Acacia Avenue, Port Talbot

Drainage Strategy

July 2024

Assessment | Modelling | Design

Project Information	
Project:	Acacia Avenue, Port Talbot
Report Title:	Drainage Strategy
Client:	Fresenius Medical Care
Instruction:	The instruction to undertake this Drainage Strategy was received from Phil Pearson of Sandycroft Projects Limited acting on behalf of the Client.
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Approval Record	
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	Document History	
Revision	**Date**	**Comment**
01	19/07/2024	First issue
02	22/07/2024	Second issue – Updated development description

This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

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Introduction

Waterco has been commissioned to undertake a Drainage Strategy in relation to a proposed renal dialysis unit at Stationery House, Acacia Avenue, Port Talbot, SA12 7DP.

The aim of the Drainage Strategy is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment. This report has been prepared in accordance with the Welsh Government 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems' (2018) – herein referred to as 'the Statutory Standards for SuDS'.

Existing Conditions

The site covers an area of approximately 3,860m^2 and is located at National Grid Reference (NGR): 274720, 190728. A location plan and an aerial image are included in Appendix A.

Online mapping (including Google Maps / Google Streetview imagery, accessed July 2024) shows that the site comprises a former industrial unit with associated parking / yard space. The site is bordered by a car park to the north-west, the A4241 (road) to the north-east, residential properties to the south-east and Acacia Avenue to the south-west. Access to the site is provided from Acacia Avenue.

Local Topography

A topographical survey has been undertaken by Redbox Surveys in June 2024. The topographical survey shows that the site slopes from 8 metres Above Ordnance Datum (m AOD) in the south to 7.2m AOD in the north.

Topographic levels to m AOD have also been derived from a 1m resolution Natural Resources Wales (NRW) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data corresponds with the topographical survey.

Topographical data is provided as Appendix B.

Ground Conditions

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is underlain by superficial deposits of blown sand. The superficial deposits are identified as being underlain by the South Wales Middle Coal Measures formation consisting of mudstone, siltstone and sandstone.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

Infiltration testing was undertaken by Rhondda Geotechnical Services in July 2024. The Rhondda Geotechnical Services' report is included in Appendix C. The following ground conditions were identified during the infiltration testing:

- Tarmac and subbase to 0.15 meters below ground level (m.bgl).
- Loose yellowish brown fine to medium sand with occasional brick from 0.15m.bgl to 0.6m.bgl.
- Medium dense brown fine to medium sand from 0.6m.bgl to 1.5m.bgl.
- Soft brown very peaty, sandy clay from 1.5m.bgl to 1.7m.bgl.

Groundwater was recorded at 1.5m.bgl.

The infiltration test results show that infiltration techniques are feasible within the shallow soils (up to 0.7m.bgl). However, and in accordance with G3.32 of the Statutory standards for sustainable drainage systems, 'there should be a minimum depth of unsaturated ground of 1m between the base of any infiltration system and the maximum likely ground water level'. Based on the presence of groundwater at 1.5m.bgl, infiltration drainage features are not considered feasible.

It is further noted that the groundwater level was recorded in July 2024 during drier summer months. Groundwater levels may be higher in wetter winter months.

Local Drainage

Public sewer records have been obtained from DCWW are included in Appendix D. The sewer records show that there is a 300mm public combined sewer crossing through the western extent of the site. The public combined sewer orientates west from the site within Acacia Avenue. There is also a 225mm public combined sewer immediately north-west of the site flowing north-east.

As shown on the topographical survey (Appendix B), there is an existing surface water and foul connection from the site to the public combined sewer.

Development Proposals

The proposed development is for a substantial reduction of the existing building and the refurbishment of the remaining structure to a moder renal dialysis unit, with associated parking and landscaped areas. Existing and proposed development plans are included in Appendix E.

Hardstanding will comprise approximately 2,823m^2 (73% of the site area) in the form of the renal dialysis unit and parking / access road. Hardstanding measurements have been taken from a PDF copy of the 'Site Layout Plan - as proposed' and should be verified at the detailed design stage.

Policy Context

The Neath Port Talbot Council Local Development Plan contains the following policies relating to drainage:

'Policy BE1 Design

All development proposals will be expected to demonstrate high quality design which fully takes into account the natural, historic and built environmental context and contributes to the creation of attractive, sustainable places.

Proposals will only be permitted where all of the following criteria, where relevant, are satisfied:…

9. Its drainage systems are designed to limit surface water runoff and flood risk prevention pollution.'

Consultation

A pre-development enquiry request was submitted to DCWW in July 2024. A response is awaited.

Surface Water Management

The site is occupied by an industrial building. Surface water currently drains to the public combined sewer crossing the site.

The proposed development includes approximately 2,823m² of hardstanding in the form of the renal dialysis unit and associated parking / access road.

To ensure the proposed development will not increase flood risk elsewhere, and in order to provide betterment over the existing situation, surface water from the site will be controlled and attenuation storage provided on site to accommodate the 1 in 100 year plus climate change (CC) event.

Discharge Rate

In accordance with the Statutory standards for sustainable drainage systems, 'the surface water runoff rate for the 1 in 1 year return period event should be controlled to help mitigate the negative impacts of the development runoff'.

To establish the proposed limited discharge rate, greenfield runoff rates have been estimated using the Revitalised Flood Hydrograph Model (ReFH2) method. A summary of the runoff rates for a range of events is included as Appendix F. The existing 1 in 1-year greenfield rate for the 0.386ha development site is 0.58 l/s. The 1 in 100 year greenfield runoff rate is 1.85 l/s.

Existing brownfield runoff rates have been derived using the Modified Rational Method Q=CiA, whereby:

- Q is the runoff rate in litres per second

- C is a dimensionless coefficient
- i is the rainfall intensity for a 6 hour storm duration (derived from FEH rainfall data
- A is the existing contributing drainage area in hectares (0.339ha).

A summary of the brownfield runoff rates is provided in Table 1

Table 1 – Brownfield (existing) Runoff Rates (l/s)

Storm event	Rainfall Intensity (mm)	Runoff Rate
1 in 2	27.22	25.65
1 in 30	48.05	45.28
1 in 100	58.58	55.20

A discharge rate of 2 l/s is proposed for this site to ensure the drainage system is self-cleansing. A developer enquiry request has been submitted to Welsh Water to agree the discharge rate.

A discharge rate of 2 l/s provides 92.2% betterment over the existing 1 in 2 year brownfield runoff rate.

Discharge Method

Standard S1 of the Statutory Standards for SuDS sets out the following hierarchy of drainage options:

Priority Level 1: Surface water runoff is collected for use;

Priority Level 2: Surface water runoff is infiltrated to ground;

Priority Level 3: Surface water runoff is discharged to a surface water body;

Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system;

Priority Level 5: Surface water runoff is discharged to a combined sewer.

Priority Level 1: Surface water runoff collected for use

In line with section G1.4 of the Statutory Standards for SuDS, rainwater harvesting is not proposed for this site as:

1. There is no foreseeable need to harvest water at the site as DCWW water resources and drought management plans do not identify potential stresses on mains water supplies;
2. The use of rainwater harvesting is not a viable/ cost-effective part of the solution for managing surface water runoff on the site, taking account of the potential water supply benefits of such a system.

With regards to point 2 above, section G1.6 of the Statutory Standards for SuDS states that; in most cases, rainwater harvesting alone will not be adequate to deal with the site drainage and provision will be required

for an overflow to a Level 2 or lower priority runoff destination. As downstream provision of attenuation storage would be required to accommodate for rainwater harvesting system overflows, rainwater harvesting is not considered a cost-effective solution for managing surface water runoff.

Priority Level 2: Surface water runoff is infiltrated to ground

As described above, the infiltration test results show that infiltration techniques are feasible within the shallow soils (up to 0.7m.bgl). However, and in accordance with G3.32 of the Statutory standards for sustainable drainage systems, 'there should be a minimum depth of unsaturated ground of 1m between the base of any infiltration system and the maximum likely ground water level.' Based on the presence of groundwater at 1.5m.bgl, infiltration drainage features are not considered feasible.

It is further noted that the groundwater level was recorded in July 2024 during drier summer months. Groundwater levels may be higher in wetter winter months.

Priority Level 3: Surface water runoff is discharged to a surface water body

Where infiltration is not suitable, a connection to watercourse is the next consideration. There are no watercourses in the vicinity of the site therefore a connection to a watercourse is not viable.

Priority Level 4: Discharge to a surface water sewer or highway drain

Where disposal of surface water to watercourse is not possible, a connection to the public surface water sewer system is the next consideration. There are no public surface water sewers within in the vicinity of the site.

Priority Level 5: Surface water runoff is discharged to a combined sewer

A connection to the public combined sewer system is the final consideration. Surface water runoff from the site currently drains to the public combined sewer which crosses the site.

As shown on the topographical survey (Appendix B), public combined manhole SS74906701 within the site has an identified invert level of 6.07m AOD (approximately 1.78m below ground level). An existing manhole chamber on site which has a connection to the public combined sewer has an identified invert level of 6.29m AOD (1.55m below cover levels). A gravity connection is therefore considered to be feasible.

It is proposed to make a connection to the existing manhole chamber on site which ultimately drains via a 225mm pipe to the public combined sewer. A discharge rate of 2 l/s is proposed which is subject to agreement with Welsh Water.

