

SAB Pre-App

R-TECH Group

Testing House, Kenfig Ind Estate

Stormwater Drainage
Strategy.

6th May 2026



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1 Introduction.

Our client, RTECH Group, are proposing to develop a brownfield site adjacent to their current site at Kenfig Industrial Estate, Testing House, Port Talbot SA13 2PE to provide a new testing facility with accompanying car parking and service yard.

WL Squared have been engaged as Consulting Civil & Structural Engineers for the project and their scope of service relating to the appointment includes the design of a SuDS stormwater drainage network to serve the proposed development.

This document describes the approach that is being proposed to the SuDs network draining the site and it is prepared to support a SAB pre-application submission to the local SAB authority.

2 The Pre-development Situation.

The existing site is circa 0.236Ha in total and is located in the Kenfig industrial estate, adjacent to RTECH Groups existing property, west of RPC containers LTD and Northwest of Celtic Chemicals. The site is shown in the below image within the approximate red line boundary. The existing site topographical survey is attached in Appendix A.



2.1 National Resource Wales Development Advice

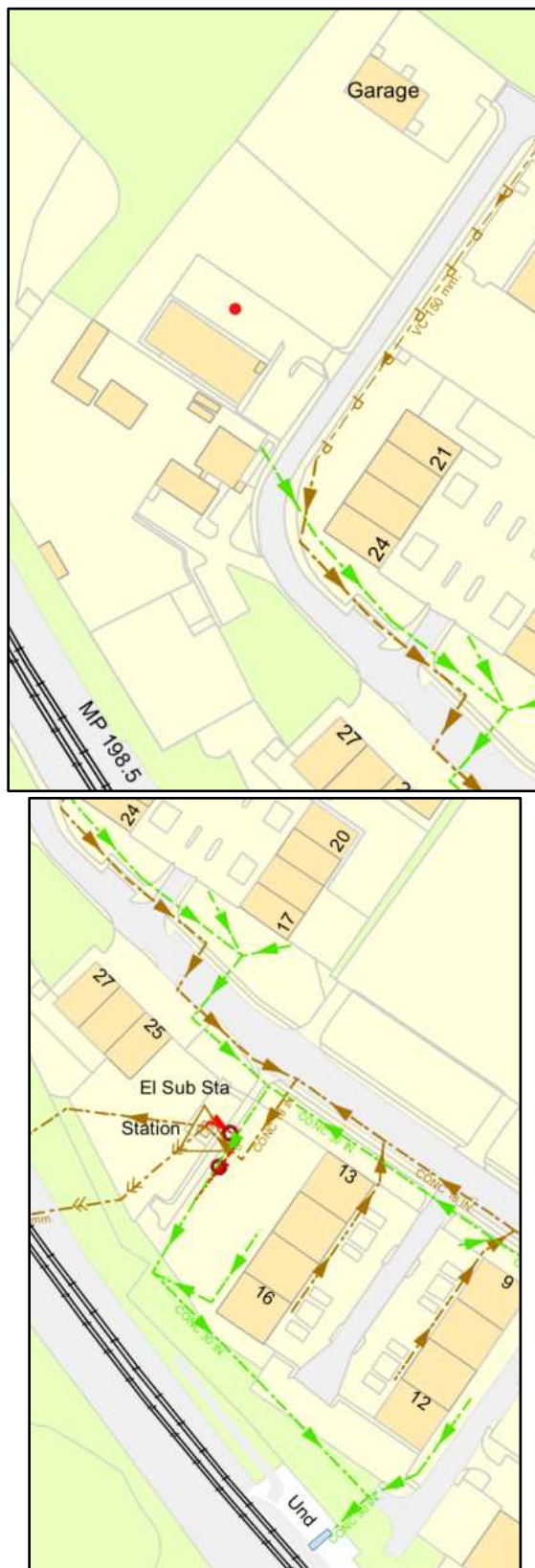
The site is situated outside zones shown on NRW maps that are associated with surface water flooding, groundwater flooding and river flooding. This is shown on the screenshot of the map below and full map in Appendix B.



2.2 DCWW Records

The Welsh Water map shows an adopted foul sewer running in the vicinity of the road adjacent to the site. The map identifies a stormwater sewer located two plot boundaries to the south, at the point where the road bends toward the site. This stormwater sewer continues to follow the road and laid to fall to a culvert before discharging into a small water course to the south of the site.

An extract of DCWW's record of the network can be seen below and the full DCWW asset plan is attached in Appendix B.



3 Existing Site Conditions.

3.1 Site Desk study

The existing site is a brownfield site that comprised of a relatively thick layer of made ground that are capped with soil and irregular stone/rubble.

A basic desk top study has been undertaken to determine ground properties using available historic information.

British Geological Survey (BGS) 1:50,000 maps show the following ground conditions are likely to underlie the site:

- Bedrock comprising of South Wales lower Coal Measures Formation, Mudstone, siltstone and sandstone. These sedimentary rocks are fluvial, palustrine and shallow marine in origin. They are detrital, forming deposits reflecting the channels, floodplains and deltas of a river in a coastal setting (with periodic inundation from the sea). Sedimentary bedrock formed between 318 and 319 million years ago during the Carboniferous period.
- There are superficial deposits comprising of tidal flat deposits-Clay, silt and sand. These sedimentary deposits are shallow-marine in origin. They are detrital, generally coarse-grained forming beaches and bars in a coastal setting. Sedimentary superficial deposit formed 2.6 million years ago during the Quaternary period.

There is a borehole record SS78SE46 dating circa 1979 within 10m of the site. Within this borehole record two drills locations were undertaken. The first one found made ground consisting of concrete, stones, brown sandy silty clay, roots, etc 1m below ground level before hitting an obstruction and terminated. The second record found the same made ground to a depth of 2.3m and sandy silty clay with some of gravels at different densities from 2.3m to 6.45m.

3.2 Intrusive Site Investigation

The initial intrusive investigation was undertaken on the 24th of February 2026 and comprised of two cable percussive (shell & auger) boreholes.

Stratum	Depth to Base (m)	Remarks
MADE GROUND.	Maximum depth 5.2m (BH1) Maximum depth 3.9m (BH2)	Made ground was very heterogenous consisting of demolition waste, limestone aggregate, steelworks slag and a variable proportion of firm Clay.
Soft silty and sandy clay	3.9m – 14.2m	Soft silty and sandy clay extended from the base of the Made Ground to 14.2m (BH1)
Fluvioglacial gravel	14m -15m	(BH2) gravel was encountered at 10.5m. The gravel was initially clayey and medium dense

Table 3-1 – (Intrusive Site Investigation soil data)

Water was encountered within BH1 and BH2 at approximately 3-3m(BH1) & 3.4m(BH2) deep. The site investigation report states seepage also occurs (between depths of around 2.4m and 2.5m). Deeper groundwater in the underlying soft silty and sandy clay is also likely. However, it is noted that levels of water may fluctuate with the changing weather and seasons.

Contamination testing was not undertaken. However, the results of the site investigation indicates that there is evidence of soil contamination within the soil at levels that are likely not to meet the recommended guidelines due to the subsoils identified on site as made ground. The made ground found consisted of construction waste and steelwork slag.

Insitu permeability testing was not undertaken. As the findings in the site investigation report found circa 5-6m of made ground above virgin soils, we do not consider soakaway drainage is feasible for the development.

The full site investigation is appended in Appendix C.

4 The Post Development Situation.

4.1 Development proposal

The overall proposed development plan is to provide a duo-pitched portal framed building with a vehicle loading and unloading service yard & associated car parking area. The proposed development consists of single-story testing facility warehouse with a pitched roof which have all been taken into account in the hardstanding roof areas. The development also consists of associated lined permeable surfacing within the service yard & parking area to filter the surface runoff and a lined biorientation rain garden to the rear of the site. An extract showing the proposed site layout is shown below:



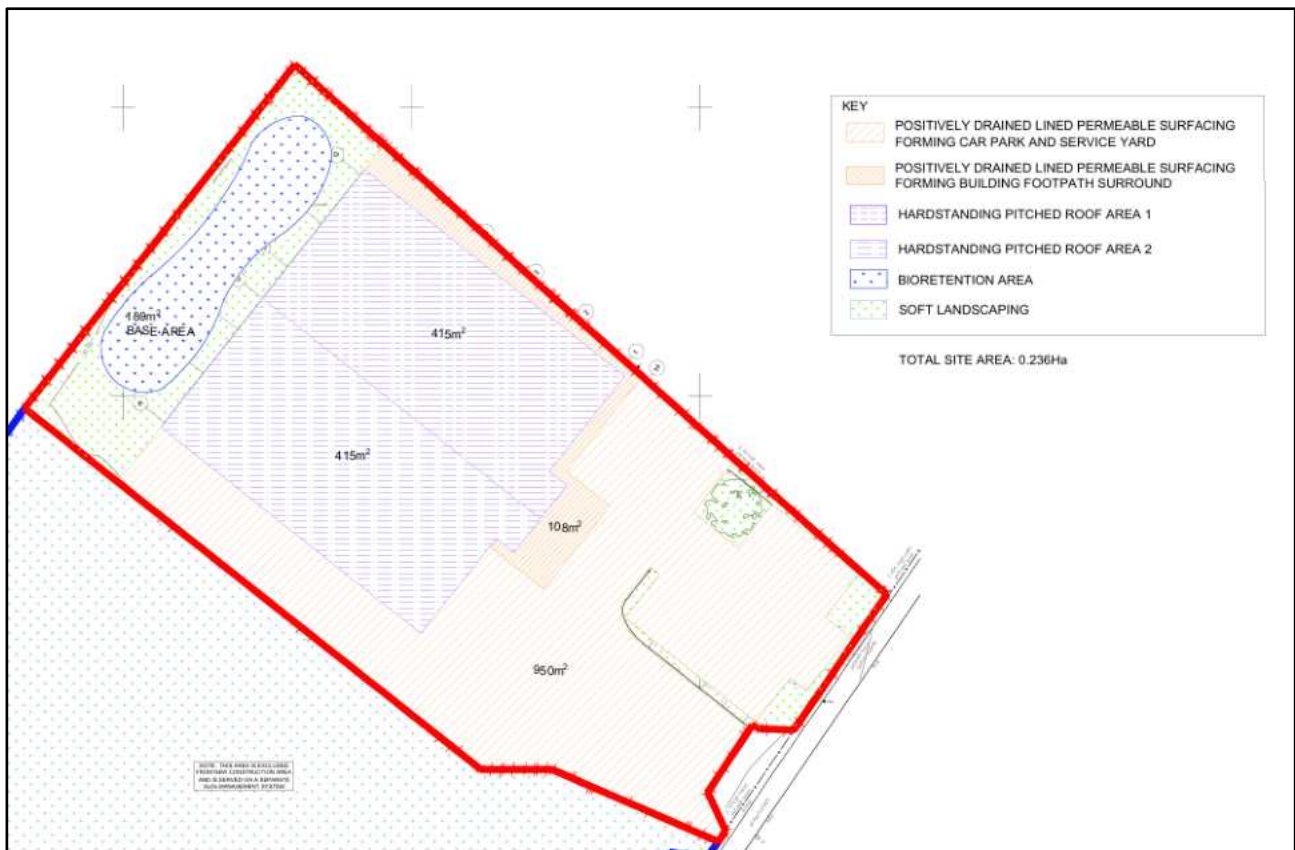
4.2 Contributing Areas

The following table illustrates the areas of impermeable and permeable areas throughout the scheme:

DEVELOPED SITE AREAS (m ²)	
OVERALL SITE AREA	2360
Hardstanding Pitched Roof Area 1	415
Hardstanding Pitched Roof Area 2	415
TOTAL HARDSTANDING AREAS	830
Walkway/footpath	108
Car Parking/ Service Yard	950
Lined Bioretention Area	180
TOTAL LINED SuDs TREATMENT AREAS SERVING THEMSELVES & HARDSTANDING AREAS	1238
SOFT LANDSCAPING/GREEN AREAS	292

Table 4-1 – (Contributing Areas of Proposed Development)

An extract plan layout outlining the various areas is shown below and a full site plan showing the contributing areas can be seen in Appendix D, drawing A001 – Contributing Areas Plan:



5 Stormwater Drainage Strategy; Proposed Development & Design.

Consideration has been given to the stormwater flows collected from the differing zones.

An assessment of the storm water discharge from the proposed development has been undertaken for a 1 in 100-year storm event plus a 40% allowance for climate change.

The 1 in 100-year event stormwater rainfall runoff is outlined below and in the calculations in Appendix E.

<u>Rainfall</u>					
Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 15 minute summer	441.486	124.925	100 year +40% CC 360 minute summer	63.377	16.309
100 year +40% CC 15 minute winter	309.815	124.925	100 year +40% CC 360 minute winter	41.197	16.309
100 year +40% CC 30 minute summer	304.460	86.152	100 year +40% CC 480 minute summer	50.006	13.215
100 year +40% CC 30 minute winter	213.656	86.152	100 year +40% CC 480 minute winter	33.223	13.215
100 year +40% CC 60 minute summer	214.603	56.713	100 year +40% CC 600 minute summer	40.997	11.214
100 year +40% CC 60 minute winter	142.577	56.713	100 year +40% CC 600 minute winter	28.011	11.214
100 year +40% CC 120 minute summer	135.791	35.885	100 year +40% CC 720 minute summer	36.560	9.799
100 year +40% CC 120 minute winter	90.216	35.885	100 year +40% CC 720 minute winter	24.571	9.799
100 year +40% CC 180 minute summer	104.615	26.921	100 year +40% CC 960 minute summer	30.041	7.911
100 year +40% CC 180 minute winter	68.003	26.921	100 year +40% CC 960 minute winter	19.900	7.911
100 year +40% CC 240 minute summer	82.776	21.875	100 year +40% CC 1440 minute summer	21.775	5.836
100 year +40% CC 240 minute winter	54.994	21.875	100 year +40% CC 1440 minute winter	14.634	5.836

Considerations have been given to the requirements stated within the "Statutory standards for sustainable drainage systems — designing, constructing, operating and maintaining surface water drainage systems:

Welsh Assembly Government: 2018" when considering the approach to be taken to discharge stormwater from the site. Several options were considered for discharging the stormwater collected from the development. As a result, the levels of hierarchy and their options were considered for discharging the stormwater from the development, these are summarised along with their acceptability and our applicable specific comments in the following sections:

5.1 **S1- Stormwater Strategic Run-off Destination**

5.1.1 **Priority level 1:**

Priority level 1 has been determined to be partly acceptable; this is attributed to the following factors:

Rainwater harvesting (RWH) and re-use has been considered and incorporated as the use of rainwater harvesting is a viable/ cost effective part of the solution for managing the surface water runoff. Given the possible demand for non-potable water within the working hours of the unit, we deem a RWH system within the SuDs management train to be partly viable/ cost effective solution and is connected with an overflow system which ties into the SuDs management train due to demand not being constant. This is in accordance

with the “*Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems*”.

The principal potential uses of harvested rainwater are WC flushing, industrial cleaning facilities/stations and industrial manufacturing/testing machinery. Given this, we comment as follows:

- Due to the nature of the development, non-potable water demand is variable and concentrated within operating hours over a typical working week; this intermittent demand profile is considered only partially suitable for RWH. As consumption is restricted to defined operational periods, the potential for meaningful water savings through RWH is limited, whilst the risk of storage overflow during non-operating hours remains significant thus the inclusion of an overflow system into the SuDs management train.
- The site soil conditions do not necessitate harvesting for irrigation purposes; therefore, the only applicable demand is for non-potable water uses. Irrigation is not required as the ground comprises approximately 5 metres of made ground, as confirmed by the Ground Investigation Report. The permeability characteristics of this material are considered unsuitable for infiltration due to the presence of contaminants, as discussed earlier in this report.

We conclude the use of an above ground RWH system to be adequate for surface water management in part but will require the use of a subsequent priority level to be a fully compliant SuDs solution.

5.1.2 Priority level 2:

Priority level 2 has been determined to be not applicable; this is attributed to the following factors:

Discharge of surface water into the ground has been considered; however, it has been excluded on the basis that the site location and ground conditions do not present a viable or responsible means of managing the surface water runoff given the nature of the proposed development. This is in accordance with the exception criteria discussed in paragraph G1.8 of “*Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems*”.

The principal potential uses of discharging stormwater into the ground would be soakaways, unlined permeable pavements/drainage blankets and unlined bioretention basins/ areas.

- Given the basic desk study, the soils and ground are made up of made ground consisting of construction waste and steelwork slag. It can be concluded that discharge into the ground would not be a suitable solution for stormwater management.
- Due to the nature of the soils and ground identified at the site there is a high risk of containments within the varying deep made ground found. The use of ground infiltration methods would pose significant environmental risks and has potential to pollute the surrounding areas.

We conclude that priority level 2 is unacceptable, and the use of a subsequent priority level will be required.

5.1.3 Priority level 3:

Priority level 3 has been determined to be not applicable; this is attributed to the following factors:

Discharge of stormwater to a surface water body via an attenuation system has not been considered as there is no local watercourse within the vicinity of the site; thus has been rejected on the basis that the site location and access to a local do not present a viable solution of managing the surface water runoff. This is in accordance with the exception criteria discussed in paragraph G1.31 of "*Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems*".

We conclude that priority level 3 is unacceptable, and the use of a subsequent priority level will be required.

5.1.4 Priority level 4:

Priority level 4 discharging into an existing Stormwater sewer system has been determined to be acceptable; this is attributed to the following factors:

- Given that the site is underlain by made ground and that existing surface water is currently stagnating on-site or infiltrating into contaminated ground, discharging into the local DCWW stormwater drainage network is considered to represent a betterment of hydraulic control and surface water management. This approach would mitigate the risk of contamination, while safeguarding the water quality and biodiversity of the surrounding environment.
- A DCWW stormwater drainage network is located within the adjacent access road of the proposed site. It is proposed to discharge the surface water via a pumped connection given the invert level of the DCWW chamber is higher than the site. Stormwater flows will be attenuated within a storage blanket and lined polystorm crates forming an attenuation tank before being discharged at a controlled rate via a manhole pumping station at a peak discharge rate of 5 l/s, representing a 25% betterment compared to the existing surface water runoff rate.

