

# Ysgol Gyfun Gymraeg Glantaf, SRB

## Sustainable Drainage Strategy

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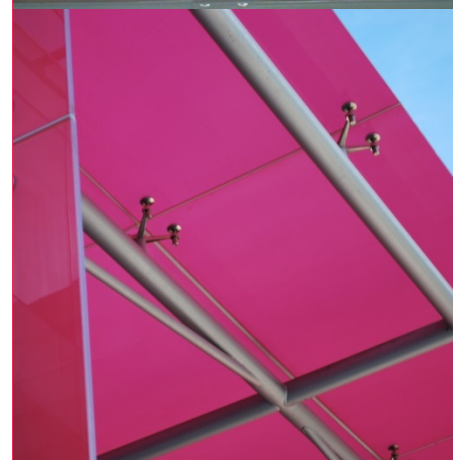
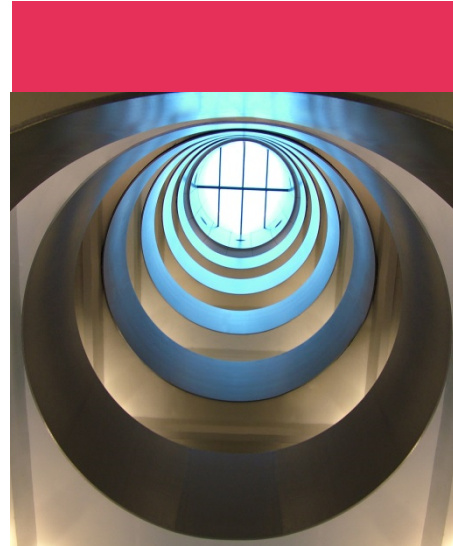
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## Control Sheet

Rev	Description	Issued by	Checked	Date
P01	Preliminary Issue	SD	AH	16/05/2023
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## 1.0 Introduction

### 1.1 Project Background

Curtins were appointed by AECOM to provide a Sustainable Drainage Strategy for a proposed new Specialist Resource Base (SRB) for learners with complex learning within the grounds of the current school at Ysgol Gyfun Gymraeg Glantaf, Llandaff North.

The report provides an assessment of the sustainable drainage proposals. The assessment follows Welsh Government guidance with regards to development, flood risk, and sustainable drainage.

The report is based on currently available information and preliminary discussions.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authorities in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Curtins shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Curtins.

### 1.2 Scope of Assessment

A Flood Consequences Assessment for the development has been prepared by JBA Consulting. This report is restricted to assessing the sustainable drainage strategy and does not include a review of flood risk to the site.

The assessment includes review of the following site-specific information:

- a) Natural Resources Wales (NRW) flood maps for rivers and sea flooding, surface water flooding, reservoir flooding, and flood warning / flood alert areas;
- b) DCWW Public Sewer Records
- c) Topographical and CCTV Survey by Azimuth Surveys (April & November 2022)
- d) Phase 1 Preliminary Risk Assessment (Curtins, Sep 2022)

### **1.3 Proposed Development**

The proposed development will include classrooms, a performance hall, learning kitchen, community café, staff rooms and changing rooms. Externally, new play areas (including a 2G football pitch), a cycle store and footpaths are proposed with a new direct pedestrian link to the Taff Trail. The existing carpark to the north will be reconfigured to improve the access & parking arrangements. The proposed site plan is enclosed in Appendix A.

## 2.0 Existing Site Details

### 2.1 History and Current Use

The site is a grass area within Ysgol Gyfun Gymraeg Glantaf and its surrounding open landscaping. The landscape comprises, soft and hard outdoor playing areas, informal and social areas. The topography is flat but there is a slope down toward the river offsite.

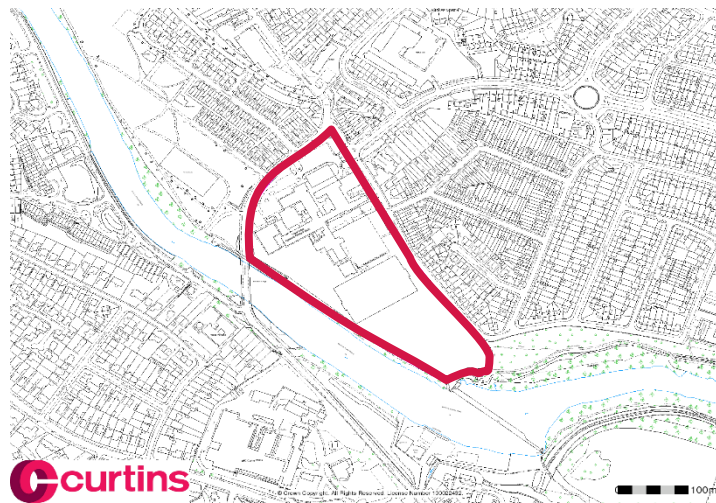


Figure 2.1 – Extent of School Grounds



Figure 2.2 – Area of new development

The early maps show the site as featureless (agricultural) land just off what is now Gabalfa Road. The first OS map shows that the development site is within an enclosed field, which became a plant nursery, with the site becoming a playing field in the early 1950s. The 1940's aerial photography of the site shows the enclosed field system.

The former Glantaff County Secondary School was constructed during the early 1950s. The buildings occupy land adjacent to the proposed development. The school appears as a cross-shaped building with an annexe Glantaff Youth Annexe, added in the 1970s. By 1978 Ysgol Gyfun Gymraeg Glantaff was founded and shared the grounds with the English Medium Secondary School parts of the school had been demolished and expanded to host this change.

## **2.2 Existing Watercourses**

The site is adjacent to the Taff Trail and is approximately 15m from the River Taff which runs along the south side of the school.

There are seven discharge consent records within 250m of the site. However, only five are active, belong to Welsh Water and Beazer Homes (Wales) Ltd, and are related to the discharge of Sewage Treatment Works, Storm Overflow or Storm Tanks.

## **2.3 Existing Drainage**

The public sewer records have been obtained from Dŵr Cymru Welsh Water (DCWW) for the development site and surrounding area enclosed in Appendix B. The proposed development site is in the immediate vicinity of a combined sewerage system, comprising combined and foul water public sewers, which drains to Cog Moors Treatment Works (WwTW). Fig 2.3 is an excerpt of the DCWW sewer map. The existing DCWW combined sewers are in red and the existing DCWW surface water sewers are shown in green.



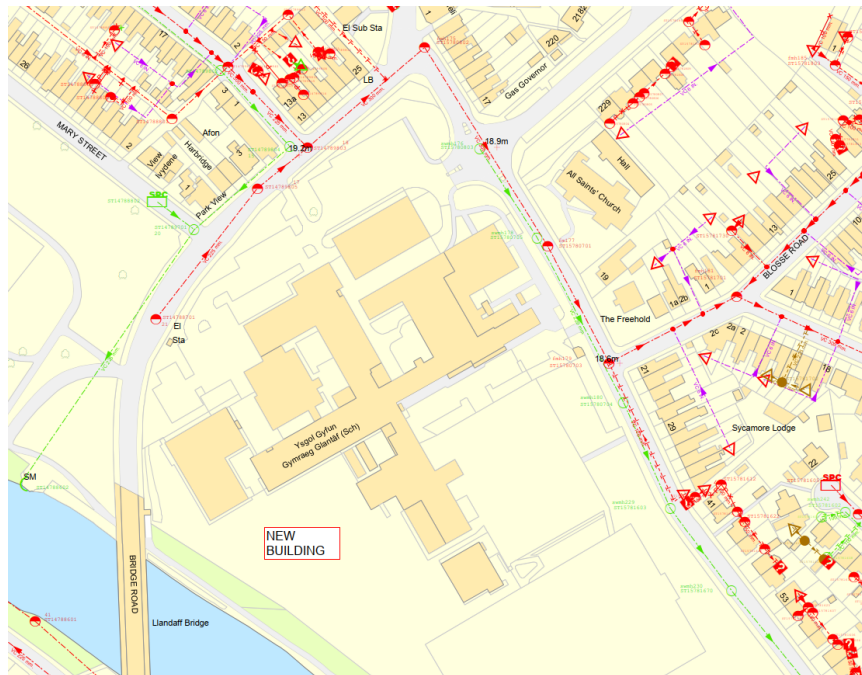


Fig 2.3 DCWW Sewer Map

Drainage and utility sub-scan and CCTV Surveys have been completed and are included in Appendix C. The relevant drainage information has been extrapolated to an Existing Drainage drawing in Appendix B.

The existing foul drainage system for the school discharges to the DCWW sewer in Gabalfa Road. The surface water run-off discharge from the school is split into minor catchments with two outlets discharging directly to the River Taff and two outlets to the DCWW surface water sewers in Gabalfa Road and Bridge Road.

## 2.4 Topography

Topographical and underground services surveys were carried out at the site in April 2022, November 2022 and June 2023 and is enclosed in Appendix C.

The site is relatively flat with a fall of 1 in 200 in a southeast direction. The floor level of the new building (18.70m AOD) will be the same as the adjacent existing school building. Major earthworks are not envisaged with minor earthworks required for footings, services and drainage features.

## 2.5 Geology

A Phase 1 study (ref 082089.300-CUR-00-XX-RP-GE-001-V01\_Phase 1\_PRA) of the site has been completed and the ground conditions have been summarised as per Table 1 below.

Stratum	Depth to top of strata m bgl	Thickness (m)		Description
		Min	Max	
MADE GROUND	0.00	0.00	1.55	Grass over reworked topsoil overlying firm slightly silty, slightly gravelly CLAY or MACADAM overlying dense GRAVEL or CONCRETE overlying dense clayey sandy GRAVEL of limestone aggregate.
MERCIA MUDSTONE GROUP	0.20 – 10.00	At least 9.5*		Recovered as firm to very stiff CLAY. At greater depths recovered as MUDSTONE.

\* Thickness not proved

Table 1 Summary of Ground Conditions

The nearest BGS recorded borehole is located approximately 175m northeast of the site and is described in Table 2 below.

Record No.	Location (NGR)	Details (depth to the top of strata/lithology)	
ST17NW38	175m north (314820,178990)	GL 0.61m <u>bgl</u> 10.90m <u>bgl</u> 14.94m <u>bgl</u> 16.31m <u>bgl</u>	Made Ground Loamy sands and gravel, with boulders throughout. Mercia Mudstone Group – Mudstone? Mercia Mudstone – Sandstone. Mercia Mudstone Group – Mudstone?  19.81m <u>bgl</u> borehole termination Groundwater was encountered at 6.10m <u>bgl</u> , falling to 7.01m <u>bgl</u> .
ST17NW37	215m north (314890,179020)	GL 0.10m  7.59m <u>bgl</u>	Concrete Sands & Gravels with Boulders (up to 0.61m)  borehole termination Groundwater was encountered at 5.18m <u>bgl</u> .

Table 2 Nearest Borehole Information

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## 2.6 Groundwater

The superficial geology has a moderate groundwater vulnerability; however, the bedrock has a high groundwater vulnerability, and whilst water will penetrate more slowly through the superficial deposits, it will flow fast through well-connected fractures in the solid geology with a low ability to attenuate pollutants. The site is not situated within a Source Protection Zone (SPZ).

Based on information available at the time of compilation of this report, groundwater is expected to be of an intermediate depth (5 to 7m BGL) within the Superficial Alluvium Deposits. According to the geological memoir, these deposits were extensively abstracted; however, these deposits are no longer suitable due to the risk of pollution. Trial Pits have been excavated to allow for soakaway testing. Groundwater was not encountered in the trial pits. More detail on this is provided in section 3.2.

## 3.0 Drainage Strategy

### 3.1 Proposed Foul Water Drainage

A separate foul and surface water system is proposed.

A Pre-Planning Enquiry was made to DCWW and they have advised that the foul only flows from the proposed development can be accommodated within the public sewerage system and that the flows can be communicated to the 225mm/300mm public combined sewer located in the highway of Bridge Road, at or between manhole ST14788701 and ST15780802 as indicated on the extract of public sewer record provided. However survey of the existing foul system for the school has shown that the school currently discharges to a DCWW manhole in Gabalfa Road.

The connection to the DCWW drainage system is relatively shallow. Because of this the western section of the existing school drains to a pumping station which pumps the foul flows up to the level of the outfall. A similar method of conveyance will be required for the new development. The proposed drainage plan is included in Appendix C.

It is proposed to drain the foul flows from the development to a foul package pumping station. The pumping station has been provisionally positioned adjacent to the cycle store. This is subject to ensuring that this area can be suitably accessed by maintenance vehicles. The foul flows will then be pumped to a new manhole in the playground to the east which will then drain by gravity to a new connection with the existing foul drainage system.

Fats, oil & grease (FOG) from the proposed learning kitchen will be treated either via a passive grease arrestor (external, in-ground) or a wall mounted biological treatment system in the kitchen. The final grease treatment system is subject to liaison with the catering team to fully determine the flows and loads that can be expected from the kitchen.

The proposed arrangement will require further liaison with DCWW to ensure there are no issues with this approach and to determine if there are requirements for Trade Effluent discharge consent.

### 3.2 Proposed Surface Water Drainage

National and local standards dictate that the drainage system is to be designed to provide adequate capacity to capture and convey surface water run-off for the critical 1 in 30-year storm event. Surface water run-off from exceedance events up to the critical 1 in 100-year plus climate change storm event, shall be contained within the site in a manner that will not cause damage to buildings, essential services or adjoining developments and services.

The proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, we are required to explore and fully exhaust all surface water drainage options in accordance with the discharge hierarchy:

1. Collection for reuse
2. Infiltration to the ground
3. Discharge to a watercourse/surface water body
4. Discharge into a surface water sewer
5. Discharge into a combined sewer.

#### Collected for reuse

The potential for reuse has been explored with the wider design team including the Architect and Landscape Architect. Anecdotal evidence from the school (and the SAB officer) is that the area of the development is inhabited by a large population of gulls that are likely to foul the roof and the run-off that could be reused. Standard filtration & UV water treatment within a reuse system would not be sufficient to treat the water to this degree. Additionally, the maintenance costs associated with the rainwater harvesting system are high and the lack of reuse potential during the summer months when the school is closed makes management of the system difficult. As discussed in Section 4, it is instead proposed to provide a partial green roof and intercept rainwater directly rather than store it for reuse. For these reasons, it is not proposed to collect rainwater for reuse.

### Infiltration to ground

Soakaway testing has been carried out at the site and the permeability of the subsoil is found to be suitable for discharge by infiltration. Testing was done at TP103, TP104 & TP105. The locations of these test pits are shown in the figure below. The results are included in the appendices. No groundwater or bedrock was encountered. The following infiltration rates were recorded:

- TP103:  $6.28 \times 10^{-4}$  m/s
- TP104:  $5.03 \times 10^{-4}$  m/s
- TP105:  $8.86 \times 10^{-4}$  m/s

For design purposes the lowest rate, from TP105, will be used. The details of the proposed drainage system are described in further detail in Section 4.0.