Attenuation Storage

To achieve a discharge rate of 2 l/s, attenuation storage will be required. An attenuation storage estimate has been provided using MicroDrainage and is included in Appendix G. An estimated storage volume of 208m³ will be required to accommodate the 1 in 100 year plus 40% CC event. The storage estimate is based on a discharge rate of 2 l/s, storage within a tank structure, an impermeable drainage area of 2,820m², a design head of 1m and hydro-brake flow control.

Sustainable Drainage Systems

Attenuation storage will be provided in the form of Sustainable Drainage Systems (SuDS). The following drainage features are proposed:

Permeable surfacing will be incorporated for the car parking spaces. Attenuation storage will be provided within the sub-grade material of the permeable car parking. The sub-grade of the permeable surfaced car parking will be formed from a 0.3m depth of stone aggregate underlain by a 0.4m deep geo-cellular storage structure.

Runoff from the access road will either flow onto the permeable surfaced parking spaces or directed via a collection gully and pipe to the sub-grade. Runoff from the building roof will be piped to the permeable surfacing sub-grade.

Based on a combined car parking space area of approximately 443m^2, a stone sub-grade depth of 0.3m with a void ratio of 30%, will accommodate 39.87m^3 of attenuation storage (assuming the base of the sub-grade will be formed at a level gradient).

Based on a combined car parking space area of approximately 443m^2, a geo-cellular sub-grade depth of 0.4m with a void ratio of 95%, will accommodate 168.34m^3 of attenuation storage.

The combined stone and geo-cellular sub-grade will provide 208.21m^3 of attenuation storage, sufficient to accommodate the 1 in 100 year plus 40% CC storm event.

Rain Gardens

Rain gardens are proposed peripheral to the car park area and will be linked hydraulically (by pipes) to the sub-grade of the permeable surfacing. Rain gardens will provide both amenity and bio-diversity benefits to the site. The rain gardens will also offer additional storm water storage in extreme exceedance events.

Concept Surface Water Drainage Scheme

Surface water runoff will be discharged to the public combined sewer which crosses the site via an existing connection. Discharge will be made at a limited rate of 2 l/s, providing significant betterment over the existing situation. Surface water runoff up to the 1 in 100 year plus 40% climate change event will be attenuated on site. A total attenuation volume of 208m^3 will be required to achieve the discharge rate and will be provided in the form of the sub-grade of permeable surfacing. The sub-grade will be formed from a 0.3m depth of stone aggregate underlain by a 0.4m deep geo-cellular storage structure.

The sub-grade will be lined as to prevent groundwater ingress. A geo-cellular structure with suitable load bearing capacity such as the Polypipe Permavoid system will be used to enable shallow depth installation.

A Concept Drainage Sketch is included in Appendix H.

Exceedance Event

Storage will be provided for the 1 in 100 year plus 40% CC event. Storm events in excess of the 1 in 100 year plus 40% CC event should be permitted to produce temporary shallow depth flooding within the car park,

access road and landscaped areas (including in the rain gardens which offer additional attenuation volume).

Surface Water Treatment

The Statutory Standards for SuDS sets out the following guidance for surface water treatment:

S3 - Surface water quality management

Treatment for surface water runoff should be provided to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems, including sewers.

In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), other roofs (applicable to the Renal unit) and low traffic roads / car parking have a 'low' pollution hazard level. Table 2 shows the pollution hazard indices for each land use.

Table 2 – Pollution Hazard Indices

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other Roofs	Low	0.3	0.2	0.05
Low Traffic Roads / Car parks with infrequent change	Low	0.5	0.4	0.4

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

Runoff from roofs and the car park will be drained via permeable surfacing. The permeable surfacing will have a minimum 0.3m stone sub-grade which will provide treatment through filtration of water. Table 3 demonstrates that permeable paving provides sufficient treatment.

Table 3 – SuDS Mitigation Indices

	Mitigation Indices		
Type of SuDS	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Permeable Pavement	0.7	0.6	0.7

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

Subject to final site levels, runoff from parts of the site access road may need to be collected by gullies and piped directly to the permeable surfacing sub-grade, or piped directly to the flow control chamber. In such instances, treatment will be provided in the form of a suitably sized separator (such as the SDS AquaSwirl).

Amenity

The Statutory Standards for SuDS provide the following guidance in relation to Standard S4 – Amenity:

'The design of the surface water management system should maximise amenity benefits.'

The proposed development will include raingardens and permeable surfacing which will maximise the amenity value of the proposed drainage system.

Biodiversity

The Statutory Standards for SuDS provide the following guidance in relation to Standard S5 – Biodiversity:

'The design of the surface water management system should maximise biodiversity benefits.'

The proposed raingardens will maximise the biodiversity value of the proposed development.

Construction, Operation and Maintenance

Standard S6 of the Statutory Standards for SuDS states:

S6 – Design of drainage for Construction, Operation and Maintenance

1) All elements of the surface water drainage system should be designed so that they can be constructed easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).

2) All elements of the surface water drainage system should be designed to ensure maintenance and operation can be undertaken (by the relevant responsible body) easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).

3) The surface water drainage system should be designed to ensure structural integrity of all elements under anticipated loading conditions over the design life of the development site, taking into account the requirement for reasonable levels of maintenance.

All drainage systems will be readily accessible for maintenance access.

Maintenance of the drainage system will be the responsibility of the site owner. Maintenance can be arranged through appointment of a site management company.

Maintenance schedules for permeable paving and raingardens (bioretention systems) are included in Appendix I. Maintenance of a separator will be as per the manufacturer's guidance.

Foul Drainage

Foul flows will be discharged to the public combined sewer crossing the site utilising the existing connection. A gravity connection can be achieved.

The site layout provides a greater than 3m offset from the proposed building to the public combined sewer crossing the site.

Conclusions

The proposed development is for a substantial reduction of the existing building and the refurbishment of the remaining structure to a moder renal dialysis unit, with associated parking and landscaped areas.

All methods of surface water discharge have been assessed. Infiltration techniques are not considered suitable due to the presence of groundwater at 0.5m.bgl. In absence of a nearby watercourse or public surface water sewer, a connection to the public combined sewer is proposed.

Surface water from the site currently discharges to the public combined sewer which crosses the site. The existing connection will be retained. Discharge will be made at a limited rate of 2 l/s, providing significant betterment over the existing situation.

Surface water runoff up to the 1 in 100 year plus 40% climate change event will be attenuated on site. A total attenuation volume of 208m³ will be required to achieve the discharge rate and will be provided in the form of the sub-grade of permeable surfaced parking spaces. The sub-grade will be formed from a 0.3m depth of stone aggregate underlain by a 0.4m deep geo-cellular storage structure.

The sub-grade will be lined as to prevent groundwater ingress. A geo-cellular structure with suitable load bearing capacity such as the Polypipe Permavoid system will be used to enable shallow depth installation.

Raingardens are also proposed to provide amenity and biodiversity benefits.

Foul flows will be discharged to the public combined sewer crossing the site utilising the existing connection.

A Concept Designer's Risk Assessment (cDRA) has been prepared to inform future designers of any identified hazards associated with the scheme. The cDRA has been included in Appendix J.

Recommendations

1. Submit this Drainage Strategy to the Planning Authority in support of the Planning Application.

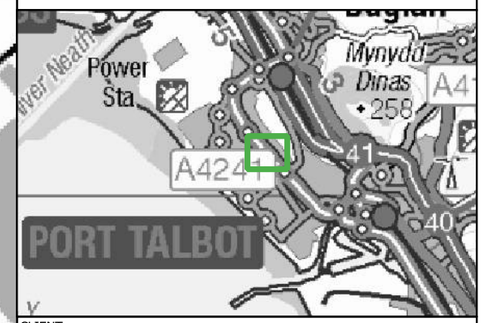
2. Undertake detailed drainage design and submit a SAB application.

Appendix A Location & Aerial Plan

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies



CLIENT:
Fresenius Medical Care

waterco
www.waterco.co.uk

SCHEME:
Acacia Avenue, Port Talbot

PLOT TITLE:
Location Plan

PLOT STATUS:	DATE:
FINAL	08-07-2024

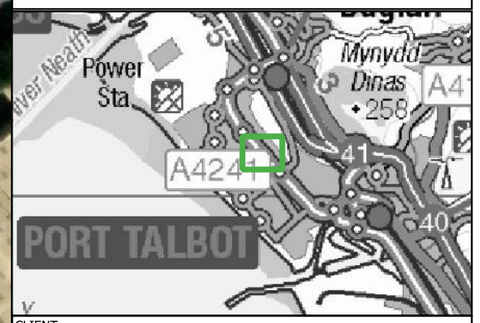
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IT	AW	MW	1:2000

PLOT NAME:	REVISION:
15942_Location_Plan	-

Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary



CLIENT:
Fresenius Medical Care

www.waterco.co.uk

SCHEME:
Acacia Avenue, Port Talbot

PLOT TITLE:
Aerial Plan

PLOT STATUS:	DATE:
FINAL	08-07-2024

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IT	AW	MW	1:2000

PLOT NAME:	REVISION:
15942_Aerial_Plan	-

Appendix B Topographical Information

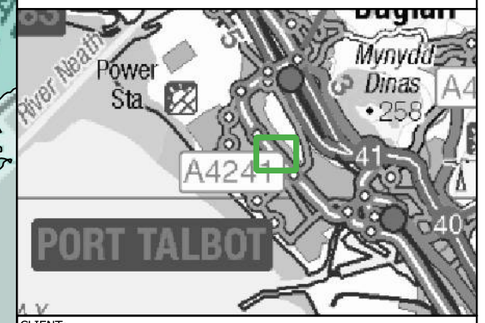
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- 1m contour
- Site Levels (m AOD)