We conclude the use of discharging into a DCWW Stormwater sewer to be adequate for surface water management from all contributing areas to be fully compliant with sustainable drainage solution.

5.1.5 Priority level 5:

Priority level 5 has been determined to be not applicable; this is attributed to the following factors:

The stormwater has been discharged at a previous priority level.

5.1.6 Conclusion:

As a result of the above considerations, rainwater runoff from the site will be discharged at priority level 4 of the hierarchy. Rainwater runoff from the rear of the roof is directed and collected via rainwater pipes and filtered through a bioretention area. The bioretention area provides 350mm of ponding depth and has overflow pipes connected to a perforated underdrain. The underdrain is laid to fall to a series of pipes and incorporated manholes, connected into an underground attenuation storage structure (10 m × 16 m, 0.8 m depth, ~115 m³) comprising of lined polystorm xtra crates. Additionally, the flows from the front area of the roof are collected via roof gutters and downpipes which discharge into an above ground rainwater harvesting tank with an overflow system and into the lined drainage blanket below the permeable surfacing via distributor boxes. The service yard/car park is a permeably surfaced area filtering surface water through into a lined drainage blanket below laid with nominal falls directing the flows into the attenuation tank. The attenuation tank is formed using lined polystorm crates. The design will ignore the potential storage volume within the drainage blanket as a worst-case scenario. The flows within the attenuation tank will then discharge via an underground pipe network and manhole pumping station. A rising main within the access road will communicate the flows at 5l/s into a manhole prior to discharging into the adjacent DCWW stormwater sewer via gravity at the controlled brownfield run-off rate with a 25% betterment (5l/s).

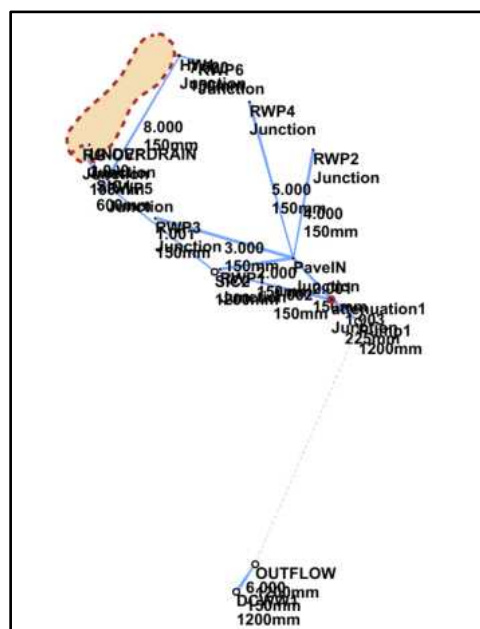
The proposed stormwater drainage layout and SuD system details are provided in Appendix E.

5.2 S2- SuDs Network performance and hydraulic control

A SuDs drainage system has been designed and detailed considering guidance given in the CIRIA publication C753- The SuDs Manual. Scheme detail drawings of this system are attached as Appendix E.

The analysis of the performance of the SuDs network has been undertaken using “Causeway Flow” software for a variety of storm events including a 1 in 100-year event with a +40% allowance for climate change.

The assessments were undertaken for the analysis plan and scenario outlined below:



Rainwater discharge flows collected from the rear of the roof are conveyed via rainwater pipes and directed to a bioretention area which is laid to fall to a series of pipes and incorporated manholes connected into an attenuation tank comprising of lined polystorm crates. Additionally, the other contributing areas, frontage of the roof and yard/car park, are laid to fall directly into the attenuation tank. The lined polystorm crates attenuate flows from all contributing areas as a worst-case scenario prior to being discharged by an underground pipe network incorporating a pump manhole and discharging into an adjacent DCWW stormwater sewer at the controlled brownfield run-off rate with a 25% betterment (5l/s). The site has additional storage volume within the drainage blanket that has not been included within the design as this forms a failsafe that would store exceedance flows if required.

A full assessment output including plan and long sections can be seen in Appendix F.

6 Water Quality, Amenity and Biodiversity.

6.1 S3- Water Quality

The previously uncontrolled surface water flows are now directed through a bioretention area and lined drainage blankets, laid to fall toward an attenuation tank, thereby improving the quality of water discharged from the site.

Simple Index Assessments have been undertaken for the rainfall runoff from the areas to determine if the SuDs systems proposed are adequate at intercepting and filtering to meet the water quality criteria for stormwater discharge. The assessments for surfaces can be seen in Appendix G.

6.2 S4- Amenity

The bioretention and landscaped areas will further enhance the landscape amenity and visual character of the local area.

6.3 S5- Biodiversity

The bioretention basin proposed within the development promotes biodiversity as they provide additional habitats to support new and existing wildlife

7 Implementation and Future Ownership.

7.1 S6- Design of drainage for Construction, Operation and Maintenance and Structural Integrity

The drainage systems described will be constructed as part of the proposed development, they will become operable as they are completed.

All the proposed SuDS features are located within the curtilage of the private property and will remain the responsibility of the owner. The owner is responsible for the maintenance of the SuDs features and they will not be subject to an adoption process. The rising main and manhole within the road will remain in the ownership of the property owner and is to be maintained by the owner.

8 Flood Exceedance Plan.

Flood scenario in the case of the drainage system becoming overcharged.

During the occurrence of a more intense rainfall event than the 1 in 100 event the below ground drainage system and SuD features designed could overtop causing surface flooding to occur. Rainfall run-off will back up and surcharge the various aspects within the system and surface flooding will occur.

Surface water run-off will flow over the ground, across the site. Runoff from a small area of the front of the site will flow towards the eastern boundary into the adjacent marshland and will direct the flow towards the local river (over 20m away). The site has additional storage volume within the drainage blanket that would store some of the exceedance flows.

The risk associated with events exceeding the capacity of the drainage system.

As the drainage systems proposed for the re-development is designed to withstand flows from a 1 in 100 year event plus an additional allowance of 40% due to the increase in flow due to climate change the unaccounted storage areas within the site associated with the soft landscaped areas will be utilised hence, the risk of flood exceedance occurring is significantly less than 0.01. The site has additional storage volume within the drainage blanket that would store some of the exceedance flows.

Any exceedance flooding that may occur will take the form of surface water run-off that will run across the ground and into the adjacent marshland area to the rear of the site. This is acceptable as the site is a new industrial unit and there is little risk of returned flood water collecting onsite. The direction of exceedance flows can be seen illustrated within the attached drawing, A002, in Appendix H.

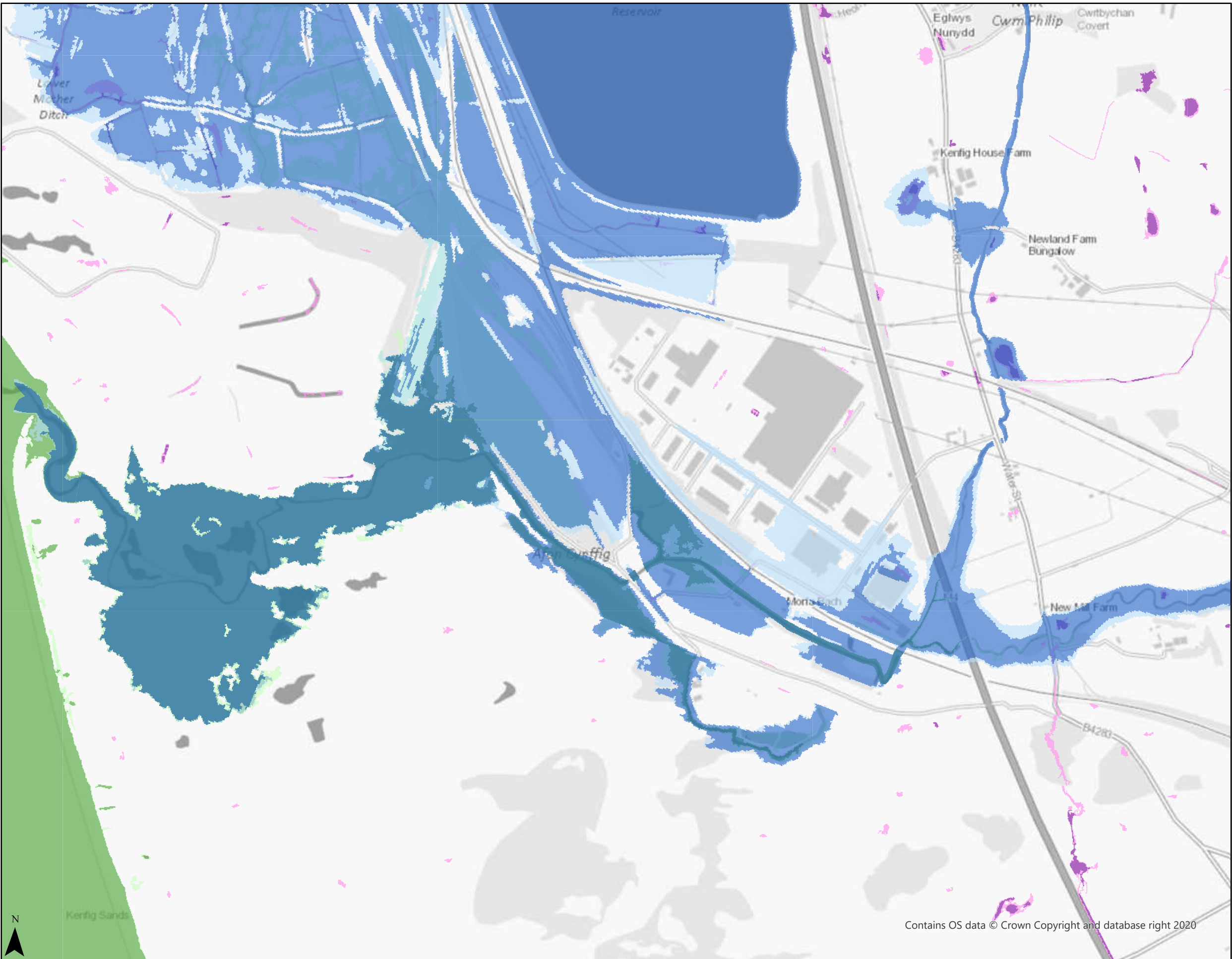
Conclusion.

Exceedance flow does not run into the site; exceedance flows are likely to run from within the site to the southwest onto unused fields during events that have a probability of occurring that is significantly less than 0.01.

The consequences of exceedance flow from the site are considered to be minor in terms of social disruption, damage or risk to the life of other residents adjacent to the site. Hence the stormwater drainage proposals for the development are considered to be acceptable.

Appendix A

Appendix B



Flood Map for Planning - Detail

Enter title (max 35 characters)

Legend

TAN15 Defended Zones

 Rivers

 Sea

 Rivers and Sea

Rivers

 Flood Zone 3

 Flood Zone 2

Sea

 Flood Zone 3

 Flood Zone 2

Surface Water and Small Watercourses

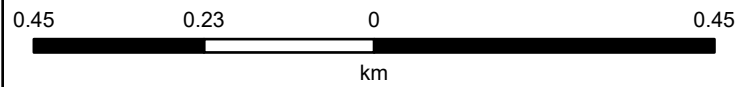
 Flood Zone 3

 Flood Zone 2

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Scale at A3: 1:10,000

Date: 08/05/2026



British National Grid

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Dŵr Cymru
Welsh Water

Testing House Unit 29



LEGEND(Representative of most common features)

Waste network:		
	Foul chamber	 Outfall
	Surface water chamber	 Lamphole
	Combined chamber	 Storm Overflow
	Combined sewer overflow	 Rising main
	Special purpose chamber	 Gravity sewer
	Treatment works	 Private sewer
	Pumping station	 Private sewer subject to Sect. 104 adoption agreement
NB: Sewer symbol colour indicates the type.		 Private Sewer Transfer
RED	- Combined	 Lateral Drain
GREEN	- Surface Water	 Inspection Chamber
BROWN	- Foul	

Notes:

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

Dŵr Cymru Cyfyngedig ("the Company") gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus and that the Company shall not be liable for any damage to property or persons caused by such excavations or other works by the Company, is done up in accordance with statutory requirements of sections 195 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 above, it is hereby declared that the Company does not know of any underground apparatus, other than the apparatus mentioned in the above schedule, which is situated in the area of the Company's sewer, lateral drain or disposal main and any associated apparatus, installed 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 information of the Company is entirely without prejudice to the provisions of the New Roads and Street Works Act 1991 and that the Company's liability to be responsible for any damage to property or persons caused by such excavations or other works shall not be affected by the provisions of the said Act.

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: 1:2500
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Printed on: 22 Sep 2020

Appendix C



RHONDDA
GEOTECHNICAL
SERVICES

GEOTECHNICAL REPORT
ON GROUND CONDITIONS
PROPOSED INDUSTRIAL UNIT AT
R-TECH MATERIALS
TESTING HOUSE
KENFIG INDUSTRIAL ESTATE
MARGAM
PORT TALBOT
SA13 2PE
18/03/2026

This document, including any enclosures and attachments has been prepared for the exclusive use and benefit of the Client as an assessment of ground conditions at the location on the front cover. Options for foundation design are discussed. The recommendations for precise foundation design will be made by others. This report can be supplied to third persons with a legitimate interest such as Planning Officers, Structural Engineers, Construction Firms or Finance Lenders. This report is based solely on observations made during the site investigation and is limited to the remit requested by the client. Rhondda Geotechnical Services do not accept any duty, liability or responsibility for any other use of the report or use by unauthorised third parties. This report remains the intellectual property of the author. Unauthorised use will result in legal action.

All Ordnance Survey mapping used in this report has been purchased from Groundsure or Promap and remains Crown Copyright. The B.G.S. Geoindex is open access courtesy of N.E.R.C. and is acknowledged as such. All mapping is orientated to grid north unless otherwise stated.

INTRODUCTION

Rhondda Geotechnical Services were initially approached by Richard Andrews Architects on behalf of a client R-Tech Materials, to investigate ground conditions at a site at Kenfig Industrial Estate, Margam. Plans have been drawn up for a new steel frame portal building at the site on land already owned by R-Tech Materials. Following initial consultations, Rhondda Geotechnical Services were formally commissioned to arrange a site investigation by Dr Dave Mumford, the Managing Director.

The R.G.S. remit was to scope suitable methods for the site investigation work via a preliminary desk study. Following this, R.G.S. were arrange and supervise contractors to carry the works out and collate the results. These were then to be presented in a factual report with foundation recommendations based on ground conditions as found. The data in the report is anticipated to be submitted to a Structural Engineer for foundation design.

The site is centred on grid reference 279510, 183690 and is at an altitude of approximately 10m A.O.D. The R-Tech site is trapezoidal and covers approximately 0.46 Ha. The proposed building footprint measures 28m x 27m on the drawing and is located in the northern corner of the site. The site of the proposed building is currently a flat featureless yard laid with aggregate. The site location is shown in Figure 1 overleaf. Figure 2 shows the site boundary as a red line with the position of the proposed building shown.

