



Mann Williams
Consulting Civil and
Structural Engineers

Cyfarthfa Castle

Roof Surface Water Drainage Strategy

Job Number: 12050

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Appendices

Appendix 1 – Proposed Drainage Strategy Drawing

Suitability Codes as stated within QA data describe documents intended use and are in accordance with BS EN ISO 19650-2-2018.

Code	Description
Shared (Non-Contractual – Not For Construction)	
S1	For Coordination
S2	For Information
S3	For Review & Comment
S4	For Review & Authorization
S5	For Review & Acceptance
Published (Contractual)	
A1	Stage 1 Authorized (Not For Construction)
A2	Stage 2 Authorized (Not For Construction)
A3	Stage 3 Authorized (Not For Construction)
A4	Stage 4 Authorized (For Construction)
A5	Stage 5 Authorized (Final Design Record)

Quality Assurance

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Whilst all reasonable care has been taken in this assessment, we cannot guarantee that during the lifetime of this development the flood risk may not exceed that stated in this report. This report has addressed the risk of flooding to the site from surface water runoff, and the conclusions stated in it are based on our best estimate using available data with a precautionary approach taken where possible. We must make it clear that the assessment of weather generated flooding is inexact and that analysis is limited by the accuracy and availability of recorded data. Higher flood risk may occur in the future due to the actions or omissions of third parties, or to poor maintenance, blockage, storm events in excess of the design standard quoted, inaccuracy or unavailability of data. Flooding beyond that estimated in this report may also occur due to climate change.

1.0 Introduction

- 1.1.1 Mann Williams have been appointed to advise on a surface water drainage strategy to inform repairs to existing drainage infrastructure at Cyfarthfa Castle, Cyfarthfa Park, Brecon Rd, Merthyr Tydfil CF47 8RE, and address local and national policy requirements.
- 1.1.2 Merthyr Tydfil County Borough Council (MTCBC) are proposing sensitive restorations to the historic Grade I listed castle including a temporary roof structure and drainage works. During the proposed work it may be necessary to erect a tented scaffold over Cyfarthfa Castle, covering all areas except the mid-20th-century extensions to the north-east elevation. Once works are complete new above ground rainwater goods, and below ground drainage infrastructure will convey surface water to a dedicated surface water network, to be disposed of, off site via an existing offsite surface water connection.
- 1.1.3 This drainage strategy has been prepared to accompany listed building and planning applications in line with the policies set out in the Merthyr Tydfil County Borough Council Replacement Local Development Plan as listed in the pre-application advice letter. The proposed drainage strategy has been developed to deliver a scheme which addresses both the run-off from the temporary condition and long-term drainage scenarios. This strategy targets the most sustainable disposal techniques identified in the sustainable drainage hierarchy, relevant to this site.

2.0 Site Location & Existing Development

2.1 Site Location & Setting

- 2.1.1 The proposed development is located at Cyfarthfa Castle, Cyfarthfa Park, Brecon Rd, Merthyr Tydfil CF47 8RE at national grid reference SO 04176 07331.
- 2.1.2 The nearest statutory main river to the development site is the River Taff, located approximately 300m West of the castle.
- 2.1.3 A desktop investigation has been undertaken and it has been shown that the site is underlain by impermeable ground conditions.
- 2.1.4 The Castle site and grounds extend over a large area, approximately 50Ha. This largely comprises of woodland and open grassland with a body of water to the South West of the site. The Castle is approximately central to the wider site.
- 2.1.5 A wooded area to the North East is drained by a networks of ditches and water courses. These watercourses enter a below ground drainage network and discharge via a connection to the Welsh Water public surface water drain to the south of the site.
- 2.1.6 The plant nursery, greenhouse & associated building to the north is understood to be drained by a conventional network to Cyfarthfa Park Lake which is entirely separate from the proposed surface water network
- 2.1.7 The grassland to the south drains overground commensurate to its greenfield characteristics.



