | | | | (2.70) | |  | |
| 2.00 | SV >250kPa | | | | | |  | |
| 2.70 | B | | | | 3.00 | Complete at 3.00m |  | |


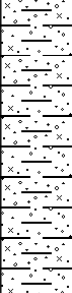



| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

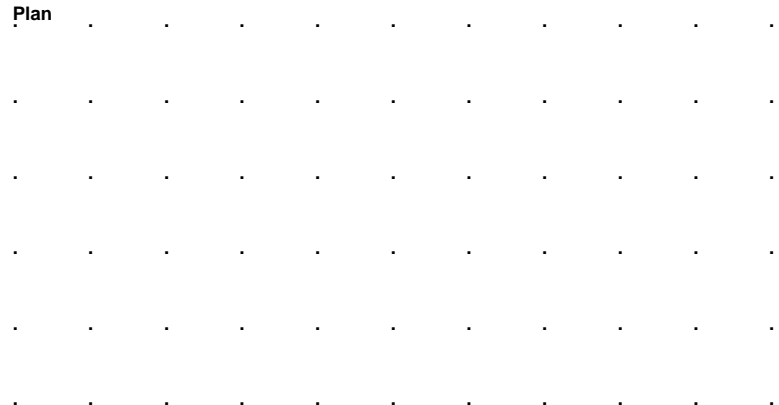
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.20m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|--------------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 0.70 | SV 122kPa B | | | | 0.30 (0.60) | Stiff, brown and grey, silty, sandy CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 1.00 1.10 | SV 196kPa B | | | | 0.90 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 1.50 | SV >250kPa | | | | | | | |
| 2.00 | B | | | | (2.30) | | | |
| 3.00 | B | | | | 3.20 | Complete at 3.20m | | |









| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. At 0.90m; friable and unable to take shear vanes as either shatters or is too stiff. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.20m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.20) 0.20 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | SV 184kPa | | | | | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.50 | B | | | | | | | |
| 1.00 | SV 212kPa | | | | | Below 1.20m: Grey mottled brown and reddish brown |  | |
| 1.30 | B | | | | | | | |
| 1.50 | SV >250kPa | | | | (3.00) | Below 2.2m: Reddish brown mottled grey |  | |
| 2.40 | B | | | | | | | |
| 3.00 | B | | | | 3.20 | Complete at 3.20m |  | |



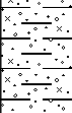
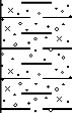
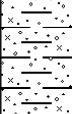
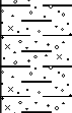
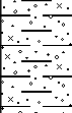
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

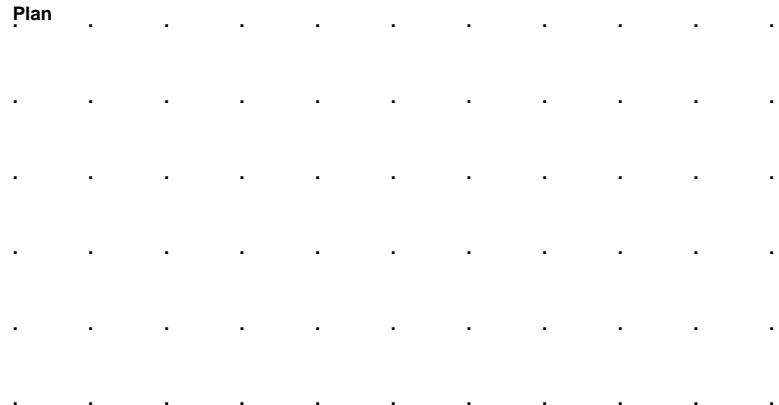
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.20m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 16/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 156kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 | B | | | | | |  | |
| 1.00 | SV 222kPa | | | | | |  | |
| 1.50 | SV >250kPa | | | | | |  | |
| 1.60 | B | | | | (2.90) | |  | |
| 2.60 | B | | | | | |  | |
| | | | | | 3.20 | Complete at 3.20m |  | |

| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.20m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | B | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. At 0.60m: Ceramic land drain, approximately 70mm in diameter, orientated north east to south west. Dry |  | |
| 0.60 | SV 170kPa | | | | | |  | |
| 1.20 | SV 194kPa | | | | | |  | |
| 1.80 | SV 220kPa | | | | (2.80) | |  | |
| 2.30 | SV >250kPa | | | | | |  | |
| | | | | | 3.20 | Complete at 3.20m |  | |

| | | | |
|---|--|------------------------|-------------------|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | |
| | Scale (approx) 1:25 | Logged By ST | Checked By |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|------------------------------|-------------|-----------------------|--|--------|-------|
| 0.10 | B | | | | (0.30) | MADEGROUND (similar to topsoil). Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is angular to sub-rounded, fine to coarse of various lithologies including brick fragments and masonry fragments. Low cobble content of brick. | | |
| 0.40 | B | | | | 0.30 | MADEGROUND. Firm, reddish brown, slightly gravelly, silty, sandy CLAY. Sand is fine to coarse. Gravel is angular to sub-rounded, fine to coarse of various lithologies including brick fragments and ceramic fragments. | | |
| 1.00 | B | | Moderate inflow(1) at 0.90m. | | (0.60) | MADEGROUND. Soft, dark grey, slightly gravelly, clayey, sandy, organic SILT with frequent pockets of spongy, fibrous peat. Gravel is angular to sub-angular, fine to coarse of various lithologies including brick fragments, masonry fragments and timber. Moderate cobble and boulder content of tree branches/trunks. Distinct organic odour. | | ∇1 |
| 2.75 | B | | | | 0.90 | | | |
| 2.80 | B SV >250kPa | | | | (1.80) | | | |
| 2.80 | | | | | 2.70 (0.10) 2.80 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. | | |
| | | | | | | Complete at 2.80m | | |





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|---|---|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Collapsed between 0.90-2.70m due to water ingress. Moderate inflow at 0.90m during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

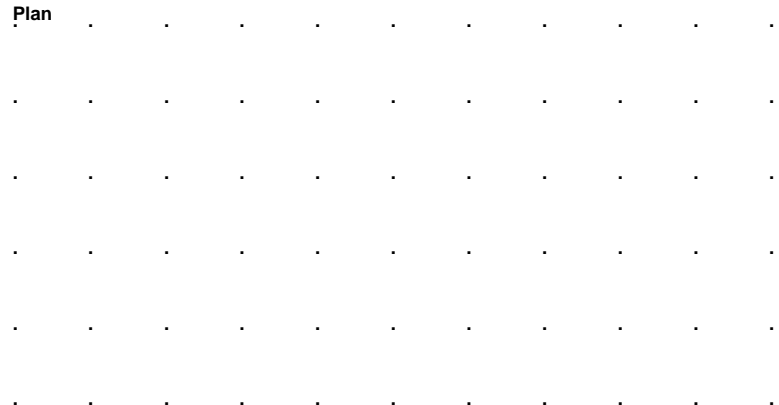
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.50m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|----------------------------------|-------------|-----------------------|--|--------|-------|
| 0.10 | B | | | | (0.30) | MADEGROUND (similar to topsoil). Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is angular to sub-rounded, fine to coarse of various lithologies including brick fragments and ceramic fragments. Low cobble content of brick. | | |
| 0.60 | B | | | | (1.00) | MADEGROUND. Brown, sandy GRAVEL and COBBLE of predominantly whole brick and sandstone. Low boulder content of sandstone. Sand is fine to coarse. | | |
| | | | Groundwater seepage(1) at 1.30m. | | 1.30 | MADEGROUND. Soft, dark grey, slightly gravelly, clayey, sandy SILT. Sand is fine to coarse. Gravel is angular to sub-angular, fine to coarse of various lithologies including brick. | | ▽1 |
| | | | | | (1.10) | | | |
| 2.50 | SV 220kPa | | | | 2.40 (0.10) | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. | | |
| 2.50 | B | | | | 2.50 | Complete at 2.50m | | |



| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. Seepage at 1.30m during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
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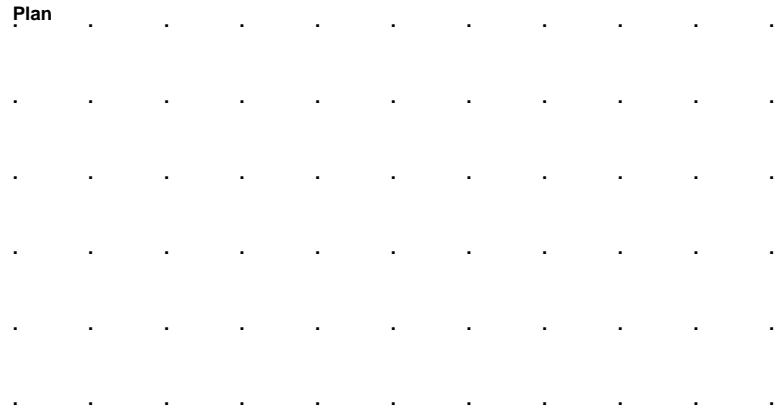
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 1.50m | Ground Level (mOD) | Client Castle Green Homes Ltd | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | 0.30 | MADEGROUND (similar to topsoil). Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies including brick. |  | |
| 0.40 | SV 170kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| | | | | | (1.20) | |  | |
| 1.40 | SV 210kPa | | | | 1.50 | Complete at 1.50m |  | |


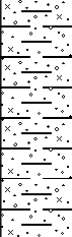
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|---|--|------------------------|-------------------|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | |
| | Scale (approx) 1:25 | Logged By ST | Checked By |

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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 1.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.50) | MADEGROUND (similar to topsoil). Grass over dark brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is angular to sub-rounded, fine to coarse of various lithologies including brick. Low cobble content of brick. |  | |
| 0.60 | SV 210kPa | | | | (0.50) | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| | | | | | 1.00 | Complete at 1.00m | | |


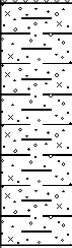
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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
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| 1:25 | ST | | | | | |

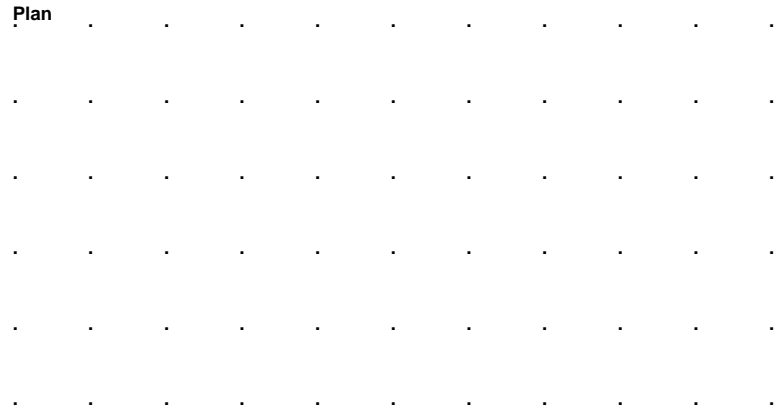
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 1.30m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|--|---|-------|
| 0.10 | B | | | | (0.50) | MADEGROUND (similar to topsoil). Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content of brick. |  | |
| 0.60 | SV 198kPa | | | | (0.80) | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| | | | | | 1.30 | Complete at 1.30m | | |



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|---|--|-------------------------------|------------------------|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | |
| | <table border="1"> <tr> <td>Scale (approx) 1:25</td> <td>Logged By ST</td> <td>Checked By</td> </tr> </table> | Scale (approx) 1:25 | Logged By ST |
| Scale (approx) 1:25 | Logged By ST | Checked By | |

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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 1.10m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|--|---|-------|
| 0.10 | B | | | | (0.30) | MADEGROUND (similar to topsoil). Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is angular to sub-rounded, fine to coarse of various lithologies including brick. Low cobble content of brick. |  | |
| 0.50 | SV 194kPa | | | | 0.30 (0.80) | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| | | | | | 1.10 | Complete at 1.10m | | |




| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | SV 170kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 1.00 | B | | | | | | | |
| 1.10 | SV 190kPa | | | | | | | |
| 1.60 | SV 234kPa | | | | (2.50) | | | |
| 2.20 | SV >250kPa | | | | | | | |
| | | | | | 2.80 | Complete at 2.80m | | |


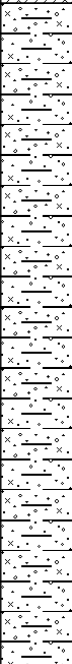
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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.50m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV >250kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. At 0.60m: Ceramic land drain, approximately 70mm in diameter, orientated north east to south west. Dry |  | |
| 1.50 | B | | | | (2.20) | |  | |
| | | | | | 2.50 | Complete at 2.50m | | |







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|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.50m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 208kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.60 | B | | | | | | | |
| 1.00 | SV 220kPa | | | | | | | |
| 1.70 | SV >250kPa | | | | (2.20) | | | |
| 2.50 | B | | | | 2.50 | Complete at 2.50m | | |



| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
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| 1:25 | ST | | | | | |

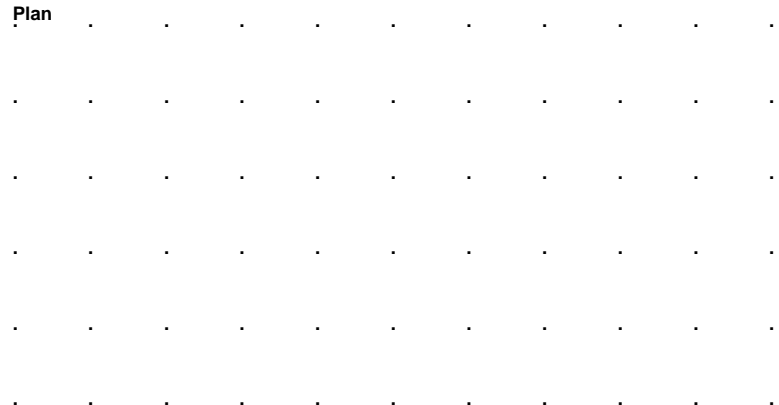
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.50m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.35) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 | SV 174kPa | | | | 0.35 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.90 | B | | | | | |  | |
| 1.00 | SV 232kPa | | | | | |  | |
| 1.60 | SV >250kPa | | | | (2.15) | |  | |
| | | | | | 2.50 | Complete at 2.50m |  | |


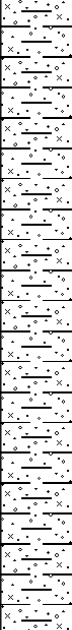
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.90m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 190kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 1.00 | SV 214kPa | | | | | | | |
| 1.30 | B | | | | | | | |
| 1.50 | SV >250kPa | | | | (2.60) | | | |
| | | | | | 2.90 | Complete at 2.90m | | |


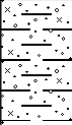
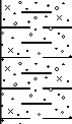
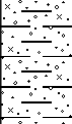

| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

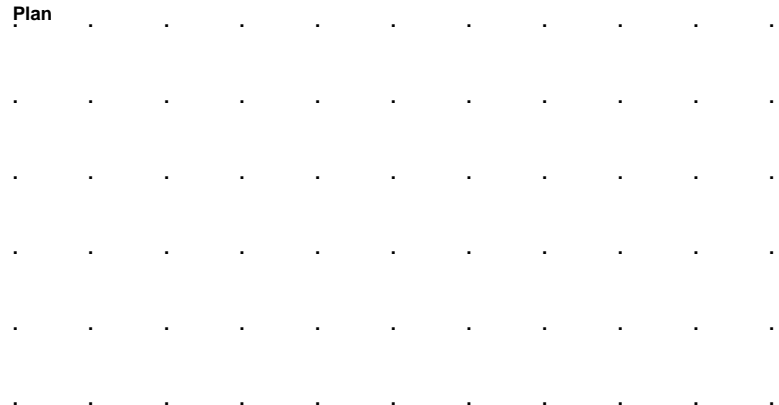
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.60m | Ground Level (mOD) | Client Castle Green Homes Ltd | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.50) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 | SV 200kPa | | | | 0.50 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 1.00 | B | | | | | | | |
| 1.50 | SV >250kPa | | | | (2.10) | | | |
| | | | | | 2.60 | Complete at 2.60m | | |