Fig 3.2 Soakaway test locations

### Watercourse/Surface water body

As can be seen in Fig 3.2.1 the site is directly adjacent to the River Taff, separated only by a public footway that forms part of the Taff Trail. The existing school has multiple drainage outlet points. Adjacent to the proposed new building there are two existing stormwater pipes that discharge directly to the Taff. In particular, a 225mm diameter stormwater pipe runs in a south-westerly direction, on the south side of the new building. This pipe conveys the run-off from the playground and the building adjacent to the hockey pitch. It is proposed to construct a new manhole over this existing surface water pipe. This manhole will provide an emergency overflow outlet for the proposed infiltration system.



Fig 3.2.1 Site Extent

### Surface Water Sewers

A Pre-Development Enquiry was issued to DCWW and they confirmed that a connection to the surface water sewer will only be accepted as a last resort and when the higher priority levels to the SuDS hierarchy have indeed been explored and exhausted. As discharge via infiltration and to the River Taff is viable, discharge to a surface water sewer is not proposed.

### Combined Sewers

A Pre-Development Enquiry was issued to DCWW and they confirmed that a connection to the sewer will only be accepted as a last resort and when the higher priority levels to the SuDS hierarchy have indeed been explored and exhausted. . As discharge via infiltration and to the River Taff is viable, discharge to a surface water sewer is not proposed.

Table 3 provides a summary of the Surface Water Hierarchy investigations results

Surface Water Disposal	Potential	Description
Collected for reuse	X	High potential of pollution of roof by gull population. Green roof run-off unsuitable for reuse also.
Infiltration	✓	The SRB roof, & surrounds will be discharged via infiltration.
Watercourse	✓	The site is adjacent to the River Taff. It is proposed to maintain the existing carpark discharge to the river through an existing outfall. The infiltration system will also allow for an emergency overflow to the river.
Surface Water Public Sewer	X	Not considered suitable
Combined Public Sewer	X	Not considered suitable

Table 3: Surface Water Disposal Summary

All proposed private/public drainage shall be in accordance with Building Regulations: Part H and Sewers for Adoption 7<sup>th</sup> Edition and comply with C.C.C. Building Control, Welsh Government's 'Standards for Sewers and Lateral Drains' and DCWW standards (where appropriate).

The final design of the drainage shall be in accordance with the requirements of DCWW, the Cardiff Council SAB, the NRW and Planning & Building Control.

### 3.3 Maintenance

A suitable maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

An Operation and Maintenance Manual (ref 082089-CUR-XX-XX-RP-C-92000) will be provided to the school's assets maintenance team with guidance provided on the type and frequency of maintenance required for the drainage features.



## 4.0 Sustainable Drainage Systems (SuDS)

The drainage scheme for the development is subject to approval by the SuDS Approval Body (SAB) and a pre-application will be made to the SAB to agree on the design principles before making the full SAB application. We have consulted with Cardiff City Council as the determining SAB, in relation to proposals for SuDS features and the wider drainage scheme.

Section 1.1 of the SuDS Manual (CIRIA C753) states the following:

*“Sustainable drainage systems (SuDS) can deliver multiple benefits.*

*Surface water is a valuable resource, and this should be reflected in the way it is managed and used in the built environment. It can add to and enhance biodiversity, beauty, tranquillity and the natural aesthetic of buildings, places and landscapes and it can help make them more resilient to the changing climate.”*

*“The philosophy of sustainable drainage systems is about maximising the benefits and minimising the negative impacts of surface water run-off from developed areas.*

*The SuDS approach involves slowing down and reducing the quantity of surface water runoff from a developed area to manage downstream flood risk and reducing the risk of that runoff causing pollution. This is achieved by harvesting, infiltrating, slowing, storing, conveying and treating runoff on site and, where possible, on the surface rather than underground. Water then becomes a much more visible and tangible part of the built environment, which can be enjoyed by everyone.”*

The SuDS Manual describes the four pillars of SuDS design as Water Quality, Water Quantity, Amenity and Biodiversity as illustrated in Figure 5.1.

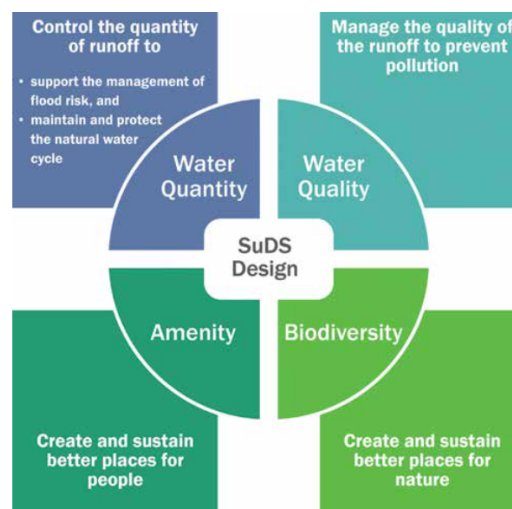


Figure 4.0 Four Pillars of SuDS Design: Taken from The SuDS Manual, Figure 2.1

#### 4.1 Surface Water runoff hydraulic control – Standard S2

Greenfield and brownfield runoff rates have been estimated for the site using the ReFH2 method. Rainfall and catchment descriptors have been determined using the HR Wallingford data for the area.

The calculated greenfield runoff rate for the SRB has been calculated as  $Q_{bar} = 1.9$  l/s.

However, as the proposed form of discharge is via infiltration, the design control is the permeability rate of the subsoil rather than  $Q_{bar}$ .

In addition, it is proposed to redirect a small number of existing downpipes from the existing classrooms to the north of the proposed SRB location. These downpipes currently drain to the east of the site and join the wider drainage system that discharges to the DCWW stormwater sewer in Gabalfa Road. Future work is proposed in the school at a later date, which will extend the existing kitchen and dining hall. There is very little space in the vicinity of the dining hall to provide suitable SuDS features. As per discussions with the SAB, it is proposed to offset the SuDS requirements for the future dining hall extension, by diverting existing downpipes into the SRB scheme, which can more efficiently provide water quality treatment to the run-off while redirecting the downpipes from a traditional in-ground drainage system to an above ground conveyance system that will infiltrate to the subsoil. This in turn has the added benefit of reducing the catchment of stormwater run-off discharging to the DCWW stormwater sewer in Gabalfa Road.

As discussed in Section 3.2 it is proposed to use an infiltration rate of  $8.86 \times 10^{-4}$  m/s for design purposes. Modelling of the system shows that approximately  $120\text{m}^3$  of stormwater storage will be required for this proposal. The storage volume will be provided in the form of cellular storage below the new 2G pitch and rain gardens located around the site. It is proposed to allow for an emergency overflow from the infiltration storage by providing an outlet pipe to the existing nearby stormwater pipe that discharges directly to the River Taff.

The southern section discharges directly to the river. Neither outfalls have any water quality devices.

#### 4.2 Water Quality – Standard S3

The design proposed has made every effort to keep the water run-off on the surface rather than underground. Starting with the section of green roof, some treatment will be provided directly at source. It is proposed for downpipes to drain across the footpaths into raingardens and a filter trench before discharging to the cellular storage system. The strategy aims to strike the right balance between suitable SuDs features and the use of the external areas as a play area for children with special education needs.

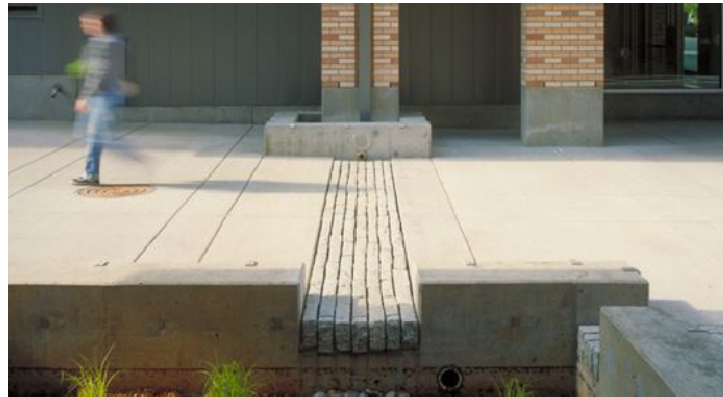


Fig 4.1 Rainwater pipe discharge conveyance (example only)

The SuDS design for the development will ensure that the quality of any receiving system is not adversely affected and preferably enhanced in accordance with CIRIA SuDS Manual C753, Chapter 4.

The recommended approaches for water quality risk management are given in the SuDs Manual C753 Table 26.1. With reference to Table 26.1, the Simple Index approach will be used as the initial Pollution Hazard Index characterisation for this site.

Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS Manual C753. In accordance with Table 26.2 of the SuDS Manual, the proposed development will have the pollution hazard indices as shown in Table 5.

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Roof	Low	0.3	0.3	0.05
Footpaths	Low	0.5	0.4	0.4

**Table 4 Summary of Pollution Indices for Residential Development**

Table 6 presents the mitigation indices provided by each SuDS method proposed as part of the drainage strategy, as set out in Table 26.3 of the SuDs Manual C753 (for surface water).

SuDS Measure	TSS	Metals	Hydrocarbons
Green roof	0.8	0.7	0.9
Bioretention (raingarden)	0.6	0.5	0.5
Filter strip	0.9	0.7	0.8

**Table 5 Summary of Pollution Indices for Residential Development**

Table 6 indicates that the proposed use of green roof, raingardens, and a filter strip provides adequate water treatment for the proposed development.

### 4.3 Amenity – Standard S4

The bioretention raingardens and filter drain/swale will form part of the wider “green” landscape. This provision of SuDs features will provide an improved local environment which integrates the surface water drainage function with open space, making the school a more pleasant place to attend which helps promote the well-being of the students and staff.

### 4.4 Biodiversity – Standard S5

The planting associated with the green roof and the raingardens will help maximise the biodiversity potential of the site by providing habitat opportunities. The existing site consists only of flat grassed area. The proposed planting will encourage new ecosystems to develop.



Fig 4.2 Typical Raingarden

#### 4.5 Potential SuDS Measures

The table below summarises the proposed SuDS features.

Components	Comments	Benefits		
		Quantity	Quality	Amenity & Biodiversity
Green Roofs	The flat area of roof will be planted to form a green roof	✓	✓	✓
Raingardens	Raingardens are proposed at the edge of the paved areas	✓	✓	✓
Filter trench	A filter trench will capture, convey and treat runoff from some roof and pavement areas	✓	✓	✓
Proprietary below ground storage	Underground storage will be provided to help provide hydraulic control	✓		
Manhole Catchpits	Manhole catchpits / sumps are to be included in the design to manage silt and reduce maintenance requirements on the attenuation tank.	✓	✓	

**Table 6 Summary of SuDS measures**

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## 5.0 Flood Risk Activity Permits (FRAP)

The proposed development will require consultation with the Natural Resources Wales (NRW) due to its proximity to the River Taff. The NRW have been contacted and have advised confirmed that a Flood Risk Activity Permit (FRAP) will be required for the construction of the new pedestrian access from the Taff Trail. Of the two existing outfalls to the river, the southern outfall does not have an existing headwall, and this outlet may require rectification works to provide a formal headwall. If any remediation work is required to the existing outfalls then it should be noted that the NRW have advised that no construction work will be allowed in the river during the period of May 15<sup>th</sup> to October 15<sup>th</sup>.

## 6.0 Conclusion

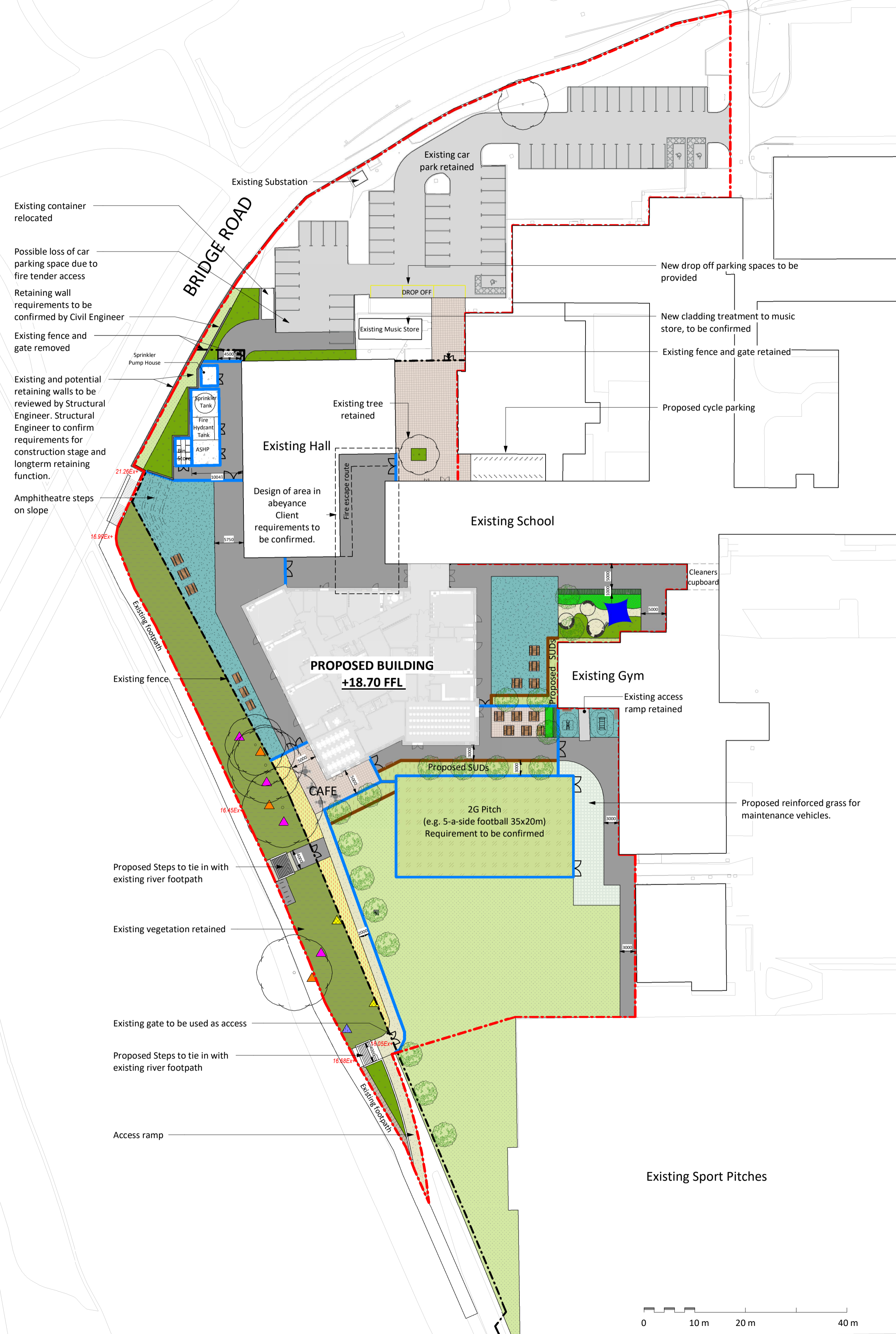
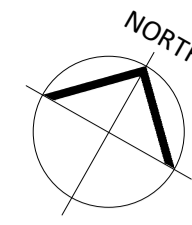
A new foul water drainage network will be provided for the new building. This will discharge to the DCWW sewer system in Gabalfa Road via a private pumping station within the school grounds.