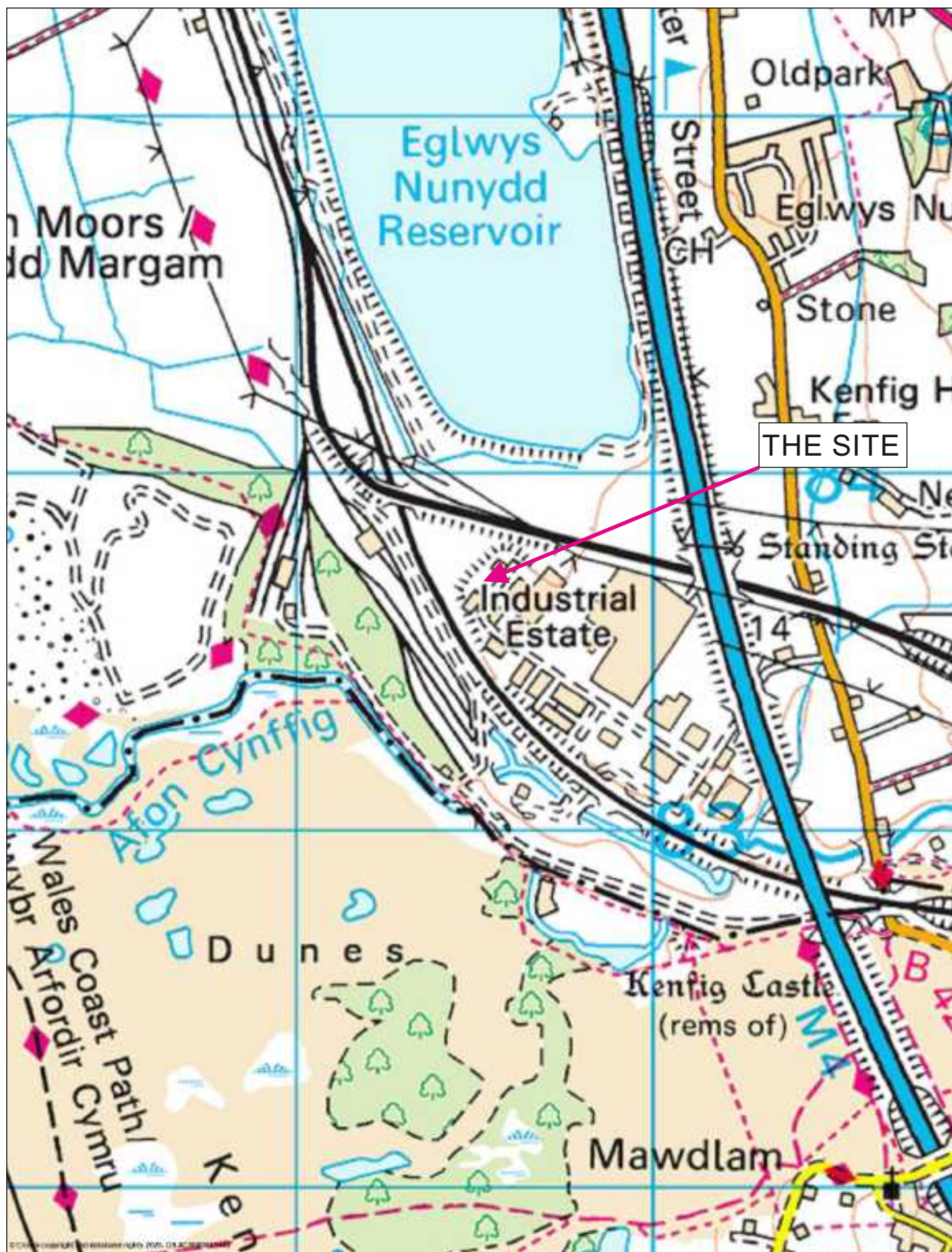


FIGURE 1
SITE LOCATION

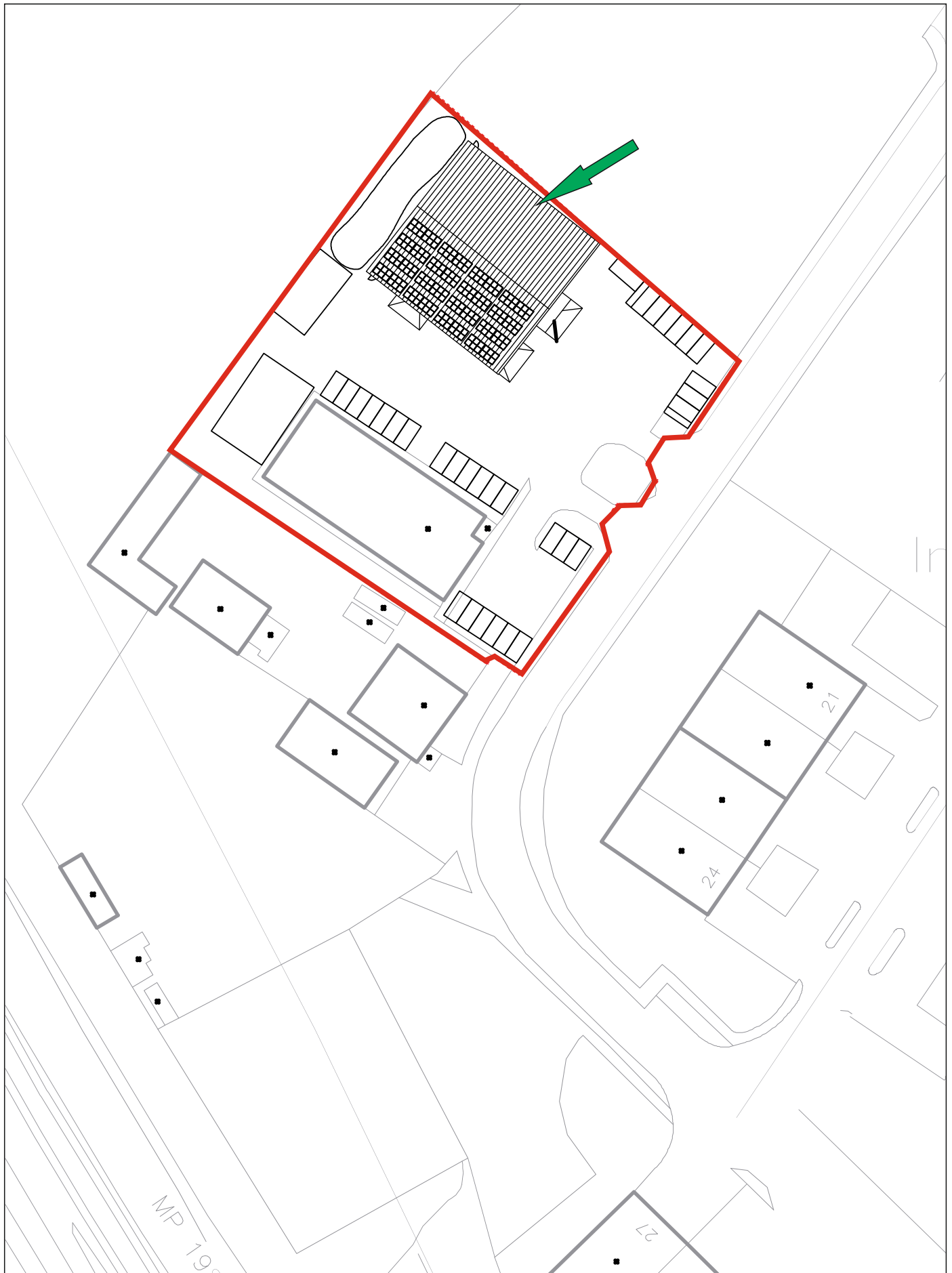


FIGURE 2
LOCATION OF PROPOSED NEW BUILDING (ARROWED).

1. SOLID GEOLOGY

Figure 3 is taken from the B.G.S. Geoindex 1:50,000 bedrock map. The site is underlain by bedrock of the Lower Coal Measures, close to their boundary with the Middle Coal Measures. To the south of the site the Coal Measures are overlain unconformably by Mercia Mudstone (formerly Keuper Marl). The Lower Coal Measures are predominantly argillaceous with subordinate Sandstones and Siltstones. The Lower Coal Measures contain multiple coal seams of economic thickness and have been heavily exploited in the past. The former Newlands Colliery was situated 1400m the east of the site. Workings from the colliery underlie part of the former Borg Warner plant on the Industrial Estate, now occupied by Amazon. The workings do not extend as far as the site. The site lies within a Coal Mining Reporting Area (C.M.R.A.) as defined by the Mining Remediation Authority. As part of any desk study within such an area, it is a requirement to look at the mining situation. Figure 4 is taken from the M.R.A. Interactive Viewer. All land within the C.M.R.A. is divided into Development High Risk and Development Low Risk areas. The hatched areas in Figure 4 are Development High Risk. The blue areas indicate recorded shallow mining. These are not connected to Newlands Colliery and are shallow outcrop workings. They are of limited extent, with the closest being 600m from the site. The purple colour indicates these linear areas are buffer zones above seam outcrops. Although orientated toward the site, these are all truncated well short of the site. This reflects the fact that the precise position of the seams is unknown because of the deep superficial deposits (see below). The Coal Measures are known to extend out to sea and across Swansea Bay. Water bearing superfcials made conditions too difficult for mining beneath the site prior to 1874 and the compulsory keeping of mine plans. There is no possibility of unrecorded mining beneath the site.

2. SUPERFICIAL DEPOSITS

Figure 5 is taken from the B.G.S. Geoindex 1:50,000 superficial deposits map. The site sits within a large area of Tidal Flat deposits. These consist of a considerable thickness of soft clays and silts. To the west these deposits are covered by blown sand. The Tidal Flats deposits are problematic for conventional foundation design because of the low bearing capacity of these soils. To the north in Figure 3, the pink colour represents Fluvioglacial deposits. These were laid down by meltwater at the end of the last Ice Age and are known to extend beneath the tidal flat deposits at the site and well past the present-day shoreline. The history and appearance of the site indicate Made Ground of unknown thickness or composition forms the present ground level.

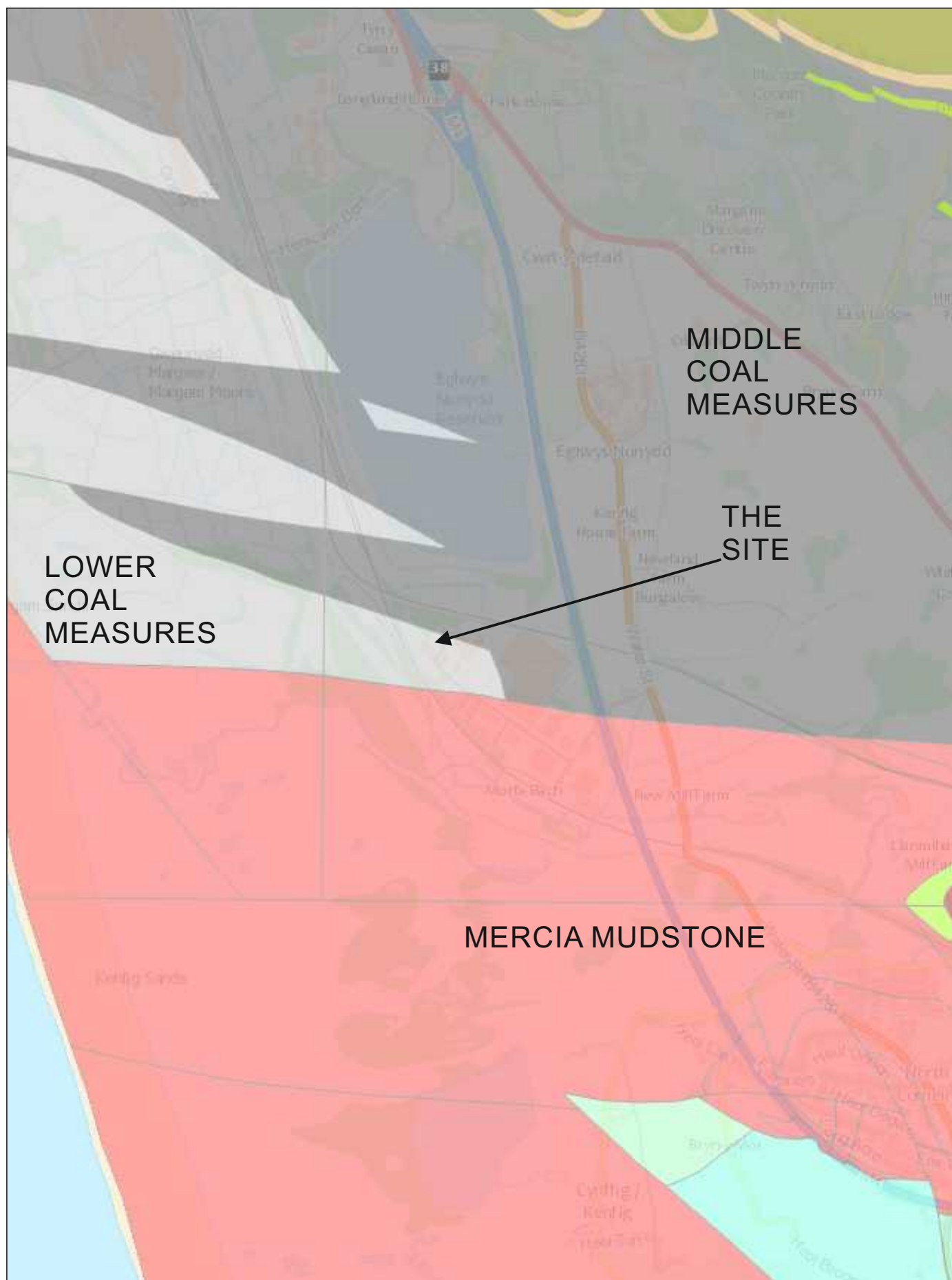


FIGURE 3
B.G.S. GEOINDEX 1:50,000 BEDROCK MAP.

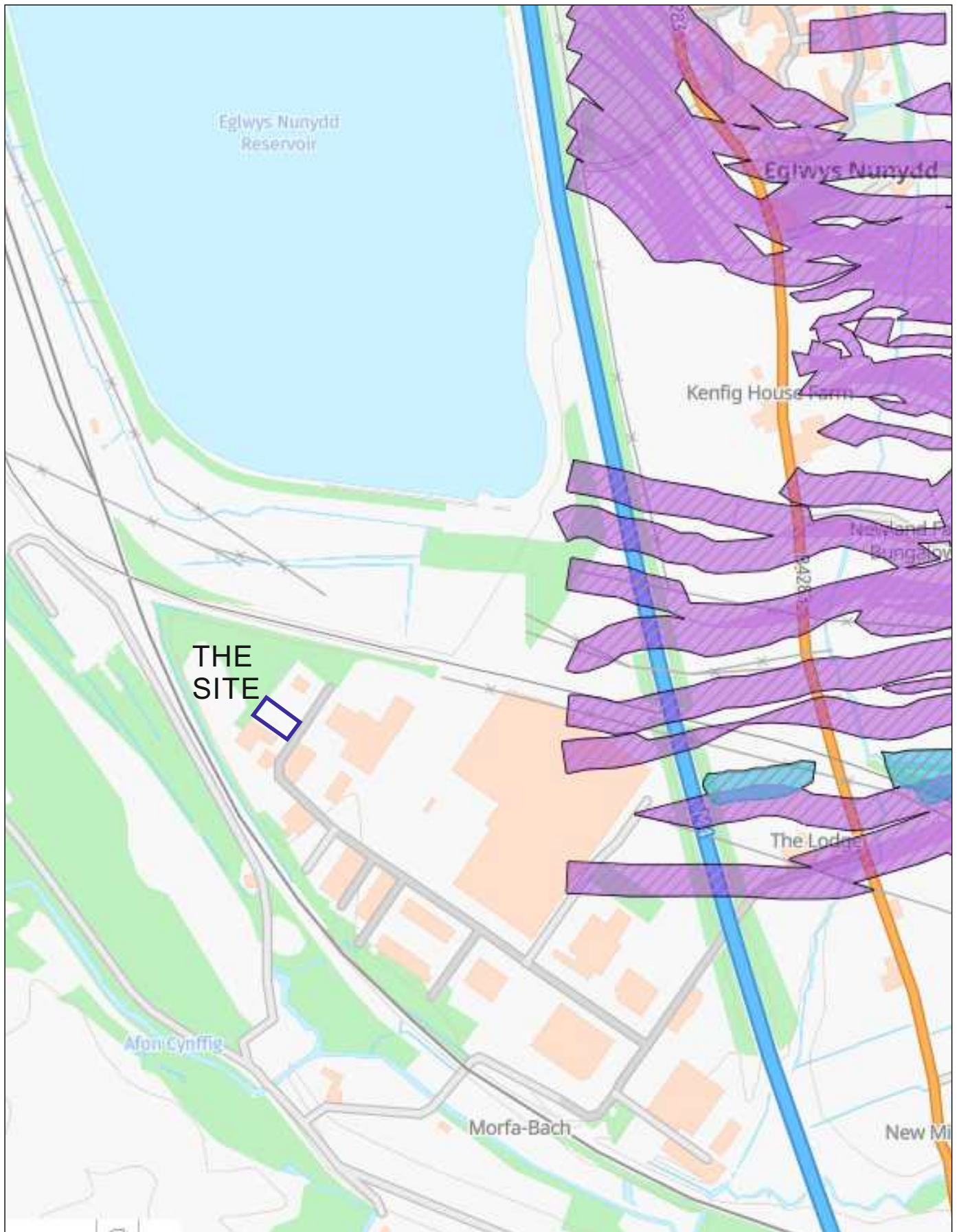


FIGURE 4
COAL AUTHORITY INTERACTIVE VIEWER.
HATCHED AREAS ARE CLASSSED AS DEVELOPMENT HIGH RISK.

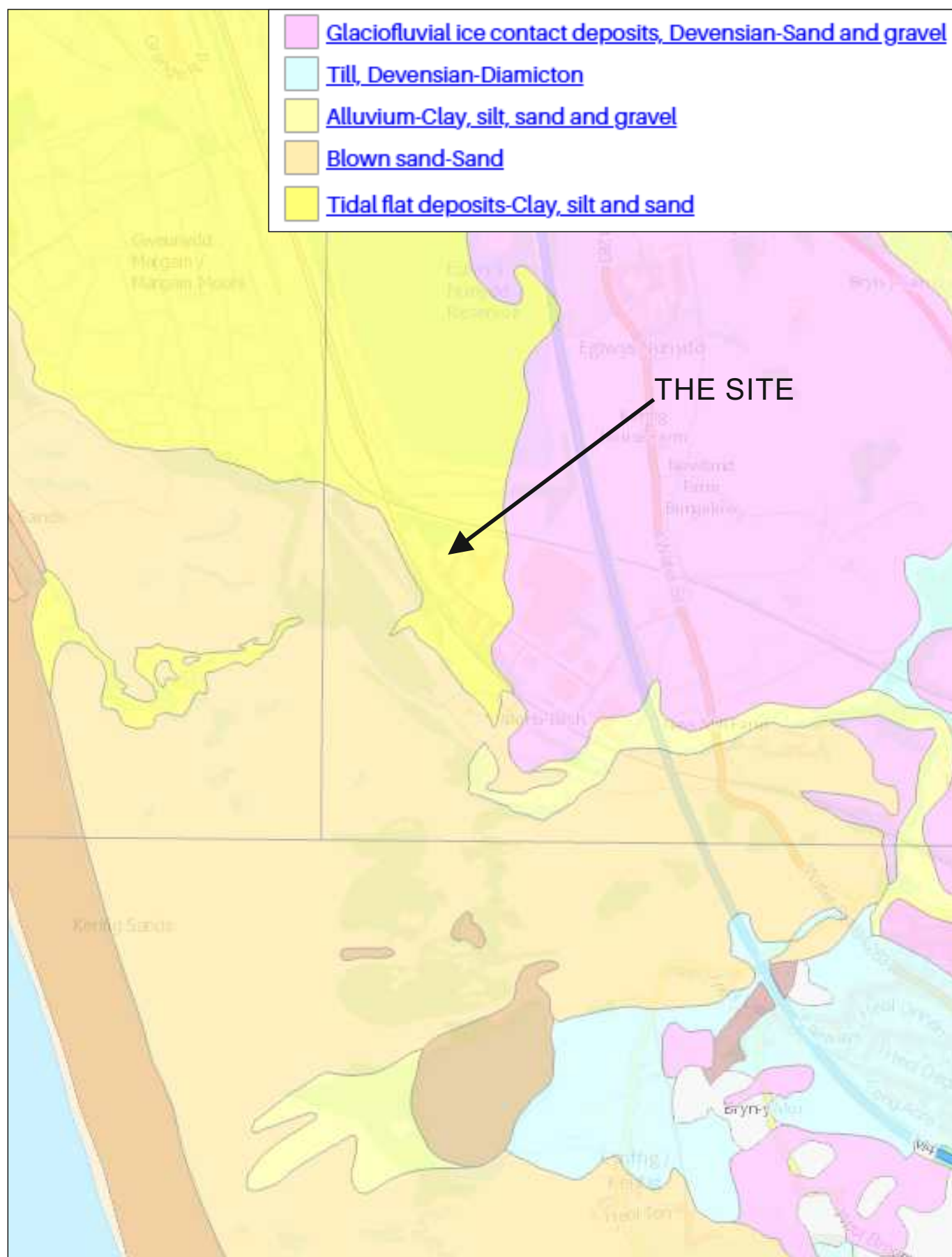


FIGURE 5
B.G.S. GEOINDEX 1:50,000 MAP OF SUPERFICIAL DEPOSITS.