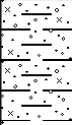
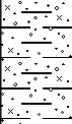
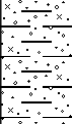

| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

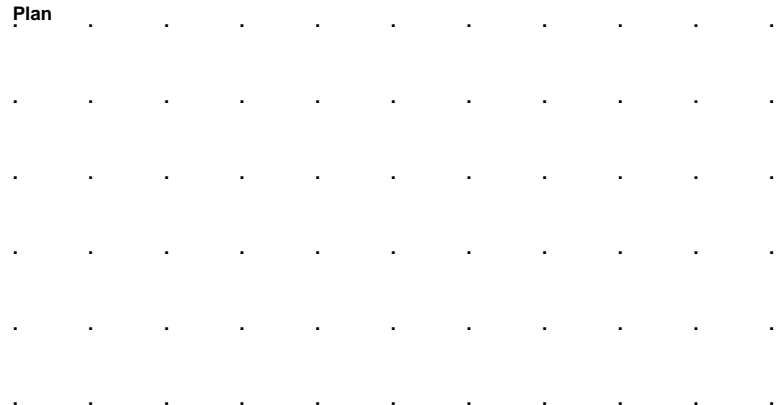
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|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.60m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | B | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.80 | SV 229kPa | | | | | |  | |
| 1.40 | SV >250kPa | | | | (2.20) | |  | |
| 2.60 | B | | | | 2.60 | Complete at 2.60m |  | |


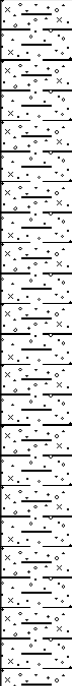
| | | | |
|---|--|------------------------|-------------------|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | |
| | Scale (approx) 1:25 | Logged By ST | Checked By |

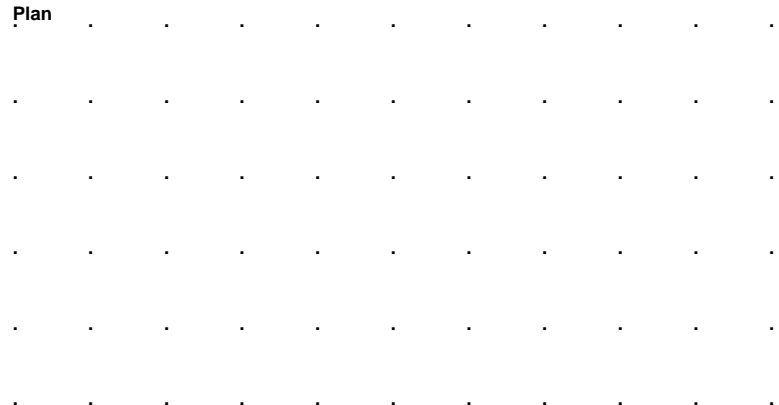
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.60m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|--------------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | 0.40 | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 160kPa | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 1.30 1.40 | SV 214kPa B | | | | (2.20) | |  | |
| 1.80 | SV >250kPa | | | | | |  | |
| 2.50 | B | | | | 2.60 | Complete at 2.60m |  | |


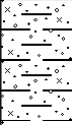
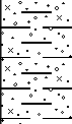
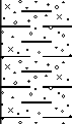

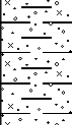
| | | | |
|---|--|------------------------|-------------------|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | |
| | Scale (approx) 1:25 | Logged By ST | Checked By |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.70m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|--------------|-----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 140kPa | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 1.10 1.20 | B SV 180kPa | | | | (2.30) | | | |
| 1.80 | SV 224kPa | | | | | | | |
| 2.40 2.50 | SV >250kPa B | | | | 2.70 | | | |
| | | | | | | Complete at 2.70m | | |



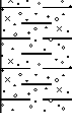
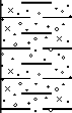
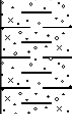
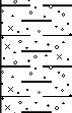
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.70m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 180kPa | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.80 | B | | | | | |  | |
| 1.00 | SV 232kPa | | | | | |  | |
| 1.50 | SV >250kPa | | | | (2.30) | |  | |
| 2.60 | B | | | | 2.70 | Complete at 2.70m |  | |


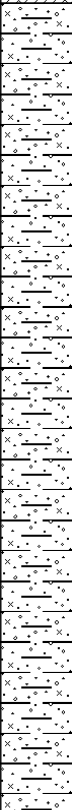
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.70m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 210kPa | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 | B | | | | | |  | |
| 1.00 | SV >250kPa | | | | | |  | |
| 1.10 | B | | | | (2.30) | |  | |
| 2.60 | B | | | | 2.70 | Complete at 2.70m |  | |



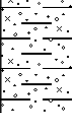
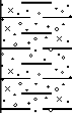
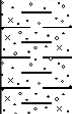
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

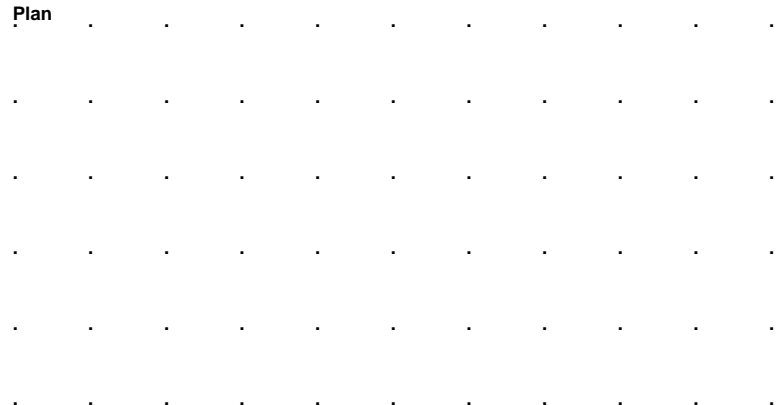
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.00m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.40 | B | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 190kPa | | | | | | | |
| 1.00 | B | | | | | | | |
| 1.10 | SV 210kPa | | | | | | | |
| 1.60 | SV >250kPa | | | | (2.70) | | | |
| 2.80 | B | | | | 3.00 | Complete at 3.00m | | |









| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan . | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

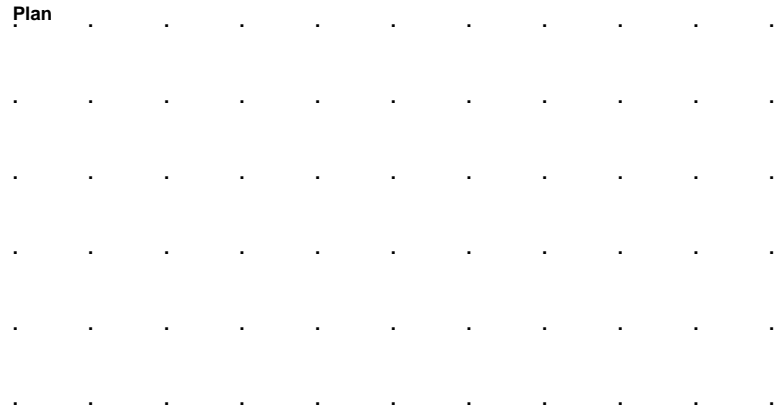
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.60m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | B | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 | SV 204kPa | | | | | |  | |
| 1.20 | SV 238kPa | | | | (2.20) | |  | |
| 2.00 | B | | | | 2.60 | Complete at 2.60m |  | |


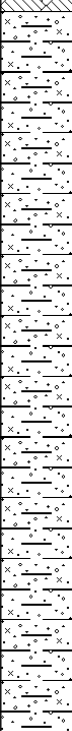
| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

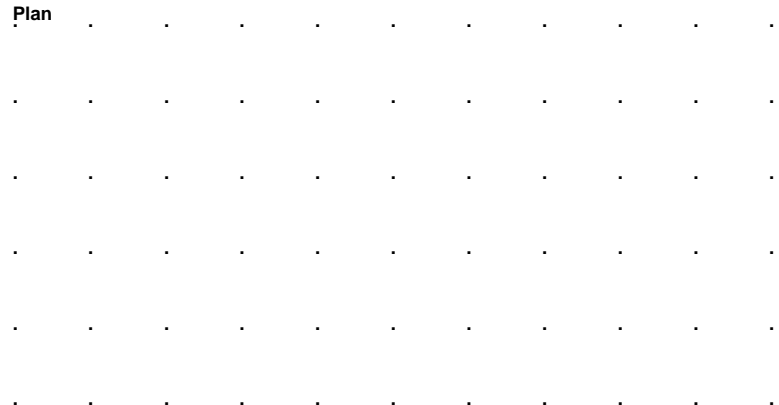
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.50m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 120kPa | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.60 | B | | | | | |  | |
| 1.10 | SV 140kPa | | | | (2.10) | At 1.10m: Very stiff |  | |
| 1.20 | B | | | | | |  | |
| 1.60 | SV 196kPa | | | | 2.50 | Complete at 2.50m |  | |
| 2.10 | SV 234kPa | | | | | |  | |
| 2.40 | B | | | | |  | | |










| | | | |
|---|--|------------------------|-------------------|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | |
| | Scale (approx) 1:25 | Logged By ST | Checked By |

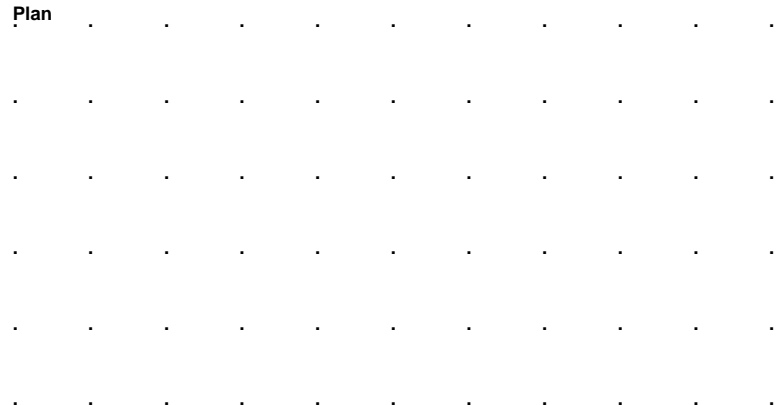
| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 2.80m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|--|-------|
| 0.10 | B | | | | (0.40) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 170kPa | | | | 0.40 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 1.00 | SV 186kPa | | | | | | | |
| 1.50 | B | | | | (2.40) | | | |
| 1.60 | SV 210kPa | | | | | | | |
| 2.00 | SV 234kPa | | | | | | | |
| 2.50 | B | | | | 2.80 | Complete at 2.80m | | |

| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

| | | | | |
|--|---|----------------------------|--|---------------------------|
| Machine : 13 Tonne Tracked Excavator Method : Mechanical Excavation | Dimensions ?? x ?? x 3.20m | Ground Level (mOD) | Client Castle Green Homes Lts | Job Number 7870 |
| | Location (Observed measurements) | Dates 17/08/2021 | Engineer Coopers (Chester) Ltd | Sheet 1/1 |

| Depth (m) | Sample / Tests | Water Depth (m) | Field Records | Level (mOD) | Depth (m) (Thickness) | Description | Legend | Water |
|-----------|----------------|-----------------|---------------|-------------|-----------------------|---|---|-------|
| 0.10 | B | | | | (0.30) | TOPSOIL. Grass over brown, slightly gravelly, clayey, fine to coarse SAND. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. |  | |
| 0.50 | SV 170kPa | | | | 0.30 | Very stiff, reddish brown mottled grey, slightly sandy, slightly gravelly, silty CLAY. Sand is fine to medium. Gravel is sub-angular to sub-rounded, fine to coarse of various lithologies. Low cobble content. |  | |
| 0.80 | B | | | | | |  | |
| 1.00 | SV 182kPa | | | | | |  | |
| 1.50 | SV 220kPa | | | | (2.90) | |  | |
| 2.00 | B | | | | | |  | |
| 2.10 | SV >250kPa | | | | | |  | |
| | | | | | | Below 2.50m: Light reddish brown sand lenses |  | |
| 3.00 | B | | | | 3.20 | Complete at 3.20m |  | |

| | | | | | | |
|---|--|-----------------------|------------------|-------------------|------|----|
| Plan  | Remarks Location CAT scanned prior to excavation. Sides stable during excavation. No groundwater encountered during excavation. Please note that discolouration of photographs may occur when viewed on screen as a PDF, or when printed as a hard copy. Trial pit backfilled with arisings upon completion. | | | | | |
| | <table border="1"> <tr> <td>Scale (approx)</td> <td>Logged By</td> <td>Checked By</td> </tr> <tr> <td>1:25</td> <td>ST</td> <td></td> </tr> </table> | Scale (approx) | Logged By | Checked By | 1:25 | ST |
| Scale (approx) | Logged By | Checked By | | | | |
| 1:25 | ST | | | | | |

Flood Consequences Assessment and Drainage Strategy
for Land off Upper Denbigh Road, St Aspah

Appendix 3

Correspondence

Dwr Cymru Welsh Water Pre Development Sewerage Enquiry

Dwr Cymru Welsh Water Historical Flooding

Denbighshire County Council Historical Flooding

Natural Resources Wales Historical Flooding

From: Rhodri Perry <Rhodri.Perry@dwrcymru.com>
Sent: 10 September 2021 11:37
To: Michael Ollier <michael.ollier@castlegreenhomes.uk>
Cc: Norman Kelly <norman.kelly@castlegreenhomes.uk>
Subject: RE: Upper Denbigh Road, St. Asaph

Hi Michael,

Sorry I missed your call,

We can confirm that we can accommodate flows into the sewerage network as well as the catchment's waste water treatment works, upon further reviewing I can also confirm that this treatment works is not within the Special Areas of Conversation (SAC) , therefore phosphate treatment is not an issue for this site.

My water colleagues are yet to confirm if we can supply an adequate water supply to this site, given the pre planning was submitted on Monday my water colleagues are still within their service level agreement (SLA) to complete comments.

We will get comments over to you regarding water supply as soon as we can.

Thank you,

Rhodri



Rhodri Perry

Development Control Officer | Developer Services
Dŵr Cymru Welsh Water



W: dwrcymru.com



E: developer.services@dwrcymru.com



T: 0800 917 2652 | M: 07557 849514



A: PO Box 3146, Cardiff, CF30 0EH



Before you print please think about the **ENVIRONMENT**

If we've gone the extra mile to provide you with excellent service, let us know. You can nominate an individual or team for a Diolch award through our [website](#)

Andy Jones

From: Alaw Jones <Alaw.Jones@dwrcymru.com>
Sent: 30 September 2021 11:32
To: Andy Jones
Subject: RE: FCA Upper Denbigh Road, St Asaph

Good morning Andy,

Thank you for your e-mail.

We are unable to provide detailed information about recorded flooding instances along the network downstream of the site. However, we are able to confirm that there are no recorded flooding instances in the immediate vicinity of your site.

I hope the above is of assistance.