Ground Elevations (m AOD)

- <= 6
- 6 - 7
- 7 - 8
- 8 - 9
- 9 - 10
- > 10



CLIENT:
Fresenius Medical Care

waterco
www.waterco.co.uk

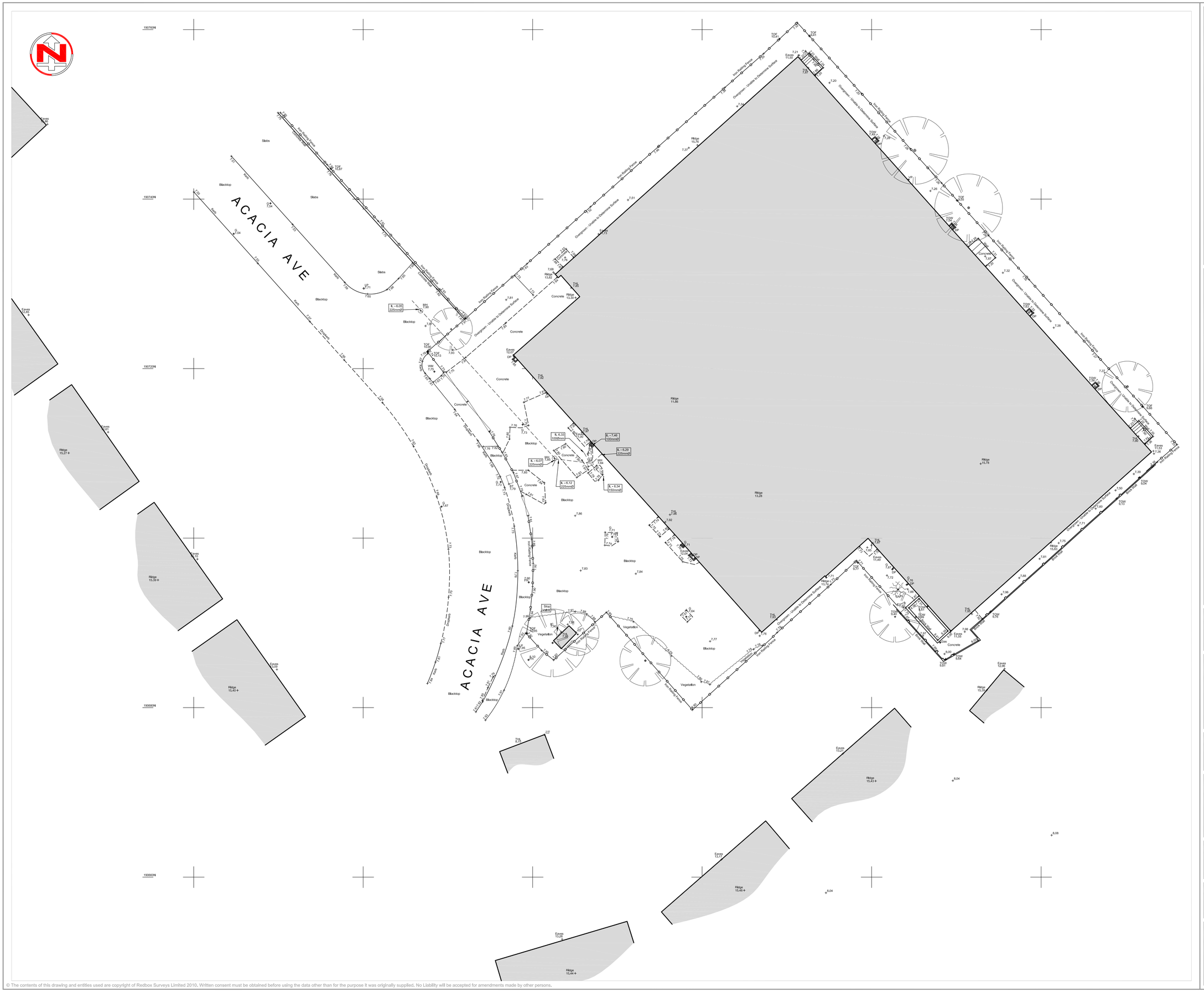
SCHEME:
Acacia Avenue, Port Talbot

PLOT TITLE:
LiDAR Plan
1m Resolution
Data from Natural Resources Wales

PLOT STATUS:	DATE:
FINAL	10-07-2024

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IT	AW	MW	1:2000

PLOT NAME:	REVISION:
15942_LiDAR_Plan	-



Topographical Survey Abbreviations

AC	AIR CONDITIONING UNIT	LP	LAMP POST
B	BOLLARD	MKR	MARKER POST
BB	BELISHA BEACON	MH	MANHOLE
BED	BED LEVEL	OHC	OVERHEAD CABLE
BH	BOREHOLE (WITH No.)	PM	PARKING METER
BS	BUS STOP	P	POST
BT	BRITISH TELECOM COVER	RE	RODDING EYE
CATV	CABLE TELEVISION COVER	RS	ROAD SIGN
CC	CONTROL CABINET	RWL	RETAINING WALL
CL	COVER LEVEL (MANHOLE)	SA	SOAK AWAY
COL	COLUMN	SCAM	SECURITY CAMERA
CP	CATCH PIT	SG	STRIP GULLY
DP	RAIN WATER DOWN PIPE	SP	SIGN POST
EC	ELECTRIC CABLE	SV	STOP VALVE
EL	ELECTRIC COVER	TAP	WATER TAP
EP	ELECTRIC POLE	TCB	TELEPHONE CALL BACK
ER	EARTH ROD	THL	THRESHOLD LEVEL
FFL	FINISHED FLOOR LEVEL	TL	TRAFFIC LIGHT
FH	FIRE HYDRANT	TOF	TOP OF FENCE LEVEL
FLT	FLOODLIGHT	TOW	TOP OF WALL LEVEL
G	GULLY	TP	TELEGRAPH POLE
GP	GATE POST	TPIT	TRIAL PIT (WITH No)
GV	GAS VALVE	VP	VENT PIPE
IC	INSPECTION CHAMBER	WLV	WATER LEVEL
IL	INVERT LEVEL	WM	WATER METER
KO	KERB OUTLET	WO	WASH OUT
LB	LITTER BIN		

BUILDINGS

OPEN SIDED BUILDINGS

TREE
SPREAD & DIA. TO SCALE

Technical Notes:

- All survey levels and co-ordinates are related to OS Datum using the GPS Active Network. The Grid is orientated to Grid North with a Scale Factor of 1.00.
- All Boundaries surveyed are physical features. Please bear in mind that these may not represent the legally conveyed ownership.
- Trees are drawn to scale showing the average canopy spread and are approximate only. Where heights are shown they have been taken from ground level and are an estimate only.
- All underground features have been measured from the surface, therefore pipe sizes, depths etc are only an estimate or assumption. If dimensions are critical information must be checked and verified prior to work commencing.
- Whilst every effort has been made to locate all physical features during the survey no responsibility can be taken where features are obscured or hidden at the time of survey. This is especially important where high volumes of plant or vehicles are present on site.
- Off site features may have been measured remotely and as such may not show the full detail of the feature due to limited access or obstructions with line of sight.
- All critical dimensions including levels should be checked prior to construction. Any errors or discrepancies should be reported immediately.
- All measurements have been taken from ground level only.
- Do not scale from this drawing.
- Tree Information
  1. Trunk Diameters are measured where possible at approximately 1.5m above ground.
  2. Tree Spreads are indicative only and are representative of the generalised canopy size, and therefore may not represent the true canopy position as outlined on site. Tree boles may also not sit centrally to the canopy.
  3. Where tree heights are shown they are an approximate height to the top of the canopy and are an estimation from ground level.
  4. Attention should be paid to the original survey brief as to which trees have actually been surveyed; i.e. Only Trees larger than "X"mm diameter, or Only Trees within the site.

DO NOT SCALE OFF THIS DRAWING

1:50 - 0	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m
1:100- 0	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m
1:200- 0	2m	4m	6m	8m	10m	12m	14m	16m	18m	20m
1:500- 0	10m	20m	30m	40m	50m

SAXON HOUSE
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WEB: WWW.REDBOXSURVEYS.CO.UK
EMAIL: INFO@REDBOXSURVEYS.CO.UK

redbox SURVEYS

Client:

CTD Architects

Project:

Stationery House
Acacia Ave
Port Talbot

Drawing Title:

Topographical Survey

Rev.	Description	Surveyed	Approved	Date

Surveyor:	Checked By:	Approved By:	Date of Survey:	Date of Issue:
VM	AJS	ART	12/06/24	24/06/24

Drawing Status:	Scale:	Paper Size:	Sheet No:
Final	1:200	A1	1 of 1

Project No:	Drawing No:	Revision:
RBS - 24/3826	RBS - 24/3826/001	-

Appendix C Infiltration Test Report

RHONDDA GEOTECHNICAL SERVICES

BRE365 INFILTRATION TESTS AND PERMEABILITY CALCULATIONS N.P.T. PLANNING APP. REF. Q2024/0061 PROPOSED RENAL UNIT STATIONERY HOUSE ACACIA AVENUE SANDFIELDS PORT TALBOT SA12 7DP

6/07/2024

RICHARD DAVIES – BSc.(hons), MSc., F.G.S.