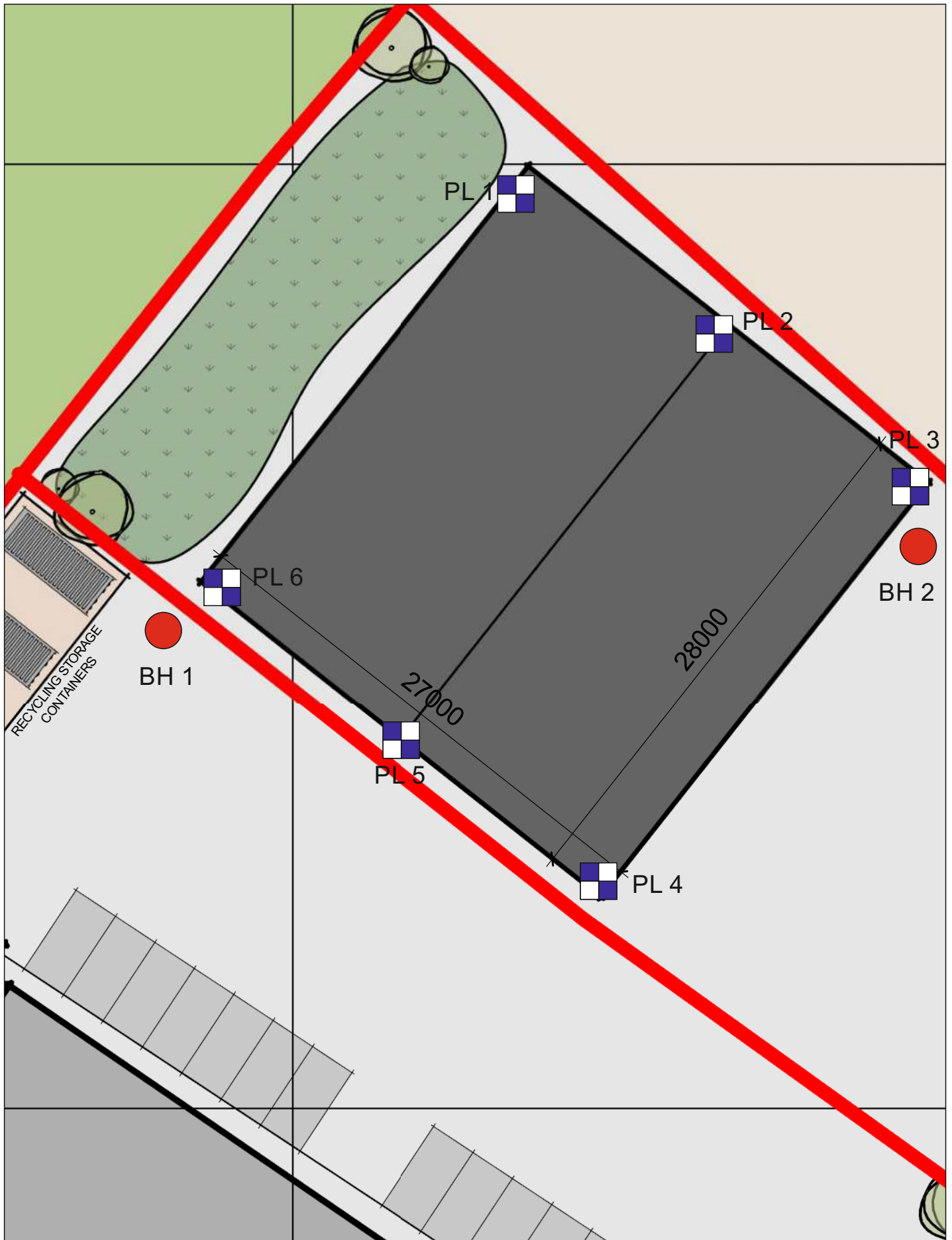


FIGURE 6
SITE INVESTIGATION LOCATIONS.
BH=BOREHOLE, PL=PLATE LOAD TEST.

3. CHOICE OF SITE INVESTIGATION METHODS

Based on the desk study material and extensive previous site investigation work in the area it was decided to initially drill two cable percussive (shell and auger) boreholes with the option of a further two, depending on findings. The purpose was to establish the extent and nature of the superficial deposits beneath the site. From previous work it was known that the Fluvioglacial deposits shown in Figure 5 would extend under the site. These have a high bearing capacity and are ideally suited for conventional foundations. The artificial nature of the surrounding landscape made it impossible to form a reliable estimate of their depth. The drilling rig and crew were supplied by Forester Drilling on the recommendation of R.G.S. to the client. The cable percussive rig was brought to site on Tuesday 24th February 2026. The borehole positions were set out by R.G.S. to be just outside the proposed building footprint at diagonally opposite corners. The positions are shown in Figure 6 on the preceding page. The drilling took four days in total and was supervised part time by Richard Davies who also logged all the samples taken.

4. SUMMARY OF SOIL CONDITIONS

Full borehole logs to BS5930:2015 have not been produced as they would be an unnecessary expense given the results. The drillers logs are attached as Appendix A. The drilling commenced at 200mm diameter. This was specified by R.G.S. at the outset to enable the borehole to be taken to the maximum depth possible. In summary, beneath approximately 200mm of aggregate laid on Terram was 3.9m (BH2)- 5.2m (BH1) of Made Ground. This was very heterogenous, consisting of demolition waste, limestone aggregate, steelworks slag and a variable proportion of firm Clay. The expected soft silty and sandy clay extended from the base of the Made Ground to 14.2m in BH1. S.P.T. tests were scheduled at 1m intervals. n values ranged from 5-8. At 14.2 the top of the fluvioglacial gravel was encountered. C.P.T. n values at 14.0m and 15.0m were 45 and 50 respectively. The density of the gravels indicated they would be suitable for end bearing driven pile design. In BH2 gravel was encountered at 10.5m. The gravel was initially clayey and medium dense with n values from 21-25. An n value of 41 was recorded at both 14m and 15m. The borehole was then terminated on the instruction of R.G.S. who believed there was already sufficient information obtained for the design of piled foundations for a relatively light building.

5. PLATE LOAD TESTING.

Piling was not the preferred option for the clients. The boreholes indicated driven piles of 15m+ would be required to reach strata suitable for end bearing. Apart from

the large former Borg Warner plant it is unlikely the smaller units on the Kenfig Industrial Estate are piled. As an alternative solution for a light portal building, founding on the Made ground could be considered. To assess this possibility, the bearing capacity of the Made Ground needed to be quantified. C.P.T. n-values from the drilling were low but the interpretation of n values in Made Ground with large particle size is difficult and unreliable with the cone tending to find the easiest way down. A more reliable method of assessing bearing capacity in these circumstances is plate loading. In this method a direct load is applied to the ground and settlement monitored. R.G.S. brought in South Wales Ground Testing to carry out the work. The testing was undertaken on Wednesday 11th March 2026. The ground was excavated to 0.2m with the aggregate and Terram removed. A JCB3CX excavator was used for the work as a counterweight for the tests. The six test locations are shown in Figure 6.

6. RESULTS

The full results are attached as Appendix B. In summary, in each location loadings were increased in 50kN/m² increments to 150kN/m². Settlements ranged from 0.50mm-1.49mm at 50kN/m², 1.03mm-4.21mm at 100kN/m² and 2.28mm-7.59mm at 150kN/m².

7. CONCLUSIONS AND RECOMMENDATIONS

It would be advisable to use the highest settlement values above to assess the bearing capacity of the Made Ground because of the presence of suspected large objects at shallow depth. Several were encountered during the cable percussive drilling. Taking the results above, the maximum settlement at a loading of 100kN/m² was 4.21mm. Settlements of this order should not be a problem for a portal building. In conclusion, the Made Ground at the site has a sufficient bearing capacity for pad foundations supporting the main columns. The loading on these columns is not known by the author at the time of writing. It is anticipated the design of the pad sizes will be carried out by a qualified Structural Engineer to incorporate a sufficient Factor of Safety and acceptable settlement based on the building loads and the bearing capacity indicated by the settlement results obtained during the testing.

Richard Davies BSc. (Hons.), MSc., F.G.S.

18.03.2026

APPENDIX A
CABLE PERCUSSIVE BOREHOLE LOGS
R-TECH MATERIALS
KENFIG INDUSTRIAL ESTATE

Tel: 07795 967491
Email: r.forester@sky.com

FORESTER DRILLING

26 Pyle Inn Way, Pyle, Bridgend CF33 6LP

DRILLERS DAILY LOG

[illegible]

Tel: 07795 967491
Email: r.forester@sky.com

FORESTER DRILLING

26 Pyle Inn Way, Pyle, Bridgend CF33 6LP

DRILLERS DAILY LOG

[illegible]

Tel: 07795 967491
Email: r.forester@sky.com

FORESTER DRILLING

26 Pyle Inn Way, Pyle, Bridgend CF33 6LP

DRILLERS DAILY LOG

[illegible]

Tel: 07795 967491
Email: r.forester@sky.com

FORESTER DRILLING

26 Pyle Inn Way, Pyle, Bridgend CF33 6LP

DRILLERS DAILY LOG

[illegible]

APPENDIX B

PLATE LOADING TEST RESULTS R-TECH MATERIALS KENFIG INDUSTRIAL ESTATE

Plate Load Test Settlement v Time Data

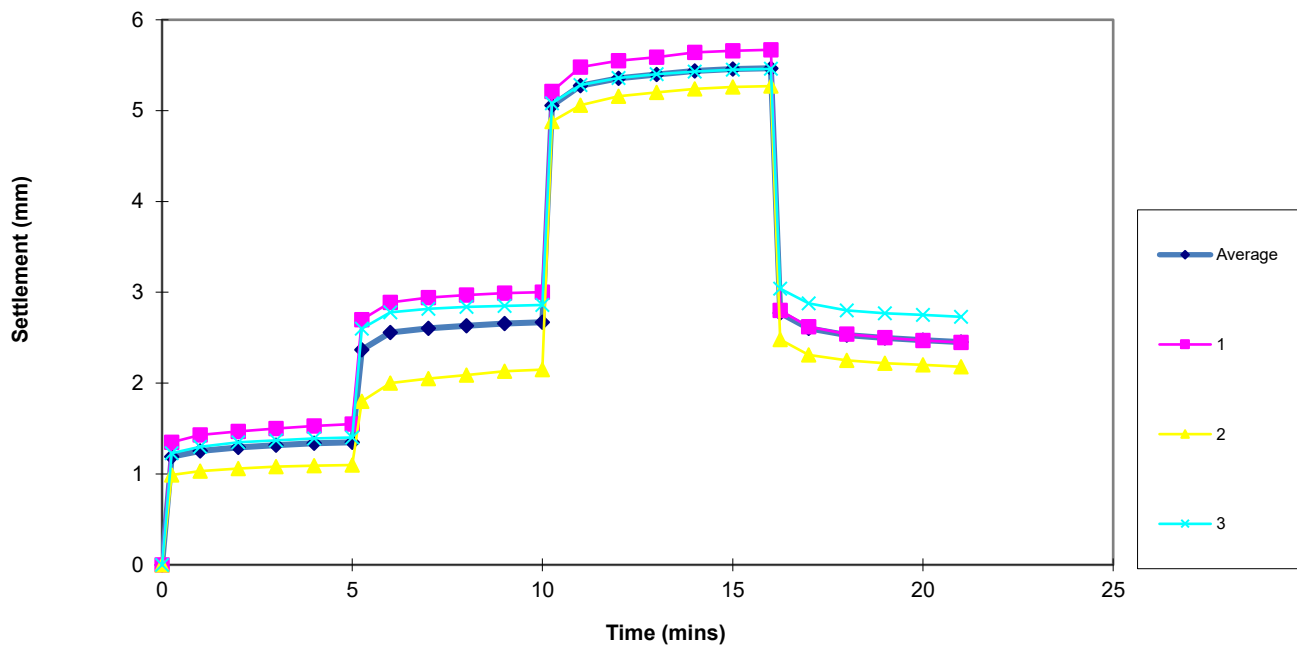
11.03.26

Seating Load: 5kN/m^2 Page 1 of 3

SOUTH WALES GROUND TESTING

Plate Load Test Settlement v Time Plot

Test Reference: Plate Test 1



Contract: R Tech Materials Kenfig Industrial Estate

Date: 11.03.26

South Wales Ground Testing, Unit 25, South Cornelly
Trading Estate, Bridgend, CF33 4RE



**SOUTH WALES
GROUND TESTING**

Page 2 of 3

Plate Load Test Settlement v Time Data

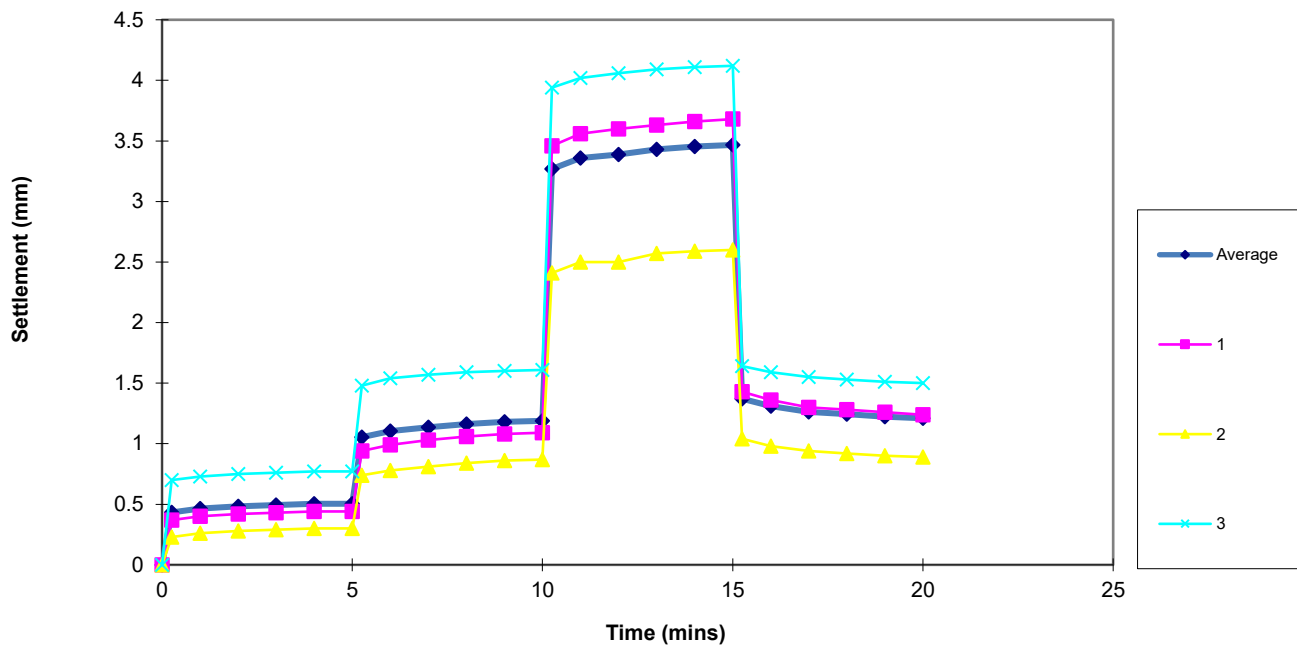
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Seating Load: 5kN/m^2 Page 1 of 3

SOUTH WALES GROUND TESTING

Plate Load Test Settlement v Time Plot

Test Reference: Plate Test 2



Contract: R Tech Materials Kenfig Industrial Estate

Date: 11.03.26

South Wales Ground Testing, Unit 25, South Cornelly
Trading Estate, Bridgend, CF33 4RE



**SOUTH WALES
GROUND TESTING**

Page 2 of 3

Plate Load Test Settlement v Time Data

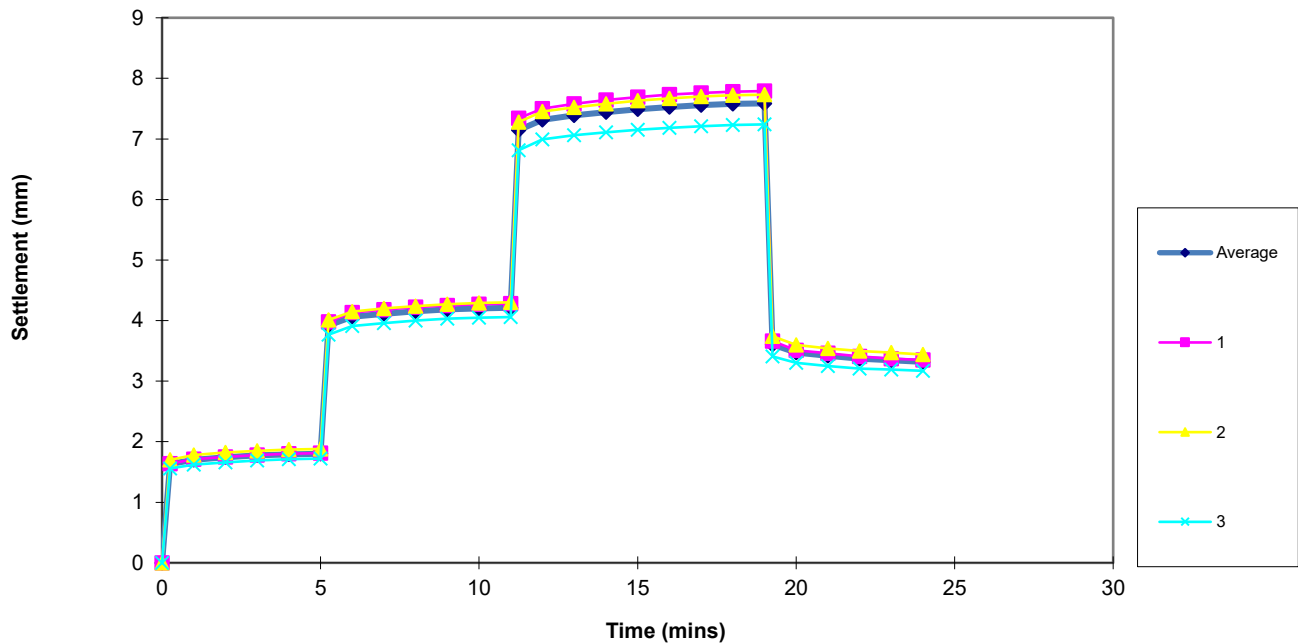
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Seating Load: 5kN/m^2 Page 1 of 3