Kind regards,
Alaw



Alaw Jones

Development Control Officer | Developer Services
Dŵr Cymru Welsh Water



T: 0800 917 2652 | M: 07557861384



A: PO Box 3146, Cardiff, CF30 0EH

W: dwrcymru.com



E: developer.services@dwrcymru.com

From: Andy Jones <ajones@coopers.co.uk>
Sent: 20 September 2021 12:46
To: Sewerage Services <Sewerage.Services@dwrcymru.com>
Subject: FCA Upper Denbigh Road, St Asaph

***** External Mail *****

7866 Upper Denbigh Road, St Asaph
FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

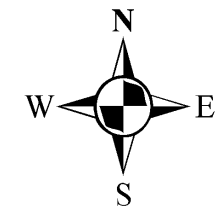
Regards

Andy Jones
Senior Infrastructure Engineer
COOPERS



Dŵr Cymru
Welsh Water

Upper Denbigh Road



LEGEND(Representative of most common features)

| | |
|-----------------------|---|
| Waste network: | |
| | Foul chamber |
| | Surface water chamber |
| | Combined chamber |
| | Special purpose chamber |
| | Treatment works |
| | Pumping station |
| | Lamphole |
| | Storm Overflow |
| | Rising main |
| | Gravity sewer |
| | Private sewer |
| | Private sewer subject to Sect. 104 adoption agreement |
| | Private Sewer Transfer |
| | Lateral Drain |
| | Inspection Chamber |

NB: Sewer symbol colour indicates the type.
 RED - Combined
 GREEN - Surface Water
 BROWN - Foul
 Purple - Former S24 sewers (for indicative purposes only)

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation.

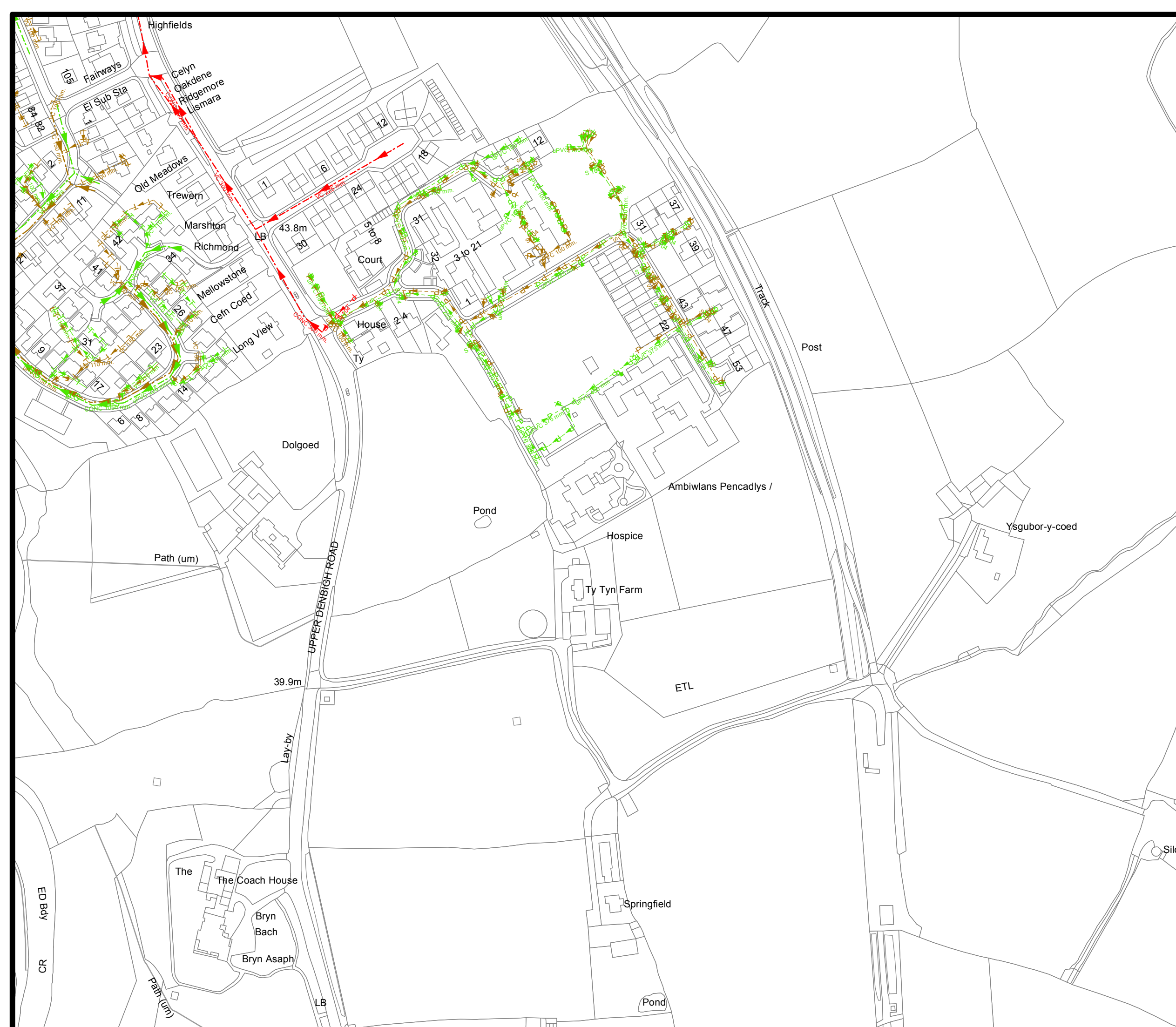
Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 304430,373609
Map scale: 1:2500
Printed by: Emma John
Printed on: 29 Jun 2021



Andy Jones

From: Andy Jones
Sent: 20 September 2021 12:47
To: yourvoice@denbighshire.gov.uk
Subject: FCA Upper Denbigh Road, St Asaph [Filed 20 Sep 2021 12:47]
Attachments: 7866_L1.pdf

7866 Upper Denbigh Road, St Asaph FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones
Senior Infrastructure Engineer
COOPERS
Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU

☎: (01244) 684910 ☎: Direct Dial No. (01244) 684933
📠: (01244) 684911
✉: ajones@coopers.co.uk
Web: <http://www.coopers.co.uk>

Andy Jones

From: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>
Sent: 28 September 2021 16:52
To: Andy Jones
Subject: ATI22217a P5&6, FCA Upper Denbigh Road, St Asaph

Dear Mr Jones,

Further to your recent email and as requested, please see your link to access your data as below:

- **Model Reports and Output (Free):** StAsaph_5_V4.0_2020 - <https://cyfoethnaturiolcymru.sharefile.eu/d-s128f7d4eb939494e96174f98973ead03>
- **Model Build Information (£150+VAT):** StAsaph_5_V4.0_2020 - FMP-TUFLOW, (if required after reviewing model report and output).

Please find a link to our Open Government Licence (OGL) here -

<http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

Please also include the attribution statement: "Contains Natural Resources Wales information © Natural Resources Wales and database right. All rights reserved."

Self Service Open Data:

You can now make the most of open data provided **free online**:

- **[NRW Flood Risk Map Viewer](#):** create and export an A4 or A3 PDF map at a scale of 1:5000. You will find many spatial risk layers, including the Development Advice Map, flood zones, surface water, reservoir hazard data and historic flooding.
- **["Lle" the Welsh Government Portal for Open Spatial data](#):** Spatial data is free to download, view and use within your own GIS system. The flood datasets includes Flood Zones, Flood Defences, Historic Flood Outlines, Areas Benefiting Defences, Surface Water, Development Advice Map, and [LiDAR Composite Dataset](#). You can also download the 'Coastal Design – Extreme Sea Levels' report and data covering still water levels for the Welsh Coastline (wave overtopping is **not** calculated).

Please Note the Following:

- All information supplied will need to be verified by the recipient **PRIOR** to using in a Flood Consequences Assessment (FCA). We would expect to see a review of hydrology, in-channel survey, floodplain topography etc. to demonstrate the data is suitable for the purposes of producing an FCA.
- As of 1st of December, 2016 you will need to apply climate change allowances carefully to ensure compliance with [Welsh Government climate change allowances and flood consequence assessments](#).
- **Pre-application Advice:** NRW are changing the way in which we provide advice to developers. We will continue to meet our duties as an adviser. In addition, we will offer a free initial opinion on your proposal. However, in cases where you would like to access any extra advice that falls outside of our statutory duties, we can only offer this as part of our Discretionary Planning Advice Service (DPA Service). For more information regarding free service and our discretionary planning can be found in the following links: [Welsh Version](#) / [English version](#).

Your request for our free or charged discretionary advice service needs to be accompanied by the relevant 'Request Form' which is available to download from our website. You will then need to send the form to northplanning@cyfoethnaturiolcymru.gov.uk who will coordinate our response.

I trust that this is of use to you.

Yn gywir / Yours sincerely,

Michelle Lewis

Cyfoeth Naturiol Cymru / Natural Resources Wales

Ffôn/ Phone: 03000 653577

Symudol / Mobile: 07917243096

Office Location Llys Afon, Hwlfordd / Office Location River Court, Haverfordwest

Cwsmer, Cyfarthrebu a Masnach - Customer, Communications and Commercial

Oriau gwaith arferol/Normal working hours – Mon-Fri, 9 to 5

Yn falch o arwain y ffordd at ddyfodol gwell i Gymru trwy reoli'r amgylchedd ac adnoddau naturiol yn gynaliadwy.

Proud to be leading the way to a better future for Wales by managing the environment and natural resources sustainably.

cyfoethnaturiol.cymru / naturalresources.wales

[Twitter](#) | [Facebook](#) | [LinkedIn](#) | [Instagram](#)

From: Data Distribution

Sent: 20 September 2021 13:26

To: 'Andy Jones' <ajones@coopers.co.uk>

Subject: RE: FCA Upper Denbigh Road, St Asaph

Dear Mr Jones,

Thank you for your email concerning the above.

I note you are undertaking a Flood Consequences Assessment and Drainage Strategy and request information you may have in relation to [historical flooding](#) and for further information and advice on FCAs, please see the information on our [website](#).

Please note that we no longer produce product 4s and for further information on this, please see the attached documents.

Please also accept this as an acknowledgement that your e-mail has been received and has been added to our queue. We have **20 working days** to respond to requests, as allowed under the Legislation. Working days do not include weekends or bank holidays.

Due to the high volume of requests that we deal with, we are unable to respond to chaser e-mails. If you believe the 20-working day period has expired and you have not heard from us further, please get in touch. **However, we cannot respond to chasers before this date.**

Unfortunately, we are unable to move any requests further up our queue because the data / information is needed urgently. **All requests are dealt with in order of the date they are received to be fair and consistent to all customers.**

We will only use your personal data in accordance with the General Data Protection Regulation to deal with your request and any matters that arise from it. If you have any queries or concerns please contact dataprotection@naturalresourceswales.gov.uk. For further information on the processing of your personal details please see our [Privacy Notice Page](#).

We will therefore add your email to our queue and enquire about the remaining products and be in touch in due course.

Yn gywir / Yours sincerely,

Michelle Lewis

Cyfoeth Naturiol Cymru / Natural Resources Wales

Ffôn/ Phone: 03000 653577

Symudol / Mobile: 07917243096

Office Location Llys Afon, Hwlfordd / Office Location River Court, Haverfordwest

Cwsmer, Cyfarthrebu a Masnach - Customer, Communications and Commercial

Oriau gwaith arferol/Normal working hours – Mon-Fri, 9 to 5

Yn falch o arwain y ffordd at ddyfodol gwell i Gymru trwy reoli'r amgylchedd ac adnoddau naturiol yn gynaliadwy.

Proud to be leading the way to a better future for Wales by managing the environment and natural resources sustainably.

cyfoethnaturiol.cymru / naturalresources.wales

[Twitter](#)

|

[Facebook](#)

|

[LinkedIn](#)

|

[Instagram](#)

From: Andy Jones <ajones@coopers.co.uk>

Sent: 20 September 2021 12:49

To: Data Distribution <datadistribution@cyfoethnaturiolcymru.gov.uk>

Subject: FCA Upper Denbigh Road, St Asaph

7866 Upper Denbigh Road, St Asaph
FCA Historical Flood Information

To whom it may concern

We are undertaking a Flood Consequences Assessment and Drainage Strategy for the above site (see attached Site Location Plan) and request any information you may have in relation to historical flooding or any information you may consider relevant to assist with the production of the FCA report.

Please let me know if you require any further information or please contact me on the details below should you want to discuss further.

Regards

Andy Jones

Senior Infrastructure Engineer

COOPERS

Park House, Sandpiper Court, Chester Business Park, Chester, CH4 9QU

☎: (01244) 684910

☎: Direct Dial No. (01244) 684933

☎: (01244) 684911

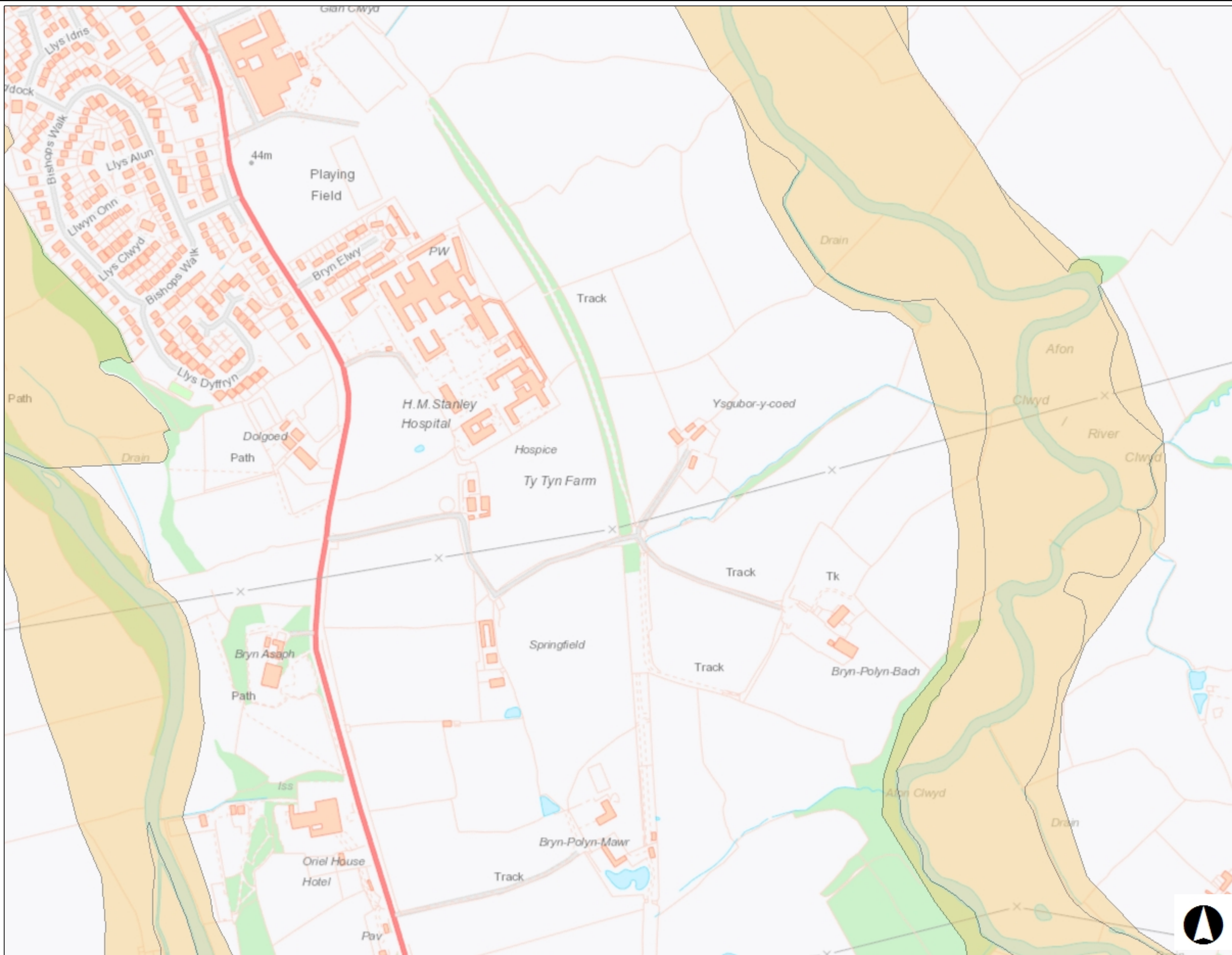
✉: ajones@coopers.co.uk

Web: <http://www.coopers.co.uk>

Map Perygl Llifogydd / Flood Risk Map -

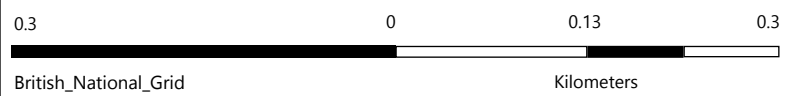
Allwedd / Map Key

Recorded Flood Extents



Graddfa / Scale at A3 1:5,000

Dyddiad / Date
31/03/2022



Flood Consequences Assessment and Drainage Strategy
for Land off Upper Denbigh Road, St Aspah