INTRODUCTION

Since January 2019 any new development over 100m^2 is covered by SuDS regulations regarding the disposal of surface water. This is to ensure the development does not cause or exacerbate flood risk in the area. The preferred method of stormwater disposal is by either a soakaway or shallow infiltration if possible. The proposed development is the adaptation of an existing industrial unit at Acacia Avenue, Port Talbot into an N.H.S. Renal Unit. The N.P.T. planning reference is Q2024/0061. The conversion involves a large reduction in the current roof area. Presently the roof drains into a Welsh Water combined sewer. Rhondda Geotechnical Services have been commissioned by the contractors to check if either soakaways or shallow infiltration are feasible for the proposed development.

To investigate the possibility of an effective soakaway the procedures outlined in BRE Digest 365 (soakaway design 2016 revision) must be followed. These involve obtaining the soil infiltration characteristics (permeability) and then using this figure in the calculations outlined in the digest to design a suitable drainage proposal. In its most simple form this is:-

I-O=S where I is the inflow from the impermeable area to be drained, O is the outflow infiltrating into the soil during rainfall and S is the required storage of the drainage system to balance temporarily inflow and outflow. The drainage is to be designed by others, the sole involvement of R.G.S. is to carry out the BRE365 test and produce a value for f.

To obtain the infiltration characteristic figure (f) a trial pit must be excavated and tested by filling it with water and timing how fast it runs away. The trial pit needs to be at a level relevant to finished ground levels. An initial trial pit SA3 was dug using a tracked excavator. The end depth was 1.2m, a commonly used design depth for a soakaway. The BRE Digest states that the water table should not be capable of rising to the base of the proposed soakaway. Most S.A.B.s now insist that the water table must be 1m below the design depth of any soakaway. To prove this is the case, any site investigation now requires a trial pit to be dug to 1m below the test pit base. Before testing SA3, SA2 was dug. Figure 1 shows the locations of the trial pits. The author has carried out much work in the area in the past and the water table is known to be at very shallow depth. During the excavation of SA2 there was a water strike. This was allowed to stabilise for 20 minutes as per normal best practice. After 20 minutes the water level was at 1.5m and remained at this level throughout siteworks. Figure 2 shows the stabilised water table in SA2.

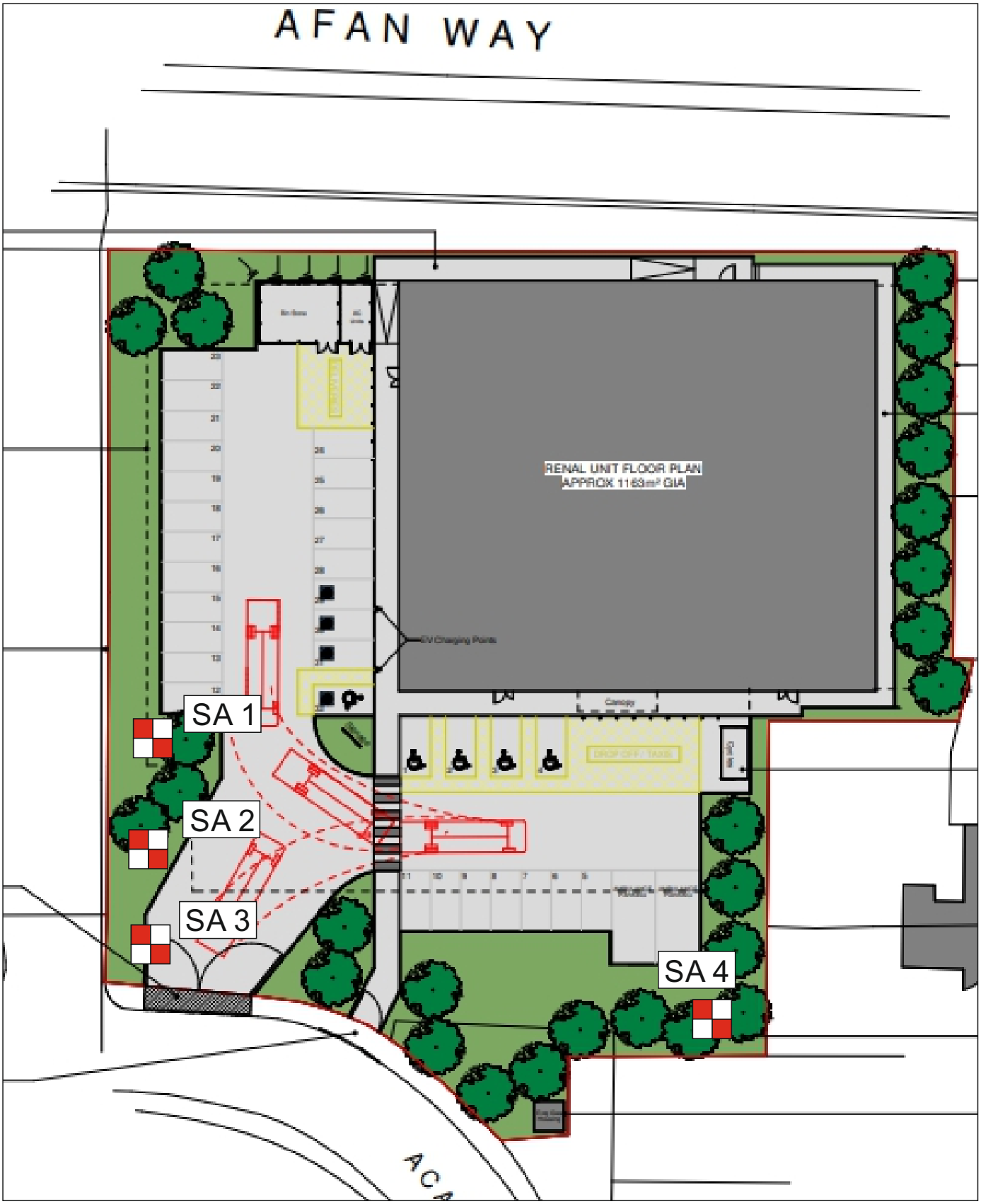


FIGURE 1
SOAKAWAY TRIAL PIT LOCATIONS ON PROPOSED BUILDING LAYOUT.

FIGURE 2
WATER TABLE AT 1.5m IN SA2.

Because of the very shallow water table it was decided on site that shallow infiltration would be the only possible way forward and that the depths of the trial pits should reflect this. The soil description below is for the deepest pit SA2, but the upper section can be applied to the two infiltration test pits SA1 and SA4

BS5930:2015 SOIL DESCRIPTION

G.L.-0.15m

Tarmac and subbase.

0.15m-0.6m

Loose yellowish brown fine to medium SAND with occasional brick (MADE GROUND).

0.6m-1.5m

Medium dense brown fine to medium SAND.

1.5m-1.7m

Soft brown very peaty, sandy CLAY.

As stated above, tests were carried out in two different locations to cater for any variation in ground conditions, as recommended in the BRE Digest. There was very little noticeable difference between soil conditions at the two locations. The following calculations have been based on the figures recorded. For shallow infiltration testing no invert depth is assumed, but allowance must be made for permeable paviors or whatever the proposed surface finish is. SA1 was filled to ground level for the tests. SA4 was filled to 0.15m b.g.l. so the water did not run away in the prominent subbase layer. But the effective storage depth for both locations was taken from ground level. Normal procedure is to measure the time taken for the water to drop from 75% to 25% of the effective storage depth of the pit. This is the V_{p75-25} value.

A 500-gallon bowser with a 50mm pump was used to fill the pits. This meant the pits could be filled rapidly, which is a requirement of the guidance. The pits were filled with water and the drop in levels measured and timed. Figures 3 and 4 show the trial pits prior to testing. The test must be repeated three times, and the lowest value from the tests used. This is almost inevitably the third test This produces a more conservative infiltration rate for the purpose of the drainage design. The infiltration calculations are shown below. The full measurement results are tabulated on pages 10-11. The final infiltration values were 5.17×10^{-5}m/s and 2.95×10^{-5}m/s. These infiltration values will be used by the drainage consultants to produce a shallow infiltration design.