Figure 1 Approximate extents of Castle grounds highlighted green, to the North West of Merthyr Tydfil town centre. (freemaptools.com)

2.2 Existing Development

- 2.2.1 The roofscape of Cyfarthfa Castle, its courtyards, and surrounding hard paved ground, cover an area of approximately 9000m². An overview of the site with key features identified is illustrated in Figure 3.
- 2.2.2 The existing roofscape and courtyards of the castle are approximately 4500m² and has been illustrated in Figure 2.
- 2.2.3 Drainage around the perimeter of the castle comprises a combined network, in some locations the drainage is at a significant depth below external ground as it is believed gravity drainage serves the basement storey. Both RWP's and yard gullies connect to combined sewers within the castle courtyards and other areas (for example the forecourt) discharge overground to the surrounding soft landscaping.
- 2.2.4 During exceedance events, rainfall follows overland flow routes dictated by the topography of the land.
- 2.2.5 There have been some remediation works to the below ground network which have improved conveyance, but the present-day network remains to be a combined surface and foul water network.

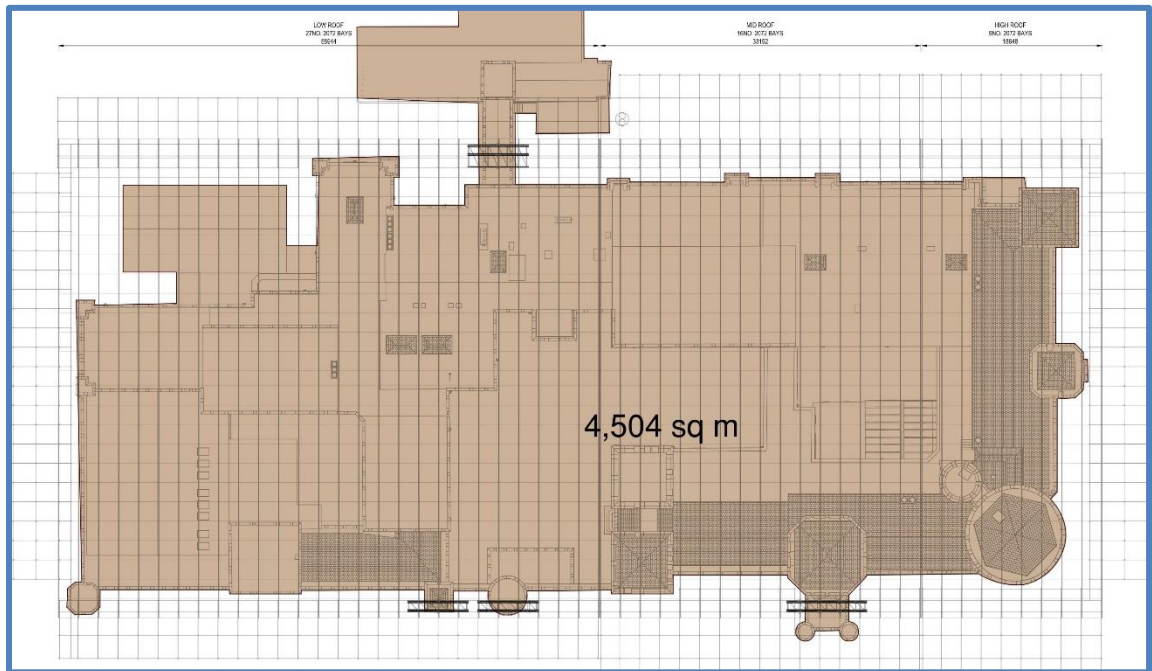


Figure 2 Existing roofscape area of Cyfarthfa Castle, shaded brown with an approximate site area.

- 2.2.6 It has been reported by the client that some of the main drainage runs are in poor conditions, and as expected, are undersized. Occurrences of flooding within the grounds are known to occur. A CCTV survey has been undertaken which has confirmed numerous defects in the drains across the site and that extensive remedial works or replacement drains are required at various points within the network.