Appendix 4

MicroDrainage Calculation

Source Control Greenfield Run-off Calculation

Preliminary Surface Water Design

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

| | Default | Edited |
|--------------|---------|--------|
| SOIL type: | 4 | 4 |
| HOST class: | N/A | N/A |
| SPR/SPRHOST: | 0.47 | 0.47 |

Hydrological characteristics

| | Default | Edited |
|--------------------------------|---------|--------|
| SAAR (mm): | 725 | 725 |
| Hydrological region: | 9 | 9 |
| Growth curve factor 1 year: | 0.88 | 0.88 |
| Growth curve factor 30 years: | 1.78 | 1.78 |
| Growth curve factor 100 years: | 2.18 | 2.18 |
| Growth curve factor 200 years: | 2.46 | 2.46 |

Notes
(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

| | Default | Edited |
|-------------------------|---------|--------|
| Q _{BAR} (l/s): | 10.66 | 10.66 |
| 1 in 1 year (l/s): | 9.38 | 9.38 |
| 1 in 30 years (l/s): | 18.98 | 18.98 |
| 1 in 100 year (l/s): | 23.25 | 23.25 |
| 1 in 200 years (l/s): | 26.23 | 26.23 |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

Calculated by:

Site name:

Site location:

Site Details

Latitude:

Longitude:

Reference:

Date:

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

Site characteristics

Total site area (ha):

Methodology

Q_{BAR} estimation method:

SPR estimation method:

Soil characteristics

| | Default | Edited |
|--------------|---------|--------|
| SOIL type: | 4 | 4 |
| HOST class: | N/A | N/A |
| SPR/SPRHOST: | 0.47 | 0.47 |

Hydrological characteristics

| | Default | Edited |
|--------------------------------|---------|--------|
| SAAR (mm): | 725 | 725 |
| Hydrological region: | 9 | 9 |
| Growth curve factor 1 year: | 0.88 | 0.88 |
| Growth curve factor 30 years: | 1.78 | 1.78 |
| Growth curve factor 100 years: | 2.18 | 2.18 |
| Growth curve factor 200 years: | 2.46 | 2.46 |

Notes
(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.


(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

| | Default | Edited |
|-------------------------|---------|--------|
| Q _{BAR} (l/s): | 13.88 | 13.88 |
| 1 in 1 year (l/s): | 12.22 | 12.22 |
| 1 in 30 years (l/s): | 24.71 | 24.71 |
| 1 in 100 year (l/s): | 30.27 | 30.27 |
| 1 in 200 years (l/s): | 34.15 | 34.15 |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement, which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

| | | |
|--|---|---|
| Coopers | | Page 1 |
| Park House Sandpiper Court Chester CH4 9QU | Upper Denbigh Road, St Asaph TENDER SW Design |  |
| Date 04/05/2022 File 7866 SW06 +HQ SITE.MDX | Designed by Coopers Checked by AJ | |
| Micro Drainage | | Network 2020.1.3 |

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for 7866 SW02.SWS














Pipe Sizes 7866 SW01 Manhole Sizes 7866 SW01

FSR Rainfall Model - England and Wales

| | | | |
|--------------------------------------|--------|---------------------------------------|-------|
| Return Period (years) | 2 | PIMP (%) | 100 |
| M5-60 (mm) | 17.000 | Add Flow / Climate Change (%) | 10 |
| Ratio R | 0.350 | Minimum Backdrop Height (m) | 0.000 |
| Maximum Rainfall (mm/hr) | 0 | Maximum Backdrop Height (m) | 0.000 |
| Maximum Time of Concentration (mins) | 30 | Min Design Depth for Optimisation (m) | 1.200 |
| Foul Sewage (l/s/ha) | 0.000 | Min Vel for Auto Design only (m/s) | 1.00 |
| Volumetric Runoff Coeff. | 0.750 | Min Slope for Optimisation (1:X) | 400 |

Designed with Level Soffits

Network Design Table for 7866 SW02.SWS

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|-------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|---|
| 1.000 | 27.121 | 0.271 | 100.1 | 0.173 | 5.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 1.001 | 18.846 | 0.188 | 100.0 | 0.069 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 2.000 | 17.068 | 0.071 | 240.0 | 0.088 | 5.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit |  |
| 2.001 | 10.621 | 0.044 | 240.0 | 0.025 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit |  |
| 2.002 | 21.134 | 0.080 | 263.7 | 0.138 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 2.003 | 17.135 | 0.071 | 240.0 | 0.026 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 3.000 | 16.189 | 0.095 | 170.4 | 0.063 | 5.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 3.001 | 30.629 | 0.128 | 239.3 | 0.063 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 3.002 | 14.356 | 0.060 | 239.3 | 0.063 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 3.003 | 16.397 | 0.068 | 241.1 | 0.063 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 3.004 | 13.050 | 0.054 | 241.7 | 0.063 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 2.004 | 31.503 | 0.131 | 240.5 | 0.076 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |
| 2.005 | 31.696 | 0.132 | 240.0 | 0.059 | 0.00 | 0.0 | 0.600 | o | 375 | Pipe/Conduit |  |

Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|-------|--------------|-------------|-----------|---------------|-------------------|------------|----------------|-----------|-----------|------------|
| 1.000 | 0.00 | 5.25 | 44.751 | 0.173 | 0.0 | 0.0 | 0.0 | 1.81 | 200.0 | 0.0 |
| 1.001 | 0.00 | 5.42 | 44.480 | 0.242 | 0.0 | 0.0 | 0.0 | 1.81 | 200.1 | 0.0 |
| 2.000 | 0.00 | 5.28 | 44.894 | 0.088 | 0.0 | 0.0 | 0.0 | 1.01 | 71.4 | 0.0 |
| 2.001 | 0.00 | 5.46 | 44.823 | 0.113 | 0.0 | 0.0 | 0.0 | 1.01 | 71.4 | 0.0 |
| 2.002 | 0.00 | 5.77 | 44.704 | 0.251 | 0.0 | 0.0 | 0.0 | 1.11 | 122.7 | 0.0 |
| 2.003 | 0.00 | 6.02 | 44.625 | 0.277 | 0.0 | 0.0 | 0.0 | 1.17 | 128.7 | 0.0 |
| 3.000 | 0.00 | 5.27 | 45.109 | 0.063 | 0.0 | 0.0 | 0.0 | 1.00 | 39.7 | 0.0 |
| 3.001 | 0.00 | 5.71 | 44.864 | 0.126 | 0.0 | 0.0 | 0.0 | 1.17 | 128.9 | 0.0 |
| 3.002 | 0.00 | 5.91 | 44.736 | 0.189 | 0.0 | 0.0 | 0.0 | 1.17 | 128.9 | 0.0 |
| 3.003 | 0.00 | 6.15 | 44.676 | 0.252 | 0.0 | 0.0 | 0.0 | 1.16 | 128.4 | 0.0 |
| 3.004 | 0.00 | 6.34 | 44.608 | 0.315 | 0.0 | 0.0 | 0.0 | 1.16 | 128.2 | 0.0 |
| 2.004 | 0.00 | 6.79 | 44.554 | 0.668 | 0.0 | 0.0 | 0.0 | 1.16 | 128.6 | 0.0 |
| 2.005 | 0.00 | 7.24 | 44.423 | 0.727 | 0.0 | 0.0 | 0.0 | 1.17 | 128.7 | 0.0 |

| | | |
|--|--|---|
| Coopers | | Page 2 |
| Park House Sandpiper Court Chester CH4 9QU | | Upper Denbigh Road, St Asaph TENDER SW Design |
| Date 04/05/2022 File 7866 SW06 +HQ SITE.MDX | | Designed by Coopers Checked by AJ |
| Micro Drainage | | Network 2020.1.3 |




Network Design Table for 7866 SW02.SWS









| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|-------|------------|----------|-------------|-------------|-------------|-----------------|--------|----------|----------|--------------|-------------|
| 1.002 | 22.180 | 0.069 | 321.4 | 0.052 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.003 | 36.304 | 0.113 | 321.3 | 0.100 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.004 | 17.926 | 0.056 | 320.1 | 0.153 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.005 | 15.365 | 0.048 | 320.1 | 0.012 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.006 | 26.302 | 0.082 | 320.8 | 0.034 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.007 | 30.708 | 0.096 | 319.9 | 0.136 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.008 | 54.746 | 0.171 | 320.2 | 0.100 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.009 | 12.009 | 0.038 | 316.0 | 0.021 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 4.000 | 10.371 | 0.061 | 170.0 | 0.094 | 5.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| 5.000 | 10.100 | 0.101 | 100.0 | 0.013 | 5.00 | 0.0 | 0.600 | o | 150 | Pipe/Conduit | |
| 4.001 | 11.394 | 0.068 | 167.6 | 0.025 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| 4.002 | 11.662 | 0.070 | 166.6 | 0.031 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| 4.003 | 42.988 | 0.258 | 166.6 | 0.035 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| 1.010 | 33.637 | 0.084 | 400.4 | 0.046 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.011 | 16.468 | 0.041 | 401.7 | 0.033 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.012 | 27.632 | 0.069 | 400.5 | 0.091 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.013 | 12.466 | 0.031 | 402.1 | 0.033 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.014 | 22.528 | 1.317 | 17.1 | 0.078 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 1.015 | 36.870 | 1.754 | 21.0 | 0.080 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit | |
| 6.000 | 30.071 | 1.230 | 24.4 | 0.078 | 5.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |
| 6.001 | 13.131 | 0.077 | 170.5 | 0.099 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit | |

Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|-------|--------------|-------------|-----------|---------------|-------------------|------------|----------------|-----------|-----------|------------|
| 1.002 | 0.00 | 7.57 | 44.216 | 1.021 | 0.0 | 0.0 | 0.0 | 1.13 | 179.5 | 0.0 |
| 1.003 | 0.00 | 8.10 | 44.147 | 1.121 | 0.0 | 0.0 | 0.0 | 1.13 | 179.5 | 0.0 |
| 1.004 | 0.00 | 8.37 | 44.033 | 1.274 | 0.0 | 0.0 | 0.0 | 1.13 | 179.9 | 0.0 |
| 1.005 | 0.00 | 8.59 | 43.977 | 1.286 | 0.0 | 0.0 | 0.0 | 1.13 | 179.9 | 0.0 |
| 1.006 | 0.00 | 8.98 | 43.929 | 1.320 | 0.0 | 0.0 | 0.0 | 1.13 | 179.7 | 0.0 |
| 1.007 | 0.00 | 9.43 | 43.847 | 1.456 | 0.0 | 0.0 | 0.0 | 1.13 | 179.9 | 0.0 |
| 1.008 | 0.00 | 10.24 | 43.751 | 1.556 | 0.0 | 0.0 | 0.0 | 1.13 | 179.8 | 0.0 |
| 1.009 | 0.00 | 10.42 | 43.580 | 1.577 | 0.0 | 0.0 | 0.0 | 1.14 | 181.0 | 0.0 |
| 4.000 | 0.00 | 5.17 | 44.225 | 0.094 | 0.0 | 0.0 | 0.0 | 1.00 | 39.8 | 0.0 |
| 5.000 | 0.00 | 5.17 | 44.340 | 0.013 | 0.0 | 0.0 | 0.0 | 1.00 | 17.8 | 0.0 |
| 4.001 | 0.00 | 5.36 | 44.164 | 0.132 | 0.0 | 0.0 | 0.0 | 1.01 | 40.0 | 0.0 |
| 4.002 | 0.00 | 5.55 | 44.096 | 0.163 | 0.0 | 0.0 | 0.0 | 1.01 | 40.2 | 0.0 |
| 4.003 | 0.00 | 6.26 | 44.026 | 0.198 | 0.0 | 0.0 | 0.0 | 1.01 | 40.2 | 0.0 |
| 1.010 | 0.00 | 10.97 | 43.542 | 1.821 | 0.0 | 0.0 | 0.0 | 1.01 | 160.6 | 0.0 |
| 1.011 | 0.00 | 11.24 | 43.458 | 1.854 | 0.0 | 0.0 | 0.0 | 1.01 | 160.3 | 0.0 |
| 1.012 | 0.00 | 11.70 | 43.417 | 1.945 | 0.0 | 0.0 | 0.0 | 1.01 | 160.6 | 0.0 |
| 1.013 | 0.00 | 11.91 | 43.348 | 1.978 | 0.0 | 0.0 | 0.0 | 1.01 | 160.3 | 0.0 |
| 1.014 | 0.00 | 11.98 | 43.317 | 2.056 | 0.0 | 0.0 | 0.0 | 4.93 | 784.8 | 0.0 |
| 1.015 | 0.00 | 12.12 | 42.000 | 2.136 | 0.0 | 0.0 | 0.0 | 4.45 | 707.7 | 0.0 |
| 6.000 | 0.00 | 5.19 | 43.330 | 0.078 | 0.0 | 0.0 | 0.0 | 2.66 | 105.7 | 0.0 |
| 6.001 | 0.00 | 5.41 | 42.100 | 0.177 | 0.0 | 0.0 | 0.0 | 1.00 | 39.7 | 0.0 |

| | | |
|--|---|---|
| Coopers | | Page 3 |
| Park House Sandpiper Court Chester CH4 9QU | Upper Denbigh Road, St Asaph TENDER SW Design |  |
| Date 04/05/2022 File 7866 SW06 +HQ SITE.MDX | Designed by Coopers Checked by AJ | |
| Micro Drainage | | Network 2020.1.3 |

Network Design Table for 7866 SW02.SWS

| PN | Length (m) | Fall (m) | Slope (1:X) | I.Area (ha) | T.E. (mins) | Base Flow (l/s) | k (mm) | HYD SECT | DIA (mm) | Section Type | Auto Design |
|-------|---------------|-------------|----------------|----------------|----------------|--------------------|-----------|-------------|-------------|--------------|---|
| 6.002 | 25.867 | 0.152 | 170.2 | 0.039 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit |  |
| 6.003 | 35.951 | 1.342 | 26.8 | 0.065 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit |  |
| 6.004 | 14.027 | 0.058 | 241.8 | 0.014 | 0.00 | 0.0 | 0.600 | o | 300 | Pipe/Conduit |  |
| 1.016 | 84.016 | 0.420 | 200.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 450 | Pipe/Conduit |  |
| 1.017 | 13.345 | 0.575 | 23.2 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 1.018 | 56.795 | 0.950 | 59.8 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 1.019 | 52.602 | 0.314 | 167.5 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |
| 1.020 | 21.416 | 0.676 | 31.7 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 | Pipe/Conduit |  |

Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ I.Area (ha) | Σ Base Flow (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|-------|-----------------|----------------|--------------|------------------|----------------------|---------------|-------------------|--------------|--------------|---------------|
| 6.002 | 0.00 | 5.77 | 41.948 | 0.216 | 0.0 | 0.0 | 0.0 | 1.20 | 85.0 | 0.0 |
| 6.003 | 0.00 | 5.96 | 41.796 | 0.281 | 0.0 | 0.0 | 0.0 | 3.05 | 215.6 | 0.0 |
| 6.004 | 0.00 | 6.20 | 40.454 | 0.295 | 0.0 | 0.0 | 0.0 | 1.01 | 71.2 | 0.0 |
| 1.016 | 0.00 | 13.10 | 39.520 | 2.431 | 0.0 | 0.0 | 0.0 | 1.43 | 228.0 | 0.0 |
| 1.017 | 0.00 | 13.18 | 39.100 | 2.431 | 0.0 | 0.0 | 0.0 | 2.73 | 108.5 | 0.0 |
| 1.018 | 0.00 | 13.74 | 38.525 | 2.431 | 0.0 | 0.0 | 0.0 | 1.69 | 67.4 | 0.0 |
| 1.019 | 0.00 | 14.61 | 37.575 | 2.431 | 0.0 | 0.0 | 0.0 | 1.01 | 40.1 | 0.0 |
| 1.020 | 0.00 | 14.76 | 37.261 | 2.431 | 0.0 | 0.0 | 0.0 | 2.33 | 92.8 | 0.0 |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022

Designed by Coopers

File 7866 SW06 +HQ SITE.MDX

Checked by AJ

Micro Drainage

Network 2020.1.3

Manhole Schedules for 7866 SW02.SWS

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | Pipe Out PN | Pipe Out Invert Level (m) | Pipe Out Diameter (mm) | Pipes In PN | Pipes In Invert Level (m) | Pipes In Diameter (mm) | Backdrop (mm) |
|---------|-----------|--------------|---------------|--------------------|-------------|---------------------------|------------------------|-------------|---------------------------|------------------------|---------------|
| 1 | 46.924 | 2.173 | Open Manhole | 1500 | 1.000 | 44.751 | 375 | | | | |
| 2 | 46.940 | 2.460 | Open Manhole | 1500 | 1.001 | 44.480 | 375 | 1.000 | 44.480 | 375 | |
| 3 | 47.224 | 2.330 | Open Manhole | 1200 | 2.000 | 44.894 | 300 | | | | |
| 4 | 47.033 | 2.210 | Open Manhole | 1200 | 2.001 | 44.823 | 300 | 2.000 | 44.823 | 300 | |
| 5 | 46.974 | 2.270 | Open Manhole | 1500 | 2.002 | 44.704 | 375 | 2.001 | 44.779 | 300 | |
| 6 | 47.113 | 2.490 | Open Manhole | 1500 | 2.003 | 44.625 | 375 | 2.002 | 44.623 | 375 | |
| 101 | 47.013 | 1.904 | Open Manhole | 1200 | 3.000 | 45.109 | 225 | | | | |
| 102 | 47.200 | 2.336 | Open Manhole | 1500 | 3.001 | 44.864 | 375 | 3.000 | 45.014 | 225 | |
| 103 | 47.500 | 2.764 | Open Manhole | 1500 | 3.002 | 44.736 | 375 | 3.001 | 44.736 | 375 | |
| 104 | 47.650 | 2.974 | Open Manhole | 1500 | 3.003 | 44.676 | 375 | 3.002 | 44.676 | 375 | |
| 105 | 47.622 | 3.014 | Open Manhole | 1500 | 3.004 | 44.608 | 375 | 3.003 | 44.608 | 375 | |
| 7 | 47.463 | 2.909 | Open Manhole | 1500 | 2.004 | 44.554 | 375 | 2.003 | 44.554 | 375 | |
| | | | | | | | | 3.004 | 44.554 | 375 | |
| 8 | 47.077 | 2.654 | Open Manhole | 1500 | 2.005 | 44.423 | 375 | 2.004 | 44.423 | 375 | |
| 9 | 47.171 | 2.955 | Open Manhole | 1500 | 1.002 | 44.216 | 450 | 1.001 | 44.292 | 375 | 1 |
| | | | | | | | | 2.005 | 44.291 | 375 | |
| 10 | 47.488 | 3.341 | Open Manhole | 1500 | 1.003 | 44.147 | 450 | 1.002 | 44.147 | 450 | |
| 11 | 47.900 | 3.867 | Open Manhole | 1500 | 1.004 | 44.033 | 450 | 1.003 | 44.034 | 450 | 1 |
| 12 | 48.200 | 4.223 | Open Manhole | 1500 | 1.005 | 43.977 | 450 | 1.004 | 43.977 | 450 | |
| 13 | 48.542 | 4.613 | Open Manhole | 1500 | 1.006 | 43.929 | 450 | 1.005 | 43.929 | 450 | |
| 14 | 48.377 | 4.530 | Open Manhole | 1500 | 1.007 | 43.847 | 450 | 1.006 | 43.847 | 450 | |
| 15 | 48.000 | 4.249 | Open Manhole | 1500 | 1.008 | 43.751 | 450 | 1.007 | 43.751 | 450 | |
| 16 | 47.316 | 3.736 | Open Manhole | 1500 | 1.009 | 43.580 | 450 | 1.008 | 43.580 | 450 | |
| 17 | 46.100 | 1.875 | Open Manhole | 1200 | 4.000 | 44.225 | 225 | | | | |
| 18A | 45.929 | 1.589 | Open Manhole | 1200 | 5.000 | 44.340 | 150 | | | | |
| 18 | 46.231 | 2.067 | Open Manhole | 1200 | 4.001 | 44.164 | 225 | 4.000 | 44.164 | 225 | |
| | | | | | | | | 5.000 | 44.239 | 150 | |
| 19 | 46.465 | 2.369 | Open Manhole | 1200 | 4.002 | 44.096 | 225 | 4.001 | 44.096 | 225 | |
| 20 | 46.627 | 2.601 | Open Manhole | 1200 | 4.003 | 44.026 | 225 | 4.002 | 44.026 | 225 | |
| 21 | 47.158 | 3.616 | Open Manhole | 1500 | 1.010 | 43.542 | 450 | 1.009 | 43.542 | 450 | |
| | | | | | | | | 4.003 | 43.768 | 225 | 1 |
| 22 | 45.991 | 2.533 | Open Manhole | 1500 | 1.011 | 43.458 | 450 | 1.010 | 43.458 | 450 | |
| 23 | 45.363 | 1.946 | Open Manhole | 1500 | 1.012 | 43.417 | 450 | 1.011 | 43.417 | 450 | |
| 24 | 45.512 | 2.164 | Open Manhole | 1500 | 1.013 | 43.348 | 450 | 1.012 | 43.348 | 450 | |
| 25 | 45.666 | 2.349 | Open Manhole | 1500 | 1.014 | 43.317 | 450 | 1.013 | 43.317 | 450 | |
| 26 | 43.650 | 1.650 | Open Manhole | 1500 | 1.015 | 42.000 | 450 | 1.014 | 42.000 | 450 | |
| 27 | 45.205 | 1.875 | Open Manhole | 1200 | 6.000 | 43.330 | 225 | | | | |
| 28 | 44.024 | 1.924 | Open Manhole | 1200 | 6.001 | 42.100 | 225 | 6.000 | 42.100 | 225 | |
| 29 | 44.000 | 2.052 | Open Manhole | 1200 | 6.002 | 41.948 | 300 | 6.001 | 42.023 | 225 | |
| 30 | 43.500 | 1.704 | Open Manhole | 1200 | 6.003 | 41.796 | 300 | 6.002 | 41.796 | 300 | |
| 31 | 42.300 | 1.846 | Open Manhole | 1200 | 6.004 | 40.454 | 300 | 6.003 | 40.454 | 300 | |
| 32 | 42.300 | 2.780 | Open Manhole | 1800 | 1.016 | 39.520 | 450 | 1.015 | 40.246 | 450 | 726 |
| | | | | | | | | 6.004 | 40.396 | 300 | 726 |
| 33 | 41.200 | 2.100 | Open Manhole | 2400 | 1.017 | 39.100 | 225 | 1.016 | 39.100 | 450 | |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022
File 7866 SW06 +HQ SITE.MDX

Designed by Coopers
Checked by AJ

Micro Drainage Network 2020.1.3

Manhole Schedules for 7866 SW02.SWS

| MH Name | MH CL (m) | MH Depth (m) | MH Connection | MH Diam., L*W (mm) | Pipe Out PN | Invert Level (m) | Diameter (mm) | Pipes In PN | Invert Level (m) | Diameter (mm) | Backdrop (mm) |
|---------|-----------|--------------|---------------|--------------------|-------------|------------------|---------------|-------------|------------------|---------------|---------------|
| 34 | 39.950 | 1.425 | Open Manhole | 1200 | 1.018 | 38.525 | 225 | 1.017 | 38.525 | 225 | |
| 35 | 39.000 | 1.425 | Open Manhole | 1200 | 1.019 | 37.575 | 225 | 1.018 | 37.575 | 225 | |
| 36 | 38.750 | 1.489 | Open Manhole | 1200 | 1.020 | 37.261 | 225 | 1.019 | 37.261 | 225 | |
| 37 | 38.010 | 1.425 | Open Manhole | 1500 | | OUTFALL | | 1.020 | 36.585 | 225 | |

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| 1 | 304559.701 | 373576.902 | 304559.701 | 373576.902 | Required | |
| 2 | 304533.097 | 373571.633 | 304533.097 | 373571.633 | Required | |
| 3 | 304535.074 | 373664.275 | 304535.074 | 373664.275 | Required | |
| 4 | 304540.219 | 373648.001 | 304540.219 | 373648.001 | Required | |
| 5 | 304543.242 | 373637.837 | 304543.242 | 373637.837 | Required | |
| 6 | 304522.550 | 373633.538 | 304522.550 | 373633.538 | Required | |
| 101 | 304486.105 | 373704.526 | 304486.105 | 373704.526 | Required | |
| 102 | 304472.274 | 373696.114 | 304472.274 | 373696.114 | Required | |
| 103 | 304488.876 | 373670.373 | 304488.876 | 373670.373 | Required | |
| 104 | 304496.637 | 373658.295 | 304496.637 | 373658.295 | Required | |
| 105 | 304502.721 | 373643.068 | 304502.721 | 373643.068 | Required | |
| 7 | 304505.711 | 373630.365 | 304505.711 | 373630.365 | Required | |
| 8 | 304508.690 | 373598.890 | 304508.690 | 373598.890 | Required | |
| 9 | 304514.653 | 373567.760 | 304514.653 | 373567.760 | Required | |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022

Designed by Coopers

File 7866 SW06 +HQ SITE.MDX

Checked by AJ

Micro Drainage

Network 2020.1.3

Manhole Schedules for 7866 SW02.SWS

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| 10 | 304492.900 | 373563.429 | 304492.900 | 373563.429 | Required | |
| 11 | 304457.295 | 373556.340 | 304457.295 | 373556.340 | Required | |
| 12 | 304439.755 | 373552.638 | 304439.755 | 373552.638 | Required | |
| 13 | 304425.681 | 373546.475 | 304425.681 | 373546.475 | Required | |
| 14 | 304400.181 | 373540.032 | 304400.181 | 373540.032 | Required | |
| 15 | 304393.034 | 373569.896 | 304393.034 | 373569.896 | Required | |
| 16 | 304379.607 | 373622.971 | 304379.607 | 373622.971 | Required | |
| 17 | 304334.030 | 373691.760 | 304334.030 | 373691.760 | Required | |
| 18 | 304334.030 | 373681.390 | 304334.030 | 373681.390 | Required | |
| 19 | 304345.200 | 373679.144 | 304345.200 | 373679.144 | Required | |
| 20 | 304354.156 | 373671.674 | 304354.156 | 373671.674 | Required | |
| 21 | 304374.863 | 373634.002 | 304374.863 | 373634.002 | Required | |
| 22 | 304344.636 | 373619.244 | 304344.636 | 373619.244 | Required | |
| 23 | 304328.407 | 373616.450 | 304328.407 | 373616.450 | Required | |
| 24 | 304327.752 | 373588.825 | 304327.752 | 373588.825 | Required | |
| 25 | 304326.751 | 373576.400 | 304326.751 | 373576.400 | Required | |
| 26 | 304304.886 | 373570.973 | 304304.886 | 373570.973 | Required | |
| 27 | 304303.554 | 373670.976 | 304303.554 | 373670.976 | Required | |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022

Designed by Coopers

File 7866 SW06 +HQ SITE.MDX

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Micro Drainage

Network 2020.1.3

Manhole Schedules for 7866 SW02.SWS

| MH Name | Manhole Easting (m) | Manhole Northing (m) | Intersection Easting (m) | Intersection Northing (m) | Manhole Access | Layout (North) |
|---------|---------------------|----------------------|--------------------------|---------------------------|----------------|----------------|
| 28 | 304273.526 | 373669.373 | 304273.526 | 373669.373 | Required | |
| 29 | 304274.098 | 373656.255 | 304274.098 | 373656.255 | Required | |
| 30 | 304270.767 | 373630.604 | 304270.767 | 373630.604 | Required | |
| 31 | 304261.398 | 373595.895 | 304261.398 | 373595.895 | Required | |
| 32 | 304271.123 | 373585.787 | 304271.123 | 373585.787 | Required | |
| 33 | 304237.365 | 373508.851 | 304237.365 | 373508.851 | Required | |
| 34 | 304226.387 | 373501.263 | 304226.387 | 373501.263 | Required | |
| 35 | 304215.064 | 373445.608 | 304215.064 | 373445.608 | Required | |
| 36 | 304212.339 | 373393.077 | 304212.339 | 373393.077 | Required | |
| 37 | 304211.626 | 373371.673 | | | No Entry | |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design

Date 04/05/2022
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Micro Drainage