INFILTRATION CALCULATIONS SA1

V_{p75-25} = 1.2 x 0.45 x 0.35 = 0.19m^3

A_{s50} = (3.3 x 0.35) + (1.2 x 0.45) = 1.7m^2 FILL 1

T_{p75-25} = 29 mins. (1740 secs.)

$$f = \frac{0.19}{1.7 \times 1740}$$

$$= \frac{0.19}{2958}$$

$f = 6.42 \times 10^{-5}$

V_{p75-25} = 1.2 x 0.45 x 0.35 = 0.19m^3

A_{s50} = (3.3 x 0.35) + (1.2 x 0.45) = 1.7m^2 FILL 2

T_{p75-25} = 32 minutes (1920 seconds)

$$f = \frac{0.19}{1.7 \times 1920}$$

$$= \frac{0.19}{3624}$$

$f = 5.24 \times 10^{-5}$

V_{p75-25} = 1.2 x 0.45 x 0.35 = 0.19m^3

A_{s50} = (3.3 x 0.35) + (1.2 x 0.45) = 1.7m^2 FILL 3

T_{p75-25} = 36 minutes (8580 secs.)

$$f = \frac{0.19}{1.7 \times 2160}$$

$$= \frac{0.19}{3672}$$

$f = 5.17 \times 10^{-5}$

INFILTRATION CALCULATIONS SA4

V_{p75-25} = 0.9 x 0.4 x 0.375 = 0.135m^3

A_{s50} = (2.6 x 0.375) + (0.9 x 0.4) = 1.335m^2 FILL 1

T_{p75-25} = 25 mins. (1500 secs.)

$$f = \frac{0.135}{1.335 \times 1500}$$

$$= \frac{0.135}{2002.5}$$

$f = 6.74 \times 10^{-5}$

V_{p75-25} = 0.9 x 0.4 x 0.375 = 0.135m^3

A_{s50} = (2.6 x 0.375) + (0.9 x 0.4) = 1.335m^2 FILL 2

T_{p75-25} = 32 mins. (1920 secs.)

$$f = \frac{0.135}{1.335 \times 1920}$$

$$= \frac{0.135}{2563.2}$$

$f = 5.26 \times 10^{-5}$

V_{p75-25} = 0.9 x 0.4 x 0.375 = 0.135m^3

A_{s50} = (2.6 x 0.375) + (0.9 x 0.4) = 1.335m^2 FILL 3

T_{p75-25} = 57 mins. (3420 secs.)

$$f = \frac{0.135}{1.335 \times 3420}$$

$$= \frac{0.135}{4565.7}$$

$f = 2.95 \times 10^{-5}$

FIGURE 3
SA 1 PRIOR TO TESTING.

FIGURE 4
SA 4 PRIOR TO TESTING.

BRE365 POROSITY TEST SA1 STATIONERY HOUSE, PORT TALBOT					
FILL 1		FILL 2		FILL 3	
TIME MINS	DEPTH cm	TIME MINS	DEPTH cm	TIME MINS	DEPTH cm
0	G.L.	0	G.L.	0	G.L.
1	14	1	12	1	8
2	19	2	18	2	14
3	21	3	20	3	19
4	23	4	24	4	23
5	25	5	26	5	24
6	27	6	28	6	25
7	29	7	29	7	27
8	31	8	30	8	29
9	32	9	32	9	30
10	33	10	34	10	31
11	34	11	35	11	32
12	35	12	36	12	33
13	36	13	37	13	34
14	37	14	39	14	35
15	38	15	41	18	38
16	39	16	42	21	42
17	40	18	43	26	46
18	42	20	44	31	48
19	43	22	46	36	51
20	44	24	48	38	53
22	46	27	50	41	55
24	48	30	52	46	58
26	50	34	53	51	62
28	52	38	54	56	66
30	53	39	56	60	DRY
35	57	41	58		
40	61	44	60		
45	64	46	62		
50	68	48	64		
53	DRY	53	66		
		58	68		
		63	69		
		73	DRY		
TRIAL PIT DIMENSIONS 1200mm x 450mm x 700mm Deep					
V_{75-25} TIME SHADED BLUE					

BRE365 POROSITY TEST SA4 STATIONERY HOUSE, PORT TALBOT					
FILL 1		FILL 2		FILL 3	
TIME MINS	DEPTH cm	TIME MINS	DEPTH cm	TIME MINS	DEPTH cm
0	17	0	16	0	19
1	22	1	22	1	23
2	27	2	27	2	27
3	31	3	31	3	30
4	35	4	34	4	32
5	38	5	36	5	33
6	40	6	37	6	33.5
7	42	7	39	7	34
8	44	8	40	8	34.5
9	45	9	41	9	35
10	46	10	42	10	36
11	47	11	46	15	40
12	48	16	48	20	43
13	49	21	51	25	45
14	50	27	54	30	47
15	51	32	57	35	49
20	54	37	60	40	51
25	57	42	63	45	53
30	60	47	64	50	56
35	63	52	66	52	57
40	66	57	68	55	59
45	69	67	DRY	65	61
50	72			70	63
55	74			75	65
60	DRY			80	67
				85	69
				90	71
				95	73
				100	DRY
TRIAL PIT DIMENSIONS 900mm x 400mm x 750mm Deep					
V_{75-25} TIME SHADED BLUE					

Appendix D DCWW Sewer Plan

Dŵr Cymru
Welsh Water

Stationary House Acaica Avenue Traethmelyn
Port Talbot SA12 7DP

N
W E
S

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
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

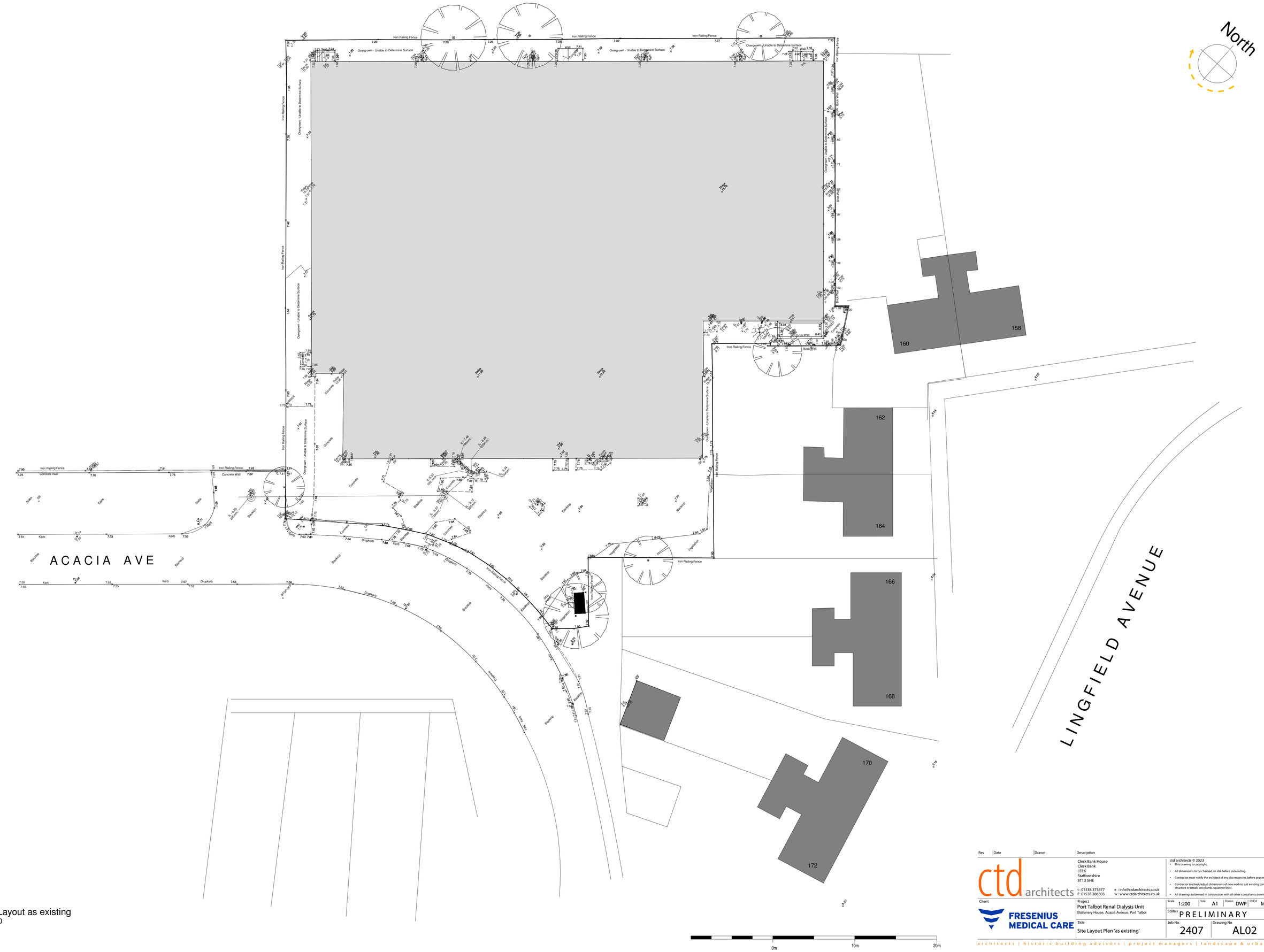
Notes:

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

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	274745,190771
Map scale:	1:1250
Printed by:	Zara Howells
Printed on:	21 Feb 2024

Appendix E Existing and Proposed Development Plans



Site Layout as existing
1 : 200

Rev	Date	Drawn	Description

ctd architects
Clerk Bank House
Clerk Bank
LEEK
Staffordshire
ST13 5HE
t : 01538 373477 e : info@ctdarchitects.co.uk
f : 01538 386503 w : www.ctdarchitects.co.uk

Client: FRESENIUS MEDICAL CARE

Project	Scale	Size	Drawn	Ch'd	Date
Port Talbot Renal Dialysis Unit Stationery House, Acacia Avenue, Port Talbot	1:200	A1	DWP	MM	08/07/24

Status: PRELIMINARY

Title	Job No.	Drawing No	Rev.
Site Layout Plan 'as existing'	2407	AL02	

Site Layout as proposed
1 : 200

Rev	Date	Drawn	Description

ctd architects
Clerk Bank House
Clerk Bank
LEEK
Staffordshire
ST13 5HE
t : 01538 373477
f : 01538 386503
e : info@ctdarchitects.co.uk
w : www.ctdarchitects.co.uk

Client: FRESENIUS MEDICAL CARE

Project: Port Talbot Renal Dialysis Unit
Stationery House, Acacia Avenue, Port Talbot

Title: Site Layout Plan 'as proposed'