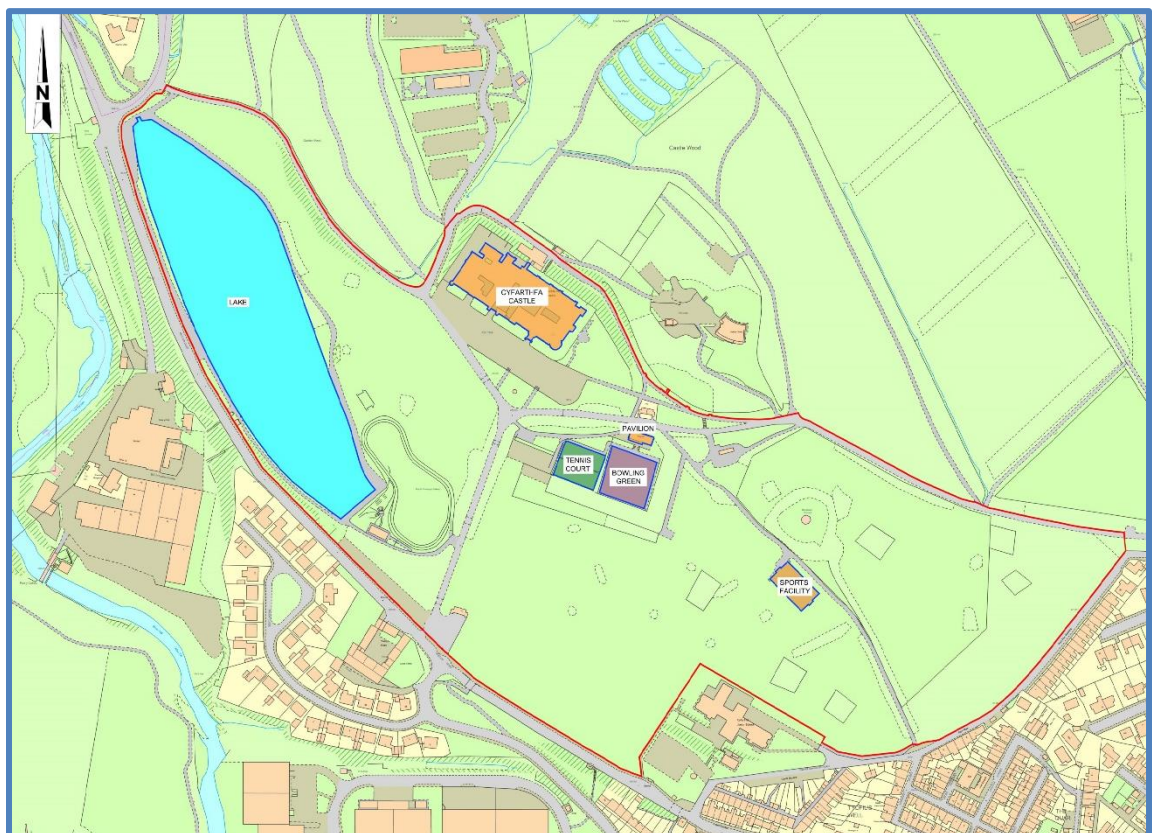


Figure 3 Cyfarthfa Castle with key features identified

3.0 Proposed Development

- 3.1.1 The long-term development comprises general repairs to the castle requiring the installation of a temporary scaffold enclosure and temporary over roof.
- 3.1.2 During the installation of the temporary roof enclosure, the rate of run-off will be increased relative to the pre-development scenario due to the large relatively uniform and sloping surface of the temporary roof.
- 3.1.3 A drainage strategy is required to address the temporary condition, but also provide the refurbished castle with a sustainable surface water drainage system for the ongoing future.
- 3.1.4 The temporary roof enclosure will cover the existing roofscape including any drainage features, this drainage strategy has been prepared to demonstrate how surface water runoff from the temporary over roof is to be conveyed away from the structure and disposed of at a controlled rate. It also demonstrates the improvements which will result for the future scenario.
- 3.1.5 No increase in impermeable area is to be created as part of the development proposals.

4.0 Surface Water Drainage Strategy

4.1 Drainage Strategy

- 4.1.1 It is proposed to install a new below ground surface water drainage network to convey runoff away from the building to an existing point of discharge within the wider ownership of Cyfarthfa Castle.
- 4.1.2 The new drainage infrastructure will be designed for two scenarios:
 - a) a temporary over roof required during the construction phase
 - b) the refurbished building and roofscape for the long-term future.
- 4.1.3 Defra and the SuDS Manual recommend a sustainable approach to managing runoff from impermeable areas.
- 4.1.4 A surface water management train has been developed to manage the run-off from the site in accordance with the Welsh Governments Sustainable Drainage Developer Guide (WGSDDG).
- 4.1.5 Due to the impermeable ground conditions, it has been agreed with MTCBC that infiltration is not a viable disposal solution.
- 4.1.6 Trial excavations have been carried out to confirm underlying bedrock is at a suitable depth to allow excavations for below ground tanks to be carried out with conventional excavating machinery.
- 4.1.7 The design criteria for the network, attenuation and rate control have been discussed with MTCBC where it was agreed that the 60-minute 1in10yr event would be the design scenario for the temporary condition, otherwise the requirements of the WGSDDG will apply for the permanent scenario.
- 4.1.8 The network for the permanent scenario will be designed for the 1 in 30-year event. With the current principal network collapsed, storm water goes to ground so exceedance is difficult to ascertain but likely to flow down the hill towards the lake and lower parkland.
- 4.1.9 A further constraint is to meet the limiting capacity of the existing below ground network beyond the proposed final site connection into the existing network to the roads and residential estate beyond.