SOUTH WALES GROUND TESTING

Plate Load Test Settlement v Time Plot

Test Reference: Plate Test 3



Contract: R Tech Materials Kenfig Industrial Estate

Date: 11.03.26

South Wales Ground Testing, Unit 25, South Cornelly
Trading Estate, Bridgend, CF33 4RE



SOUTH WALES
GROUND TESTING

Page 2 of 3

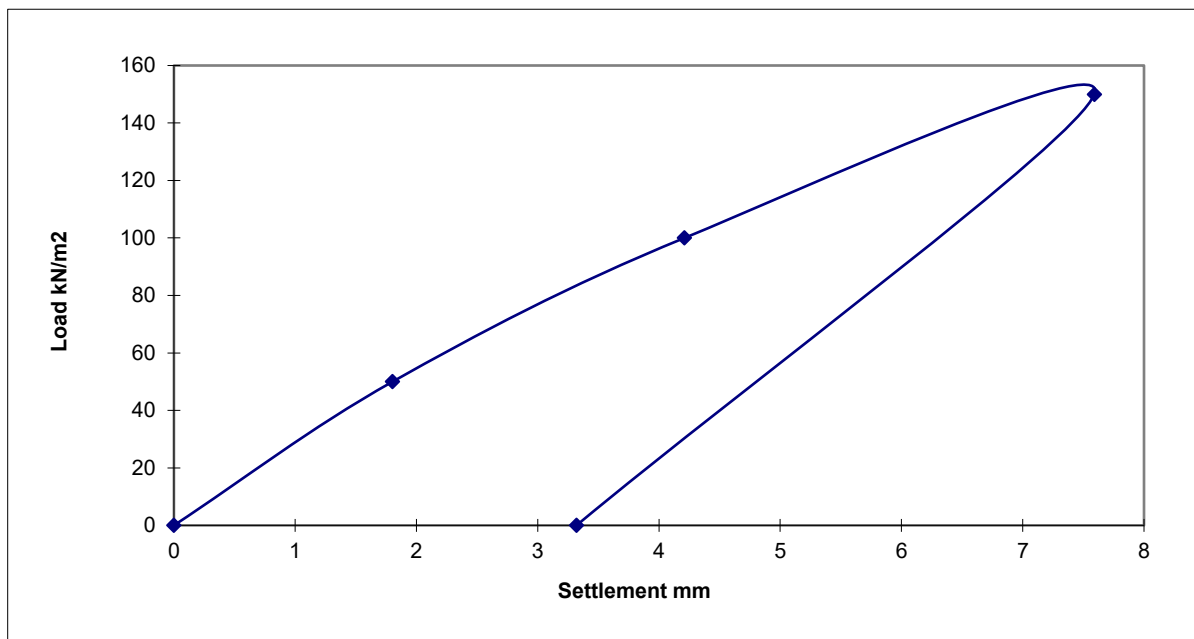
SOUTH WALES GROUND TESTING

PLATE LOAD TEST REPORT

Test Reference: Plate Test 3 0	Test Depth: 0.20m bgl	Plate Diameter: 600mm	Soil Description: Light brown very gravelly clay
		Counterweight:	
		Tracked excavator	Weather Conditions: Sunny

[illegible]

Deformation Modulus (E)	8.5	MN/m ²
Degree of Rebound (%)	56.3	%
Load req'd to achieve 1.25mm settlement	24.7	kN/m ²
Modulus of subgrade reaction (K762)	17984	kPa/m
Derived CBR Value	2.8	%
σ_{max}	150	kN/m ²
s at σ_{max}	7.59	mm



Notes:

- 1: Circular steel plate bedded on uniform coarse sand.
- 2: Tracked excavator used as counter weight.
- 3: Load applied to plate via hydraulic jack and loading columns.
- 4: Each load increment applied until plate settlement less than 0.01mm per minute.
- 5: Plate settlement measured by three travel gauges fixed to datum beams.
- 6: Load measured using UKAS calibrated electric load cell.

Approved by :

David McArthur BSc MSc ARSM

REMARKS: Test carried out in accordance with BS1377.1990, Part 9.

k762 for 600mm circular plate = pressure required to achieve 1.25mm penetration x 0.91 (HD 25/94)

Size factor correction after Croney 1991. CBR derivation from CBR USA FAA (Tuleubek and Brill)

CONTRACT:

R Tech Materials Kenfig Industrial Estate



SOUTH WALES GROUND TESTING

Date:	11.03.26
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Page 3 of 3

Plate Load Test Settlement v Time Data

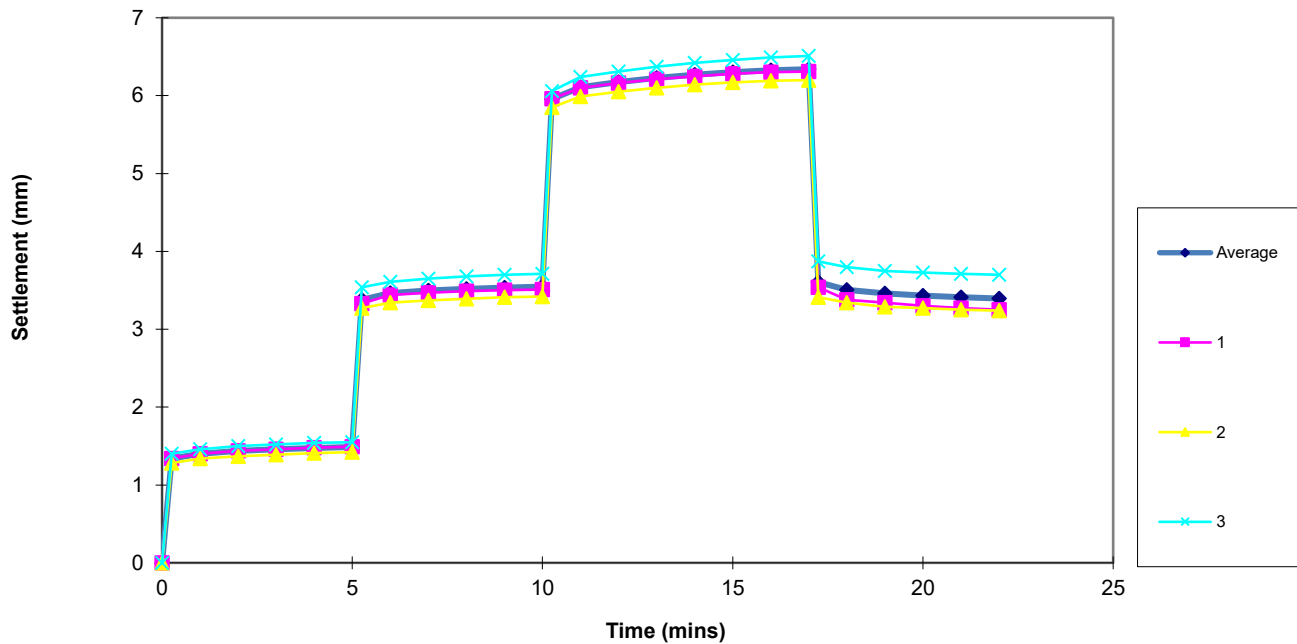
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Seating Load: 5kN/m^2 Page 1 of 3

SOUTH WALES GROUND TESTING

Plate Load Test Settlement v Time Plot

Test Reference: Plate Test 4



Contract: R Tech Materials Kenfig Industrial Estate

Date: 11.03.26

South Wales Ground Testing, Unit 25, South Cornelly
Trading Estate, Bridgend, CF33 4RE



**SOUTH WALES
GROUND TESTING**

Page 2 of 3

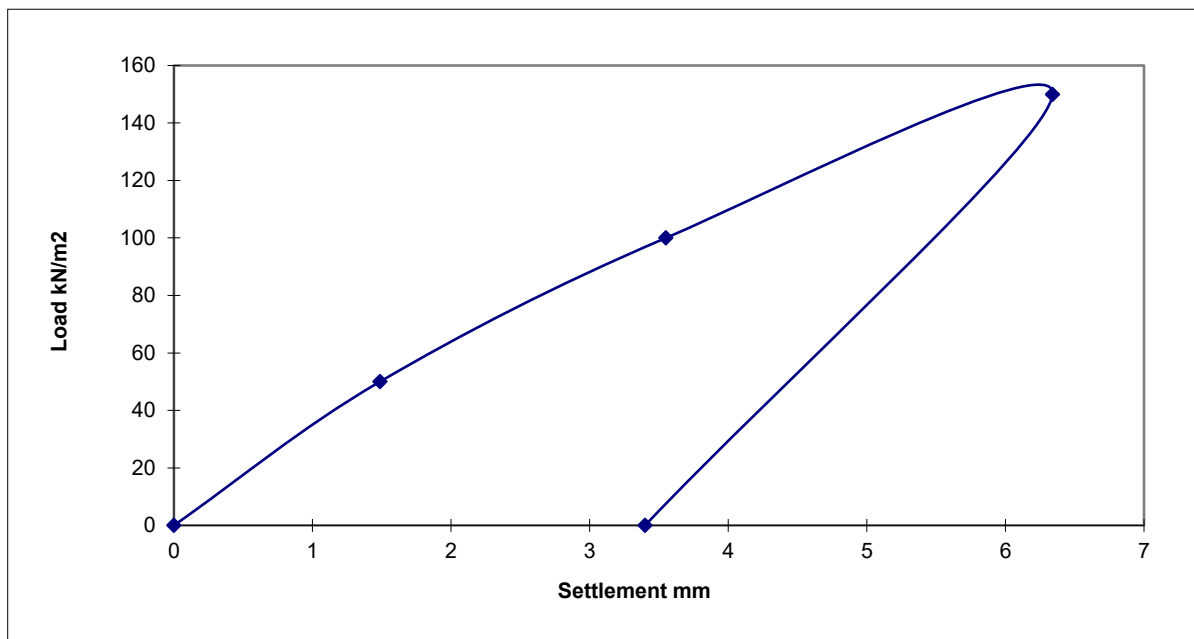
SOUTH WALES GROUND TESTING

PLATE LOAD TEST REPORT

Test Reference: Plate Test 4 0	Test Depth: 0.20m bgl	Plate Diameter: 600mm Counterweight: Tracked excavator	Soil Description: Light brown very gravelly clay Weather Conditions: Sunny
--------------------------------------	--------------------------	--	---

Average Plate Settlement (mm)	Load (kN/m ²)	Time (mins)
0	0	0
1.49	50	5
3.55	100	10
6.34	150	17
3.40	0	22

Deformation Modulus (E)	10.2	MN/m ²
Degree of Rebound (%)	46.4	%
Load req'd to achieve 1.25mm settlement	29.6	kN/m ²
Modulus of subgrade reaction (K762)	21530	kPa/m
Derived CBR Value	3.6	%
σ _{max}	150	kN/m ²
s at σ _{max}	6.34	mm



Notes:

- 1: Circular steel plate bedded on uniform coarse sand.
- 2: Tracked excavator used as counter weight.
- 3: Load applied to plate via hydraulic jack and loading columns.
- 4: Each load increment applied until plate settlement less than 0.01mm per minute.
- 5: Plate settlement measured by three travel gauges fixed to datum beams.
- 6: Load measured using UKAS calibrated electric load cell.

Approved by :

D. McArthur

David McArthur BSc MSc ARSM

REMARKS: Test carried out in accordance with BS1377.1990, Part 9.

k762 for 600mm circular plate = pressure required to achieve 1.25mm penetration x 0.91 (HD 25/94)

Size factor correction after Croney 1991. CBR derivation from CBR USA FAA (Tulebek and Brill)

CONTRACT:

R Tech Materials Kenfig Industrial Estate



SOUTH WALES
GROUND TESTING

Date: 11.03.26

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Plate Load Test Settlement v Time Data

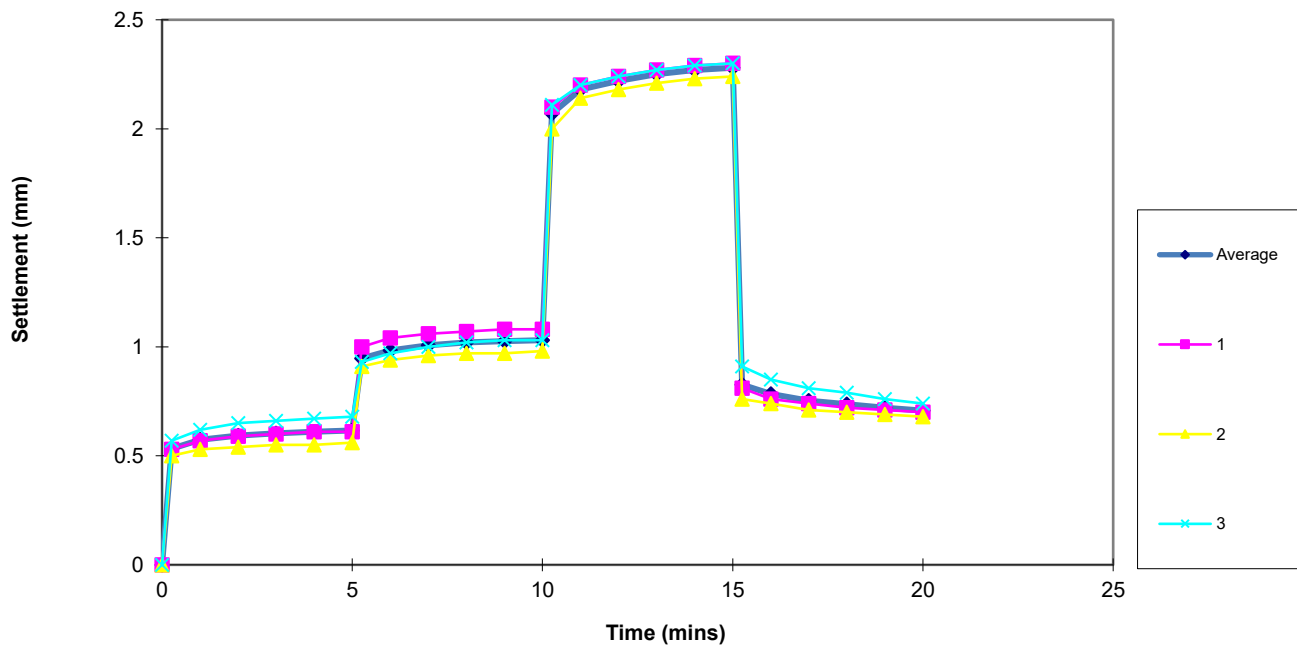
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Seating Load: 5kN/m^2 Page 1 of 3

SOUTH WALES GROUND TESTING

Plate Load Test Settlement v Time Plot

Test Reference: Plate Test 5



Contract: R Tech Materials Kenfig Industrial Estate

Date: 11.03.26

South Wales Ground Testing, Unit 25, South Cornelly
Trading Estate, Bridgend, CF33 4RE



**SOUTH WALES
GROUND TESTING**

Page 2 of 3

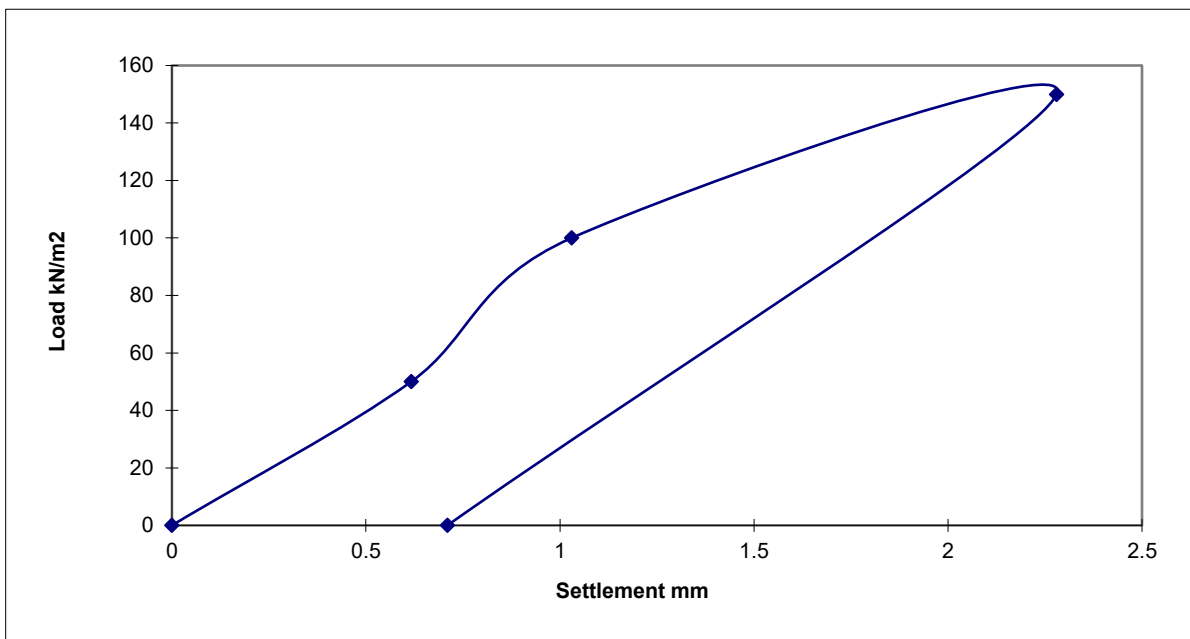
SOUTH WALES GROUND TESTING

PLATE LOAD TEST REPORT

Test Reference: Plate Test 5 0	Test Depth: 0.20m bgl	Plate Diameter: 600mm Counterweight: Tracked excavator	Soil Description: Light brown very gravelly clay Weather Conditions: Sunny
--------------------------------------	--------------------------	--	---

Average Plate Settlement (mm)	Load (kN/m ²)	Time (mins)
0	0	0
0.62	50	5
1.03	100	10
2.28	150	15
0.71	0	20

Deformation Modulus (E)	28.3	MN/m ²
Degree of Rebound (%)	68.9	%
Load req'd to achieve 1.25mm settlement	82.2	kN/m ²
Modulus of subgrade reaction (K762)	59868	kPa/m
Derived CBR Value	13.3	%
σ_{max}	150	kN/m ²
s at σ_{max}	2.28	mm



Notes:

- 1: Circular steel plate bedded on uniform coarse sand.
- 2: Tracked excavator used as counter weight.
- 3: Load applied to plate via hydraulic jack and loading columns.
- 4: Each load increment applied until plate settlement less than 0.01mm per minute.
- 5: Plate settlement measured by three travel gauges fixed to datum beams.
- 6: Load measured using UKAS calibrated electric load cell.