Scale	Size	Drawn	Chk'd	Date
1:200	A1	DWP	MM	08/07/24

Status: PRELIMINARY

Job No	Drawing No	Rev.
2407	AL03	

Appendix F Greenfield Runoff Rates

DOCUMENT VERIFICATION RECORD	
Project:	15942-Acacia Avenue, Port Talbot
Client:	Fresenius Medical Care
Report Title:	Drainage Strategy
Date:	08/07/2024

DOCUMENT REVIEW & APPROVAL	
Author:	Iwan Thomas BSc (Hons)
Checker:	Aled Williams BSc (Hons) MCIWEM C.WEM
Approver:	Mike Wellington BEng (Hons) MSc CEng CEnv FICE FCIWEM C.WEM IMaPS MAPM

ReFH2 RUNOFF RATES*	
Return Period (Years)	**As-rural Peak Flow (l/s)**
1	0.584045712
2	0.667822522
5	0.944818091
10	1.140421409
30	1.461943734
50	1.615875868
75	1.748145525
100	1.847105204
200	2.091047861
1000	2.799030216

*Runoff Rates printed from the ReFH Flood Modelling software package

Appendix G MicroDrainage Storage Estimate

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	7.060	0.360	1.9	75.5	O K
30 min Summer	7.201	0.501	1.9	105.2	O K
60 min Summer	7.368	0.668	1.9	140.2	O K
120 min Summer	7.474	0.774	1.9	162.6	Flood Risk
180 min Summer	7.539	0.839	1.9	176.3	Flood Risk
240 min Summer	7.584	0.884	1.9	185.6	Flood Risk
360 min Summer	7.638	0.938	1.9	197.0	Flood Risk
480 min Summer	7.665	0.965	2.0	202.8	Flood Risk
600 min Summer	7.678	0.978	2.0	205.3	Flood Risk
720 min Summer	7.680	0.980	2.0	205.7	Flood Risk
960 min Summer	7.671	0.971	2.0	203.8	Flood Risk
1440 min Summer	7.645	0.945	1.9	198.4	Flood Risk
2160 min Summer	7.623	0.923	1.9	193.8	Flood Risk
2880 min Summer	7.605	0.905	1.9	190.0	Flood Risk
4320 min Summer	7.559	0.859	1.9	180.4	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	109.114	0.0	76.2	18
30 min Summer	76.574	0.0	106.4	33
60 min Summer	51.610	0.0	145.4	64
120 min Summer	30.745	0.0	173.3	122
180 min Summer	22.791	0.0	192.5	182
240 min Summer	18.441	0.0	207.6	242
360 min Summer	13.668	0.0	230.5	362
480 min Summer	11.037	0.0	247.7	480
600 min Summer	9.341	0.0	261.6	600
720 min Summer	8.145	0.0	273.0	720
960 min Summer	6.551	0.0	289.9	838
1440 min Summer	4.816	0.0	293.5	1096
2160 min Summer	3.606	0.0	366.0	1496
2880 min Summer	2.964	0.0	401.1	1928
4320 min Summer	2.256	0.0	456.8	2764

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
5760 min Summer	7.518	0.818	1.9	171.7	Flood Risk
7200 min Summer	7.485	0.785	1.9	164.9	Flood Risk
8640 min Summer	7.458	0.758	1.9	159.3	Flood Risk
10080 min Summer	7.437	0.737	1.9	154.8	Flood Risk
15 min Winter	7.059	0.359	1.9	75.5	O K
30 min Winter	7.201	0.501	1.9	105.2	O K
60 min Winter	7.368	0.668	1.9	140.3	O K
120 min Winter	7.475	0.775	1.9	162.7	Flood Risk
180 min Winter	7.541	0.841	1.9	176.5	Flood Risk
240 min Winter	7.586	0.886	1.9	186.0	Flood Risk
360 min Winter	7.641	0.941	1.9	197.7	Flood Risk
480 min Winter	7.671	0.971	2.0	203.8	Flood Risk
600 min Winter	7.685	0.985	2.0	206.8	Flood Risk
720 min Winter	7.689	0.989	2.0	207.7	Flood Risk
960 min Winter	7.680	0.980	2.0	205.8	Flood Risk

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
5760 min Summer	1.878	0.0	508.3	3584
7200 min Summer	1.647	0.0	557.1	4400
8640 min Summer	1.490	0.0	605.1	5264
10080 min Summer	1.378	0.0	652.9	6048
15 min Winter	109.114	0.0	76.2	18
30 min Winter	76.574	0.0	106.4	32
60 min Winter	51.610	0.0	145.4	62
120 min Winter	30.745	0.0	173.3	120
180 min Winter	22.791	0.0	192.5	180
240 min Winter	18.441	0.0	207.6	238
360 min Winter	13.668	0.0	230.4	354
480 min Winter	11.037	0.0	247.7	468
600 min Winter	9.341	0.0	261.5	582
720 min Winter	8.145	0.0	273.0	692
960 min Winter	6.551	0.0	289.9	902

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

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
1440 min Winter	7.643	0.943	1.9	198.1	Flood Risk
2160 min Winter	7.604	0.904	1.9	189.8	Flood Risk
2880 min Winter	7.564	0.864	1.9	181.4	Flood Risk
4320 min Winter	7.471	0.771	1.9	161.9	Flood Risk
5760 min Winter	7.380	0.680	1.9	142.8	O K
7200 min Winter	7.281	0.581	1.9	122.0	O K
8640 min Winter	7.182	0.482	1.9	101.3	O K
10080 min Winter	7.113	0.413	1.9	86.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
1440 min Winter	4.816	0.0	293.7	1126
2160 min Winter	3.606	0.0	366.0	1600
2880 min Winter	2.964	0.0	401.1	2072
4320 min Winter	2.256	0.0	457.0	2980
5760 min Winter	1.878	0.0	508.3	3864
7200 min Winter	1.647	0.0	557.2	4752
8640 min Winter	1.490	0.0	605.2	5440
10080 min Winter	1.378	0.0	653.0	6144

Rainfall Details

Rainfall Model	FEH
Return Period (years)	100
FEH Rainfall Version	2013
Site Location	GB 274730 190723 SS 74730 90723
Data Type	Point
Summer Storms	Yes
Winter Storms	Yes
Cv (Summer)	1.000
Cv (Winter)	1.000
Shortest Storm (mins)	15
Longest Storm (mins)	10080
Climate Change %	+40

Time Area Diagram

Total Area (ha) 0.282

Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)	Time (mins) From:	To:	Area (ha)
0	1	0.094	1	2	0.094	2	3	0.094

Model Details

Storage is Online Cover Level (m) 7.700

Tank or Pond Structure

Invert Level (m) 6.700

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	210.0	1.000	210.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0067-2000-1000-2000
Design Head (m)	1.000
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	67
Invert Level (m)	6.695
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	2.0
Flush-Flo™	0.296	1.9
Kick-Flo®	0.599	1.6
Mean Flow over Head Range	-	1.7

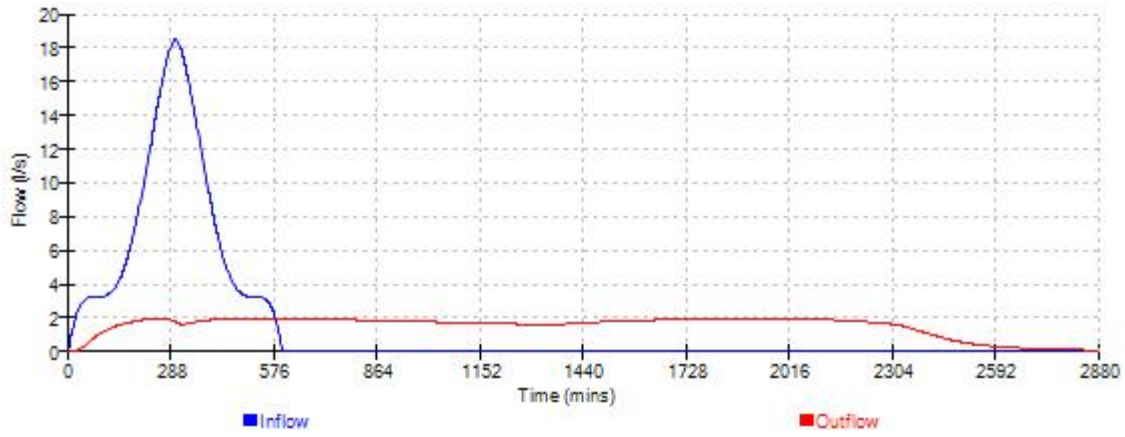
The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