- 4.1.10 As an existing developed site, a betterment target of 30% over existing run-off rates for design storms is to be achieved.

4.2 Proposed Solution

- 4.2.1 The proposed method of surface water disposal is via attenuated, controlled discharge to an existing Welsh Water connection at the South East of the development site. The disposal of storm water will reuse existing rainwater pipes where appropriate with trapped gullies and catch pits to collect debris & silt. An attenuation tank will allow flow control for the two scenarios described in paragraph 4.1.7 and 4.1.8.
- 4.2.2 The proposal seeks to control the peak rate of surface water run off to a betterment of 30% of the pre-development rate in line with the WGSDDG.
- 4.2.3 The proposed scheme will convey the surface water into a new below ground network comprising new pipework, manholes and a geocellular attenuation tank prior to controlled discharge into the existing Dwr Cymru Welsh Water gravity sewer to the south of the development site.

4.3 Temporary Over Roof Scenario

- 4.3.1 The temporary over roof which will collect and discharge surface water to the new below ground network has been calculated as being approximately 5400m² in area and is illustrated in Figure 4.
- 4.3.2 The temporary roof scaffold will discharge surface water runoff to the drainage network via conventional gullies, conveyance will be via a below ground pipe and chamber network, a geocellular below ground attenuation tank will provide storage to allow the rate of run-off will be controlled by a flow control device.
- 4.3.3 Existing peak surface water runoff has been calculated in accordance with the Wallingford Procedure for an area of 5400m². There are some limitations to this analysis which does not account for wetting of the building, storage within existing pipes or runoff from flows that may already be disposed of via the poor performing existing network.



Figure 4 Approximate temporary scaffold roof area

- 4.3.4 Estimated peak surface water runoffs pre and post development have been calculated for the 60-minute duration storm events and have been tabulated below in Table 1.

Table 1 Temporary Scenario - Existing surface water runoff and minimum betterment requirement in accordance with gov.wales

Return Period	Existing Maximum surface water runoff (l/s)	30% betterment to existing (l/s)
1 in 1 year	41.0	28.7
1 in 2 year (Qbar)	52.5	36.8
1 in 10 year	77.4	54.2

- 4.3.5 It is proposed to limit the surface water runoff for all events up to a maximum of 20.0 l/s which is the approximate capacity of the existing below ground network (representing a betterment on the pre-development rates).
- 4.3.6 The proposed sewer network has been designed to avoid flooding in the 1in10yr event due to the temporary scenario and 1in30yr event for the permanent design.
- 4.3.7 It has been calculated that an approximate storage volume of 54m³ is required to meet a 20.0 l/s rate control for the over roof with an area of 5400m² for the 1in10yr event.

4.4 Exceedance

In the exceedance events above the 1 in 10-year design event, surface water will flow overground and follow the contours of the landscaped and soft landscaping areas, away from the proposed building and towards the Lake located to the West of the development. This maintains the existing predevelopment exceedance routes.

4.5 Permanent Scenario Allowing for Future Phases of Work.

- 4.5.1 On completion of repairs to the Castle, it is proposed to convey all practical sources of surface water to the new network, via the attenuation tank and to the point of discharge offsite at the south of the site boundary.
- 4.5.2 To achieve this, a new network to convey surface away from the building will be installed, the existing network will remain to serve foul sewage from the building and also any drained basement areas, which are at significant depth below the typical ground level and not practical to collect with the new surface water drainage network.
- 4.5.3 The existing roof catchment area to connect to the below ground network in future phases has been calculated as being approximately 4500m² in area and as illustrated in Figure 5.
- 4.5.4 It is proposed to limit the surface water runoff for all events up to the design event to a maximum of 32.0 l/s (representing a betterment on the pre-development rates).
- 4.5.5 The proposed sewer network has been designed to avoid flooding in the 1in10yr event due to the temporary scenario and 1in30yr event for the permanent design.
- 4.5.6 It has been calculated that a storage volume of 54m³ is required to meet a 32.0 l/s rate control for the roofscape with an area of 4500m² for the 1in30yr event.