Approved by :

D. McArthur

David McArthur BSc MSc ARSM

REMARKS: Test carried out in accordance with BS1377.1990, Part 9.

k762 for 600mm circular plate = pressure required to achieve 1.25mm penetration x 0.91 (HD 25/94)

Size factor correction after Croney 1991. CBR derivation from CBR USA FAA (Tulebek and Brill)

CONTRACT:

R Tech Materials Kenfig Industrial Estate



SOUTH WALES
GROUND TESTING

Date: 11.03.26

Page 3 of 3

Plate Load Test Settlement v Time Data

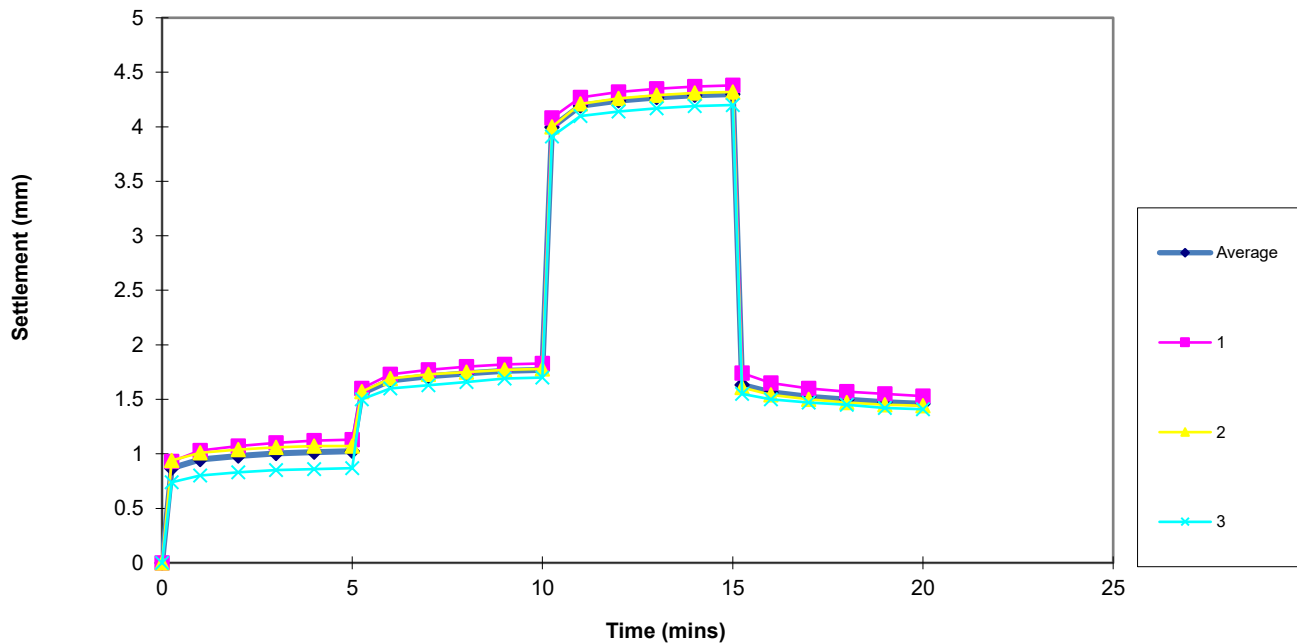
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Seating Load: 5kN/m^2 Page 1 of 3

SOUTH WALES GROUND TESTING

Plate Load Test Settlement v Time Plot

Test Reference: Plate Test 6



Contract: R Tech Materials Kenfig Industrial Estate

Date: 11.03.26

South Wales Ground Testing, Unit 25, South Cornelly
Trading Estate, Bridgend, CF33 4RE



**SOUTH WALES
GROUND TESTING**

Page 2 of 3

SOUTH WALES GROUND TESTING

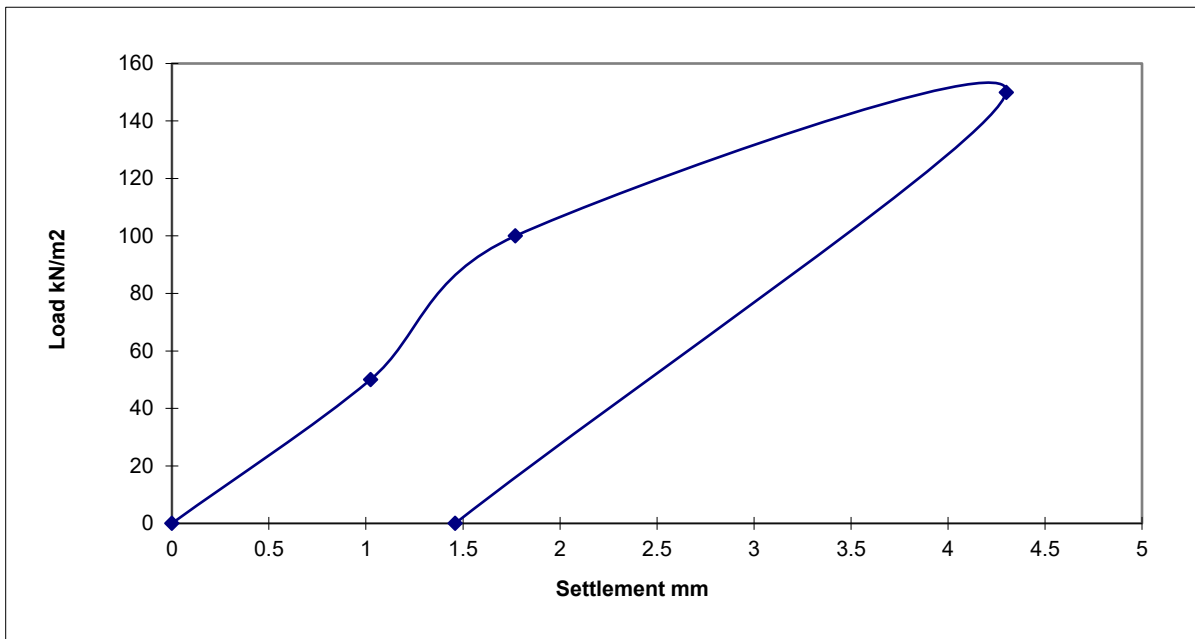
PLATE LOAD TEST REPORT

Test Reference: Plate Test 6 0	Test Depth: 0.20m bgl	Plate Diameter: 600mm	Soil Description: Light brown very gravelly clay
		Counterweight: Tracked excavator	

[illegible]

Deformation Modulus (E)	15.0	MN/m ²
Degree of Rebound (%)	66.0	%
Load req'd to achieve 1.25mm settlement	43.6	kN/m ²
Modulus of subgrade reaction (K762)	31744	kPa/m
Derived CBR Value	5.9	%

$\sigma_{\max}$	150	kN/m^2
s at $\sigma_{\max}$	4.30	mm



Notes:

- 1: Circular steel plate bedded on uniform coarse sand.
- 2: Tracked excavator used as counter weight.
- 3: Load applied to plate via hydraulic jack and loading columns.
- 4: Each load increment applied until plate settlement less than 0.01mm per minute.
- 5: Plate settlement measured by three travel gauges fixed to datum beams.
- 6: Load measured using UKAS calibrated electric load cell.

Approved by :

David McArthur BSc MSc ARSM

REMARKS: Test carried out in accordance with BS1377.1990, Part 9.

k762 for 600mm circular plate = pressure required to achieve 1.25mm penetration x 0.91 (HD 25/94)

Size factor correction after Croney 1991. CBR derivation from CBR USA FAA (Tuleubek and Brill)

CONTRACT:

R Tech Materials Kenfig Industrial Estate

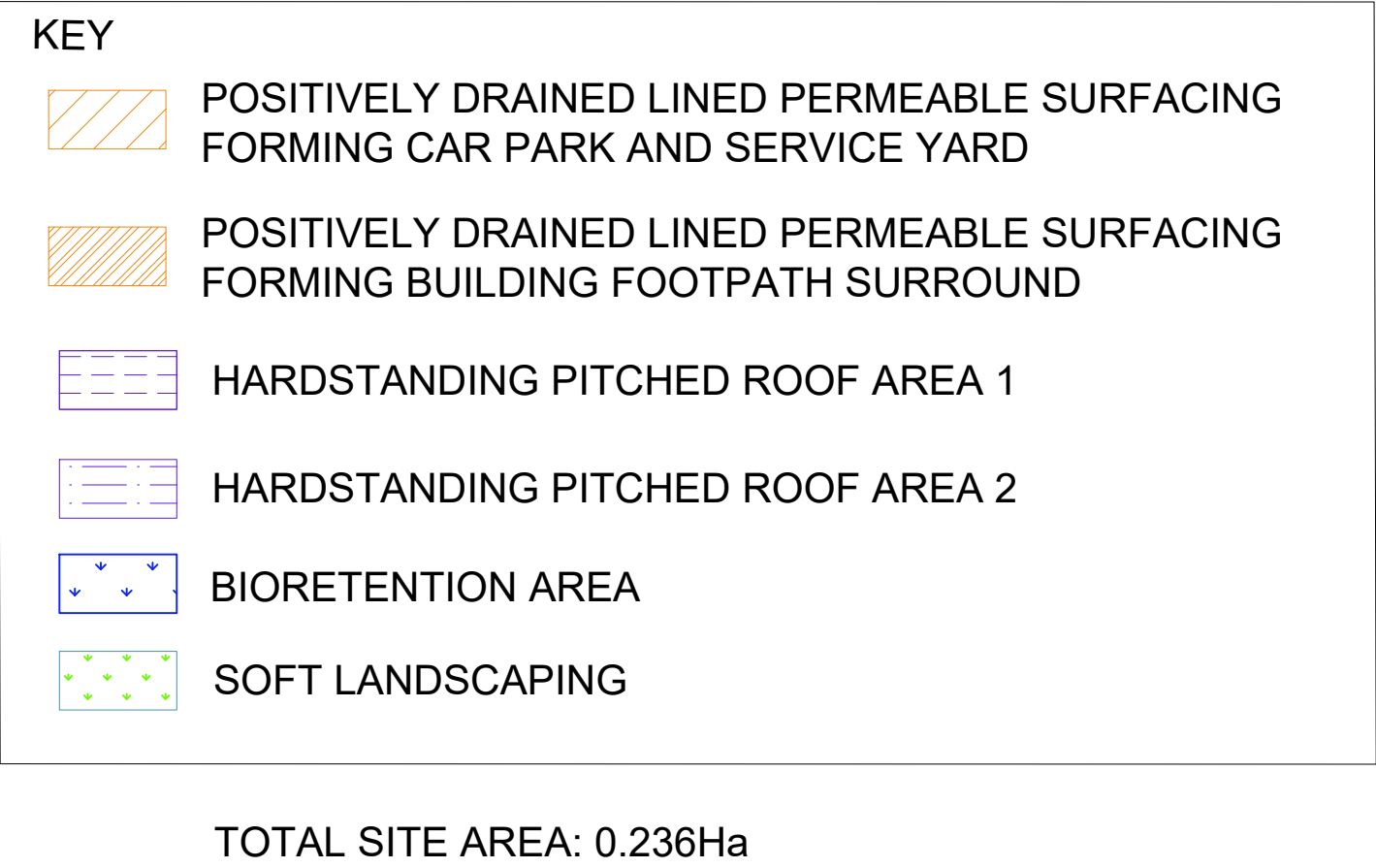


SOUTH WALES GROUND TESTING

Date:	11.03.26
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Page 3 of 3

Appendix D



1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELATED WL/ ARCHITECTS & SUB-CONTRACTORS DRAWINGS. IN THE CASE OF DISCREPANCIES BETWEEN DRAWING REFER TO WL/ FOR CLARIFICATION.
2. THIS DRAWING IS BASED ON SITE LAYOUTS AND FLOOR PLANS PRODUCED BY ARCHITECTS.
3. ALL EXTERNAL DRAINAGE WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH 'CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY' 7TH EDITION, BS EN 12252 & PART H OF THE CURRENT BUILDING REGULATIONS.
4. ALL BUILDING DRAINAGE TO BE INSTALLED AND TESTED IN COMPLIANCE WITH THE BUILDING REGULATIONS 2000 DRAINAGE AND WASTE DISPOSAL APPROVED DOCUMENT H 2002 EDITION. ALL DRAINAGE WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH LATEST EDITION OF "SEWERS FOR ADOPTION".
5. ALL COMPONENTS AND MATERIALS ARE TO BE MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, AND LAID AND BACKFILLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND THE RELEVANT BRITISH STANDARDS.
6. THE CONTRACTOR SHALL, BEFORE COMMENCING THE WORKS, VERIFY ALL SITE AND SETTING DIMENSIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE AND PROPER SETTING OUT OF THE WORKS AND FOR THE CORRECTIONS OF ANY DIMENSIONAL LEVELS, DIMENSIONS, AND ALIGNMENT OF ALL PARTS OF THE WORKS.
7. SMALL LIGHTWEIGHT ACCESS COVERS SHOULD BE SECURED FOR EXAMPLE WITH SCREWS TO DETER UNAUTHORISED ACCESS.
8. INSPECTION CHAMBERS AND MANHOLES IN BUILDING TO HAVE MECHANICALLY FIXED AIRTIGHT COVERS UNLESS THE DRAIN ITSELF HAS WATERTIGHT ACCESS COVERS.
9. MANHOLES DEEPER THAN 1M TO HAVE GALVANISED STEEL STEP IRONS OR FIXED LADDERS.
10. ALL INSITU CONCRETE USED FOR DRAINAGE WORKS SHALL BE GEN1 C20 MIX AND COMPLY WITH BS EN 206-1 AND BS8950.
11. ALL GRAVITY SEWER PIPES ARE TO BE LAID USING PIPE LENGTHS NOT EXCEEDING 3m AND CONSTRUCTED USING UNBELLIED PIPE AND SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1401-1, BS EN 1825 and BS EN 12666-1.
12. ALL NEW PIPES LAID OUTSIDE SITE BOUNDARY TO BE ENCASED IN 100mm CONCRETE BED AND SURROUND (GRADE GEN3 (C16/C20)).