A new private surface water drainage network is proposed to serve the SRB development. This will be designed to accommodate storms up to and including the 1 in 100-year event plus a 40% climate change allowance. Run-off from the new building as well as from existing downpipes serving the existing school, will discharge at surface level and be conveyed via channels, swales and raingardens to an infiltration tank below the new 2G pitch. The infiltration tank will have an emergency overflow pipe to an existing stormwater pipe within the site, which in turn discharges to the River Taff. The flat area of the new roof will be planted and this green roof complemented with bioretention (raingardens) and a swale will provide an improved local environment which integrates the surface water drainage function with open space, providing a pleasant environment for the SRB and helping to promote the well-being of the students and staff.



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## Appendix A - Proposed Site Layout



**LEGEND**

Site Boundary

**SOFT LANDSCAPE**  
Refer to Soft Landscape Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-9020

- Existing trees to be retained
- Proposed trees
- Existing Planting retained
- Proposed hedge planting
- Proposed ornamental shrub and herbaceous planting
- Proposed sensory planting
- Proposed rain garden / SuDS
- Grass
- Wildflower

**HARD LANDSCAPE**  
Refer to Hard Landscape Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-09160

- Proposed asphalt surface to pedestrian areas  
Heavy duty build-ups will be required to servicing, maintenance and emergency access zone. Refer to Engineers plans for details
- Proposed asphalt surface to vehicular areas
- Proposed resin bound paving
- Proposed paving
- Proposed reinforced grass for maintenance access
- Proposed concrete slab to service area
- Proposed wetpour
- 2G sports pitch

**FURNITURE**  
Refer to Furniture Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-????

- Benches
- Curved benches
- Tables and benches
- Canopy
- Outdoor gym equipment
- Cafe style tables and seating
- Sheffield cycle stands
- Knee rail

**FENCING**  
Refer to Landscape Hard Layout Plan for details, dwg no. GSRB-STL-XX-XX-DR-L-09180

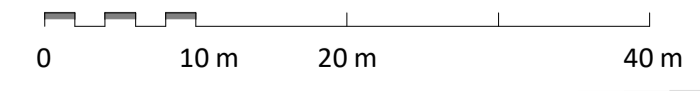
- Existing Boundary Fence (to be retained)  
Repairs and making good as required.
- Proposed Fencing

**ECOLOGICAL ENHANCEMENTS**

- Bird box (mounted on existing trees)
- Bat box (mounted on existing trees)
- Log piles
- Hibernaculum
- Bee bank (bare earth)

**NOTE:**

- For levels and drainage information refer to engineers plans and details.
- All roof rain water run-off to discharge via green roof system or rain gardens.
- All other landscaping borders are purely ornamental with no dual drainage function.



S4	P32	28/09/23	Updates to landscape design following client meeting/feedback
S4	P29	22/09/23	STAGE 3 ISSUE
S0	P27	21/09/23	Draft for tracking coordination
S0	PLO1	24/08/23	First Draft for Team Co-ordination

STATUS	REV	DATE	DESCRIPTION	REVISED BY
CLIENT				CMS
CHECKED BY				CS
ORIGINATOR NO				155452

CONSULTANT  
**STRIDE TREGLOWN**  
www.stridetreglown.com © Stride Treglown Limited 2020  
PROJECT  
**Ysgol Glantaf SRB**  
Bridge Road, Cardiff CF14 2JL

DRAWING TITLE  
**Landscape GA Plan**

STATUS CODE	SCALE
<b>S4 : Suitable for stage approval</b>	<b>1 : 500@A1</b>
DRAWING USAGE:	
PROJECT - ORIGINATOR - VOLUME - LEVEL - TYPE - ROLE - CLASS - NUMBER	STATUS - REVISION
GSRB-STL-XX-XX-DR-L-09001	S4_P32

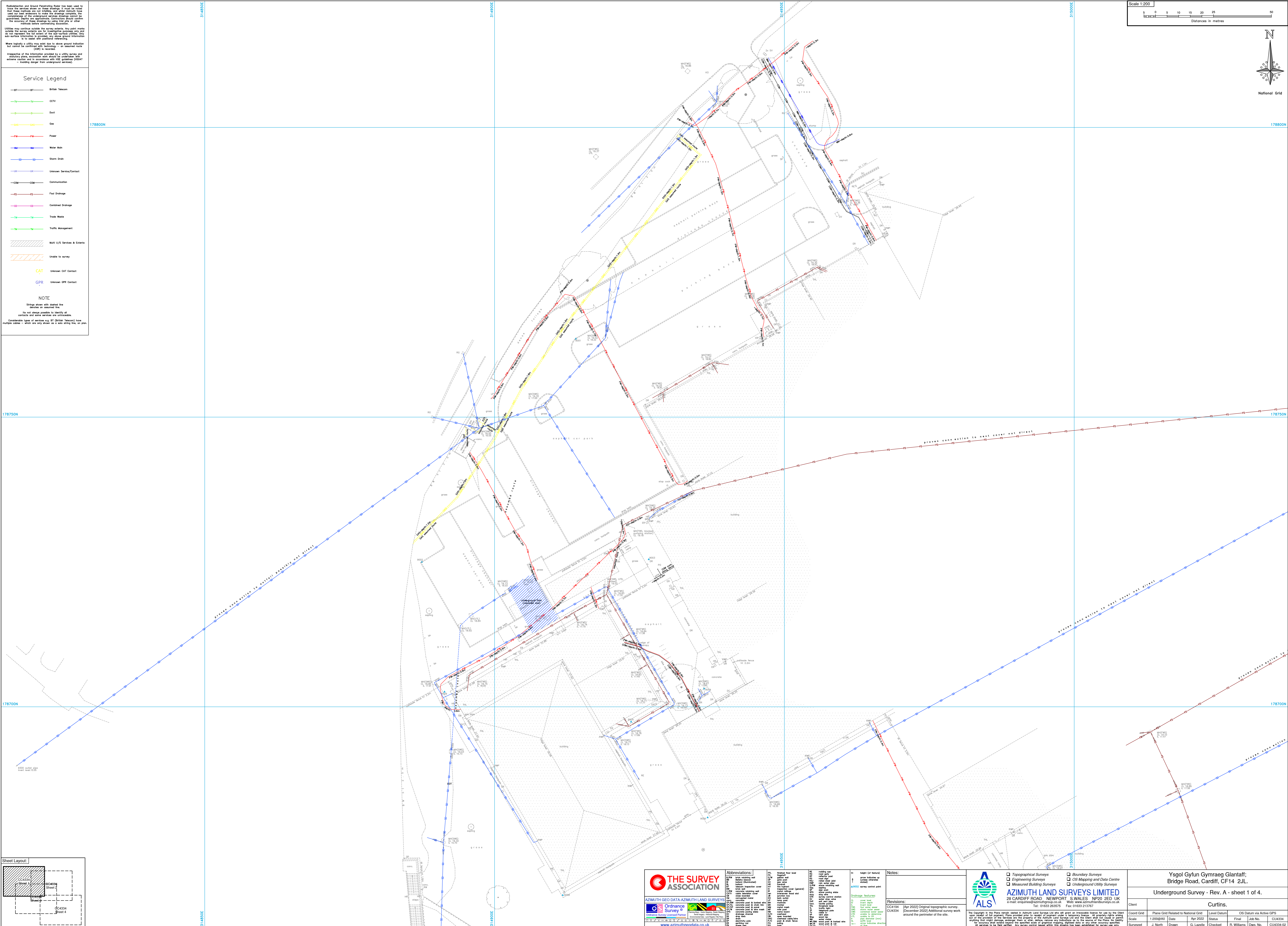


---

## Appendix B - DCWW Public Sewer Records & Existing Drainage Plan

## Appendix C

### Topographical and Services Survey



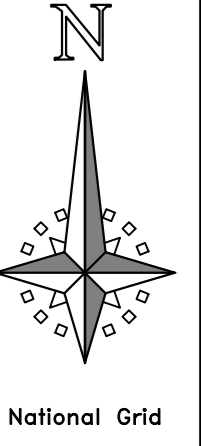
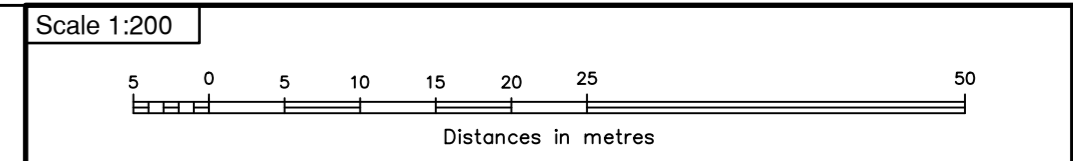
**Service Legend**

- BT British Telecom
- CTV
- Duct
- Gas
- Power
- Water Main
- Storm Drain
- Unknown Service/Contact
- Communication
- Foul Drainage
- Combined Drainage
- Toile Waste
- Traffic Management
- Wall U/G Services & Extents
- Unable to survey
- CAT Unknown CAT Contact
- GPR Unknown GPR Contact

**NOTE**

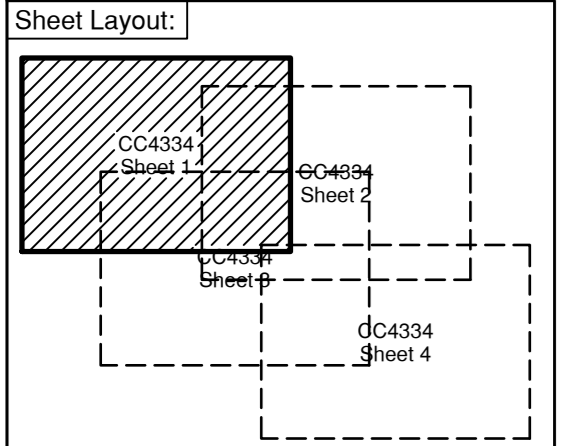
Drains shown with dashed line  
 Services are indicated by  
 No red arrow possible to identify or  
 contact and some services are unknown.

Considerable types of services e.g. BT (British Telecom) have  
 multiple cables - which are only shown to a set along the, on plan.



178750N

178700N



**THE SURVEY ASSOCIATION**

AZIMUTH GEO DATA AZIMUTH LAND SURVEYS

Ordnance Survey

www.azimuthgeodata.co.uk

**Abbreviations:**

BT	British Telecom
CTV	Cable Television
Duct	Utility Duct
Gas	Gas
Power	Power
Water Main	Water Main
Storm Drain	Storm Drain
Unknown Service/Contact	Unknown Service/Contact
Communication	Communication
Foul Drainage	Foul Drainage
Combined Drainage	Combined Drainage
Toile Waste	Toile Waste
Traffic Management	Traffic Management
Wall U/G Services & Extents	Wall U/G Services & Extents
Unable to survey	Unable to survey
CAT	Cable Access Terminal
GPR	Ground Penetrating Radar

**Notes:**

CC4184 (Apr 2022) Original topographic survey.

CU4334 (December 2022) Additional survey work around the perimeter of the site.

**ALS AZIMUTH LAND SURVEYS LIMITED**

29 CARDIFF ROAD NEWPORT, SILES NP20 2ED UK

Tel: 01533 363075 Fax: 01533 917197

**Services:**

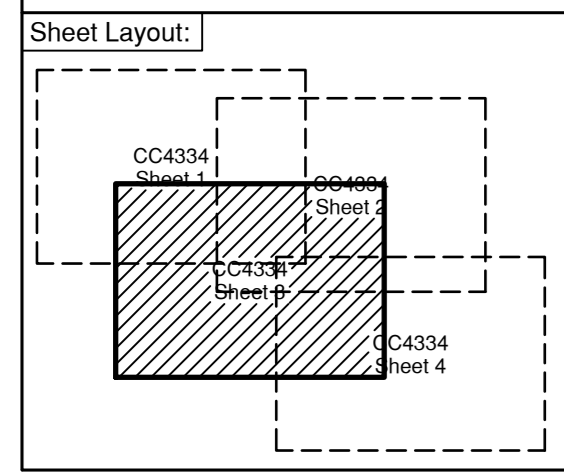
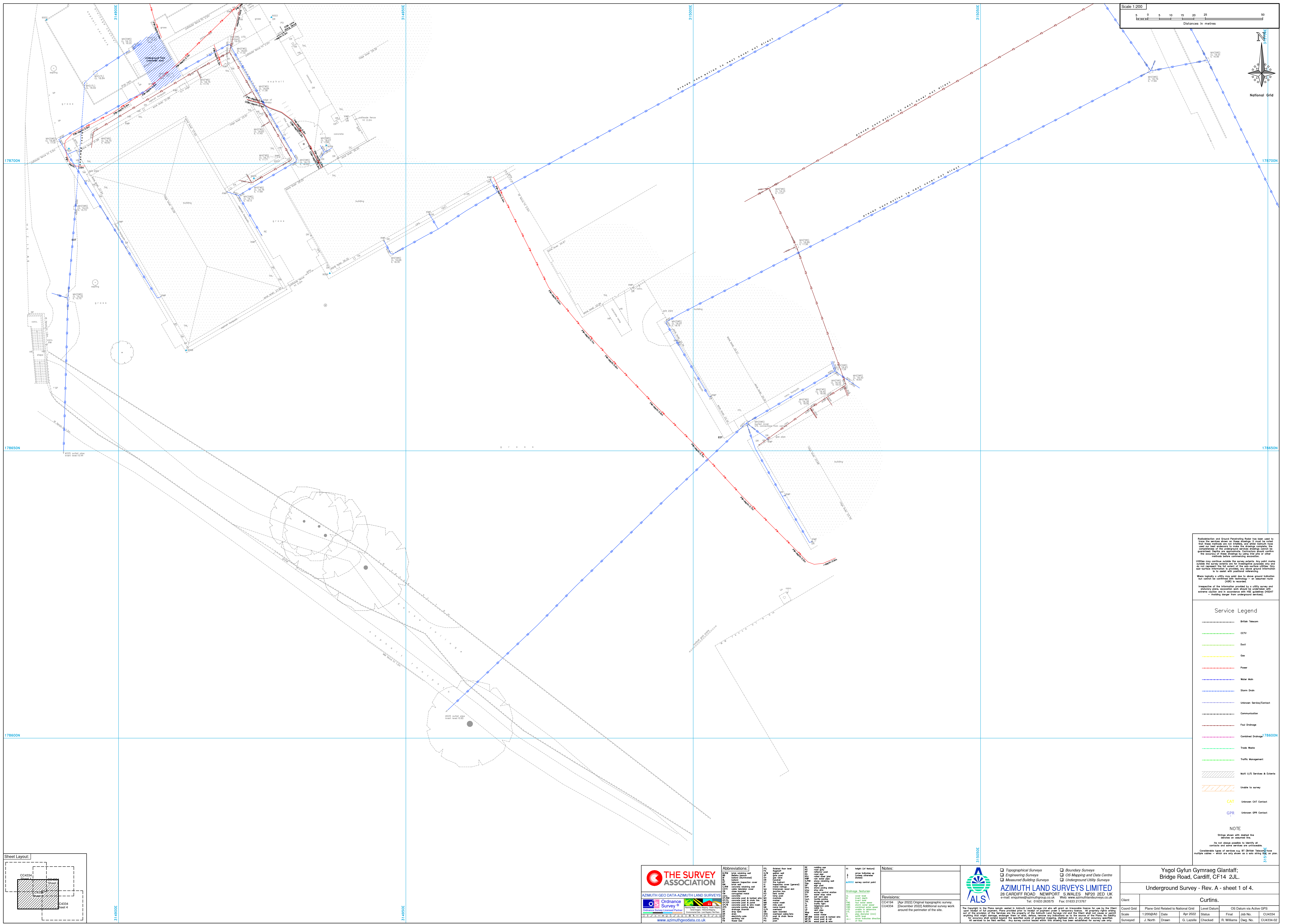
- Topographical Surveys
- Engineering Surveys
- Measurement Building Surveys
- Boundary Surveys
- CS Mapping and Data Centre
- Underground Utility Surveys