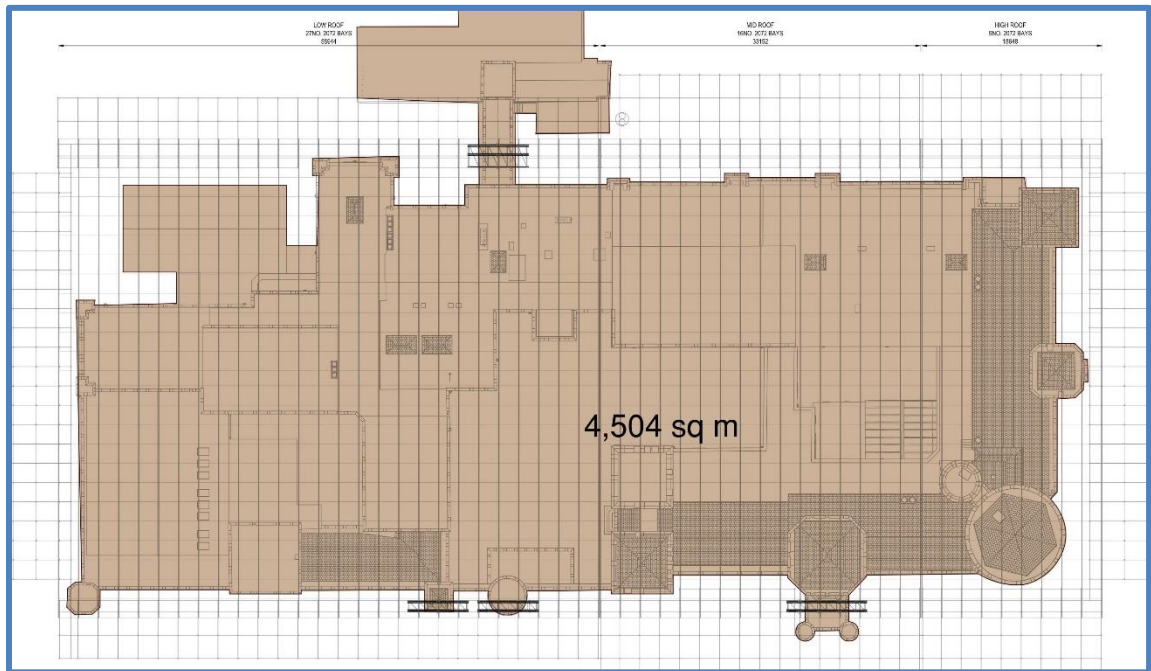


Figure 5 Cyfarthfa Castle's roofscape and catchment areas with Brown shading illustrating areas with the feasibility of connection post temporary over roof.

- 4.5.7 The permanent solution will utilise the same below ground geocellular attenuation tank installed to serve the temporary over roof scenario.
- 4.5.8 A new flow control device is proposed for the permanent scenario to be in accordance with the requirements of the WGSDDG. The flow control is proposed to limit rates of runoff for storms up to the 1 in 30-year events to a minimum betterment of 30% of pre-development rates.
- 4.5.9 Estimated peak surface water runoffs and a 30% betterment have been calculated for the 15-minute duration storm events and have been tabulated below in Table 2. Detailed calculations are proposed to be included at the detailed design stage.

Table 2 Permanent Scenario - Existing surface water runoff and minimum betterment requirement in accordance with gov.wales

Area	Return Period	Existing Maximum surface water runoff (l/s) – 15-min duration	30% Betterment Maximum surface water runoff (l/s) – 15 min duration
Total: 4500m²	1 in 1 year	54.0	37.8
	1 in 2 year (Qbar)	65.0	45.5
	1 in 10 year	92.0	64.4
	1 in 30 year	104.0	72.8

Table 3 Permanent Scenario proposed discharge rates

Area	Return Period	Proposed surface water runoff (l/s) – 15-min duration	Betterment % Maximum surface water runoff (l/s) – 15 min duration
Total: 4500m²	1 in 1 year	22.2	- 59%
	1 in 2 year (Qbar)	27.9	- 57%
	1 in 10 year	32.0	- 65%
	1 in 30 year	32.0	- 69%

4.6 Exceedance

In the exceedance events above the 1 in 30-year design event, surface water will flow overground and follow the contours of the landscaped and soft landscaping areas, away from the proposed building and towards the Lake located to the South West of the development. This maintains the existing predevelopment exceedance routes.