Drawing Status			
Pre-App SAB			
Client			
R-Tech Group			
Job Title			
Testing House, Kenfig Ind Estate			
Drawing Title			
Contributing Areas Plan			
Architects			
RA Architects Ltd			
 Consulting Civil & Structural Engineers Email: projects@wsquared.com Telephone: 01656 669867			
Scales		Originator	
1:200		JH	
Checked	Approved	Date	
DG	DG	07/05/26	
Job No.	Drawing No.	Rev.	
2025_109	A001		

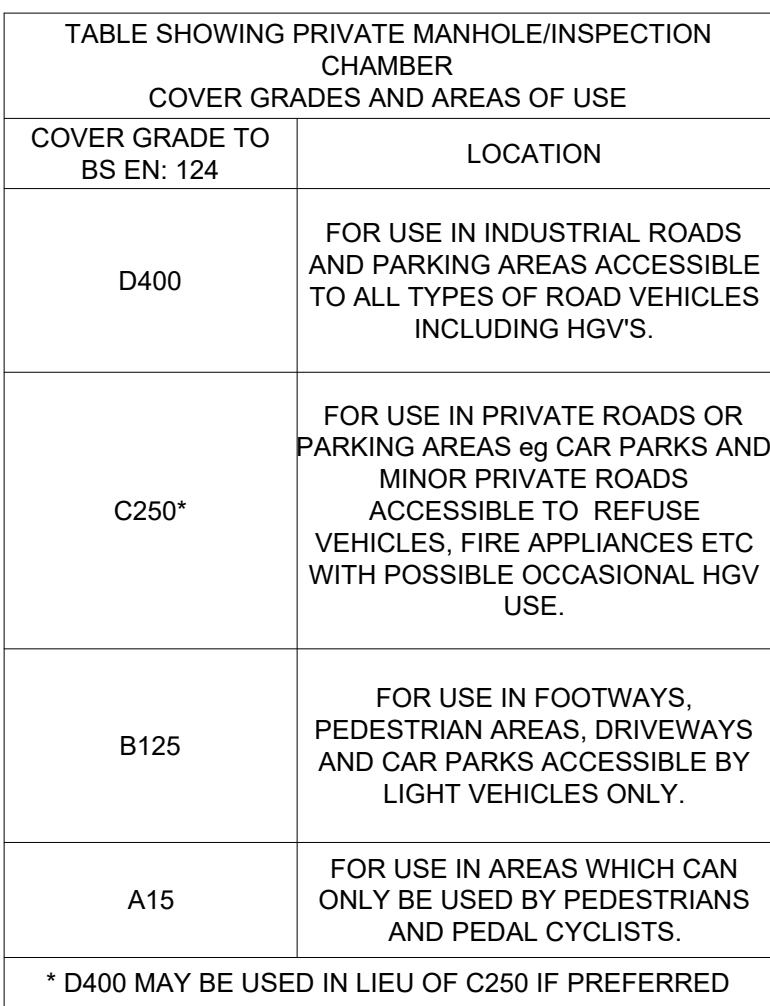
Appendix E



NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELATED WL², ARCHITECTS & SUB-CONTRACTORS DRAWINGS. IN THE CASE OF DISCREPANCIES BETWEEN DRAWING REFER TO WL² FOR CLARIFICATION.
- THIS DRAWING IS BASED ON SITE LAYOUTS AND FLOOR PLANS PRODUCED BY ARCHITECTS.
- ALL EXTERNAL DRAINAGE WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH 'CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY' 7TH EDITION, BS EN 752 & PART H OF THE CURRENT BUILDING REGULATIONS.
- ALL BUILDING DRAINAGE TO BE INSTALLED AND TESTED IN COMPLIANCE WITH THE BUILDING REGULATIONS 2000 DRAINAGE AND WASTE DISPOSAL APPROVED DOCUMENT H 2002 EDITION. ALL DRAINAGE WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH LATEST EDITION OF 'SEWERS FOR ADOPTION'.
- ALL COMPONENTS AND MATERIALS ARE TO BE MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, AND LAID AND BACKFILLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND THE RELEVANT BRITISH STANDARDS.
- THE CONTRACTOR SHALL, BEFORE COMMENCING THE WORKS, VERIFY ALL SITE AND SETTING DIMENSIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE AND PROPER SETTING OUT OF THE WORKS AND FOR THE CORRECTNESS OF THE POSITIONS, LEVELS, DIMENSIONS, AND ALIGNMENT OF ALL PARTS OF THE WORKS.
- SMALL LIGHTWEIGHT ACCESS COVERS SHOULD BE SECURED FOR EXAMPLE WITH SCREWS TO DETER UNAUTHORISED ACCESS.
- INSPECTION CHAMBERS AND MANHOLES IN BUILDING TO HAVE MECHANICALLY FIXED AIRTIGHT COVERS UNLESS THE DRAIN ITSELF HAS WATERTIGHT ACCESS COVERS.
- MANHOLES DEEPER THAN 1M TO HAVE GALVANISED STEEL STEP IRONS OR FIXED LADDERS.
- ALL INSITU CONCRETE USED TOR DRAINAGE WORKS SHALL BE GEN1 C20 MIX AND COMPLY WITH BS EN 206-1 AND BS8500.
- ALL GRAVITY SEWER PIPES ARE TO BE LAID USING PIPE LENGTHS NOT EXCEEDING 3m AND CONSTRUCTED USING UPVC PIPES AND SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1401-1, BS EN 1852 AND BS EN 12866-1.
- ALL NEW PIPES LAID OUTSIDE SITE BOUNDARY TO BE ENCASED IN 100mm CONCRETE BED AND SURROUND (GRADE GEN3 (C16/C20)).

Drawing Status		Pre-App SAB		Client		R-Tech Group		Architects		RA Architects Ltd		Scale		1:200		Checked		DG		Approved		DG		Date		07/05/26		Job Title		Testing House, Kenfig Ind Estate		Drawing Title		Stormwater Drainage Strategy	
Job No.		2025_109		Drawing No.		D001		Rev.				Email: projects@wlsquared.com		47 Park Street		Bridgend		CF31 4AX		Originator		JH		Rev.				Rev.							



MINIMUM DIMENSIONS FOR ACCESS FITTINGS AND INSPECTION CHAMBERS					
TYPE OF ACCESS	DEPTH TO INVERT FROM COVER LEVEL (m)	MINIMUM INTERNAL DIMENSIONS(1)		MINIMUM INTERNAL DIMENSIONS(1)	
		LENGTH X WIDTH (mm X mm)	CIRCULAR (mm)	LENGTH X WIDTH (mm X mm)	CIRCULAR (mm)
RODDING EYE	-	AS DRAIN BUT MINIMUM 100mm.	-	-	SAME SIZE AS PIPEWORK
ACCESS FITTING SMALL 150mm DIA. SMALL 150X100mm LARGE 225X100mm	0.6m OR LESS EXCEPT WHERE SITUATED IN A CHAMBER	150 X 100 225 X 100	150 225	150 X 100 ⁽¹⁾ 250 X 100 ⁽¹⁾	SAME SIZE AS ACCESS FITTING
INSPECTION CHAMBER					
SHALLOW	0.6m OR LESS	225 X 100	190 (2)		190 ⁽¹⁾
MEDIUM	1.2m OR LESS	450X 450	450	MIN 430 X 430	430
DEEP	GREATER THAN 1.2M	450 X 450	450	MAX 300 X 300 ⁽³⁾	ACCESS RESTRICTED TO MAX 350 ⁽³⁾

NOTES:

⁽¹⁾ THE CLEAR OPENING MAY BE REDUCED BY 20mm IN ORDER TO PROVIDE PROPER SUPPORT FOR THE COVER AND FRAME.

⁽²⁾ DRAINS UPTO 150mm DIAMETER.

⁽³⁾ A LARGER CLEAR OPENING COVER MAY BE USED IN CONJUNCTION WITH A RESTRICTED ACCESS THE SIZE IS RESTRICTED FOR HEALTH AND SAFETY REASONS TO DETER ENTRY.

NOTES:

- (1) THE CLEAR OPENING MAY BE REDUCED BY 20mm IN ORDER TO PROVIDE PROPER SUPPORT FOR THE COVER AND FRAME.
- (2) DRAINS UPTO 150mm DIAMETER.
- (3) A LARGER CLEAR OPENING COVER MAY BE USED IN CONJUNCTION WITH A RESTRICTED ACCESS THE SIZE IS RESTRICTED FOR HEALTH AND SAFETY REASONS TO DETER ENTRY.

MINIMUM DIMENSIONS FOR MANHOLE					
TYPE OF ACCESS	SIZE OF LARGEST PIPE	MINIMUM INTERNAL DIMENSIONS(1)		MINIMUM CLEAR OPENING (1)	
		RECTANGULAR LENGTH X WIDTH (mm X mm)	CIRCULAR DIAMETER (mm)	RECTANGULAR LENGTH X WIDTH (mm X mm)	CIRCULAR DIAMETER (mm)
MANHOLE LESS THAN 1.5m DEEP TO SOFFIT	LESS THAN OR EQUAL TO 150	750 X 675 (7)	1000 (7)	750X675 (2)	N/A (3)
	225	1200 X 675	1200	1200 X 675 (2)	
	300	1200 X 750	1200	1200 X 675 (2)	
	GREATER THAN 300	1800 X (DN+450)	THE LARGER OF 1800 OR (DN+450)	1200 X 675 (2)	
MANHOLE GREATER THAN 1.5m DEEP TO SOFFIT	LESS THAN OR EQUAL TO 225	1200 X 1000	1200	600 X 600	600
	300	1200 X 1075	1200		
	375-2450	1350 X 1225	1200		
	GREATER THAN 450	1800 X (DN+450)	THE LARGER OF 1800 OR (DN+775)		
MANHOLE SHAFT GREATER THAN 3.0m DEEP TO SOFFIT OF PIPE	STEPS (5)	1050 X 800	1050	600 X 600	600
	LADDER (5)	1200 X 800	1200		
	WINCH (6)	900 X 800	900		

NOTES:

- (1) LARGER SEIZES MAY BE REQUIRED FOR MANHOLES ON BENDS OR WHERE THERE ARE JUNCTIONS.
- (2) MAY BE REDUCED TO 600X800mm WHERE REQUIRED BY HIGHWAY LOADING CONSIDERATIONS, SUBJECT TO A SAVED RECORD.
- (3) NOT APPLICABLE DUE TO WORKING SPACE NEEDED.
- (4) MINIMUM HEIGHT OF CHAMBER IN SHAFTED MANHOLE 2M FROM BENCHING TO UNDER SIDE OF REDUCING SLAB.
- (5) MINIMUM CLEAR SPACE BETWEEN LADDER OR STEPS AND THE OPPOSITE FACE OF THE SHAFT SHOULD BE APPROXIMATELY 900mm.
- (6) WINCH ONLY - NO STEPS OR LADDERS, PERMANENT OR REMOVABLE.
- (7) THE MINIMUM SEIZE FOR ANY MANHOLE SERVING A SEWER (ie. ANY DRAIN SERVING MORE THAN ONE PROPERTY) SHOULD BE 1200X750mm RECTANGULAR OR 1200mm DIAMETER.

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELATED 'W/L' ARCHITECTS & SUB-CONTRACTORS DRAWINGS. IN THE CASE OF DISCREPANCIES BETWEEN DRAWING REFER TO 'W/L' FOR CLARIFICATION.
2. THIS DRAWING IS BASED ON SITE LAYOUTS AND FLOOR PLANS PRODUCED BY ARCHITECTS.
3. ALL EXTERNAL DRAINAGE WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH 'CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY' 7TH EDITION, BS EN 752 & PART 'H' OF THE CURRENT BUILDING REGULATIONS.
4. BUILDING DRAINAGE TO BE INSTALLED AND TESTED IN COMPLIANCE WITH THE BUILDING REGULATIONS 2000 DRAINAGE AND WASTE DISPOSAL APPROVED DOCUMENT H 2002 EDITION. ALL DRAINAGE WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH LATEST EDITION OF 'SEWERS FOR ADOPTION'.
5. ALL COMPONENTS AND MATERIALS ARE TO BE MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, AND LAID AND BACKFILLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND THE RELEVANT BRITISH STANDARDS.
6. THE CONTRACTOR SHALL, BEFORE COMMENCING THE WORKS, VERIFY ALL SITE AND SETTING DIMENSIONS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE AND PROPER SETTING OUT OF THE WORKS AND FOR THE CORRECTNESS OF THE POSITIONS, LEVELS, DIMENSIONS, AND ALIGNMENT OF ALL PARTS OF THE WORKS.
7. SMALL LIGHTWEIGHT ACCESS COVERS SHOULD BE SECURED FOR EXAMPLE WITH SCREWS TO DIETER UNAUTHORISED ACCESS.
8. INSPECTION CHAMBERS AND MANHOLES IN BUILDING TO HAVE MECHANICALLY FIXED AIRTIGHT COVERS UNLESS THE DRAIN ITSELF HAS WATERTIGHT ACCESS COVERS.
9. MANHOLES DEEPER THAN 1M TO HAVE GALVANISED STEEL STEP IRONS OR FIXED LADDERS.
10. ALL INSITU CONCRETE USED FOR DRAINAGE WORKS SHALL BE G21 C20 MIX AND COMPLY WITH BS EN 206-1 AND BS5850.
11. ALL GRAVITY SEWER PIPES ARE TO BE LAID USING PIPE LENGTHS NOT EXCEEDING 3M AND CONSTRUCTED USING UPVC PIPES AND SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1401-1, BS EN 1852 AND BS EN 12666-1.
12. ALL NEW PIPES LAID OUTSIDE SITE BOUNDARY TO BE ENCASED IN 100mm CONCRETE BED AND SURROUND (GRADE G21 C16/C20).

TABLE FOR CHAMBER DIMENSIONS

The diagrams illustrate three methods of pipe installation:

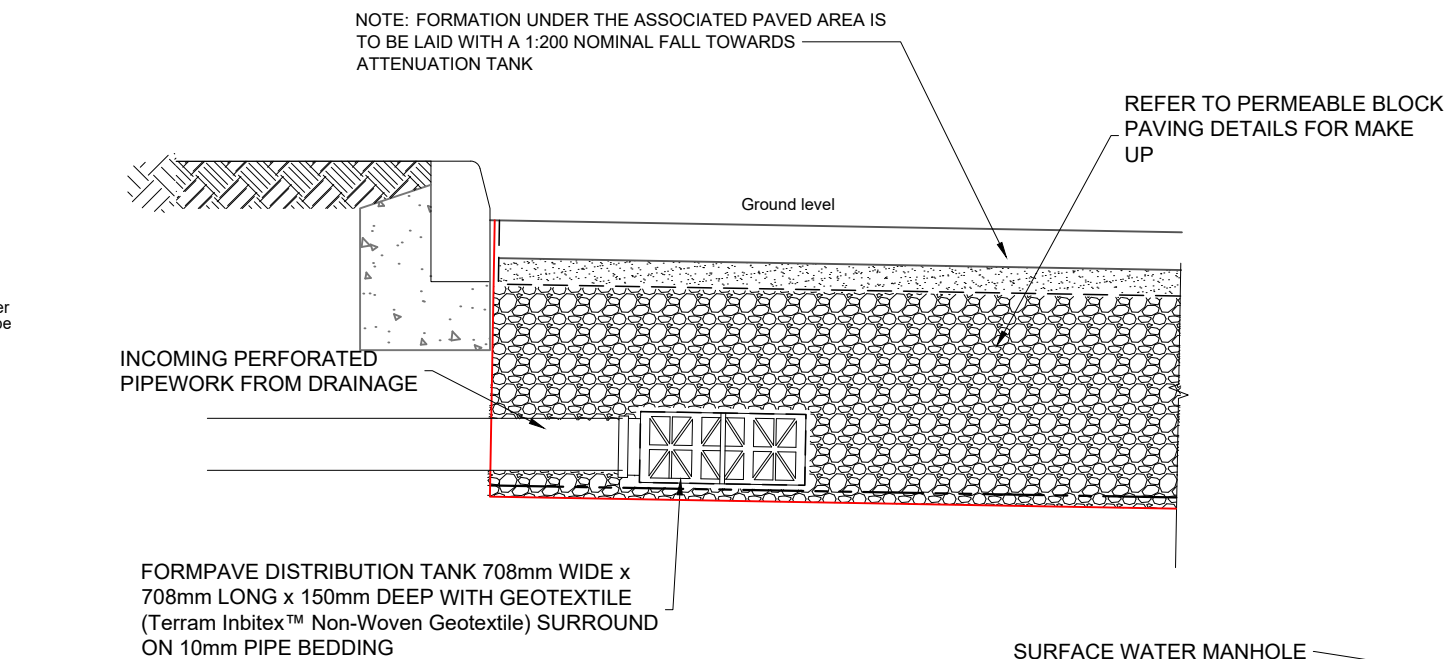
- Diagram 1:** Shows a cross-section of a road or field. A pipe is laid at a depth of 300mm below the ground level (GL). The pipe is surrounded by bedding material, which is 100mm thick on the sides and bottom. The total depth of the bedding material is 100mm.
- Diagram 2:** Shows a cross-section of a road or field. A pipe is laid at a depth of 100mm below the ground level (GL). The pipe is surrounded by bedding material, which is 100mm thick on the sides and bottom. The total depth of the bedding material is 100mm.
- Diagram 3:** Shows a cross-section of a road or field. A pipe is laid at a depth of 100mm below the ground level (GL). The pipe is surrounded by bedding material, which is 100mm thick on the sides and bottom. The total depth of the bedding material is 100mm.

KEY FOR PIPE BACKFILLING

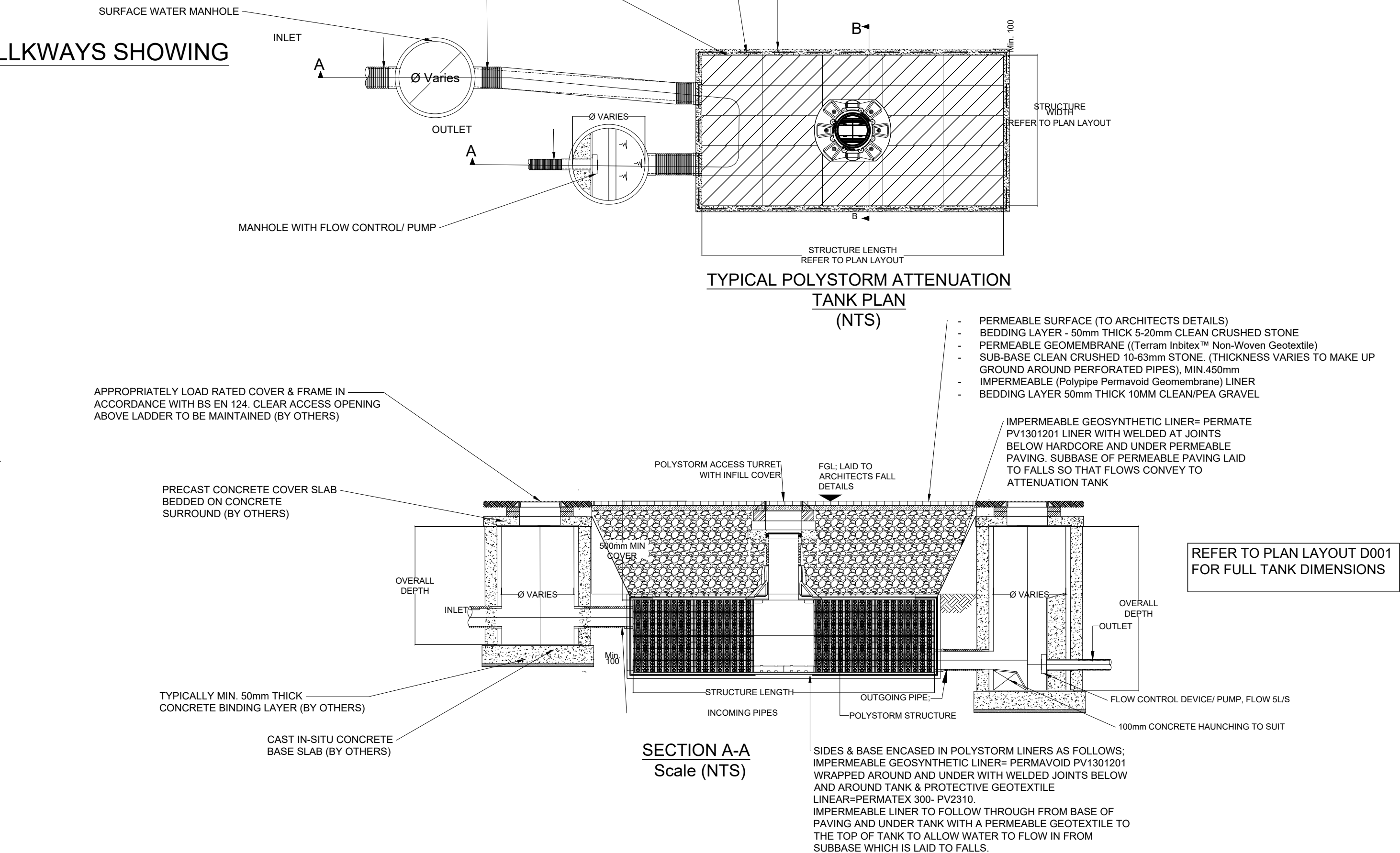
	NE - WHERE BACKFILL ABOVE PIPE CONTAINS STONES GREATER THAN 40MM OR COVER TO PIPE EXCEEDS 3M IN FOUR OR MORE EXTENDING THE BEDDING MATERIAL TO 100MM ABOVE THE PIPE CROWN
	BACKFILL FREE FROM STONES GREATER THAN 40MM (UNLESS GRANULAR MATERIAL EXTENDS 100MM ABOVE PIPE - SEE ABOVE)
	AS DUG BACKFILL
	GRANULAR MATERIAL IN ACCORDANCE WITH BS 5955 PART 6 1990: TABLE 2 - PIPE DIA MATERIAL (COMPLYING WITH BS 882)