**Ysgol Gyfun Gymraeg Glantaff; Bridge Road, Cardiff, CF14 2JL.**

**Underground Survey - Rev. A - sheet 1 of 4.**

Client	Curfins.
Client	Curfins.
Coord Grid	Phone Grid Related to National Grid
Scale	1:200@A0
Date	Apr 2022
Status	Final
Job No.	CU4334
Drawn	R. Williams
Checked	G. Lazele
Dep. No.	CU4334-02





**THE SURVEY ASSOCIATION**

AZIMUTH GEO DATA AZIMUTH LAND SURVEYS

Ordnance Survey

www.azimuthgeodata.co.uk

**Abbreviations:**

BT	British Telecom	CC	Construction Contour
CC	Construction Contour	CD	Construction Detail
CD	Construction Detail	CE	Construction Edge
CE	Construction Edge	CF	Construction Face
CF	Construction Face	CG	Construction Ground
CG	Construction Ground	CH	Construction Height
CH	Construction Height	CI	Construction Interval
CI	Construction Interval	CJ	Construction Junction
CJ	Construction Junction	CK	Construction Key
CK	Construction Key	CL	Construction Line
CL	Construction Line	CM	Construction Mark
CM	Construction Mark	CN	Construction Note
CN	Construction Note	CO	Construction Object
CO	Construction Object	CP	Construction Point
CP	Construction Point	CQ	Construction Quarter
CQ	Construction Quarter	CR	Construction Ratio
CR	Construction Ratio	CS	Construction Section
CS	Construction Section	CT	Construction Trench
CT	Construction Trench	CU	Construction Unit
CU	Construction Unit	CV	Construction Value
CV	Construction Value	CW	Construction Wall
CW	Construction Wall	CX	Construction X
CX	Construction X	CY	Construction Y
CY	Construction Y	CZ	Construction Z

**Notes:**

CG4184 (Apr 2022) Original topographic survey  
 CL4334 (December 2022) Additional survey work around the perimeter of the site.

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29 CARDIFF ROAD NEWPORT, S.WALES NP20 2ED UK

www.azimuthlandsurveys.co.uk

Topographical Surveys, Engineering Surveys, Massed Building Surveys, Boundary Surveys, CS Mapping and Data Centre, Underground Utility Surveys.

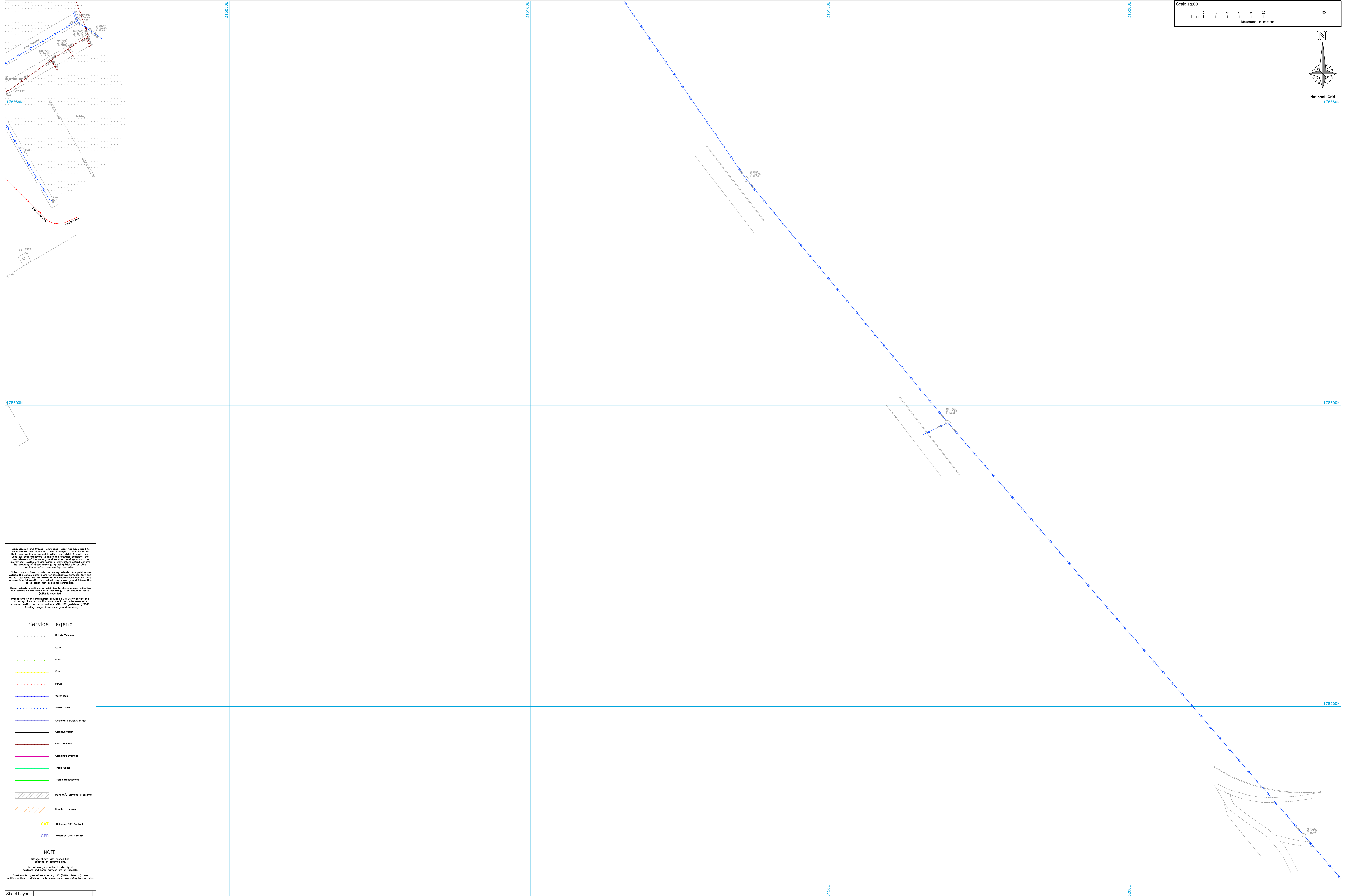
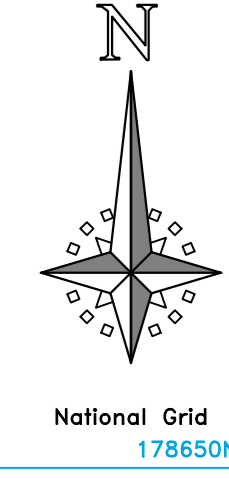
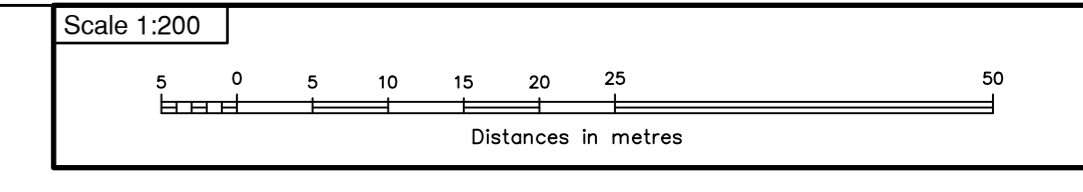
Ysgol Gylun Gymraeg Glantaff; Bridge Road, Cardiff, CF14 2JL.			
Underground Survey - Rev. A - sheet 1 of 4.			
Client	Curfins.	Level Datum	OS Datum via Active GPS
Scale	1:200@A0	Status	Final
Date	Apr 2022	Drawn	R. Williams
Surveyed	J. North	Checked	G. Lazelle
Job No.	CL4334	Dep. No.	CL4334-02

**Service Legend**

- British Telecom
- CCTV
- Duct
- Gas
- Fiber
- Water Main
- Storm Drain
- Unknown Service/Contact
- Communication
- Foul Drainage
- Combined Drainage 78600N
- Trade Waste
- Traffic Management
- M41 U/S Services & Extras
- Unable to survey
- CAT Unknown CAT Contact
- GPR Unknown GPR Contact

**NOTE**

Storage shown with dashed line denotes an assumed line. Do not attempt to identify or locate any services or utilities. Considerable care of services is to be taken. Multiple cables - each one only shown to a sub-survey level.



Reconnaissance and Ground Penetrating Radar has been used to locate services in the area shown. It must be noted that the presence of any cables or pipes is not guaranteed. It is the responsibility of the client to ensure that any services are correctly identified and marked before any excavation work is carried out.

Utilities may continue outside the survey extent. All other marks outside the survey extent are for information purposes only and do not represent the location of any services. The client is advised to check with the relevant utility companies for any services that may be present in the area shown.

Where utilities are utility companies due to design ground conditions but cannot be confirmed with technology or as assumed routes (GPR) is required.

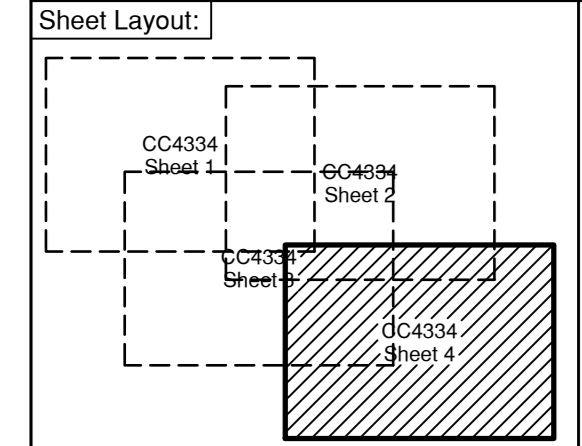
Inspection of the information provided by a utility survey and existing plans, together with what is indicated on the ground, will determine the location of any services. The following (GPR) is assumed to be a building design from underground services.

### Service Legend

- British Telecom
- CCTV
- Duct
- Gas
- Power
- Water Main
- Storm Drain
- Unknown Service/Contact
- Communication
- Fuel Drainage
- Combined Drainage
- Trade Waste
- Traffic Management
- Man U/S Services & Exits
- Unable to survey
- CAT Unknown CAT Contact
- GPR Unknown GPR Contact

**NOTE**  
Drains shown with dashed line service as assumed line. It is not always possible to identify all contacts and some services are unknown.

Coordinates (type of service e.g. BT (British Telecom)) from multiple address - which are only shown on a site plan (see site plan).



AZIMUTH GEO DATA-AZIMUTH LAND SURVEYS

Ordnance Survey

Distance Survey Licenced Partner

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**Abbreviations:**

BT	British Telecom
CC	Control Centre
CD	Control Duct
CE	Control Enclosure
CF	Control Facility
CG	Control Ground
CH	Control House
CI	Control Inlet
CJ	Control Junction
CK	Control Key
CL	Control Line
CM	Control Manhole
CN	Control Network
CO	Control Outlet
CP	Control Point
CQ	Control Quarter
CR	Control Rack
CS	Control Station
CT	Control Terminal
CU	Control Unit
CV	Control Valve
CW	Control Well
CX	Control Work
CY	Control Yard
CZ	Control Zone

**Notes:**

CC4334 (Apr 2022) Original topographic survey.

CU4334 (December 2022) Additional survey work around the perimeter of the site.

**Revisions:**

No.	Description	Date
1	Original topographic survey	Apr 2022
2	Additional survey work	December 2022

**ALS**

**AZIMUTH LAND SURVEYS LIMITED**

29 CARDIFF ROAD NEWPORT, S.WALES NP20 2ED UK

tel: 01533 263075 fax: 01533 213787

**Ysgol Gyfun Gymraeg Glantaff;**  
Bridge Road, Cardiff, CF14 2JL.

Underground Survey - Rev. A - sheet 1 of 4.