5.0 Conclusion

- 5.1.1 Merthyr Tydfil County Borough Council (MTCBC) are proposing sensitive restorations to the historic Grade I listed castle including a temporary roof structure and drainage works.
- 5.1.2 A sustainable drainage system is proposed to significantly improve the existing scenario, separating where possible surface water flows from the existing combined network and discharging via a new surface water network, connecting to an existing point of discharge from the site.
- 5.1.3 The proposed development seeks to improve the drainage infrastructure around the castle and will significantly reduced flows from the site across all rainfall events.
- 5.1.4 The proposed drainage will provided benefits to the wider community by reducing the rate of run-off from the development.

Appendix 1 – Proposed Drainage Strategy

SURVEY INDICATES
EOT FOR FW AT THIS
POINT. CONTRACTOR
TO INVESTIGATE.

CAPPED OFF TO
ALLOW FOR
CONNECTION
FOR FUTURE
WORK PHASES

KERB ON
CASTLE SIDE OF
DISH CHANNEL

CAPPED OFF TO
ALLOW FOR
CONNECTION FOR
FUTURE WORK
PHASES

EXISTING MANHOLE
INFORMATION UNKNOWN,
CONTRACTOR TO
INVESTIGATE.

CMH1B
(UTL)

EXISTING DRAINAGE
CHAMBERS WITHIN THIS AREA
HAVE NOT YET BEEN
SURVEYED. ALLOWANCE TO BE
MADE FOR NEW CONNECTIONS
TO EXISTING CHAMBERS.

ALLOWANCE TO
BE MADE FOR
BREAKING OUT
EXISTING MH
AND REPLACING
WITH NEW

YARD GULLIES TO
COLLECT HARD
LANDSCAPING INTO
PROPOSED SURFACE
WATER NETWORK.
FINAL POSITION TO
BE AGREED ON SITE.

EXISTING
MANHOLE
INFORMATION
UNKNOWN,
CONTRACTOR TO
INVESTIGATE.

MANHOLE CHAMBER FITTED WITH
HYDROBRAKE FLOW CONTROL DEVICE
TO RESTRICT FLOWS TO 20.0 L/S FOR
STORMS UP TO THE 1 IN 30 YEAR
DESIGN EVENT.

IL = 46.70, 300mm SUMP
BELOW FLOW CONTROL
OUTLET, CIRCA 46.4m.

PURPLE DASH
DENOTES EXTENT
OF EXCAVATION FOR
THE ATTENUATION
TANK

CROSS SECTION
DETAIL (SEE
DRW NO. 0506)

SURFACE WATER FROM
DITCH NETWORK IN
WOODLAND COLLECTED
AND ROUTED INTO BELOW
GROUND DRAINAGE FROM
THIS LOCATION.

MAINTAIN A
CONNECTION TO
EXISTING
DRAINAGE RUN
INTO NEW
PROPOSED

CONVEYANCE	XX	LEVEL	XX	TYPE	DR	ROLE	C	ORIGINATOR	MWB
PROJECT CODE	12050	NUMBER	0501	REVISION					P7

Mann Williams
12050 – Cyfartfha Castle - Roof Surface Water Drainage Strategy

NOTES:

- THE SURVEY INFORMATION USED IN THE PREPARATION OF THIS DRAWING IS TO BE USED FOR INFORMATION ONLY. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS AND LEVELS ON SITE MAIN SURVEYS.
- AN EXISTING UTILITIES SURVEY HAS BEEN USED IN THE PREPARATION OF THIS DRAWING UNDERTAKEN BY GWALIA SURVEYORS DATED 08.2016. MANN WILLIAMS LTD ACCEPTS NO RESPONSIBILITY FOR THE ACCURACY OF THIS SURVEY.
- THIS DRAWING MUST BE READ IN CONJUNCTION WITH THE SITE INVESTIGATION REPORT. BEFORE WORK COMMENCES CONTRACTOR SHOULD CONSULT THE ENGINEER AND THE SITE INVESTIGATION REPORT REGARDING ANY CONTAMINATION ISSUES AND ENSURE ALL NECESSARY HEALTH AND SAFETY MEASURES TO BE TAKEN.
- THIS DRAWING IS SUBJECT TO APPROVAL BY LOCAL AUTHORITY, BUILDING CONTROL, SEWERAGE UNDERTAKER. ANY WORKS UNDERTAKEN PRIOR TO THE GRANTING OF THESE APPROVALS IS CARRIED OUT AT RISK TO OTHERS.
- SHOULD ANY SURPLUS EXCAVATED MATERIAL REQUIRE DISPOSAL OFF SITE, IT SHOULD BE TAKEN TO A SUITABLY LICENSED LANDFILL SITE. DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER.
- SETTING OUT TO BE CONFIRMED BY THE ARCHITECT.
- PRIOR TO COMMENCING WORK ON THE DRAINAGE, ALL EXISTING DRAINS, SEWERS MANHOLES AND OUTFALLS TO REMAIN SHALL BE LOCATED IDENTIFIED AND A CCTV CONDITION SURVEY CARRIED OUT. WHERE NECESSARY, PROTECTION TO THE EXISTING DRAINAGE INFRASTRUCTURE SHALL BE PROVIDED.
- ALL EXISTING SEWERS AND MANHOLES ABANDONED DUE TO THE PROPOSED WORKS ARE TO BE EITHER REMOVED, AND SUITABLY BACKFILLED OR GROUTED UP.
- ALL EXTERNAL DRAINAGE WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY AND THE DESIGN AND CONSTRUCTION GUIDANCE FOR ADAPTABLE DRAINAGE, FOR PRIVATE DRAINAGE IN ACCORDANCE WITH THE BUILDING REGULATIONS PART H AND BS EN 752.
- ALL EXISTING DRAINAGE LEVELS, DIAMETERS & LOCATIONS NEED TO BE CHECKED ON SITE PRIOR TO ANY DRAINAGE WORKS, AND ANY DISCREPANCIES NEED TO BE REPORTED BACK TO THE ENGINEER.
- COVER LEVELS FOR MANHOLES ARE APPROXIMATE ONLY AND SHOULD BE ADJUSTED TO MATCH SURROUNDING LEVELS.
- ALL MANHOLE AND DRAINAGE COVERS SHALL COMPLY WITH BS EN 124. MANHOLE COVERS WITHIN BLOCK PAVED AREA AND BUILDINGS SHALL BE RECESSED. COVER STRENGTHS TO BE - CLASS E600 IN AREAS OF HEAVY LOADING. CLASS D400 IN HEAVY TRAFFICKED AREAS (ROADS, SERVICES YARDS). CLASS C250 LIGHTLY TRAFFICKED AREAS (CAR PARKS). CLASS B125 IN LANDSCAPE AND NON TRAFFICKED AREAS (MIN. 100MM DP FRAME).
- DRAINAGE PIPES 100MM Ø UNLESS STATED OTHERWISE.
- PIPES TO BE - VITRIFIED CLAY (HEPWORTH OR SIMILAR APPROVED) TO BS EN 295-1.
- ALL PIPES TO BE LAID WITH SOFFITS LEVEL, UNLESS NOTED OTHERWISE.
- ALL PIPES BENEATH BUILDINGS TO BE B4S IN CONCRETE. WHERE COVER IS LESS THAN 300MM THE CONCRETE IS TO BE CAST INTEGRALLY WITH THE FLOOR SLAB.
- PIPE RUNS NEAR BUILDINGS.
- IF A TRENCH IS WITHIN 1M OF A BUILDING IT SHALL BE FILLED WITH CONCRETE UP TO THE LOWEST LEVEL OF THE ADJACENT FOUNDATION. IF A TRENCH IS GREATER THAN 1M FROM A BUILDING THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO A LEVEL BELOW THE BUILDING EQUAL TO THE DISTANCE FROM THE BUILDING LESS 150mm.
- VENTILATION SHALL BE PROVIDED AT THE HEAD OF THE FOUL DRAINAGE RUNS.
- FOR SETTING OUT OF SVP AND RWP, SEE ARCHITECTS LAYOUT.
- THRESHOLD DRAINAGE IS REQUIRED WHERE LEVELS FALL TOWARDS A BUILDING ENTRANCE. ARCHITECT TO CONFIRM IF NOT REQUIRED.
- YARD GULLY POSITIONS ARE INDICATIVE, SHOULD BE ADJUSTED ON SITE TO SUIT LEVELS.
- ALL GULLY POSITIONS TO SUIT LOW POINTS AND TO BE TRAPPED.
- ALL CONCRETE TO DRAINAGE, MANHOLES BASES, SURROUNDS ETC TO BE IN ACCORDANCE WITH THE BRE SPECIAL DIGEST 1 - CONCRETE IN AGGRESSIVE GROUND. REFER TO SITE INVESTIGATION REPORT FOR SULPHATE REQUIREMENTS.
- ALL MANHOLES, PIPE TRENCHES ETC. TO BE BACKFILLED WITH IMPORTED GRANULAR FILL TO CLASS 6F1-6F5 (CAPPING MATERIAL) TO (SHW) TABLE 6/1 & COMPACTED IN ACCORDANCE WITH TABLE 6/4.
- ALL PIPELINES SHALL BE TESTED BOTH BEFORE AND AFTER BACKFILLING, USING EITHER AIR TEST OR WATER TEST, IN ACCORDANCE WITH BS EN 1610.
- ALL WORKS TO SEWERS/ MANHOLES BEING OFFERED FOR ADOPTION OR ON EXISTING PUBLIC SEWERS SHOULD BE IN ACCORDANCE WITH 'DESIGN AND CONSTRUCTION GUIDANCE' AND THE ADOPTING WATER AUTHORITY'S RECOMMENDATIONS.
- REQUIREMENT FOR LAND DRAINS TO BE ASSESSED ON SITE BY THE SITE MANAGER.