Network 2020.1.3

PIPELINE SCHEDULES for 7866 SW02.SWS

Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|----------|-----------|---------|-------------|-------------|-------------|---------------|--------------------|
| 1.000 | o | 375 | 1 | 46.924 | 44.751 | 1.798 | Open Manhole | 1500 |
| 1.001 | o | 375 | 2 | 46.940 | 44.480 | 2.085 | Open Manhole | 1500 |
| 2.000 | o | 300 | 3 | 47.224 | 44.894 | 2.030 | Open Manhole | 1200 |
| 2.001 | o | 300 | 4 | 47.033 | 44.823 | 1.910 | Open Manhole | 1200 |
| 2.002 | o | 375 | 5 | 46.974 | 44.704 | 1.895 | Open Manhole | 1500 |
| 2.003 | o | 375 | 6 | 47.113 | 44.625 | 2.113 | Open Manhole | 1500 |
| 3.000 | o | 225 | 101 | 47.013 | 45.109 | 1.679 | Open Manhole | 1200 |
| 3.001 | o | 375 | 102 | 47.200 | 44.864 | 1.961 | Open Manhole | 1500 |
| 3.002 | o | 375 | 103 | 47.500 | 44.736 | 2.389 | Open Manhole | 1500 |
| 3.003 | o | 375 | 104 | 47.650 | 44.676 | 2.599 | Open Manhole | 1500 |
| 3.004 | o | 375 | 105 | 47.622 | 44.608 | 2.639 | Open Manhole | 1500 |
| 2.004 | o | 375 | 7 | 47.463 | 44.554 | 2.534 | Open Manhole | 1500 |
| 2.005 | o | 375 | 8 | 47.077 | 44.423 | 2.279 | Open Manhole | 1500 |
| 1.002 | o | 450 | 9 | 47.171 | 44.216 | 2.505 | Open Manhole | 1500 |
| 1.003 | o | 450 | 10 | 47.488 | 44.147 | 2.891 | Open Manhole | 1500 |
| 1.004 | o | 450 | 11 | 47.900 | 44.033 | 3.417 | Open Manhole | 1500 |
| 1.005 | o | 450 | 12 | 48.200 | 43.977 | 3.773 | Open Manhole | 1500 |
| 1.006 | o | 450 | 13 | 48.542 | 43.929 | 4.163 | Open Manhole | 1500 |
| 1.007 | o | 450 | 14 | 48.377 | 43.847 | 4.080 | Open Manhole | 1500 |
| 1.008 | o | 450 | 15 | 48.000 | 43.751 | 3.799 | Open Manhole | 1500 |
| 1.009 | o | 450 | 16 | 47.316 | 43.580 | 3.286 | Open Manhole | 1500 |

Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|------------|-------------|---------|-------------|-------------|-------------|---------------|--------------------|
| 1.000 | 27.121 | 100.1 | 2 | 46.940 | 44.480 | 2.085 | Open Manhole | 1500 |
| 1.001 | 18.846 | 100.0 | 9 | 47.171 | 44.292 | 2.504 | Open Manhole | 1500 |
| 2.000 | 17.068 | 240.0 | 4 | 47.033 | 44.823 | 1.910 | Open Manhole | 1200 |
| 2.001 | 10.621 | 240.0 | 5 | 46.974 | 44.779 | 1.895 | Open Manhole | 1500 |
| 2.002 | 21.134 | 263.7 | 6 | 47.113 | 44.623 | 2.115 | Open Manhole | 1500 |
| 2.003 | 17.135 | 240.0 | 7 | 47.463 | 44.554 | 2.534 | Open Manhole | 1500 |
| 3.000 | 16.189 | 170.4 | 102 | 47.200 | 45.014 | 1.961 | Open Manhole | 1500 |
| 3.001 | 30.629 | 239.3 | 103 | 47.500 | 44.736 | 2.389 | Open Manhole | 1500 |
| 3.002 | 14.356 | 239.3 | 104 | 47.650 | 44.676 | 2.599 | Open Manhole | 1500 |
| 3.003 | 16.397 | 241.1 | 105 | 47.622 | 44.608 | 2.639 | Open Manhole | 1500 |
| 3.004 | 13.050 | 241.7 | 7 | 47.463 | 44.554 | 2.534 | Open Manhole | 1500 |
| 2.004 | 31.503 | 240.5 | 8 | 47.077 | 44.423 | 2.279 | Open Manhole | 1500 |
| 2.005 | 31.696 | 240.0 | 9 | 47.171 | 44.291 | 2.505 | Open Manhole | 1500 |
| 1.002 | 22.180 | 321.4 | 10 | 47.488 | 44.147 | 2.891 | Open Manhole | 1500 |
| 1.003 | 36.304 | 321.3 | 11 | 47.900 | 44.034 | 3.416 | Open Manhole | 1500 |
| 1.004 | 17.926 | 320.1 | 12 | 48.200 | 43.977 | 3.773 | Open Manhole | 1500 |
| 1.005 | 15.365 | 320.1 | 13 | 48.542 | 43.929 | 4.163 | Open Manhole | 1500 |
| 1.006 | 26.302 | 320.8 | 14 | 48.377 | 43.847 | 4.080 | Open Manhole | 1500 |
| 1.007 | 30.708 | 319.9 | 15 | 48.000 | 43.751 | 3.799 | Open Manhole | 1500 |
| 1.008 | 54.746 | 320.2 | 16 | 47.316 | 43.580 | 3.286 | Open Manhole | 1500 |
| 1.009 | 12.009 | 316.0 | 21 | 47.158 | 43.542 | 3.166 | Open Manhole | 1500 |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022

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File 7866 SW06 +HQ SITE.MDX

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Micro Drainage

Network 2020.1.3

PIPELINE SCHEDULES for 7866 SW02.SWS

Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|----------|-----------|---------|-------------|-------------|-------------|---------------|--------------------|
| 4.000 | o | 225 | 17 | 46.100 | 44.225 | 1.650 | Open Manhole | 1200 |
| 5.000 | o | 150 | 18A | 45.929 | 44.340 | 1.439 | Open Manhole | 1200 |
| 4.001 | o | 225 | 18 | 46.231 | 44.164 | 1.842 | Open Manhole | 1200 |
| 4.002 | o | 225 | 19 | 46.465 | 44.096 | 2.144 | Open Manhole | 1200 |
| 4.003 | o | 225 | 20 | 46.627 | 44.026 | 2.376 | Open Manhole | 1200 |
| 1.010 | o | 450 | 21 | 47.158 | 43.542 | 3.166 | Open Manhole | 1500 |
| 1.011 | o | 450 | 22 | 45.991 | 43.458 | 2.083 | Open Manhole | 1500 |
| 1.012 | o | 450 | 23 | 45.363 | 43.417 | 1.496 | Open Manhole | 1500 |
| 1.013 | o | 450 | 24 | 45.512 | 43.348 | 1.714 | Open Manhole | 1500 |
| 1.014 | o | 450 | 25 | 45.666 | 43.317 | 1.899 | Open Manhole | 1500 |
| 1.015 | o | 450 | 26 | 43.650 | 42.000 | 1.200 | Open Manhole | 1500 |
| 6.000 | o | 225 | 27 | 45.205 | 43.330 | 1.650 | Open Manhole | 1200 |
| 6.001 | o | 225 | 28 | 44.024 | 42.100 | 1.699 | Open Manhole | 1200 |
| 6.002 | o | 300 | 29 | 44.000 | 41.948 | 1.752 | Open Manhole | 1200 |
| 6.003 | o | 300 | 30 | 43.500 | 41.796 | 1.404 | Open Manhole | 1200 |
| 6.004 | o | 300 | 31 | 42.300 | 40.454 | 1.546 | Open Manhole | 1200 |
| 1.016 | o | 450 | 32 | 42.300 | 39.520 | 2.330 | Open Manhole | 1800 |
| 1.017 | o | 225 | 33 | 41.200 | 39.100 | 1.875 | Open Manhole | 2400 |
| 1.018 | o | 225 | 34 | 39.950 | 38.525 | 1.200 | Open Manhole | 1200 |

Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|------------|-------------|---------|-------------|-------------|-------------|---------------|--------------------|
| 4.000 | 10.371 | 170.0 | 18 | 46.231 | 44.164 | 1.842 | Open Manhole | 1200 |
| 5.000 | 10.100 | 100.0 | 18 | 46.231 | 44.239 | 1.842 | Open Manhole | 1200 |
| 4.001 | 11.394 | 167.6 | 19 | 46.465 | 44.096 | 2.144 | Open Manhole | 1200 |
| 4.002 | 11.662 | 166.6 | 20 | 46.627 | 44.026 | 2.376 | Open Manhole | 1200 |
| 4.003 | 42.988 | 166.6 | 21 | 47.158 | 43.768 | 3.165 | Open Manhole | 1500 |
| 1.010 | 33.637 | 400.4 | 22 | 45.991 | 43.458 | 2.083 | Open Manhole | 1500 |
| 1.011 | 16.468 | 401.7 | 23 | 45.363 | 43.417 | 1.496 | Open Manhole | 1500 |
| 1.012 | 27.632 | 400.5 | 24 | 45.512 | 43.348 | 1.714 | Open Manhole | 1500 |
| 1.013 | 12.466 | 402.1 | 25 | 45.666 | 43.317 | 1.899 | Open Manhole | 1500 |
| 1.014 | 22.528 | 17.1 | 26 | 43.650 | 42.000 | 1.200 | Open Manhole | 1500 |
| 1.015 | 36.870 | 21.0 | 32 | 42.300 | 40.246 | 1.604 | Open Manhole | 1800 |
| 6.000 | 30.071 | 24.4 | 28 | 44.024 | 42.100 | 1.699 | Open Manhole | 1200 |
| 6.001 | 13.131 | 170.5 | 29 | 44.000 | 42.023 | 1.752 | Open Manhole | 1200 |
| 6.002 | 25.867 | 170.2 | 30 | 43.500 | 41.796 | 1.404 | Open Manhole | 1200 |
| 6.003 | 35.951 | 26.8 | 31 | 42.300 | 40.454 | 1.546 | Open Manhole | 1200 |
| 6.004 | 14.027 | 241.8 | 32 | 42.300 | 40.396 | 1.604 | Open Manhole | 1800 |
| 1.016 | 84.016 | 200.0 | 33 | 41.200 | 39.100 | 1.650 | Open Manhole | 2400 |
| 1.017 | 13.345 | 23.2 | 34 | 39.950 | 38.525 | 1.200 | Open Manhole | 1200 |
| 1.018 | 56.795 | 59.8 | 35 | 39.000 | 37.575 | 1.200 | Open Manhole | 1200 |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022
File 7866 SW06 +HQ SITE.MDX

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Micro Drainage

Network 2020.1.3

PIPELINE SCHEDULES for 7866 SW02.SWS

Upstream Manhole

| PN | Hyd Sect | Diam (mm) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|----------|-----------|---------|-------------|-------------|-------------|---------------|--------------------|
| 1.019 | o | 225 | 35 | 39.000 | 37.575 | 1.200 | Open Manhole | 1200 |
| 1.020 | o | 225 | 36 | 38.750 | 37.261 | 1.264 | Open Manhole | 1200 |

Downstream Manhole

| PN | Length (m) | Slope (1:X) | MH Name | C.Level (m) | I.Level (m) | D.Depth (m) | MH Connection | MH DIAM., L*W (mm) |
|-------|------------|-------------|---------|-------------|-------------|-------------|---------------|--------------------|
| 1.019 | 52.602 | 167.5 | 36 | 38.750 | 37.261 | 1.264 | Open Manhole | 1200 |
| 1.020 | 21.416 | 31.7 | 37 | 38.010 | 36.585 | 1.200 | Open Manhole | 1500 |

Free Flowing Outfall Details for 7866 SW02.SWS

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) |
|---------------------|--------------|--------------|--------------|------------------|----------|--------|
| 1.020 | 37 | 38.010 | 36.585 | 0.000 | 1500 | 0 |


Simulation Criteria for 7866 SW02.SWS

| | | | |
|---------------------------------|-------|--|-------|
| Volumetric Runoff Coeff | 0.750 | Additional Flow - % of Total Flow | 0.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m ³ /ha Storage | 2.000 |
| Hot Start (mins) | 0 | Inlet Coefficient | 0.800 |
| Hot Start Level (mm) | 0 | Flow per Person per Day (l/per/day) | 0.000 |
| Manhole Headloss Coeff (Global) | 0.500 | Run Time (mins) | 60 |
| Foul Sewage per hectare (l/s) | 0.000 | Output Interval (mins) | 1 |

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

| | | | |
|-----------------------|-------------------|-----------------------|--------|
| Rainfall Model | FSR | Profile Type | Summer |
| Return Period (years) | 2 | Cv (Summer) | 0.750 |
| Region | England and Wales | Cv (Winter) | 0.840 |
| M5-60 (mm) | 17.000 | Storm Duration (mins) | 30 |
| Ratio R | 0.350 | | |

| | | |
|--|---|---|
| Coopers | | Page 11 |
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| Micro Drainage | Network 2020.1.3 | |

Online Controls for 7866 SW02.SWS


Hydro-Brake® Optimum Manhole: 33, DS/PN: 1.017, Volume (m³): 22.5

| | |
|-----------------------------------|----------------------------|
| Unit Reference | MD-SHE-0164-1350-1200-1350 |
| Design Head (m) | 1.200 |
| Design Flow (l/s) | 13.5 |
| Flush-Flo™ | Calculated |
| Objective | Minimise upstream storage |
| Application | Surface |
| Sump Available | Yes |
| Diameter (mm) | 164 |
| Invert Level (m) | 39.100 |
| Minimum Outlet Pipe Diameter (mm) | 225 |
| Suggested Manhole Diameter (mm) | 1500 |

| Control Points | Head (m) | Flow (l/s) | Control Points | Head (m) | Flow (l/s) |
|---------------------------|----------|------------|---------------------------|----------|------------|
| Design Point (Calculated) | 1.200 | 13.5 | Kick-Flo® | 0.796 | 11.1 |
| Flush-Flo™ | 0.360 | 13.5 | Mean Flow over Head Range | - | 11.6 |

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) | Depth (m) | Flow (l/s) |
|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| 0.100 | 5.9 | 0.800 | 11.2 | 2.000 | 17.2 | 4.000 | 24.0 | 7.000 | 31.4 |
| 0.200 | 12.7 | 1.000 | 12.4 | 2.200 | 18.0 | 4.500 | 25.4 | 7.500 | 32.4 |
| 0.300 | 13.4 | 1.200 | 13.5 | 2.400 | 18.8 | 5.000 | 26.7 | 8.000 | 33.5 |
| 0.400 | 13.5 | 1.400 | 14.5 | 2.600 | 19.5 | 5.500 | 27.9 | 8.500 | 34.5 |
| 0.500 | 13.3 | 1.600 | 15.5 | 3.000 | 20.9 | 6.000 | 29.1 | 9.000 | 35.4 |
| 0.600 | 12.9 | 1.800 | 16.4 | 3.500 | 22.5 | 6.500 | 30.3 | 9.500 | 36.4 |

| | | |
|--|---|---|
| Coopers | | Page 12 |
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| Micro Drainage | Network 2020.1.3 | |

Storage Structures for 7866 SW02.SWS

Cellular Storage Manhole: 102, DS/PN: 3.001

Invert Level (m) 45.650 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

| Depth (m) | Area (m ²) | Inf. Area (m ²) | Depth (m) | Area (m ²) | Inf. Area (m ²) | Depth (m) | Area (m ²) | Inf. Area (m ²) |
|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|-----------|------------------------|-----------------------------|
| 0.000 | 48.0 | 48.0 | 0.800 | 48.0 | 73.6 | 0.801 | 0.0 | 73.6 |

Tank or Pond Manhole: 33, DS/PN: 1.017

Invert Level (m) 39.100

| Depth (m) | Area (m ²) | Depth (m) | Area (m ²) | Depth (m) | Area (m ²) | Depth (m) | Area (m ²) | Depth (m) | Area (m ²) |
|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|-----------|------------------------|
| 0.000 | 670.0 | 1.200 | 1240.0 | 2.400 | 0.0 | 3.600 | 0.0 | 4.800 | 0.0 |
| 0.200 | 760.0 | 1.400 | 1350.0 | 2.600 | 0.0 | 3.800 | 0.0 | 5.000 | 0.0 |
| 0.400 | 850.0 | 1.600 | 0.0 | 2.800 | 0.0 | 4.000 | 0.0 | | |
| 0.600 | 940.0 | 1.800 | 0.0 | 3.000 | 0.0 | 4.200 | 0.0 | | |
| 0.800 | 1040.0 | 2.000 | 0.0 | 3.200 | 0.0 | 4.400 | 0.0 | | |
| 1.000 | 1140.0 | 2.200 | 0.0 | 3.400 | 0.0 | 4.600 | 0.0 | | |