**Client:** Ysgol Gyfun Gymraeg Glantaff

**Drawn:** G. Lazelle

**Checked:** R. Williams

**Scale:** 1:200@A0

**Date:** Apr 2022

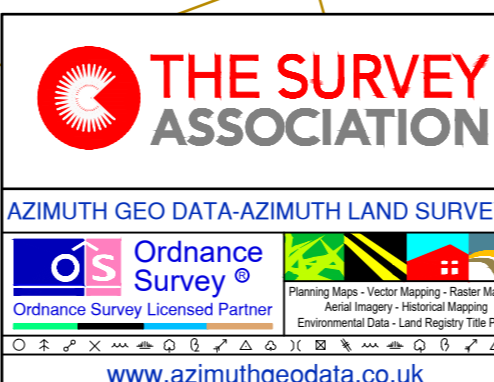
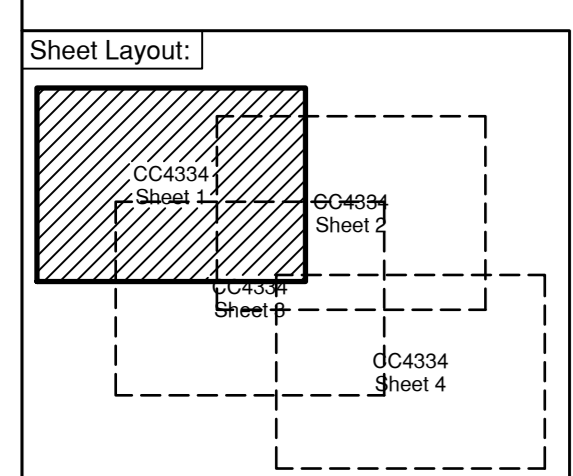
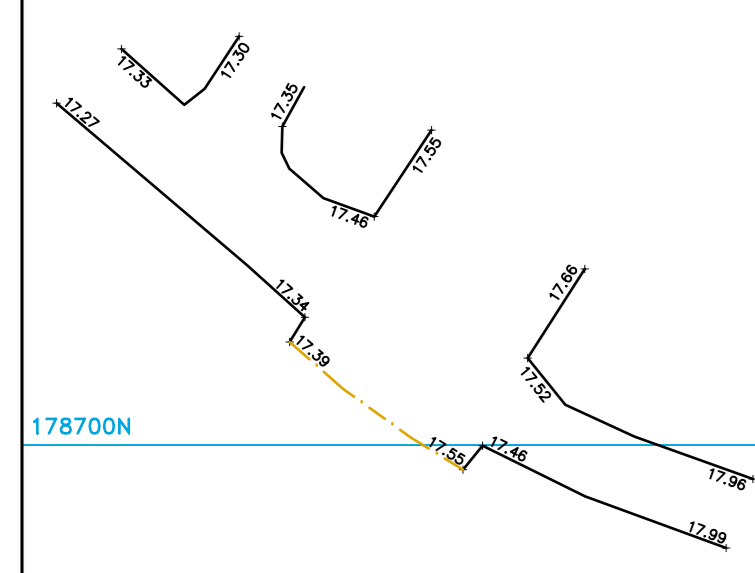
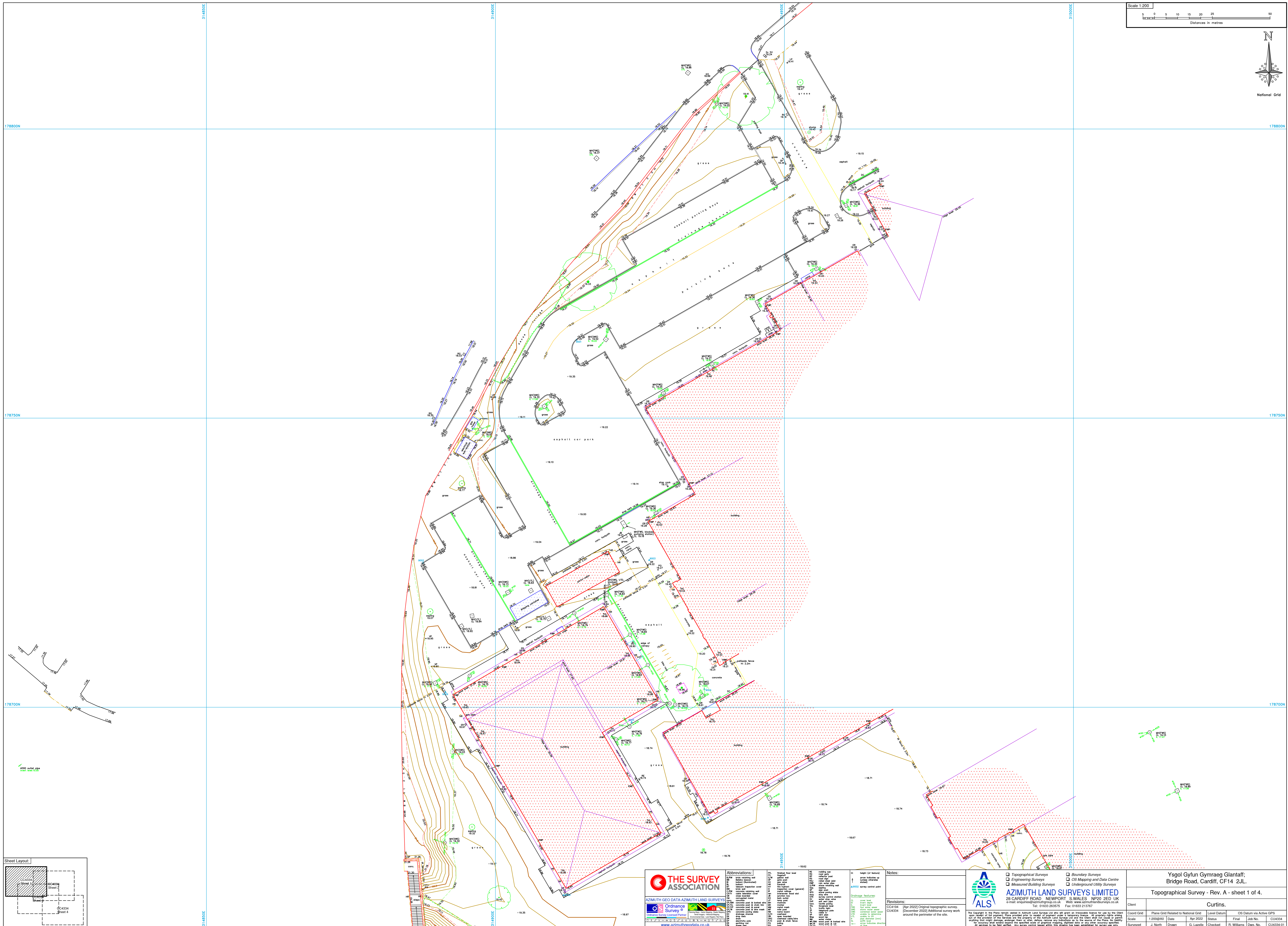
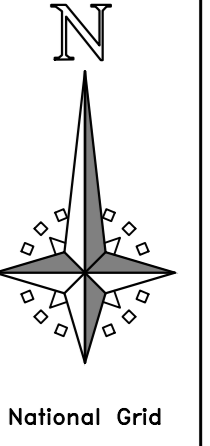
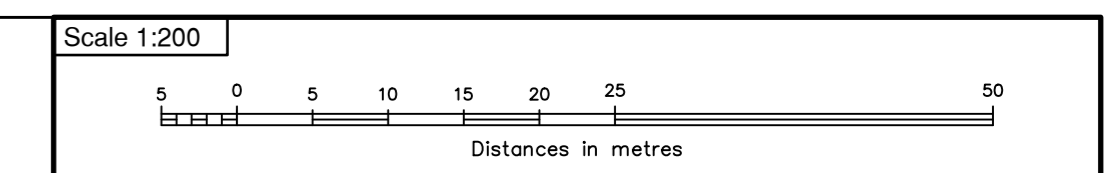
**Status:** Final

**Job No.:** CU4334

**Dep. No.:** CU4334.02

**Notes:**

The copyright in the Plans herein vests in Azimuth Land Surveys Ltd who will grant an irrevocable licence for use to the Client for the purposes of the Survey. The Client shall be responsible for the accuracy of the information provided to the Client. The Client shall be responsible for the accuracy of the information provided to the Client. The Client shall be responsible for the accuracy of the information provided to the Client.



**Abbreviations:**

AS	Asphalt	BR	Boundary	CS	Control
BL	Block	BR	Boundary	CS	Control
...	...	...	...	...	...

**Notes:**

CG4184 (Apr 2022) Original topographic survey.  
 CU4334 (December 2022) Additional survey work around the perimeter of the site.

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 29 CARDIFF ROAD NEWPORT, S.WALES NP20 2ED UK  
 Tel: 01493 260375 Fax: 01493 212197

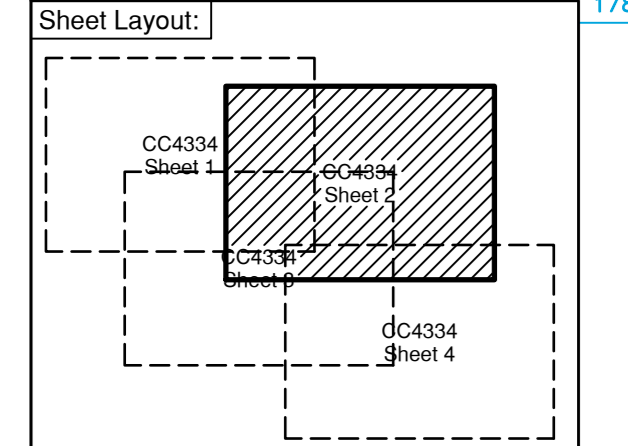
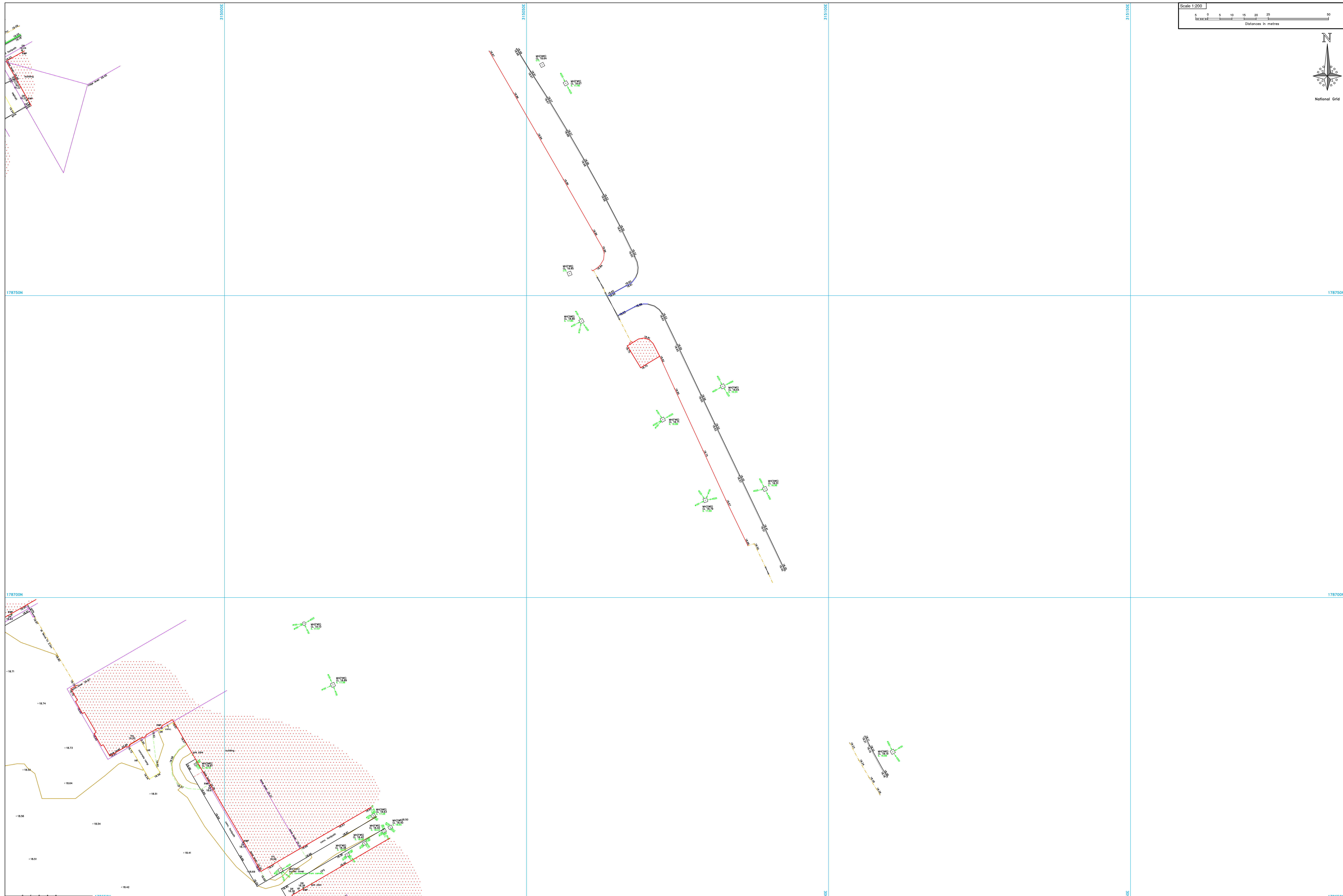
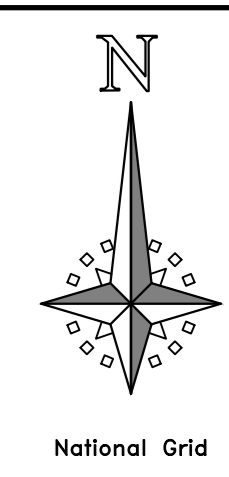
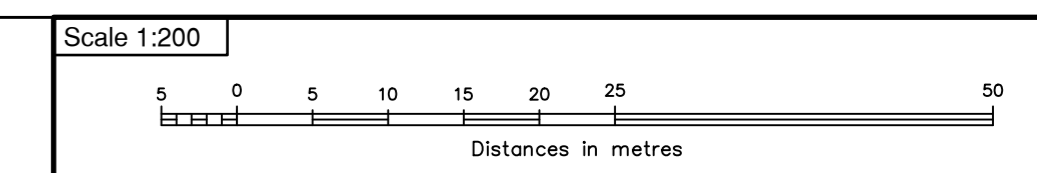
**Services:**

- Topographical Surveys
- Engineering Surveys
- Massoner Building Surveys
- Boundary Surveys
- CS Mapping and Data Centre
- Underground Utility Surveys

**Ysgol Gyfun Gymraeg Glantaff; Bridge Road, Cardiff, CF14 2JL.**

**Topographical Survey - Rev. A - sheet 1 of 4.**

Client	Curtins.		
Coord Grid	Plane Grid Related to National Grid	Level Datum	OS Datum via Active GPS
Scale	1:200@A0	Date	Apr 2022
Surveyed	J. North	Drawn	G. Lazelle
	Checked	R. Williams	Dep. No. CU4334-01



**THE SURVEY ASSOCIATION**  
 AZIMUTH GEO DATA - AZIMUTH LAND SURVEYS  
 Ordnance Survey  
 Ordnance Survey Licensed Partner  
 www.azimuthgeodata.co.uk

**Abbreviations:**

AC	Asphalt
AD	Asphalt Driveway
AG	Asphalt Gravel
AGL	Asphalt Gravel
AGP	Asphalt Gravel
AGS	Asphalt Gravel
AGT	Asphalt Gravel
AGV	Asphalt Gravel
AGW	Asphalt Gravel
AGX	Asphalt Gravel
AGY	Asphalt Gravel
AGZ	Asphalt Gravel
AGAA	Asphalt Gravel
AGAB	Asphalt Gravel
AGAC	Asphalt Gravel
AGAD	Asphalt Gravel
AGAE	Asphalt Gravel
AGAF	Asphalt Gravel
AGAG	Asphalt Gravel
AGAH	Asphalt Gravel
AGAI	Asphalt Gravel
AGAJ	Asphalt Gravel
AGAK	Asphalt Gravel
AGAL	Asphalt Gravel
AGAM	Asphalt Gravel
AGAN	Asphalt Gravel
AGAO	Asphalt Gravel
AGAP	Asphalt Gravel
AGAQ	Asphalt Gravel
AGAR	Asphalt Gravel
AGAS	Asphalt Gravel
AGAT	Asphalt Gravel
AGAU	Asphalt Gravel
AGAV	Asphalt Gravel
AGAW	Asphalt Gravel
AGAX	Asphalt Gravel
AGAY	Asphalt Gravel
AGAZ	Asphalt Gravel
AGAA	Asphalt Gravel
AGAB	Asphalt Gravel
AGAC	Asphalt Gravel
AGAD	Asphalt Gravel
AGAE	Asphalt Gravel
AGAF	Asphalt Gravel
AGAG	Asphalt Gravel
AGAH	Asphalt Gravel
AGAI	Asphalt Gravel
AGAJ	Asphalt Gravel
AGAK	Asphalt Gravel
AGAL	Asphalt Gravel
AGAM	Asphalt Gravel
AGAN	Asphalt Gravel
AGAO	Asphalt Gravel
AGAP	Asphalt Gravel
AGAQ	Asphalt Gravel
AGAR	Asphalt Gravel
AGAS	Asphalt Gravel
AGAT	Asphalt Gravel
AGAU	Asphalt Gravel
AGAV	Asphalt Gravel
AGAW	Asphalt Gravel
AGAX	Asphalt Gravel
AGAY	Asphalt Gravel
AGAZ	Asphalt Gravel

**Notes:**

Revisions:

CL4184	Apr 2022	Original topographic survey
CL4334	December 2022	Additional survey work around the perimeter of the site.