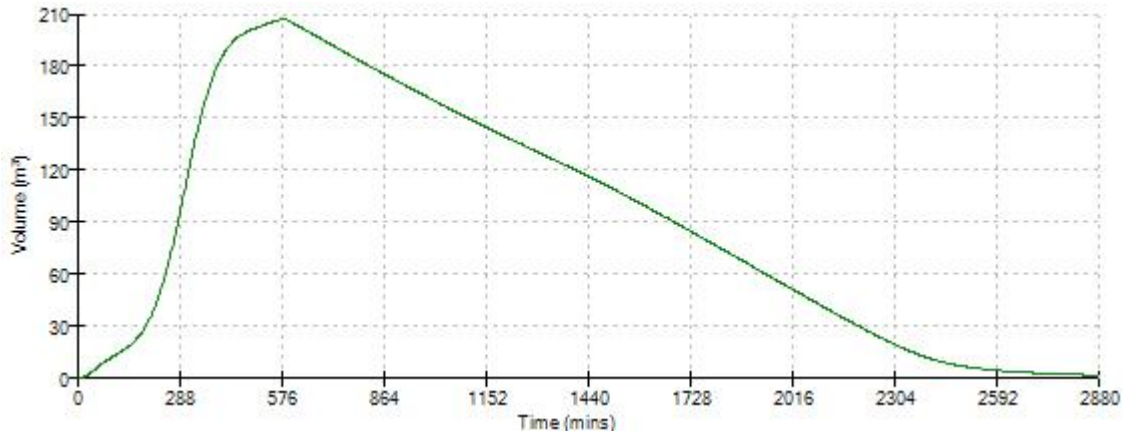
Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.6	0.400	1.9	0.800	1.8	1.400	2.3
0.200	1.9	0.500	1.8	1.000	2.0	1.600	2.5
0.300	1.9	0.600	1.6	1.200	2.2	1.800	2.6

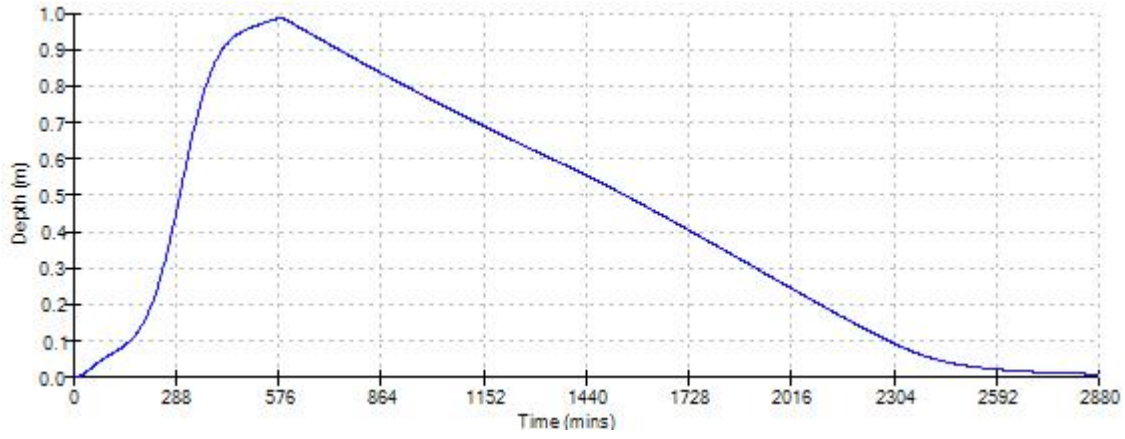
Hydro-Brake® Optimum Outflow Control

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
2.000	2.7	3.500	3.5	6.000	4.6	8.500	5.4
2.200	2.9	4.000	3.8	6.500	4.7	9.000	5.5
2.400	3.0	4.500	4.0	7.000	4.9	9.500	5.7
2.600	3.1	5.000	4.2	7.500	5.1		
3.000	3.3	5.500	4.4	8.000	5.2		