STATUS	DESCRIPTION
S1	SUITABLE FOR COORDINATION
S2	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S3	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S4	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S5	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
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S77	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S78	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S79	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S80	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S81	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S82	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S83	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S84	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
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S88	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S89	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S90	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S91	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S92	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S93	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S94	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S95	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S96	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S97	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S98	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S99	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE
S100	SUITABLE FOR STAGE REVIEW AND ACCEPTANCE

DRAINAGE KEY:

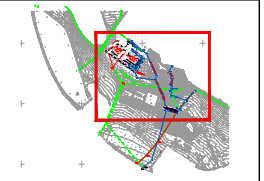
—	EXISTING SURFACE WATER RUN
—	EXISTING FOUL WATER RUN
—	EXISTING COMBINED WATER RUN/PROPOSED FOUL
—	ASSUMED EXISTING SURFACE WATER DRAINAGE ROUTES
—	PROPOSED SURFACE WATER RUN
—	EXISTING PIPE RUNS TO BE REPLACED
—	ROOT BARRIER (ALONG DRAINAGE TRENCH)
—	CASTLE CATCHMENT AREAS
—	GULLY
—	EXISTING MANHOLES

EXISTING SERVICES KEY:

—	WATER
—	ELECTRIC
—	GAS
—	SW DRAINAGE
—	UNIDENTIFIED

NAMING KEY:

RWP	- RAIN WATER PIPE
RE	- RODDING EYE
GY	- GULLY
R-GY	- ROAD GULLY
P-CP	- PERFORATED CATCH PIT
FC	- FLOW CONTROL CHAMBER
DP	- DOWN PIPE



REV	DESCRIPTION	BY	DATE
P1	PRELIMINARY ISSUE	FM	12.11.24
P2	VEGETATION ADDED	FM	13.11.24
P3	DRAINAGE AMENDED AND CATCHMENT/SCENARIO ADDED	FM	10.12.24
P4	FUTURE DRAINAGE RUNS CAPPED AND NOTES AMENDED TO SUIT	FM	07.01.25
P5	PRELIMINARY ISSUE CAPPED AND NOTES AMENDED TO SUIT	FM	17.01.25
P6	PRELIMINARY ISSUE UPDATES	FM	17.02.25
P7	AMENDED TO SUIT MINOR COMMENTS	FM	14.03.25

PROJECT
CYFARTFHA CASTLE -
SCAFFOLD PROTECTION

TITLE
DRAINAGE LAYOUT
SHEET 1



DRAWN	CHECKED	DATE	SCALE	DATE	BY	JOB NO.
FM	JP	13.11.24	1:500	NOV 2024	FM	12050

S2 | PRELIMINARY
(NOT FOR CONSTRUCTION)

CONVEYANCE	XX	LEVEL	XX	TYPE	DR	ROLE	C	ORIGINATOR	MWB
PROJECT CODE	12050	NUMBER	0501	REVISION					P7