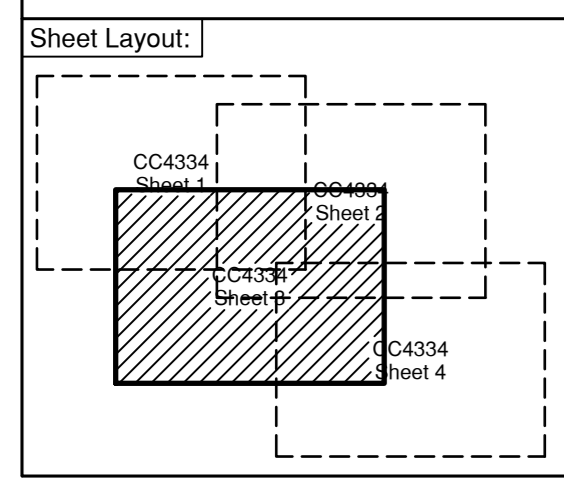
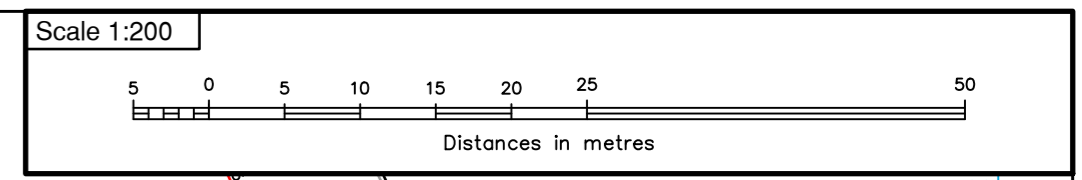
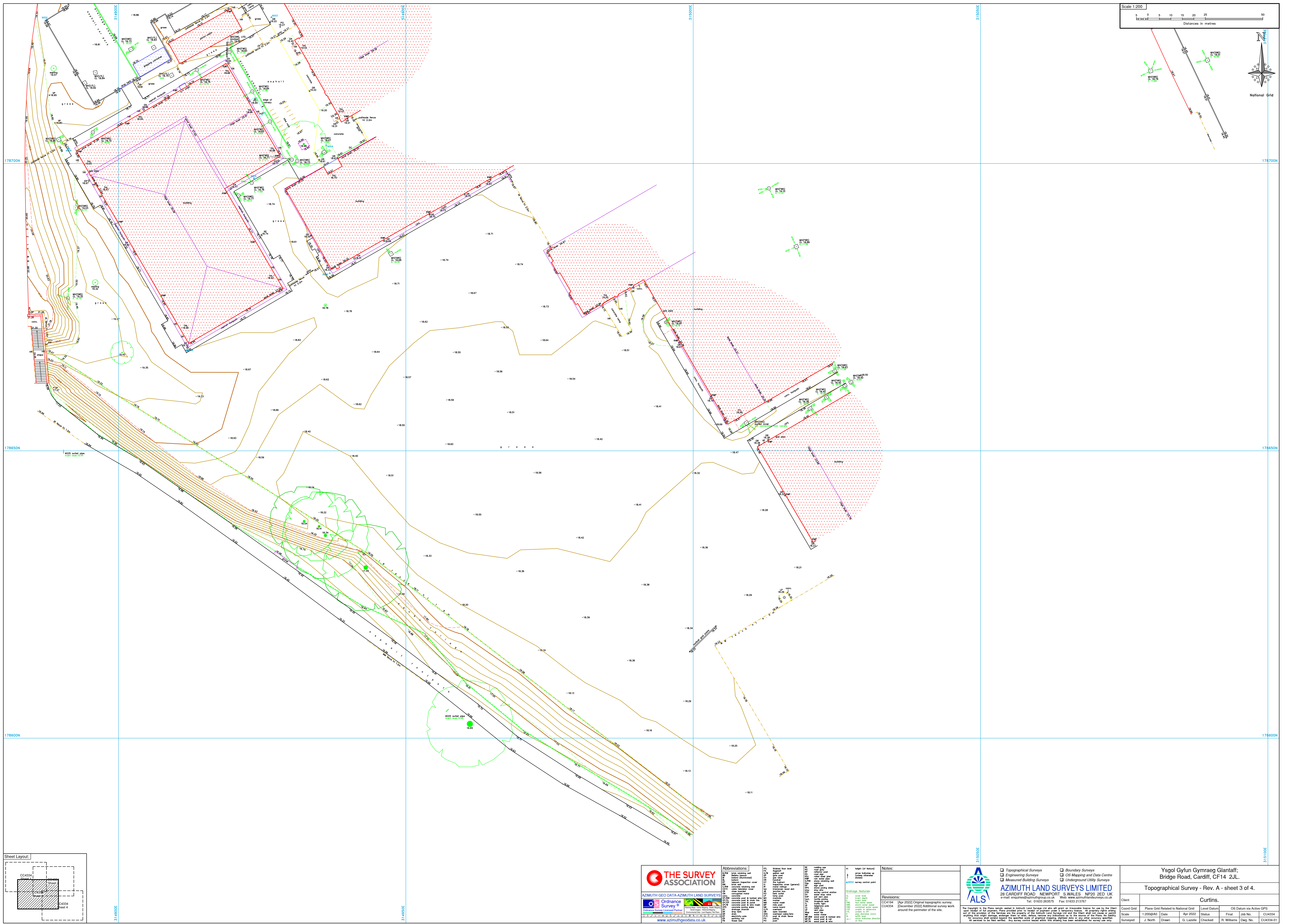
**ALS AZIMUTH LAND SURVEYS LIMITED**  
 29 CARDIFF ROAD, NEWPORT, S.WALES, NP20 2ED, UK  
 e-mail: enquiries@azimuthland.co.uk Tel: 01493 263075 Fax: 01493 213797

**Ysgol Gyfun Gymraeg Glantaff; Bridge Road, Cardiff, CF14 2JL.**

**Topographical Survey - Rev. A - sheet 2 of 4.**

Client	Curfins.		
Coord Grid	Plane Grid Related to National Grid	Level Datum	OS Datum via Active GPS
Scale	1:200@A0	Date	Apr 2022
Surveyed	J. North	Drawn	G. Lazelle
		Checked	R. Williams
		Dep. No.	CU4334-01





**THE SURVEY ASSOCIATION**

AZIMUTH GEO DATA - AZIMUTH LAND SURVEYS

Ordnance Survey

www.azimuthgeodata.co.uk

Abbreviations:

10	10m	10m level	10	10m	10m level
11	11m	11m level	11	11m	11m level
12	12m	12m level	12	12m	12m level
13	13m	13m level	13	13m	13m level
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50	50m	50m level	50	50m	50m level

Notes:

Revisions:

Rev.	Date	Description
01	Apr 2022	Original topographic survey
02	December 2022	Additional survey work around the perimeter of the site.

**AZIMUTH LAND SURVEYS LIMITED**

29 CARDIFF ROAD, NEWPORT, S.WALES NP20 2ED UK

ALSO

Topographical Surveys  
Engineering Surveys  
Massoner Building Surveys  
Boundary Surveys  
OS Mapping and Data Centre  
Underground Utility Surveys

Client: Ysgol Gyfun Gymraeg Glantaff; Bridge Road, Cardiff, CF14 2JL.

Project: Topographical Survey - Rev. A - sheet 3 of 4.

Drawn: G. Lazelle  
Checked: R. Williams  
Date: Apr 2022  
Status: Final  
Job No: CU4334

Client	Ysgol Gyfun Gymraeg Glantaff; Bridge Road, Cardiff, CF14 2JL.
Project	Topographical Survey - Rev. A - sheet 3 of 4.
Drawn	G. Lazelle
Checked	R. Williams
Date	Apr 2022
Status	Final
Job No.	CU4334
Dep. No.	CU4334.01



## Appendix D

### DCWW Correspondence and Pre-Development Enquiry



**GENERAL NOTES:**

- GENERAL**
- DO NOT SCALE THIS DRAWING.
  - ALL DIMENSIONS ARE IN METRIC UNITS UNLESS NOTED OTHERWISE.
  - THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS AND SPECIFICATIONS. ANY DISCREPANCIES ARE TO BE BROUGHT TO THE ENGINEERS ATTENTION PRIOR TO COMMENCING ANY WORKS.
  - ALL DETAILS TO BE CONSTRUCTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL COUNCILS BUILDING CONTROL.
  - ALL PROPRIETARY PRODUCT TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.

- SURVEYS**
- THIS DRAWING SHOWS THE DRAINAGE LAYOUT AS DERIVED FROM THE UTILITY AND TOPOGRAPHICAL SURVEYS BY AZIMUTH SURVEYS (C419401A AND CC4194-02, APRIL 2022)

**KEY**

<span style="color: pink;">— — — — —</span>	DCWW FOUL SEWER
<span style="color: green;">— — — — —</span>	DCWW SURFACE WATER
<span style="color: yellow;">— — — — —</span>	PRIVATE FOUL SEWER
<span style="color: blue;">— — — — —</span>	PRIVATE SURFACE WATER SEWER



P2	UPDATED FOR NEW SURVEY	12/12/22	AH	SD
P1	FIRST ISSUE	26/10/22	AH	SD
Rev:	Description:	Date:	By:	Chkd:



3 Overly Parc, Earlswood Road, Cardiff, CF14 5GH  
 029 2068 9000  
 cardiff@curtins.com  
 www.curtins.com

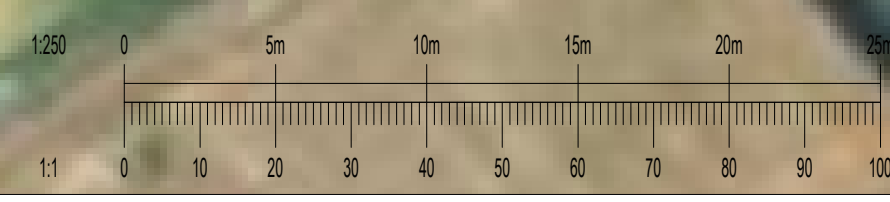
Civils & Structures • Transport Planning • Environmental • Infrastructure • Geotechnical • Conservation & Heritage • Principal Designer  
 Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kenton • Leeds • Liverpool • London • Manchester • Nottingham

Status: **SUITABLE FOR INFORMATION** S2

Project: **YSGOL GLANTAF**

Dwg Title: **EXISTING DRAINAGE PLAN**

Project No:	082089	Size:	A1	Date:	26/10/2022	Drawn By:	AH	Designed By:	JF	Checked By:	JF
Scale:	1:500										
Project Code:	082089 - CUR - XX - XX - DR - C -	Originator:		Volume:		Level:		Type:		Role:	
		Category / Number:	90001 - P02								

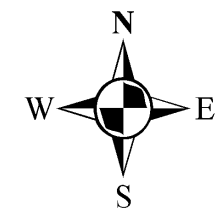


I:\Projects\082089\082089\_XX\_XX\_DR\_C-90001\_P02.dwg



Dŵr Cymru  
Welsh Water

Ysfgol Gyfun Gymraeg Glantaf Special  
Resource Base Bridge Road CF14 2JL



**LEGEND(Representative of most common features)**

- Waste network:**
- Foul chamber
  - Surface water chamber
  - Combined chamber
  - Combined sewer overflow
  - Special purpose chamber
  - Treatment works
  - △ Pumping station
  - Outfall
  - LH
  - 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.

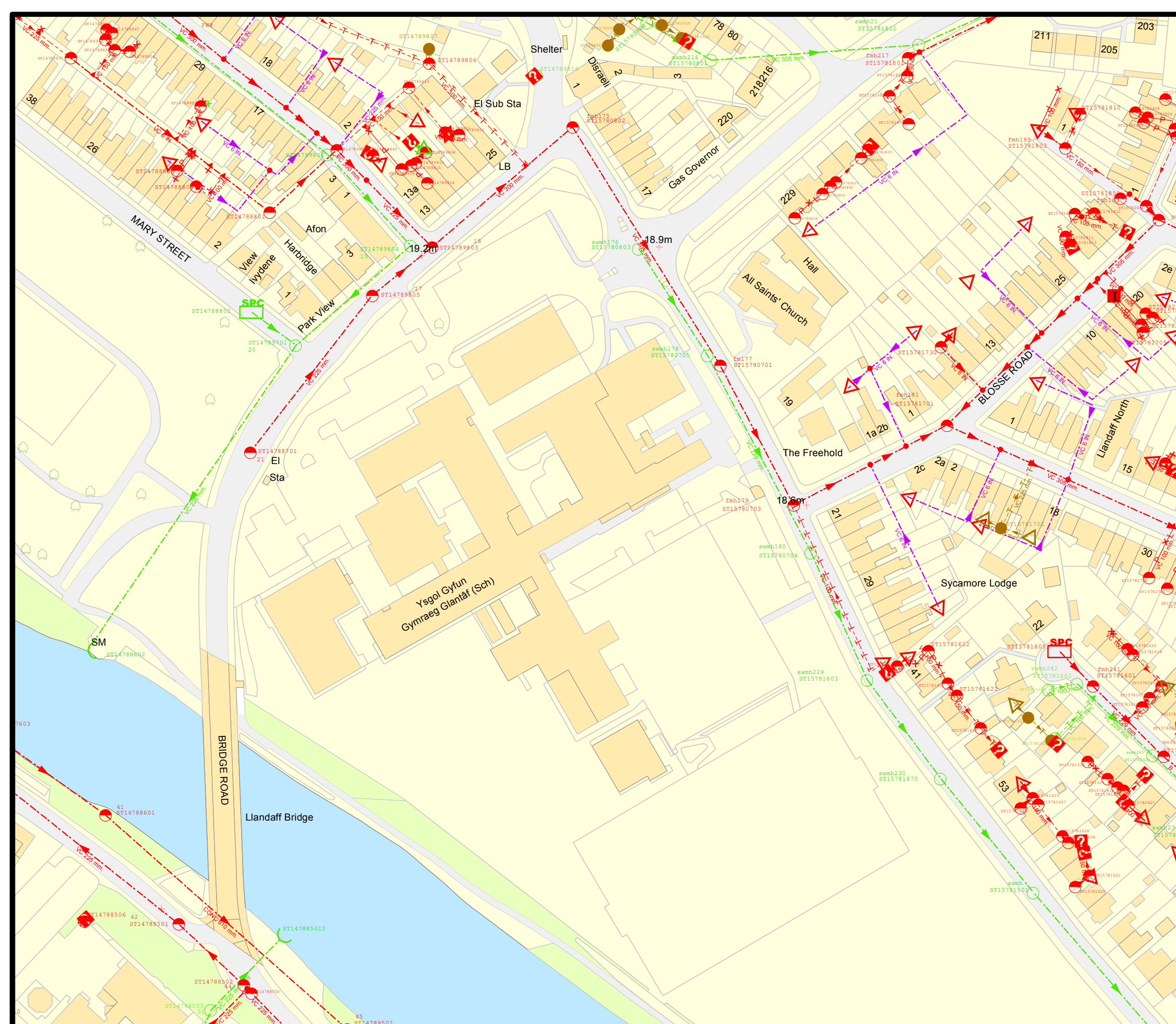
Dŵr Cymru Cylfyngedig (the Company) gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations 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 scale: 1:1250  
Printed by: Zara Howells  
Printed on: 19 Aug 2022