Park House
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Micro Drainage

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Volume Summary (Static)

Length Calculations based on Centre-Centre

| Pipe Number | USMH Name | Manhole Volume (m ³) | Pipe Volume (m ³) | Storage Structure Volume (m ³) | Total Volume (m ³) |
|----------------|--------------|-------------------------------------|----------------------------------|--|-----------------------------------|
| 1.000 | 1 | 3.840 | 2.995 | 0.000 | 6.835 |
| 1.001 | 2 | 4.347 | 2.081 | 0.000 | 6.429 |
| 2.000 | 3 | 2.635 | 1.206 | 0.000 | 3.842 |
| 2.001 | 4 | 2.500 | 0.751 | 0.000 | 3.250 |
| 2.002 | 5 | 4.012 | 2.334 | 0.000 | 6.346 |
| 2.003 | 6 | 4.397 | 1.893 | 0.000 | 6.289 |
| 3.000 | 101 | 2.153 | 0.644 | 0.000 | 2.797 |
| 3.001 | 102 | 4.128 | 3.383 | 36.495 | 44.006 |
| 3.002 | 103 | 4.884 | 1.586 | 0.000 | 6.470 |
| 3.003 | 104 | 5.255 | 1.811 | 0.000 | 7.066 |
| 3.004 | 105 | 5.326 | 1.441 | 0.000 | 6.768 |
| 2.004 | 7 | 5.141 | 3.479 | 0.000 | 8.621 |
| 2.005 | 8 | 4.691 | 3.501 | 0.000 | 8.191 |
| 1.002 | 9 | 5.222 | 3.528 | 0.000 | 8.749 |
| 1.003 | 10 | 5.904 | 5.774 | 0.000 | 11.678 |
| 1.004 | 11 | 6.834 | 2.851 | 0.000 | 9.685 |
| 1.005 | 12 | 7.463 | 2.444 | 0.000 | 9.906 |
| 1.006 | 13 | 8.152 | 4.183 | 0.000 | 12.335 |
| 1.007 | 14 | 8.005 | 4.884 | 0.000 | 12.889 |
| 1.008 | 15 | 7.509 | 8.707 | 0.000 | 16.216 |
| 1.009 | 16 | 6.602 | 1.910 | 0.000 | 8.512 |
| 4.000 | 17 | 2.121 | 0.412 | 0.000 | 2.533 |
| 5.000 | 18A | 1.797 | 0.178 | 0.000 | 1.976 |
| 4.001 | 18 | 2.338 | 0.453 | 0.000 | 2.791 |
| 4.002 | 19 | 2.679 | 0.464 | 0.000 | 3.143 |
| 4.003 | 20 | 2.942 | 1.709 | 0.000 | 4.651 |
| 1.010 | 21 | 6.390 | 5.350 | 0.000 | 11.740 |
| 1.011 | 22 | 4.476 | 2.619 | 0.000 | 7.095 |
| 1.012 | 23 | 3.439 | 4.395 | 0.000 | 7.834 |
| 1.013 | 24 | 3.824 | 1.983 | 0.000 | 5.807 |
| 1.014 | 25 | 4.151 | 3.583 | 0.000 | 7.734 |
| 1.015 | 26 | 2.916 | 5.864 | 0.000 | 8.780 |
| 6.000 | 27 | 2.121 | 1.196 | 0.000 | 3.316 |
| 6.001 | 28 | 2.176 | 0.522 | 0.000 | 2.698 |
| 6.002 | 29 | 2.321 | 1.828 | 0.000 | 4.149 |
| 6.003 | 30 | 1.927 | 2.541 | 0.000 | 4.468 |
| 6.004 | 31 | 2.088 | 0.992 | 0.000 | 3.079 |
| 1.016 | 32 | 7.074 | 13.362 | 0.000 | 20.436 |
| 1.017 | 33 | 9.500 | 0.531 | 1485.437 | 1495.468 |
| 1.018 | 34 | 1.612 | 2.258 | 0.000 | 3.870 |
| 1.019 | 35 | 1.612 | 2.091 | 0.000 | 3.703 |
| 1.020 | 36 | 1.684 | 0.852 | 0.000 | 2.536 |
| Total | | 178.186 | 114.568 | 1521.933 | 1814.687 |

| | | |
|--|---|---|
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| Park House Sandpiper Court Chester CH4 9QU | Upper Denbigh Road, St Asaph TENDER SW Design |  |
| Date 04/05/2022 File 7866 SW06 +HQ SITE.MDX | Designed by Coopers Checked by AJ | |
| Micro Drainage | Network 2020.1.3 | |

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water | Surcharged | Flooded |
|-------|------------|-----------|---------------|----------------|-----------------|-----------------|--------------------|---------------|-----------|------------|--------------------------|
| | | | | | | | | | Level (m) | Depth (m) | Volume (m ³) |
| 1.000 | 1 | 15 Winter | 1 | +0% | 30/15 Winter | | | | 44.834 | -0.292 | 0.000 |
| 1.001 | 2 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.579 | -0.276 | 0.000 |
| 2.000 | 3 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.975 | -0.219 | 0.000 |
| 2.001 | 4 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.918 | -0.205 | 0.000 |
| 2.002 | 5 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.835 | -0.244 | 0.000 |
| 2.003 | 6 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.779 | -0.221 | 0.000 |
| 3.000 | 101 | 15 Winter | 1 | +0% | 30/15 Winter | | | | 45.178 | -0.156 | 0.000 |
| 3.001 | 102 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.949 | -0.290 | 0.000 |
| 3.002 | 103 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.849 | -0.262 | 0.000 |
| 3.003 | 104 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.810 | -0.241 | 0.000 |
| 3.004 | 105 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.773 | -0.210 | 0.000 |
| 2.004 | 7 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.750 | -0.178 | 0.000 |
| 2.005 | 8 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.627 | -0.171 | 0.000 |
| 1.002 | 9 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.472 | -0.194 | 0.000 |
| 1.003 | 10 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.406 | -0.191 | 0.000 |
| 1.004 | 11 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.324 | -0.159 | 0.000 |
| 1.005 | 12 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.269 | -0.158 | 0.000 |
| 1.006 | 13 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.207 | -0.172 | 0.000 |
| 1.007 | 14 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.126 | -0.171 | 0.000 |
| 1.008 | 15 | 30 Winter | 1 | +0% | 30/15 Summer | | | | 44.071 | -0.130 | 0.000 |
| 1.009 | 16 | 30 Winter | 1 | +0% | 30/15 Summer | | | | 44.010 | -0.020 | 0.000 |
| 4.000 | 17 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.312 | -0.138 | 0.000 |
| 5.000 | 18A | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.371 | -0.119 | 0.000 |
| 4.001 | 18 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.267 | -0.122 | 0.000 |
| 4.002 | 19 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.210 | -0.111 | 0.000 |
| 4.003 | 20 | 15 Winter | 1 | +0% | 30/15 Summer | | | | 44.144 | -0.107 | 0.000 |
| 1.010 | 21 | 30 Winter | 1 | +0% | 30/15 Summer | | | | 43.964 | -0.028 | 0.000 |
| 1.011 | 22 | 30 Winter | 1 | +0% | 30/15 Summer | | | | 43.887 | -0.021 | 0.000 |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022
File 7866 SW06 +HQ SITE.MDX

Designed by Coopers
Checked by AJ

Micro Drainage

Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

| PN | US/MH Name | Flow / Cap. | Overflow (l/s) | Half Drain Pipe | | Status | Level Exceeded |
|-------|------------|-------------|----------------|-----------------|------------|--------|----------------|
| | | | | Time (mins) | Flow (l/s) | | |
| 1.000 | 1 | 0.11 | | | 19.2 | OK | |
| 1.001 | 2 | 0.16 | | | 25.8 | OK | |
| 2.000 | 3 | 0.16 | | | 9.7 | OK | |
| 2.001 | 4 | 0.22 | | | 12.2 | OK | |
| 2.002 | 5 | 0.24 | | | 24.9 | OK | |
| 2.003 | 6 | 0.25 | | | 26.5 | OK | |
| 3.000 | 101 | 0.20 | | | 7.0 | OK | |
| 3.001 | 102 | 0.11 | | 7 | 13.0 | OK | |
| 3.002 | 103 | 0.18 | | | 18.4 | OK | |
| 3.003 | 104 | 0.23 | | | 23.8 | OK | |
| 3.004 | 105 | 0.29 | | | 29.1 | OK | |
| 2.004 | 7 | 0.54 | | | 61.1 | OK | |
| 2.005 | 8 | 0.57 | | | 65.1 | OK | |
| 1.002 | 9 | 0.59 | | | 87.5 | OK | |
| 1.003 | 10 | 0.59 | | | 92.8 | OK | |
| 1.004 | 11 | 0.71 | | | 100.7 | OK | |
| 1.005 | 12 | 0.75 | | | 101.5 | OK | |
| 1.006 | 13 | 0.67 | | | 102.0 | OK | |
| 1.007 | 14 | 0.70 | | | 108.0 | OK | |
| 1.008 | 15 | 0.64 | | | 105.2 | OK | |
| 1.009 | 16 | 0.79 | | | 101.1 | OK | |
| 4.000 | 17 | 0.32 | | | 10.5 | OK | |
| 5.000 | 18A | 0.09 | | | 1.5 | OK | |
| 4.001 | 18 | 0.42 | | | 14.3 | OK | |
| 4.002 | 19 | 0.51 | | | 17.4 | OK | |
| 4.003 | 20 | 0.54 | | | 20.6 | OK | |
| 1.010 | 21 | 0.79 | | | 110.8 | OK | |
| 1.011 | 22 | 0.94 | | | 106.5 | OK | |

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Micro Drainage

Network 2020.1.3

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water | Surcharged |
|-------|---------------|-------|------------------|-------------------|------------------------|--------------------|-----------------------|------------------|--------------|--------------|
| | | | | | | | | | Level (m) | Depth (m) |
| 1.012 | 23 | 30 | Winter | 1 | +0% | 30/15 | Summer | | 43.834 | -0.033 |
| 1.013 | 24 | 30 | Winter | 1 | +0% | 30/15 | Summer | | 43.759 | -0.039 |
| 1.014 | 25 | 30 | Winter | 1 | +0% | | | | 43.438 | -0.329 |
| 1.015 | 26 | 30 | Winter | 1 | +0% | | | | 42.126 | -0.324 |
| 6.000 | 27 | 15 | Winter | 1 | +0% | | | | 43.375 | -0.180 |
| 6.001 | 28 | 15 | Winter | 1 | +0% | 30/15 | Summer | | 42.218 | -0.107 |
| 6.002 | 29 | 15 | Winter | 1 | +0% | 100/15 | Summer | | 42.058 | -0.190 |
| 6.003 | 30 | 15 | Winter | 1 | +0% | | | | 41.871 | -0.225 |
| 6.004 | 31 | 15 | Winter | 1 | +0% | 30/15 | Summer | | 40.603 | -0.151 |
| 1.016 | 32 | 30 | Winter | 1 | +0% | 30/15 | Summer | | 39.764 | -0.206 |
| 1.017 | 33 | 360 | Winter | 1 | +0% | 1/60 | Summer | | 39.429 | 0.104 |
| 1.018 | 34 | 1440 | Winter | 1 | +0% | | | | 38.592 | -0.158 |
| 1.019 | 35 | 1440 | Winter | 1 | +0% | | | | 37.664 | -0.136 |
| 1.020 | 36 | 1440 | Winter | 1 | +0% | | | | 37.319 | -0.167 |

| PN | US/MH Name | Flooded | | Half Drain | | Pipe | Level Exceeded |
|-------|---------------|----------------|----------------|-------------------|----------------|---------------|-------------------|
| | | Volume (m³) | Flow / Cap. | Overflow (l/s) | Time (mins) | Flow (l/s) | |
| 1.012 | 23 | 0.000 | 0.78 | | | 106.1 | OK |
| 1.013 | 24 | 0.000 | 1.00 | | | 101.8 | OK |
| 1.014 | 25 | 0.000 | 0.16 | | | 104.8 | OK |
| 1.015 | 26 | 0.000 | 0.17 | | | 108.1 | OK |
| 6.000 | 27 | 0.000 | 0.09 | | | 8.8 | OK |
| 6.001 | 28 | 0.000 | 0.53 | | | 18.1 | OK |
| 6.002 | 29 | 0.000 | 0.29 | | | 21.9 | OK |
| 6.003 | 30 | 0.000 | 0.14 | | | 28.0 | OK |
| 6.004 | 31 | 0.000 | 0.49 | | | 29.2 | OK |
| 1.016 | 32 | 0.000 | 0.56 | | | 121.3 | OK |
| 1.017 | 33 | 0.000 | 0.14 | | | 12.8 | SURCHARGED |
| 1.018 | 34 | 0.000 | 0.20 | | | 12.8 | OK |
| 1.019 | 35 | 0.000 | 0.33 | | | 12.8 | OK |
| 1.020 | 36 | 0.000 | 0.15 | | | 12.8 | OK |

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.000 Cv (Summer) 0.750
 Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status OFF
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 30

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water | Surcharged | Flooded |
|-------|------------|--------|---------------|----------------|-----------------|-----------------|--------------------|---------------|-----------|------------|--------------------------|
| | | | | | | | | | Level (m) | Depth (m) | Volume (m ³) |
| 1.000 | 1 30 | Winter | 30 | +0% | 30/15 | Winter | | 45.342 | 0.216 | 0.000 | |
| 1.001 | 2 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.326 | 0.471 | 0.000 | |
| 2.000 | 3 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.608 | 0.414 | 0.000 | |
| 2.001 | 4 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.599 | 0.476 | 0.000 | |
| 2.002 | 5 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.591 | 0.512 | 0.000 | |
| 2.003 | 6 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.515 | 0.515 | 0.000 | |
| 3.000 | 101 30 | Winter | 30 | +0% | 30/15 | Winter | | 45.606 | 0.272 | 0.000 | |
| 3.001 | 102 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.592 | 0.353 | 0.000 | |
| 3.002 | 103 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.583 | 0.472 | 0.000 | |
| 3.003 | 104 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.573 | 0.522 | 0.000 | |
| 3.004 | 105 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.512 | 0.529 | 0.000 | |
| 2.004 | 7 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.423 | 0.494 | 0.000 | |
| 2.005 | 8 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.323 | 0.525 | 0.000 | |
| 1.002 | 9 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.223 | 0.557 | 0.000 | |
| 1.003 | 10 30 | Winter | 30 | +0% | 30/15 | Summer | | 45.167 | 0.570 | 0.000 | |
| 1.004 | 11 15 | Winter | 30 | +0% | 30/15 | Summer | | 45.082 | 0.599 | 0.000 | |
| 1.005 | 12 15 | Winter | 30 | +0% | 30/15 | Summer | | 45.017 | 0.590 | 0.000 | |
| 1.006 | 13 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.968 | 0.589 | 0.000 | |
| 1.007 | 14 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.876 | 0.579 | 0.000 | |
| 1.008 | 15 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.771 | 0.570 | 0.000 | |
| 1.009 | 16 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.569 | 0.539 | 0.000 | |
| 4.000 | 17 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.683 | 0.233 | 0.000 | |
| 5.000 | 18A 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.668 | 0.178 | 0.000 | |
| 4.001 | 18 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.664 | 0.275 | 0.000 | |
| 4.002 | 19 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.636 | 0.315 | 0.000 | |
| 4.003 | 20 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.577 | 0.326 | 0.000 | |
| 1.010 | 21 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.462 | 0.470 | 0.000 | |
| 1.011 | 22 30 | Winter | 30 | +0% | 30/15 | Summer | | 44.262 | 0.354 | 0.000 | |