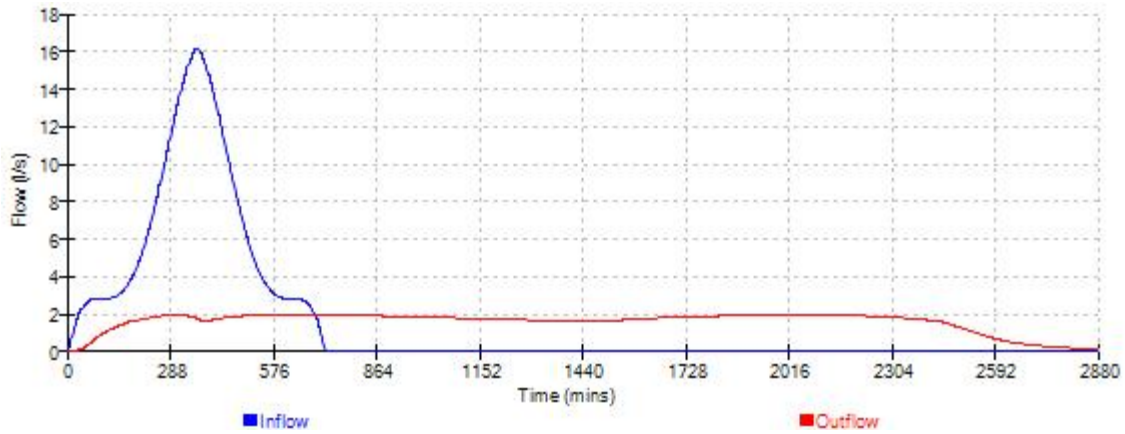
Event: 600 min Winter

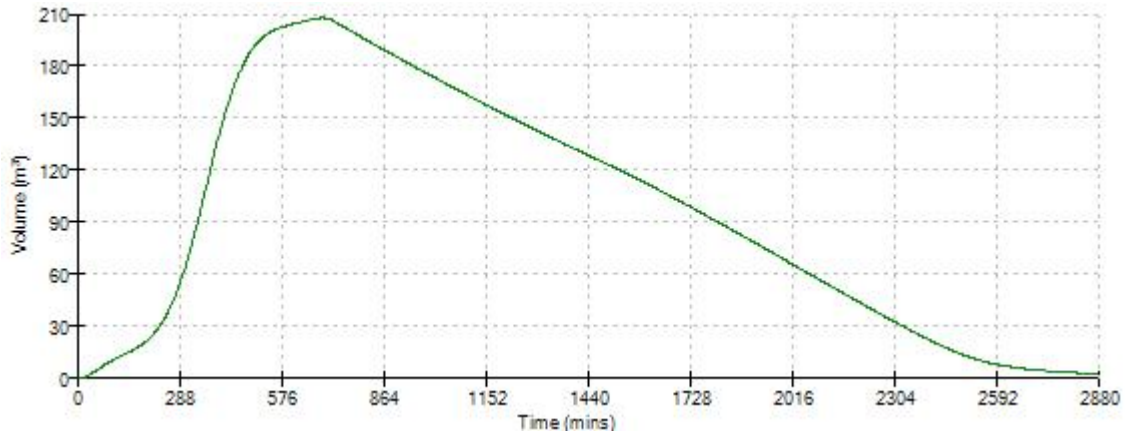


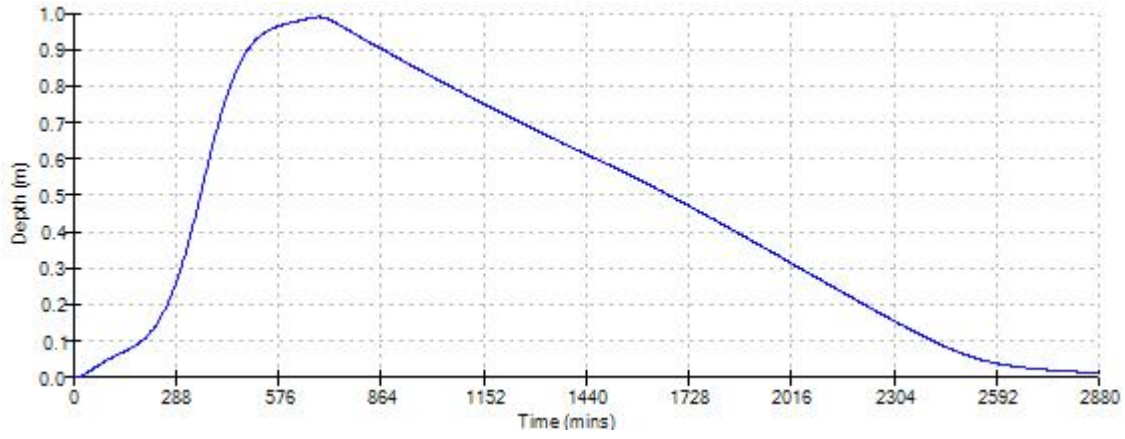




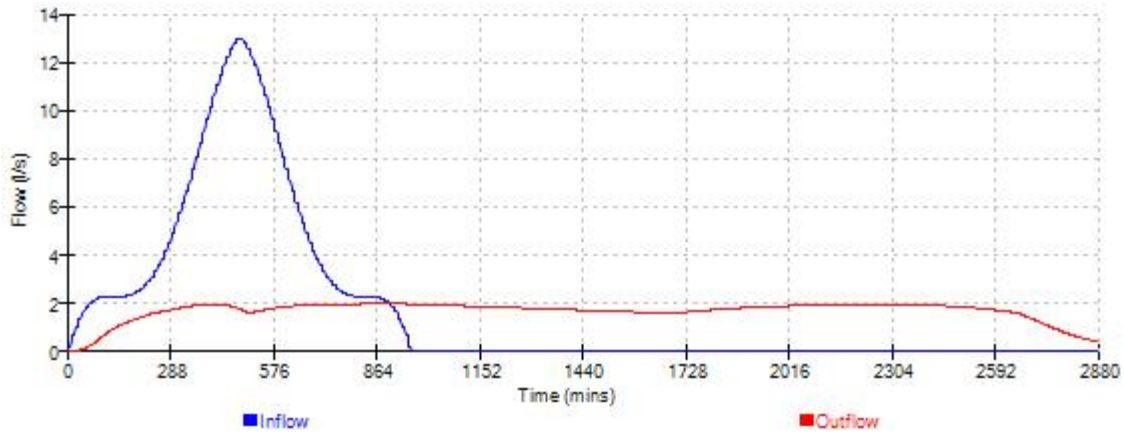
Event: 720 min Winter

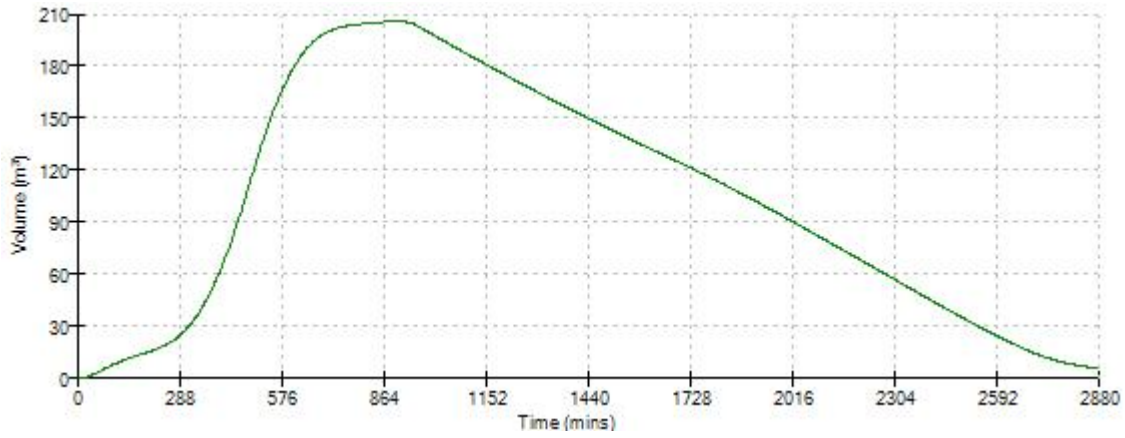


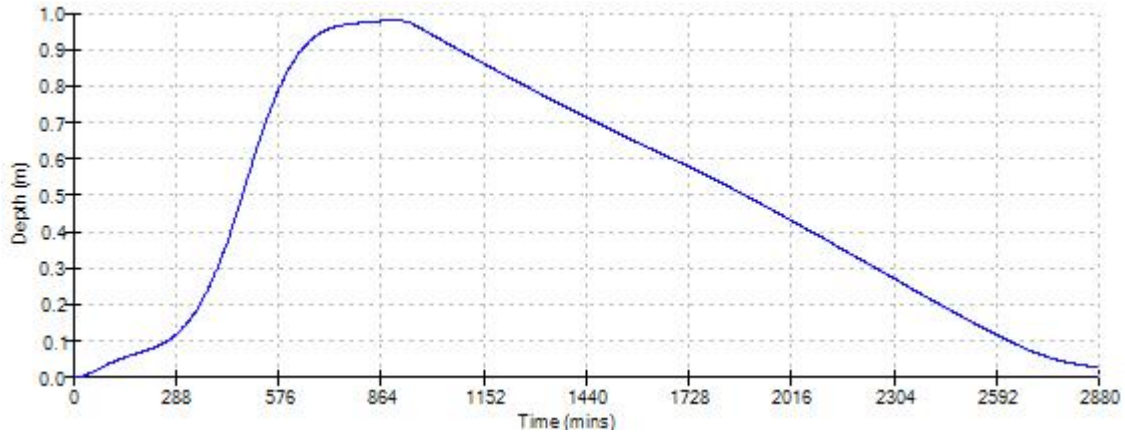




Event: 960 min Winter







Appendix H Concept Drainage Sketch

Proposed rain garden with piped connectivity to sub-grade of the permeable surfaced parking area

Permeable surfaced parking spaces with attenuation storage in the underlying sub-grade. The sub-grade will be formed from a 0.3m depth of stone aggregate underlain by a 0.4m deep geo-cellular storage structure. The total attenuation storage of the stone and cellular storage is 208.21m³, sufficient to accommodate the 1 in 100 year plus 40% CC event. Sub-grade areas linked by below ground pipes

Proposed flow control chamber limiting flows to 2l/s

Proposed connection to existing combined chamber on site

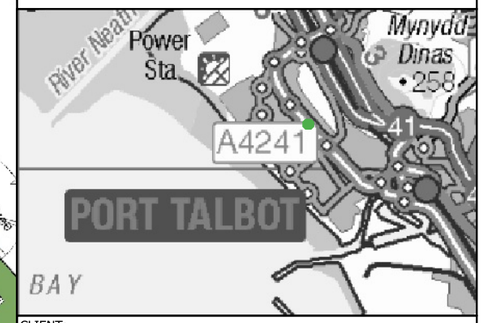
Proposed rain garden with piped connectivity to sub-grade of the permeable surfaced parking area

0 5 10 15 20 m

Notes:
1) This sketch has not been subject to formal checks or approvals. Its validity and use must therefore be limited to discussion and information purposes only.
2) Unless otherwise noted the risks associated with this proposal are not considered to be extra ordinary and within the remit of an experienced and competent contractor.
3) All dimensions in millimetres and all levels in metres above ordnance datum unless shown otherwise.
4) This drawing is an ammendment of ctd Architects 'Site Layout Plan as proposed'. This drawing provides a concept only and is not intended for detailed design.

LEGEND

- Proposed Permeable Surfacing with Sub-grade Storage
- Proposed Raingarden
- Existing Combined Sewer Manhole
- Existing Combined Sewer Network
- Proposed Surface Water Sewer
- Proposed Flow Control Chamber
- Proposed Inspection Chamber
- DCWW Combined Sewer



CLIENT:
Fresenius Medical Care

waterco
www.waterco.co.uk

SCHEME:
Acacia Avenue, Port Talbot

PLOT TITLE:
Concept Drainage Sketch

PLOT STATUS:			DATE:
FINAL			19-07-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
IT	AW	MW	1:300

PLOT NAME:	REVISION:
15942_Concept_Drainage_Sketch	-

Appendix I Maintenance Schedules

Operation and Maintenance Requirements for Bioretention Systems

Maintenance Schedule	Required Action	Typical Frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc. and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

Ref. Table 18.3, CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Operation and Maintenance Requirements for Permeable Paving

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and move contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level or the paving	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Inspect for evidence of poor operation and / or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Ref. Table 20.15, CIRIA C753 'The SuDS Manual'

The maintenance requirements detailed above are to be undertaken by the site owner.

Name :

Position :

Date :

Signed on behalf of the site owner :

Appendix J Concept Designers Risk Assessment

CONCEPT DESIGNER'S RISK ASSESSMENT

Project:	Acacia Avenue. Port Talbot	**Project No:**	15942
Client:	Frenius Medical Care		
Report Reference:	15942-Drainage Strategy-01		

Prepared by:	Iwan Thomas	**Date:**	10/07/2024
Checked by:	Aled Williams	**Date:**	19/07/2024
Reviewed by:	Mike Wellington	**Date:**	19/07/2024

Requirement:

The Construction (Design and Management) Regulations 2015 (CDM 2015) place an obligation on the Designer to take all reasonable steps to provide, with the design, sufficient information about the design, construction or maintenance of the structure, to adequately assist the client, other designers and contractors to comply with their duties under CDM. The Designer has undertaken this assessment to identify any extra-ordinary risks, or those that would not be expected on this particular project by an experienced and competent Contractor. The aim is to avoid needless paperwork and bureaucracy and ensure the assessment is project specific, relevant and proportionate to the risk.

DRA Summary

Each of the following risk areas has been considered using the question below. Is a risk present which is considered to be **extra-ordinary or unexpected** in this instance?

If **YES** - A detailed risk assessment is required at design stage
If **UNKNOWN** - Insufficient information has been provided at concept design stage and the risks are unknown. Further consideration must be given at design stage(s)
If **NO** - No further action is required.

Hazard Ref.	Risk Areas	YES, UNKNOWN or NO	Comments
1	Ground Conditions	Unknown	Groundwater at 1.5m.bgl. Made ground expected.
2	Hazardous Environment	Unknown	To be considered at detailed design stage
3	Existing Working Environment	Unknown	Site comprises a former industrial unit
4	Existing Services	Unknown	Services will be in place for existing building. Public combined sewer crosses the site
5	Proximity to Other Structure(s)	Unknown	Resedential units adjacent
6	Near Waterbody / flood risk	Unknown	NRW Flood Risk from Surface Water Map shows site is located in Flood Zone 2.
7	Proximity to Other Activities	Unknown	Resedential units adjacent.
8	Sequence of Construction	Unknown	To be considered at detailed design stage
9	Access	Unknown	Access to the site from Acacia Avenue
10	Interfaces	Unknown	To be considered at detailed design stage
11	Confined Space Working	Unknown	To be considered at detailed design stage
12	Maintenance Considerations	Unknown	To be considered at detailed design stage
13	Working at Height	Unknown	To be considered at detailed design stage
14	Steep Slopes	No	Site is relatively flat
15	Demolition / Refurbishment / Repair	Unknown	Proposal is for the conversion of the former indoor bowls club
16	Welfare	Unknown	To be considered at detailed design stage
17	Occupational Health	Unknown	To be considered at detailed design stage
18	Environmental Issues	Unknown	To be considered at detailed design stage
19	Other Significant Hazards not Identified Above	Unknown	To be considered at detailed design stage
20	Residual Risk to Future Users	Unknown	To be considered at detailed design stage