Dŵr Cymru  
Welsh Water

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Miss Jess Thomason  
Curtins Consulting Ltd  
Unit 3 Cwrt-y-Parc  
Earlswood Road  
Cardiff  
CF14 5GH

**Date: 13/09/2022**  
**Our Ref: PPA0007095**

Dear Miss Thomason

**Grid Ref: 315037 178659**

**Site Address: Ysgol Glantaf Special Resource Base, Bridge Road, Cardiff**

**Development: Additional School building**

I refer to your pre-planning enquiry received relating to the above site, seeking our views on the capacity of our network of assets and infrastructure to accommodate your proposed development. Having reviewed the details submitted I can provide the following comments which should be taken into account within any future planning application for the development.

### **APPRAISAL**

Firstly, we note that the proposal relates to the proposed additional school building, including community café and learner's kitchen on the existing school site and acknowledge that this is a brownfield site. Therefore, we offer the following comments as part of our appraisal of this development.

### **Public Sewerage Network**

The proposed development site is located in the immediate vicinity of a combined sewerage system, comprising combined and foul water public sewers, which drains to Cog Moors Treatment Works (WwTW).

You are also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations 2011. The presence of such assets may affect the proposal. In order to assist you may contact Dwr Cymru Welsh Water on 0800 085 3968 to establish the location and status of the apparatus in and around your site. Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.



Welsh Water is owned by Glas Cymru – a 'not-for-profit' company.  
Mae Dŵr Cymru yn eiddo i Glas Cymru – cwmni 'nid-er-elw'.

We welcome correspondence in  
Welsh and English

Dŵr Cymru Cyf, a limited company registered in  
Wales no 2366777. Registered office: Pentwyn Road,  
Nelson, Treharris, Mid Glamorgan CF46 6LY

Rydym yn croesawu gohebiaeth yn y  
Gymraeg neu yn Saesneg

Dŵr Cymru Cyf, cwmni cyfyngedig wedi'i gofrestru yng  
Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn  
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

## **Surface Water Drainage**

As of 07/01/2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Cardiff City Council as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice and Guidance note. In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

## **Foul Water Drainage – Sewerage Network**

The foul only flows from the proposed development can be accommodated within the public sewerage system. We advise that the flows can be communicated to the 225mm/300mm public combined sewer located in the highway of Bridge Road, at or between manhole ST14788701 and ST15780802 as indicated on the extract of public sewer record provided. Should a planning application be submitted for this development we will seek to control this point of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water Industry Act 1991. However, if the connection to the public sewer network is either via a lateral drain (i.e., a drain which extends beyond the connecting property boundary) or via a new sewer (i.e., serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains and conform with the publication “Sewers for Adoption” – 7th Edition. Further information can be obtained via the Developer Services pages of [www.dwrcymru.com](http://www.dwrcymru.com)

If the approved use intends to include food preparation, then an adequate grease trap to be fitted, in accordance with environmental health regulations, and maintained thereafter so as to prevent grease entering the public sewerage system.



## **Foul Water Drainage – Sewage Treatment**

No problems are envisaged with the Wastewater Treatment Works for the treatment of domestic discharges from this site.

## **Potable Water Supply**

We anticipate this development will require the installation of a new single water connection to serve the new premise. The provisions of Section 45 of the Water industry Act 1991 apply. We therefore rely on the Local Planning Authority to control the delivery of any required reinforcement or offsite works by way of planning condition at planning application stage.

Capacity is currently available in the water supply system to accommodate the development. Initial indications are that a connection can be utilised from the existing school building. We reserve the right however to reassess our position at planning application stage to ensure there is sufficient capacity available to serve the development without causing detriment to existing customers' supply as demands upon our water systems change continually.

I trust the above information is helpful and will assist you in forming water and drainage strategies that should accompany any future planning application. I also attach copies of our water and sewer extract plans for the area, and a copy of our Planning Guidance Note which provides further information on our approach to the planning process, making connections to our systems and ensuring any existing public assets or infrastructure located within new development sites are protected.

Please note that our response is based on the information provided in your enquiry and should the information change we reserve the right to make a new representation. Should you have any queries or wish to discuss any aspect of our response please do not hesitate to contact our dedicated team of planning officers, either on 0800 917 2652 or via email at [developer.services@dwrcymru.com](mailto:developer.services@dwrcymru.com)

Please quote our reference number in all communications and correspondence.

Yours faithfully,



**Owain George**  
**Planning Liaison Manager**  
**Developer Services**

**ENC. Sewer Plan**  
**Water Plan**  
**Pre-Planning Notes**

***Please Note that demands upon the water and sewerage systems change continually; consequently, the information given above should be regarded as reliable for a maximum period of 12 months from the date of this letter.***





Appendix E  
NRW Correspondence

## Aidan Hogan

---

**From:** Llewellyn, Carl <Carl.Llewellyn@cyfoethnaturiolcymru.gov.uk>  
**Sent:** 29 November 2022 11:14  
**To:** Aidan Hogan  
**Subject:** RE: YGG Glantaf - school extension

**Follow Up Flag:** Follow up  
**Flag Status:** Flagged

Morning

In relation to your query I cover this area from a flood risk perspective.

The site is located within the flood zone outlines therefore I presume under the planning requirements an FCA is being prepared for us to review.

In relation to the FRAP requirements any new outfall would require a FRAP. A permanent one for the headwall structure itself and a temporary one if any works are needed to construct it, such as bunding in the watercourse. The period that you cannot undertake any works within the watercourse is May 15<sup>th</sup> to October the 15<sup>th</sup>.

If I can help you further please get in touch

Regards

Eich Enw/ Carl Llewellyn  
Teitl swydd/ Dadansoddiad Risg Llifogydd / Flood Risk Analysis  
Cyfoeth Naturiol Cymru / Natural Resources Wales  
Ffôn/Tel: 03000 653092  
E-bost/E-mail:  
[Carl.Llewellyn@naturalresourceswales.gov.uk](mailto:Carl.Llewellyn@naturalresourceswales.gov.uk)

---

**From:** Thomas, Anne <Anne.Thomas@cyfoethnaturiolcymru.gov.uk>  
**Sent:** 23 November 2022 16:53  
**To:** Llewellyn, Carl <Carl.Llewellyn@cyfoethnaturiolcymru.gov.uk>  
**Subject:** FW: YGG Glantaf - school extension

Hi Carl,

Can you assist Aidan with his query please.

Kind regards

Anne Thomas MCIWEM & BSc

Ymgynghorydd – Datblygiadau a Perygl Llifogydd/Development and Flood Risk Advisor  
Cyfoeth Naturiol Cymru / Natural Resources Wales  
Ffôn / Tel: **03000 65 3460**  
Plas Gwendreath, Heol Parc Mawr, Crosshands Business Park, Crosshands, Llanelli, SA14 6RE

**Swyddog Cymorth Cyntaf Iechyd Meddwl / Mental Health First Aider**

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

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Croesewir gohebiaeth yn Gymraeg a byddwn yn ymateb yn Gymraeg, heb i hynny arwain at oedi. Correspondence in Welsh is welcomed, and we will respond in Welsh without it leading to a delay.

---

**From:** Aidan Hogan <[Aidan.Hogan@curtins.com](mailto:Aidan.Hogan@curtins.com)>  
**Sent:** 23 November 2022 15:00  
**To:** Thomas, Anne <[Anne.Thomas@cyfoethnaturiolcymru.gov.uk](mailto:Anne.Thomas@cyfoethnaturiolcymru.gov.uk)>  
**Cc:** Samantha Doody <[Samantha.Doody@curtins.com](mailto:Samantha.Doody@curtins.com)>  
**Subject:** YGG Glantaf - school extension

Hi Anne,  
I hope you're well? We previously crossed paths on the Pentre Awel development in Llanelli. I am now hoping for some advice regarding a proposed extension to the existing school in Glantaf, Cardiff.  
<https://goo.gl/maps/LeR9GF5i3kgzvpw16>

Are you the right person to speak to?

The proposal is for an extension to the existing school. The development boundary is shown in the red boundary below. I have attached a site plan from the architect showing the arrangement, as well as existing surveys.



The school is on the bank of the Taff, separated only by the Taff Trail. There are flood risk issues which we are working through. However it is advice regarding FRAPS that I am hoping for. The surface water drainage proposal will be based on discharging to the Taff either by existing outfall or a new outfall. We are currently having survey done to confirm the extent of any existing outfalls from the school to the river (the existing survey indicates a couple of runs headed to the river but the trace stopped short) . I have attached our drainage concept plan. It shows a new outfall but we will revise it as needed based on the survey findings.

The face of the new building will be approximately 18m from the river bank. The boundary of the school is approximately 11m from the riverbank.

Are you able to help guide me on what FRAPS we will need to apply for and if there are any restrictions around what time of year outfall works would need to be constructed (if a new outfall is necessary).

Thank you for taking the time to read this and if anything is unclear please let me know.

Regards,  
Aidan

**Aidan Hogan**

T. 029 2068 0900  
[aidan.hogan@curtins.com](mailto:aidan.hogan@curtins.com)

33 Cathedral Road  
Cardiff CF11 9HA



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## Appendix F

### Drainage Calculations

Design Settings

Rainfall Methodology	FEH-13	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	40	Minimum Backdrop Height (m)	0.600
CV	0.750	Preferred Cover Depth (m)	0.900
Time of Entry (mins)	5.00	Include Intermediate Ground	x
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	x
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1A	0.012	5.00	18.740	1050	314905.737	178708.071	0.540
1B			18.764	1050	314891.515	178703.739	0.714
1	0.037	5.00	18.844	1350	314888.905	178702.688	1.125
2	0.023	5.00	18.647	1350	314896.145	178667.371	1.140
3	0.017	5.00	18.649	1350	314924.526	178695.811	1.125
4	0.004	5.00	18.667	1350	314942.553	178679.603	1.050
5	0.036	5.00	18.665	1350	314935.856	178675.809	1.276
6	0.006	5.00	18.603	1350	314921.511	178668.651	1.308
7			18.539	1350	314915.524	178659.763	1.399
8	0.060	5.00	18.643	1350	314916.163	178653.701	1.623
9			18.501	1350	314949.415	178630.949	1.649
10	0.043	5.00	18.498	1350	314953.106	178635.071	1.669
11	0.119	5.00	18.743	1350	314961.147	178691.827	1.125
12			18.651	1350	314971.767	178673.475	1.158
13	0.020	5.00	18.679	1350	314967.724	178671.184	1.213
14			18.684	1350	314970.094	178667.050	1.246
15	0.028	5.00	18.519	1350	314988.783	178664.342	1.050
16	0.016	5.00	18.502	1350	314975.866	178657.232	1.255
17			18.655	1350	314961.542	178649.070	1.894
18	0.025	5.00	18.289	1350	315012.503	178641.198	1.050
19			18.284	1350	314980.745	178622.823	1.679
20	0.025	5.00	18.528	1350	314989.893	178663.660	1.050
21	0.013	5.00	18.362	1350	315002.506	178641.387	1.140
22			18.323	1350	315011.158	178646.286	1.200
23	0.025	5.00	18.281	1350	315016.765	178636.386	1.347
24	0.025	5.00	18.280	1350	315018.770	178630.555	1.050
25			18.268	1350	314986.609	178611.947	1.410
26			18.148	1350	314980.477	178615.396	1.574
27			18.104	1050	314969.222	178616.362	0.517

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1A	1B	14.867	0.600	18.200	18.050	0.150	99.1	150	5.25	50.0
1.001	1B	1	2.814	0.600	18.050	17.794	0.256	11.0	150	5.26	50.0
1.002	1	2	36.051	0.600	17.719	17.507	0.212	170.0	225	5.86	50.0
1.003	2	8	24.240	0.600	17.507	17.095	0.412	58.8	225	6.10	50.0
2.000	3	5	22.988	0.600	17.524	17.389	0.135	170.0	225	5.38	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.009	17.8	2.3	0.390	0.564	0.012	0.0	36	0.693
1.001	3.056	54.0	2.3	0.564	0.900	0.012	0.0	21	1.510
1.002	1.000	39.7	9.3	0.900	0.915	0.049	0.0	74	0.821
1.003	1.708	67.9	13.7	0.915	1.323	0.072	0.0	68	1.342
2.000	1.000	39.7	3.2	0.900	1.051	0.017	0.0	44	0.607