Park House
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Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022

Designed by Coopers

File 7866 SW06 +HQ SITE.MDX

Checked by AJ

Micro Drainage

Network 2020.1.3

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866
SW02.SWS

| PN | US/MH Name | Flow / Cap. | Overflow (1/s) | Half Drain Pipe | | Status | Level Exceeded |
|-------|---------------|----------------|-------------------|-----------------|---------------|------------|-------------------|
| | | | | Time (mins) | Flow (1/s) | | |
| 1.000 | 1 | 0.21 | | | 37.1 | SURCHARGED | |
| 1.001 | 2 | 0.27 | | | 45.6 | SURCHARGED | |
| 2.000 | 3 | 0.30 | | | 18.5 | SURCHARGED | |
| 2.001 | 4 | 0.38 | | | 21.6 | SURCHARGED | |
| 2.002 | 5 | 0.46 | | | 47.8 | SURCHARGED | |
| 2.003 | 6 | 0.44 | | | 46.5 | SURCHARGED | |
| 3.000 | 101 | 0.39 | | | 13.8 | SURCHARGED | |
| 3.001 | 102 | 0.23 | | 8 | 26.3 | SURCHARGED | |
| 3.002 | 103 | 0.33 | | | 33.4 | SURCHARGED | |
| 3.003 | 104 | 0.41 | | | 42.4 | SURCHARGED | |
| 3.004 | 105 | 0.51 | | | 51.3 | SURCHARGED | |
| 2.004 | 7 | 0.93 | | | 106.5 | SURCHARGED | |
| 2.005 | 8 | 0.91 | | | 103.9 | SURCHARGED | |
| 1.002 | 9 | 0.89 | | | 132.0 | SURCHARGED | |
| 1.003 | 10 | 0.88 | | | 139.1 | SURCHARGED | |
| 1.004 | 11 | 1.30 | | | 185.6 | SURCHARGED | |
| 1.005 | 12 | 1.30 | | | 176.6 | SURCHARGED | |
| 1.006 | 13 | 1.01 | | | 153.9 | SURCHARGED | |
| 1.007 | 14 | 1.11 | | | 172.0 | SURCHARGED | |
| 1.008 | 15 | 1.11 | | | 183.3 | SURCHARGED | |
| 1.009 | 16 | 1.44 | | | 185.3 | SURCHARGED | |
| 4.000 | 17 | 0.57 | | | 19.0 | SURCHARGED | |
| 5.000 | 18A | 0.17 | | | 2.8 | SURCHARGED | |
| 4.001 | 18 | 0.75 | | | 25.7 | SURCHARGED | |
| 4.002 | 19 | 0.90 | | | 30.9 | SURCHARGED | |
| 4.003 | 20 | 0.93 | | | 35.7 | SURCHARGED | |
| 1.010 | 21 | 1.54 | | | 215.3 | SURCHARGED | |
| 1.011 | 22 | 1.93 | | | 218.9 | SURCHARGED | |

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Micro Drainage

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water | Surcharged |
|-------|---------------|-------------|------------------|-------------------|------------------------|--------------------|-----------------------|------------------|--------------|--------------|
| | | | | | | | | | Level (m) | Depth (m) |
| 1.012 | 23 | 30 Winter | 30 | +0% | 30/15 Summer | | | | 44.110 | 0.243 |
| 1.013 | 24 | 30 Winter | 30 | +0% | 30/15 Summer | | | | 43.916 | 0.118 |
| 1.014 | 25 | 30 Winter | 30 | +0% | | | | | 43.507 | -0.260 |
| 1.015 | 26 | 30 Winter | 30 | +0% | | | | | 42.198 | -0.252 |
| 6.000 | 27 | 15 Winter | 30 | +0% | | | | | 43.401 | -0.154 |
| 6.001 | 28 | 15 Winter | 30 | +0% | 30/15 Summer | | | | 42.407 | 0.082 |
| 6.002 | 29 | 15 Winter | 30 | +0% | 100/15 Summer | | | | 42.155 | -0.093 |
| 6.003 | 30 | 15 Winter | 30 | +0% | | | | | 41.929 | -0.167 |
| 6.004 | 31 | 15 Winter | 30 | +0% | 30/15 Summer | | | | 40.803 | 0.049 |
| 1.016 | 32 | 30 Winter | 30 | +0% | 30/15 Summer | | | | 40.332 | 0.362 |
| 1.017 | 33 | 480 Winter | 30 | +0% | 1/60 Summer | | | | 39.903 | 0.578 |
| 1.018 | 34 | 180 Summer | 30 | +0% | | | | | 38.593 | -0.157 |
| 1.019 | 35 | 1440 Summer | 30 | +0% | | | | | 37.665 | -0.135 |
| 1.020 | 36 | 1440 Summer | 30 | +0% | | | | | 37.320 | -0.166 |

| PN | US/MH Name | Flooded | | Half Drain | | Pipe | Level Exceeded |
|-------|---------------|-----------------------------|----------------|----------------|---------------|------------|-------------------|
| | | Volume (m ³) | Flow / Cap. | Time (mins) | Flow (l/s) | Status | |
| 1.012 | 23 | 0.000 | 1.67 | | 227.9 | SURCHARGED | |
| 1.013 | 24 | 0.000 | 2.28 | | 231.6 | SURCHARGED | |
| 1.014 | 25 | 0.000 | 0.37 | | 239.5 | OK | |
| 1.015 | 26 | 0.000 | 0.40 | | 248.3 | OK | |
| 6.000 | 27 | 0.000 | 0.22 | | 21.5 | OK | |
| 6.001 | 28 | 0.000 | 1.47 | | 50.4 | SURCHARGED | |
| 6.002 | 29 | 0.000 | 0.80 | | 60.6 | OK | |
| 6.003 | 30 | 0.000 | 0.39 | | 78.3 | OK | |
| 6.004 | 31 | 0.000 | 1.41 | | 83.3 | SURCHARGED | |
| 1.016 | 32 | 0.000 | 1.35 | | 290.6 | SURCHARGED | |
| 1.017 | 33 | 0.000 | 0.14 | | 13.1 | SURCHARGED | |
| 1.018 | 34 | 0.000 | 0.20 | | 13.1 | OK | |
| 1.019 | 35 | 0.000 | 0.34 | | 13.1 | OK | |
| 1.020 | 36 | 0.000 | 0.16 | | 13.1 | OK | |

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866
SW02.SWS

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 2 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.000 Cv (Summer) 0.750
Region England and Wales Ratio R 0.350 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status OFF
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960,
1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 30

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) Surcharge | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water | Surcharged | Flooded |
|-------|---------------|-----------|------------------|-------------------|------------------------|--------------------|-----------------------|------------------|--------------|--------------|-----------------------------|
| | | | | | | | | | Level (m) | Depth (m) | Volume (m ³) |
| 1.000 | 1 | 15 Winter | 100 | +30% | 30/15 Winter | | | | 46.879 | 1.753 | 0.000 |
| 1.001 | 2 | 15 Winter | 100 | +30% | 30/15 Summer | | | | 46.758 | 1.903 | 0.000 |
| 2.000 | 3 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 47.000 | 1.806 | 0.000 |
| 2.001 | 4 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.982 | 1.859 | 0.000 |
| 2.002 | 5 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.949 | 1.871 | 0.000 |
| 2.003 | 6 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.869 | 1.869 | 0.000 |
| 3.000 | 101 | 30 Winter | 100 | +30% | 30/15 Winter | | | | 46.921 | 1.587 | 0.000 |
| 3.001 | 102 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.899 | 1.660 | 0.000 |
| 3.002 | 103 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.889 | 1.778 | 0.000 |
| 3.003 | 104 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.878 | 1.827 | 0.000 |
| 3.004 | 105 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.815 | 1.832 | 0.000 |
| 2.004 | 7 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.782 | 1.854 | 0.000 |
| 2.005 | 8 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.673 | 1.876 | 0.000 |
| 1.002 | 9 | 15 Winter | 100 | +30% | 30/15 Summer | | | | 46.610 | 1.944 | 0.000 |
| 1.003 | 10 | 15 Winter | 100 | +30% | 30/15 Summer | | | | 46.564 | 1.967 | 0.000 |
| 1.004 | 11 | 15 Winter | 100 | +30% | 30/15 Summer | | | | 46.467 | 1.984 | 0.000 |
| 1.005 | 12 | 15 Winter | 100 | +30% | 30/15 Summer | | | | 46.341 | 1.914 | 0.000 |
| 1.006 | 13 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.228 | 1.849 | 0.000 |
| 1.007 | 14 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 46.097 | 1.800 | 0.000 |
| 1.008 | 15 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.890 | 1.689 | 0.000 |
| 1.009 | 16 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.481 | 1.451 | 0.000 |
| 4.000 | 17 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.828 | 1.378 | 0.000 |
| 5.000 | 18A | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.774 | 1.284 | 0.000 |
| 4.001 | 18 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.766 | 1.377 | 0.000 |
| 4.002 | 19 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.688 | 1.367 | 0.000 |
| 4.003 | 20 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.608 | 1.357 | 0.000 |
| 1.010 | 21 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 45.268 | 1.276 | 0.000 |
| 1.011 | 22 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 44.849 | 0.941 | 0.000 |

Park House
Sandpiper Court
Chester CH4 9QU

Upper Denbigh Road, St Asaph
TENDER
SW Design



Date 04/05/2022

Designed by Coopers

File 7866 SW06 +HQ SITE.MDX

Checked by AJ

Micro Drainage

Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

| PN | US/MH Name | Flow / Cap. | Overflow (1/s) | Half Drain Pipe | | Status | Level Exceeded |
|-------|------------|-------------|----------------|-----------------|------------|------------|----------------|
| | | | | Time (mins) | Flow (1/s) | | |
| 1.000 | 1 | 0.33 | | | 56.8 | FLOOD RISK | |
| 1.001 | 2 | 0.39 | | | 64.1 | FLOOD RISK | |
| 2.000 | 3 | 0.38 | | | 22.9 | FLOOD RISK | |
| 2.001 | 4 | 0.48 | | | 26.9 | FLOOD RISK | |
| 2.002 | 5 | 0.58 | | | 60.4 | FLOOD RISK | |
| 2.003 | 6 | 0.60 | | | 63.3 | FLOOD RISK | |
| 3.000 | 101 | 0.51 | | | 18.1 | FLOOD RISK | |
| 3.001 | 102 | 0.58 | | 13 | 66.2 | SURCHARGED | |
| 3.002 | 103 | 0.68 | | | 69.1 | SURCHARGED | |
| 3.003 | 104 | 0.69 | | | 72.4 | SURCHARGED | |
| 3.004 | 105 | 0.76 | | | 75.6 | SURCHARGED | |
| 2.004 | 7 | 0.95 | | | 108.8 | SURCHARGED | |
| 2.005 | 8 | 1.00 | | | 114.7 | SURCHARGED | |
| 1.002 | 9 | 1.13 | | | 166.5 | SURCHARGED | |
| 1.003 | 10 | 1.16 | | | 184.0 | SURCHARGED | |
| 1.004 | 11 | 1.58 | | | 226.0 | SURCHARGED | |
| 1.005 | 12 | 1.59 | | | 215.8 | SURCHARGED | |
| 1.006 | 13 | 1.33 | | | 201.6 | SURCHARGED | |
| 1.007 | 14 | 1.51 | | | 234.8 | SURCHARGED | |
| 1.008 | 15 | 1.56 | | | 256.7 | SURCHARGED | |
| 1.009 | 16 | 2.02 | | | 259.8 | SURCHARGED | |
| 4.000 | 17 | 0.76 | | | 25.2 | FLOOD RISK | |
| 5.000 | 18A | 0.29 | | | 4.6 | FLOOD RISK | |
| 4.001 | 18 | 0.89 | | | 30.3 | SURCHARGED | |
| 4.002 | 19 | 1.07 | | | 36.7 | SURCHARGED | |
| 4.003 | 20 | 1.14 | | | 43.7 | SURCHARGED | |
| 1.010 | 21 | 2.23 | | | 312.4 | SURCHARGED | |
| 1.011 | 22 | 2.81 | | | 317.9 | SURCHARGED | |

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Micro Drainage

Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for 7866 SW02.SWS

| PN | US/MH Name | Storm | Return Period | Climate Change | First (X) SurchARGE | First (Y) Flood | First (Z) Overflow | Overflow Act. | Water | Surcharged | Flooded |
|-------|------------|------------|---------------|----------------|---------------------|-----------------|--------------------|---------------|-----------|------------|--------------------------|
| | | | | | | | | | Level (m) | Depth (m) | Volume (m ³) |
| 1.012 | 23 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 44.530 | 0.663 | 0.000 |
| 1.013 | 24 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 44.113 | 0.315 | 0.000 |
| 1.014 | 25 | 30 Winter | 100 | +30% | | | | | 43.556 | -0.211 | 0.000 |
| 1.015 | 26 | 30 Winter | 100 | +30% | | | | | 42.252 | -0.198 | 0.000 |
| 6.000 | 27 | 15 Winter | 100 | +30% | | | | | 43.424 | -0.131 | 0.000 |
| 6.001 | 28 | 15 Winter | 100 | +30% | 30/15 Summer | | | | 42.799 | 0.474 | 0.000 |
| 6.002 | 29 | 15 Winter | 100 | +30% | 100/15 Summer | | | | 42.347 | 0.099 | 0.000 |
| 6.003 | 30 | 15 Winter | 100 | +30% | | | | | 41.973 | -0.123 | 0.000 |
| 6.004 | 31 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 41.554 | 0.800 | 0.000 |
| 1.016 | 32 | 30 Winter | 100 | +30% | 30/15 Summer | | | | 41.447 | 1.477 | 0.000 |
| 1.017 | 33 | 600 Winter | 100 | +30% | 1/60 Summer | | | | 40.431 | 1.106 | 0.000 |
| 1.018 | 34 | 600 Winter | 100 | +30% | | | | | 38.596 | -0.154 | 0.000 |
| 1.019 | 35 | 600 Winter | 100 | +30% | | | | | 37.669 | -0.131 | 0.000 |
| 1.020 | 36 | 600 Winter | 100 | +30% | | | | | 37.322 | -0.164 | 0.000 |

| PN | US/MH Name | Flow / Cap. | Overflow (l/s) | Half Drain | Pipe | Level Exceeded |
|-------|------------|-------------|----------------|-------------|------------|----------------|
| | | | | Time (mins) | Flow (l/s) | |
| 1.012 | 23 | 2.45 | | | 334.2 | SURCHARGED |
| 1.013 | 24 | 3.34 | | | 340.1 | SURCHARGED |
| 1.014 | 25 | 0.55 | | | 355.1 | OK |
| 1.015 | 26 | 0.60 | | | 371.2 | OK |
| 6.000 | 27 | 0.36 | | | 35.9 | OK |
| 6.001 | 28 | 2.37 | | | 81.4 | SURCHARGED |
| 6.002 | 29 | 1.30 | | | 98.9 | SURCHARGED |
| 6.003 | 30 | 0.64 | | | 127.3 | OK |
| 6.004 | 31 | 1.73 | | | 102.2 | SURCHARGED |
| 1.016 | 32 | 2.11 | | | 452.7 | SURCHARGED |
| 1.017 | 33 | 0.15 | | | 14.2 | SURCHARGED |
| 1.018 | 34 | 0.22 | | | 14.2 | OK |
| 1.019 | 35 | 0.37 | | | 14.2 | OK |
| 1.020 | 36 | 0.17 | | | 14.2 | OK |