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
3.000	4	5	7.697	0.600	17.617	17.464	0.153	50.3	150	5.09	50.0
2.001	5	6	16.032	0.600	17.389	17.295	0.094	170.0	225	5.65	50.0
2.002	6	7	10.716	0.600	17.295	17.232	0.063	170.0	225	5.83	50.0
2.003	7	8	6.096	0.600	17.140	17.020	0.120	50.8	300	5.88	50.0
1.004	8	9	40.291	0.600	17.020	16.852	0.168	240.0	300	6.76	50.0
1.005	9	10	5.533	0.600	16.852	16.829	0.023	240.0	300	6.85	50.0
1.006	10	17	16.344	0.600	16.829	16.761	0.068	240.0	300	7.12	50.0
4.000	11	12	21.203	0.600	17.618	17.493	0.125	170.0	225	5.35	50.0
4.001	12	13	4.647	0.600	17.493	17.466	0.027	170.0	225	5.43	50.0
4.002	13	14	4.765	0.600	17.466	17.438	0.028	170.0	225	5.51	50.0
4.003	14	16	11.389	0.600	17.438	17.247	0.191	59.6	225	5.62	50.0
5.000	15	16	14.745	0.600	17.469	17.322	0.147	100.0	150	5.24	50.0
4.004	16	17	16.486	0.600	17.247	16.836	0.411	40.1	225	5.75	50.0
1.007	17	19	32.522	0.600	16.761	16.605	0.156	208.5	300	7.62	50.0
6.000	18	19	36.691	0.600	17.239	16.755	0.484	75.8	150	5.53	50.0
1.008	19	26	7.432	0.600	16.605	16.574	0.031	239.7	300	7.75	50.0
7.000	20	21	25.596	0.600	17.478	17.222	0.256	100.0	150	5.42	50.0
7.001	21	22	9.943	0.600	17.222	17.123	0.099	100.0	150	5.59	50.0
7.002	22	23	11.378	0.600	17.123	17.009	0.114	100.0	150	5.78	50.0
7.003	23	26	41.921	0.600	16.934	16.649	0.285	147.1	225	6.43	50.0
8.000	24	25	37.156	0.600	17.230	16.858	0.372	100.0	150	5.62	50.0
8.001	25	26	7.035	0.600	16.858	16.724	0.134	52.5	150	5.70	50.0
1.009	26	27	11.296	0.600	17.700	17.587	0.113	100.0	150	7.93	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
3.000	1.422	25.1	0.8	0.900	1.051	0.004	0.0	18	0.634
2.001	1.000	39.7	10.8	1.051	1.083	0.057	0.0	80	0.856
2.002	1.000	39.7	12.0	1.083	1.082	0.063	0.0	85	0.879
2.003	2.211	156.3	12.0	1.099	1.323	0.063	0.0	56	1.326
1.004	1.010	71.4	37.0	1.323	1.349	0.195	0.0	153	1.019
1.005	1.010	71.4	37.0	1.349	1.369	0.195	0.0	153	1.019
1.006	1.010	71.4	45.2	1.369	1.594	0.238	0.0	173	1.066
4.000	1.000	39.7	22.6	0.900	0.933	0.119	0.0	122	1.031
4.001	1.000	39.7	22.6	0.933	0.988	0.119	0.0	122	1.031
4.002	1.000	39.7	26.4	0.988	1.021	0.139	0.0	134	1.067
4.003	1.697	67.5	26.4	1.021	1.030	0.139	0.0	98	1.598
5.000	1.005	17.8	5.3	0.900	1.030	0.028	0.0	56	0.877
4.004	2.071	82.4	34.7	1.030	1.594	0.183	0.0	102	1.982
1.007	1.085	76.7	79.9	1.594	1.379	0.421	0.0	261	1.223
6.000	1.156	20.4	4.7	0.900	1.379	0.025	0.0	49	0.941
1.008	1.011	71.5	84.6	1.379	1.274	0.446	0.0	300	1.024
7.000	1.005	17.8	4.7	0.900	0.990	0.025	0.0	53	0.853
7.001	1.005	17.8	7.2	0.990	1.050	0.038	0.0	67	0.953
7.002	1.005	17.8	7.2	1.050	1.122	0.038	0.0	67	0.953
7.003	1.076	42.8	12.0	1.122	1.274	0.063	0.0	81	0.926
8.000	1.005	17.8	4.7	0.900	1.260	0.025	0.0	53	0.853
8.001	1.391	24.6	4.7	1.260	1.274	0.025	0.0	45	1.081
1.009	1.005	17.8	101.3	0.298	0.367	0.534	0.0	150	1.023

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	14.867	99.1	150	1 STANDARD	18.740	18.200	0.390	18.764	18.050	0.564
1.001	2.814	11.0	150	1 STANDARD	18.764	18.050	0.564	18.844	17.794	0.900
1.002	36.051	170.0	225	1 STANDARD	18.844	17.719	0.900	18.647	17.507	0.915
1.003	24.240	58.8	225	1 STANDARD	18.647	17.507	0.915	18.643	17.095	1.323
2.000	22.988	170.0	225	1 STANDARD	18.649	17.524	0.900	18.665	17.389	1.051
3.000	7.697	50.3	150	1 STANDARD	18.667	17.617	0.900	18.665	17.464	1.051
2.001	16.032	170.0	225	1 STANDARD	18.665	17.389	1.051	18.603	17.295	1.083
2.002	10.716	170.0	225	1 STANDARD	18.603	17.295	1.083	18.539	17.232	1.082
2.003	6.096	50.8	300	1 STANDARD	18.539	17.140	1.099	18.643	17.020	1.323
1.004	40.291	240.0	300	1 STANDARD	18.643	17.020	1.323	18.501	16.852	1.349
1.005	5.533	240.0	300	1 STANDARD	18.501	16.852	1.349	18.498	16.829	1.369
1.006	16.344	240.0	300	1 STANDARD	18.498	16.829	1.369	18.655	16.761	1.594
4.000	21.203	170.0	225	1 STANDARD	18.743	17.618	0.900	18.651	17.493	0.933
4.001	4.647	170.0	225	1 STANDARD	18.651	17.493	0.933	18.679	17.466	0.988
4.002	4.765	170.0	225	1 STANDARD	18.679	17.466	0.988	18.684	17.438	1.021
4.003	11.389	59.6	225	1 STANDARD	18.684	17.438	1.021	18.502	17.247	1.030
5.000	14.745	100.0	150	1 STANDARD	18.519	17.469	0.900	18.502	17.322	1.030
4.004	16.486	40.1	225	1 STANDARD	18.502	17.247	1.030	18.655	16.836	1.594
1.007	32.522	208.5	300	1 STANDARD	18.655	16.761	1.594	18.284	16.605	1.379
6.000	36.691	75.8	150	1 STANDARD	18.289	17.239	0.900	18.284	16.755	1.379
1.008	7.432	239.7	300	1 STANDARD	18.284	16.605	1.379	18.148	16.574	1.274
7.000	25.596	100.0	150	1 STANDARD	18.528	17.478	0.900	18.362	17.222	0.990
7.001	9.943	100.0	150	1 STANDARD	18.362	17.222	0.990	18.323	17.123	1.050
7.002	11.378	100.0	150	1 STANDARD	18.323	17.123	1.050	18.281	17.009	1.122
7.003	41.921	147.1	225	1 STANDARD	18.281	16.934	1.122	18.148	16.649	1.274
8.000	37.156	100.0	150	1 STANDARD	18.280	17.230	0.900	18.268	16.858	1.260
8.001	7.035	52.5	150	1 STANDARD	18.268	16.858	1.260	18.148	16.724	1.274
1.009	11.296	100.0	150	1 STANDARD	18.148	17.700	0.298	18.104	17.587	0.367







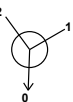






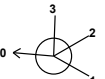
Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	1A	1050	Manhole	1 STANDARD	1B	1050	Manhole	1 STANDARD
1.001	1B	1050	Manhole	1 STANDARD	1	1350	Manhole	1 STANDARD
1.002	1	1350	Manhole	1 STANDARD	2	1350	Manhole	1 STANDARD
1.003	2	1350	Manhole	1 STANDARD	8	1350	Manhole	1 STANDARD
2.000	3	1350	Manhole	1 STANDARD	5	1350	Manhole	1 STANDARD
3.000	4	1350	Manhole	1 STANDARD	5	1350	Manhole	1 STANDARD
2.001	5	1350	Manhole	1 STANDARD	6	1350	Manhole	1 STANDARD
2.002	6	1350	Manhole	1 STANDARD	7	1350	Manhole	1 STANDARD
2.003	7	1350	Manhole	1 STANDARD	8	1350	Manhole	1 STANDARD
1.004	8	1350	Manhole	1 STANDARD	9	1350	Manhole	1 STANDARD
1.005	9	1350	Manhole	1 STANDARD	10	1350	Manhole	1 STANDARD
1.006	10	1350	Manhole	1 STANDARD	17	1350	Manhole	1 STANDARD
4.000	11	1350	Manhole	1 STANDARD	12	1350	Manhole	1 STANDARD
4.001	12	1350	Manhole	1 STANDARD	13	1350	Manhole	1 STANDARD
4.002	13	1350	Manhole	1 STANDARD	14	1350	Manhole	1 STANDARD
4.003	14	1350	Manhole	1 STANDARD	16	1350	Manhole	1 STANDARD
5.000	15	1350	Manhole	1 STANDARD	16	1350	Manhole	1 STANDARD
4.004	16	1350	Manhole	1 STANDARD	17	1350	Manhole	1 STANDARD
1.007	17	1350	Manhole	1 STANDARD	19	1350	Manhole	1 STANDARD
6.000	18	1350	Manhole	1 STANDARD	19	1350	Manhole	1 STANDARD
1.008	19	1350	Manhole	1 STANDARD	26	1350	Manhole	1 STANDARD
7.000	20	1350	Manhole	1 STANDARD	21	1350	Manhole	1 STANDARD
7.001	21	1350	Manhole	1 STANDARD	22	1350	Manhole	1 STANDARD
7.002	22	1350	Manhole	1 STANDARD	23	1350	Manhole	1 STANDARD
7.003	23	1350	Manhole	1 STANDARD	26	1350	Manhole	1 STANDARD
8.000	24	1350	Manhole	1 STANDARD	25	1350	Manhole	1 STANDARD
8.001	25	1350	Manhole	1 STANDARD	26	1350	Manhole	1 STANDARD
1.009	26	1350	Manhole	1 STANDARD	27	1050	Manhole	1 STANDARD



Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1A	314905.737	178708.071	18.740	0.540	1050				
						0	1.000	18.200	150
1B	314891.515	178703.739	18.764	0.714	1050		1	1.000	18.050
						0	1.001	18.050	150
1	314888.905	178702.688	18.844	1.125	1350		1	1.001	17.794
						0	1.002	17.719	225
2	314896.145	178667.371	18.647	1.140	1350		1	1.002	17.507
						0	1.003	17.507	225
3	314924.526	178695.811	18.649	1.125	1350				
						0	2.000	17.524	225
4	314942.553	178679.603	18.667	1.050	1350				
						0	3.000	17.617	150
5	314935.856	178675.809	18.665	1.276	1350		1	3.000	17.464
						2	2.000	17.389	225
						0	2.001	17.389	225
6	314921.511	178668.651	18.603	1.308	1350		1	2.001	17.295
						0	2.002	17.295	225
7	314915.524	178659.763	18.539	1.399	1350		1	2.002	17.232
						0	2.003	17.140	300
8	314916.163	178653.701	18.643	1.623	1350		1	2.003	17.020
						2	1.003	17.095	225
						0	1.004	17.020	300
9	314949.415	178630.949	18.501	1.649	1350		1	1.004	16.852
						0	1.005	16.852	300
10	314953.106	178635.071	18.498	1.669	1350		1	1.005	16.829
						0	1.006	16.829	300
11	314961.147	178691.827	18.743	1.125	1350				
						0	4.000	17.618	225
12	314971.767	178673.475	18.651	1.158	1350		1	4.000	17.493
						0	4.001	17.493	225

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
13	314967.724	178671.184	18.679	1.213	1350	 1	4.001	17.466	225
						0	4.002	17.466	225
14	314970.094	178667.050	18.684	1.246	1350	 1	4.002	17.438	225
						0	4.003	17.438	225
15	314988.783	178664.342	18.519	1.050	1350	 0	5.000	17.469	150
16	314975.866	178657.232	18.502	1.255	1350	 2 1 0	5.000 4.003	17.322 17.247	150 225
						0	4.004	17.247	225
17	314961.542	178649.070	18.655	1.894	1350	 1 2 0	4.004 1.006	16.836 16.761	225 300
						0	1.007	16.761	300
18	315012.503	178641.198	18.289	1.050	1350	 0	6.000	17.239	150
19	314980.745	178622.823	18.284	1.679	1350	 2 1 0	6.000 1.007	16.755 16.605	150 300
						0	1.008	16.605	300
20	314989.893	178663.660	18.528	1.050	1350	 0	7.000	17.478	150
21	315002.506	178641.387	18.362	1.140	1350	 1 0	7.000 7.001	17.222 17.222	150 150
22	315011.158	178646.286	18.323	1.200	1350	 1 0	7.001 7.002	17.123 17.123	150 150
23	315016.765	178636.386	18.281	1.347	1350	 1 0	7.002 7.003	17.009 16.934	150 225
24	315018.770	178630.555	18.280	1.050	1350	 0	8.000	17.230	150
25	314986.609	178611.947	18.268	1.410	1350	 0 1	8.000 8.001	16.858 16.858	150 150
26	314980.477	178615.396	18.148	1.574	1350	 3 2 1 0	8.001 7.003 1.008 1.009	16.724 16.649 16.574 17.700	150 225 300 150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
27	314969.222	178616.362	18.104	0.517	1050	1	1.009	17.587	150



Simulation Settings

Rainfall Methodology	FEH-13	Analysis Speed	Normal	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0	100	40	0	0
30	0	0	0				

Node 2 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Link	1.002
Side Inf Coefficient (m/hr)	1.81080	Invert Level (m)	17.507	Surround Shape	(Trench)
Safety Factor	10.0	Time to half empty (mins)		Diameter (mm)	525

Node 5 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	1.81000	Porosity	0.30	Link	2.000
Side Inf Coefficient (m/hr)	1.81000	Invert Level (m)	17.389	Surround Shape	(Trench)
Safety Factor	10.0	Time to half empty (mins)		Diameter (mm)	525

Node 8 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Link	1.003
Side Inf Coefficient (m/hr)	1.81080	Invert Level (m)	17.095	Surround Shape	(Trench)
Safety Factor	10.0	Time to half empty (mins)		Diameter (mm)	525

Node 9 Link Surround Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Link	1.004
Side Inf Coefficient (m/hr)	1.81080	Invert Level (m)	16.852	Surround Shape	(Trench)
Safety Factor	2.0	Time to half empty (mins)		Diameter (mm)	600

Node 11 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Safety Factor	10.0	Invert Level (m)	18.000
Side Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Time to half empty (mins)	
Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	60.0	60.0	0.500	60.0	60.0

Node 17 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Safety Factor	2.0	Invert Level (m)	18.000
Side Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	73.0	73.0	0.500	73.0	73.0	0.501	0.0	73.0

Node 15 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Safety Factor	2.0	Invert Level (m)	18.000
Side Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	31.0	31.0	0.350	31.0	31.0	0.351	0.0	31.0

Node 20 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Safety Factor	2.0	Invert Level (m)	18.000
Side Inf Coefficient (m/hr)	1.81080	Porosity	0.30	Time to half empty (mins)	

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	110.0	110.0	0.350	110.0	110.0	0.351	0.0	110.0

Node 26 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	1.81080	Safety Factor	2.0	Invert Level (m)	16.574
Side Inf Coefficient (m/hr)	1.81080	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )	Depth (m)	Area (m <sup>2</sup> )	Inf Area (m <sup>2</sup> )
0.000	180.0	180.0	0.500	180.0	180.0	0.501	0.0	180.0

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