(MM) (MM)

150	10, SINGLE-SIZED
160	10, 14 SINGLE-SIZED, 14-6 GRADED



TYPICAL SECTION THROUGH WALLKWAYS SHOWING RWP TO DISTRIBUTION BOX



AREA/ RAIN GARDEN SECTION

APPROPRIATELY LOAD RATED COVER & FRAME IN
ACCORDANCE WITH BS EN 124. CLEAR ACCESS OPENING
ABOVE LADDER TO BE MAINTAINED (BY OTHERS)

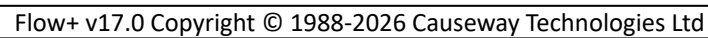
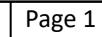
REFER TO PLAN LAYOUT D001
FOR FULL TANK DIMENSIONS

SECTION A-A
Scale (NTS)

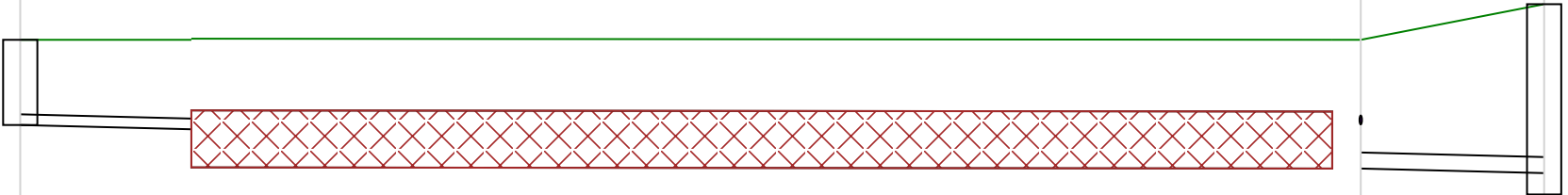
SIDES & BASE ENCASED IN POLYSTORM LINERS AS FOLLOWS:
IMPERMEABLE GEOSYNTHETIC LINER= PERMAVIOD PV1301201
WRAPPED AROUND AND UNDER WITH WELDED JOINTS BELOW
AND AROUND TANK & PROTECTIVE GEOTEXTILE
LINER=PERMATEX 300- PV2310.
IMPERMEABLE LINER TO FOLLOW THROUGH FROM BASE OF
PAVING AND UNDER TANK WITH A PERMEABLE GEOTEXTILE TO
THE TOP OF TANK TO ALLOW WATER TO FLOW IN FROM
SUBBASE WHICH IS LAID TO FALLS.

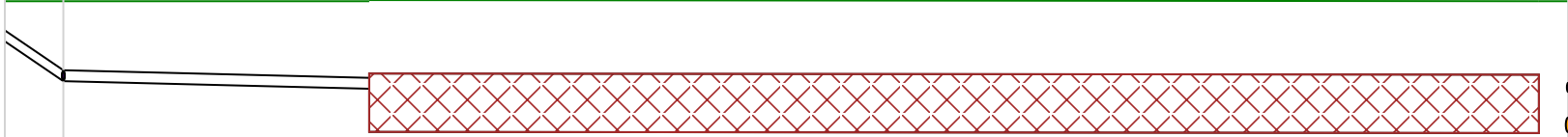
Drawing Status			
Pre-App SAB			
Client			
R-Tech Group			
Job Title			
Testing House, Kenfig Ind Estate			
Drawing Title			
Stormwater Drainage Strategy			
Architects			
RA Architects Ltd			
 W Squared Consulting Civil & Structural Engineers Email: projects@wsquared.com Telephone: 01656 669867			
Scale	NTS	Originator	JH
Checker	ETJ	Approved	ETJ
Date	07/05/26		
Job No.	2025_109	Drawing No.	D002
		Rev.	

Appendix F



Node Name		RG-OVF	SIC1	SIC2
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 4.000				
	Link Name	1.000	1.001	
	Section Type	150mm	150mm	
	Slope (1:X)	100.0	100.0	
	Cover Level (m)	9.800	10.000	10.000
Invert Level (m)		9.150	9.086 9.086	8.804
Length (m)		6.449	28.182	

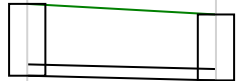
Node Name	SIC2		attenuation1	Pump1
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 3.000				
	Link Name	1.002	1.003	
	Section Type	150mm	225mm	
	Slope (1:X)	100.0	100.0	
	Cover Level (m)	10.000	10.000	10.500
Invert Level (m)	8.804	8.744	8.193	8.129
Length (m)	6.000		6.430	

Node Name		RWP1	PaveIN	attenuation1		
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 3.000						
	Link Name	2.000	2.001			
	Section Type	150m	150mm			
	Slope (1:X)	3.7	100.6			
Cover Level (m)		10.000	10.000	10.000		
Invert Level (m)		9.450 8.904	8.904	8.800		
Length (m)		2.000	10.460			

Node Name	RWP3PaveIN	
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 4.000		
	Link Name	3.000
	Section Type	150m
	Slope (1:X)	3.7
	Cover Level (m)	10.000 10.000
Invert Level (m)	9.450 8.904	
Length (m)	2.000	

Node Name	RWP2PaveIN	
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 4.000		
	Link Name	4.000
	Section Type	150m
	Slope (1:X)	3.7
	Cover Level (m)	10.000
Invert Level (m)	9.450	8.904
Length (m)	2.000	

Node Name	RWP4PaveIN	
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 4.000		
Link Name	5.000	
Section Type	150m	
Slope (1:X)	3.7	
Cover Level (m)	10.000	10.000
Invert Level (m)	9.450 8.904	
Length (m)	2.000	

Node Name	OUTFLOW	DCWW1
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 5.000		
	Link Name	6.000
	Section Type	150mm
	Slope (1:X)	100.0
	Cover Level (m)	11.000
	Invert Level (m)	10.050
	Length (m)	6.239

Node Name		RWP6	HW1	RG-OVF
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 4.000				
Link Name		7.000	Bioretention Area	
Section Type		150mm		
Slope (1:X)		200.0	1000.0	
Cover Level (m)		10.000	9.800	9.800
Invert Level (m)		9.450	9.430	9.430
Length (m)		4.000		

Node Name		RWP5	HW1	RG-OVF
A4 drawing Hor Scale 250 Ver Scale 100 Datum (m) 4.000				
Link Name		8.000	Bioretention Area	
Section Type		150mm		
Slope (1:X)		200.0	1000.0	
Cover Level (m)		10.000	9.800	9.800
Invert Level (m)		9.450	9.430	9.430
Length (m)		4.000		

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	100	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.300	Preferred Cover Depth (m)	0.400
CV	1.000	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Adoptable Manhole Type

Max Width (mm)	Diameter (mm)	Max Width (mm)	Diameter (mm)
374	1200	749	1500
499	1350	900	1800

>900 Link+900 mm

Max Depth (m)	Diameter (mm)	Max Depth (m)	Diameter (mm)
1.500	1050	99.999	1200

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	x
Barrels	1		

Available Diameters (mm)

150 | 225

Circular Link Type

Template	Freeform Carrier	Auto Increment (mm)	75
Shape	Circular	Follow Ground	x
Barrels	1		

Available Diameters (mm)

100 | 150

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
UNDERDRAIN			9.800		42.268	-14.494	0.720	9.080
RWP2	0.014	5.00	10.000		83.757	-15.414	0.550	9.450
RWP1	0.014	5.00	10.000		66.468	-37.744	0.550	9.450
RWP4	0.014	5.00	10.000		71.942	-6.465	0.550	9.450
RG-OVF		5.00	9.800		40.950	-14.659	0.650	9.150
SIC1			10.000	600	43.539	-20.566	0.914	9.086
RWP3	0.014	5.00	10.000		54.468	-28.244	0.550	9.450
PaveIN	0.011	5.00	10.000		80.055	-35.708	1.096	8.904
SIC2			10.000	1200	65.498	-38.230	1.196	8.804
attenuation1	0.095	5.00	10.000		87.134	-43.408	1.807	8.193
Pump1			10.500	1200	92.124	-47.464	2.671	7.829

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
OUTFLOW		5.00	11.000	1200	73.028	-92.875	0.950	10.050
RWP6	0.014	5.00	10.000		62.405	1.217	0.550	9.450
DCWW1			10.860	1200	69.502	-98.022	0.872	9.988
RWP5	0.014	5.00	10.000		45.530	-20.895	0.550	9.450
HW1	0.018		9.800		59.006	2.175	0.370	9.430

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	RG-OVF	SIC1	6.449	0.600	9.150	9.086	0.064	100.0	150	5.11	50.0
1.001	SIC1	SIC2	28.182	0.600	9.086	8.804	0.282	100.0	150	5.57	50.0
1.002	SIC2	attenuation1	6.000	0.600	8.804	8.744	0.060	100.0	150	5.67	50.0
2.000	RWP1	PaveIN	2.000	0.600	9.450	8.904	0.546	3.7	150	5.01	50.0
3.000	RWP3	PaveIN	2.000	0.600	9.450	8.904	0.546	3.7	150	5.01	50.0
2.001	PaveIN	attenuation1	10.460	0.600	8.904	8.800	0.104	100.6	150	5.18	50.0
1.003	attenuation1	Pump1	6.430	0.600	8.193	8.129	0.064	100.0	225	5.76	50.0
4.000	RWP2	PaveIN	2.000	0.600	9.450	8.904	0.546	3.7	150	5.01	50.0
5.000	RWP4	PaveIN	2.000	0.600	9.450	8.904	0.546	3.7	150	5.01	50.0
6.000	OUTFLOW	DCWW1	6.239	0.600	10.050	9.988	0.062	100.0	150	5.10	50.0
7.000	RWP6	HW1	4.000	0.600	9.450	9.430	0.020	200.0	150	5.09	50.0
8.000	RWP5	HW1	4.000	0.600	9.450	9.430	0.020	200.0	150	5.09	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	1.005	17.8	0.0	0.500	0.764	0.000	0.0	0	0.000
1.001	1.005	17.8	0.0	0.764	1.046	0.000	0.0	0	0.000
1.002	1.005	17.8	0.0	1.046	1.106	0.000	0.0	0	0.000
2.000	5.303	93.7	2.5	0.400	0.946	0.014	0.0	17	2.283
3.000	5.303	93.7	2.5	0.400	0.946	0.014	0.0	17	2.283
2.001	1.002	17.7	11.9	0.946	1.050	0.066	0.0	91	1.075
1.003	1.307	52.0	29.1	1.582	2.146	0.161	0.0	121	1.345
4.000	5.303	93.7	2.5	0.400	0.946	0.014	0.0	17	2.283
5.000	5.303	93.7	2.5	0.400	0.946	0.014	0.0	17	2.283
6.000	1.005	17.8	0.0	0.800	0.722	0.000	0.0	0	0.000
7.000	0.707	12.5	2.5	0.400	0.220	0.014	0.0	45	0.548
8.000	0.707	12.5	2.5	0.400	0.220	0.014	0.0	45	0.552

Pipeline Schedule

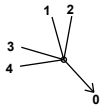
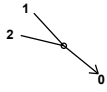
Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	6.449	100.0	150	Circular	9.800	9.150	0.500	10.000	9.086	0.764
1.001	28.182	100.0	150	Circular	10.000	9.086	0.764	10.000	8.804	1.046
1.002	6.000	100.0	150	Circular	10.000	8.804	1.046	10.000	8.744	1.106
2.000	2.000	3.7	150	Circular	10.000	9.450	0.400	10.000	8.904	0.946
3.000	2.000	3.7	150	Circular	10.000	9.450	0.400	10.000	8.904	0.946
2.001	10.460	100.6	150	Circular	10.000	8.904	0.946	10.000	8.800	1.050
1.003	6.430	100.0	225	Circular	10.000	8.193	1.582	10.500	8.129	2.146
4.000	2.000	3.7	150	Circular	10.000	9.450	0.400	10.000	8.904	0.946
5.000	2.000	3.7	150	Circular	10.000	9.450	0.400	10.000	8.904	0.946
6.000	6.239	100.0	150	Circular	11.000	10.050	0.800	10.860	9.988	0.722
7.000	4.000	200.0	150	Circular	10.000	9.450	0.400	9.800	9.430	0.220
8.000	4.000	200.0	150	Circular	10.000	9.450	0.400	9.800	9.430	0.220

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	RG-OVF		Junction		SIC1	600	Manhole	Adoptable
1.001	SIC1	600	Manhole	Adoptable	SIC2	1200	Manhole	Adoptable
1.002	SIC2	1200	Manhole	Adoptable	attenuation1		Junction	
2.000	RWP1		Junction		PaveIN		Junction	
3.000	RWP3		Junction		PaveIN		Junction	
2.001	PaveIN		Junction		attenuation1		Junction	
1.003	attenuation1		Junction		Pump1	1200	Manhole	Adoptable
4.000	RWP2		Junction		PaveIN		Junction	
5.000	RWP4		Junction		PaveIN		Junction	
6.000	OUTFLOW	1200	Manhole	Adoptable	DCWW1	1200	Manhole	Adoptable
7.000	RWP6		Junction		HW1		Junction	
8.000	RWP5		Junction		HW1		Junction	

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
UNDERDRAIN	42.268	-14.494	9.800	0.720		◦			
RWP2	83.757	-15.414	10.000	0.550		↓ ◦	0 4.000	9.450	150
RWP1	66.468	-37.744	10.000	0.550		→ ◦	0 2.000	9.450	150
RWP4	71.942	-6.465	10.000	0.550		↓ ◦	0 5.000	9.450	150

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
RG-OVF	40.950	-14.659	9.800	0.650			0		
SIC1	43.539	-20.566	10.000	0.914	600		1	1.000	150
							0	9.150	150
							1	9.086	150
							0	1.001	150
RWP3	54.468	-28.244	10.000	0.550			0	3.000	150
PaveIN	80.055	-35.708	10.000	1.096			1	5.000	150
							2	8.904	150
							3	8.904	150
							4	8.904	150
							0	2.001	150
SIC2	65.498	-38.230	10.000	1.196	1200		1	1.001	150
							0	1.002	150
attenuation1	87.134	-43.408	10.000	1.807			1	2.001	150
							2	8.744	150
							0	1.003	225
Pump1	92.124	-47.464	10.500	2.671	1200		1	1.003	225
OUTFLOW	73.028	-92.875	11.000	0.950	1200		0	6.000	150
RWP6	62.405	1.217	10.000	0.550			0	7.000	150
							1	9.988	150
DCWW1	69.502	-98.022	10.860	0.872	1200		1	6.000	150
RWP5	45.530	-20.895	10.000	0.550			0	8.000	150
							1	9.430	150
							2	9.430	150
HW1	59.006	2.175	9.800	0.370			1		
							2		

Simulation Settings

Rainfall Methodology	FSR	Skip Steady State	x
Rainfall Events	Singular	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m ³ /ha)	0.0
M5-60 (mm)	20.000	Starting Level (m)	
Ratio-R	0.300	Check Discharge Rate(s)	✓
Summer CV	1.000	100 year (l/s)	5.0
Winter CV	1.000	Check Discharge Volume	x
Analysis Speed	Normal		

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Region	9
Brownfield Method	Greenfield	QBar/QMed conversion factor	1.075
Greenfield Method	FEH	Growth Factor 100 year	2.18
Positively Drained Area (ha)	0.201	Betterment (%)	25
SAAR (mm)	1086	QMed	2.8
Host	23	QBar	3.1
BFIHost	0.220	Q 100 year (l/s)	5.0

Node Pump1 Offline Pump Control

Flap Valve	x	Design Depth (m)	0.100	Switch off depth (m)	0.000
Loop to Node	OUTFLOW	Design Flow (l/s)	5.0		
Invert Level (m)	8.129	Switch on depth (m)	0.001		

Depth (m)	Flow (l/s)
0.001	5.000

Node RG-OVF Bioretention Area Storage Structure

Underdrain Link Type	Circular	Base Inf Coefficient (m/hr)	0.00001
Underdrain Diameter (mm)	150	Side Inf Coefficient (m/hr)	0.00000
Underdrain Velocity	Colebrook-White	Safety Factor	2.0
Underdrain ks (mm) / n	0.600	Porosity	0.30
Underdrain Length (m)	5.000	Invert Level (m)	9.430
Underdrain Slope (1:X)	200.0	Time to half empty (mins)	
Underdrain Height above base (m)	0.000	Main Channel Length (m)	20.000
Underdrain DS Node	UNDERDRAIN	Main Channel Slope (1:X)	1000.0
Filter Conductivity (m/hr)	0.30000	Main Channel n	0.030
Filter Depth (m)	0.350		

Inlet Node	Connects To
HW1	Storage

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	180.0	0.350	180.0

Node attenuation1 Carpark Storage Structure

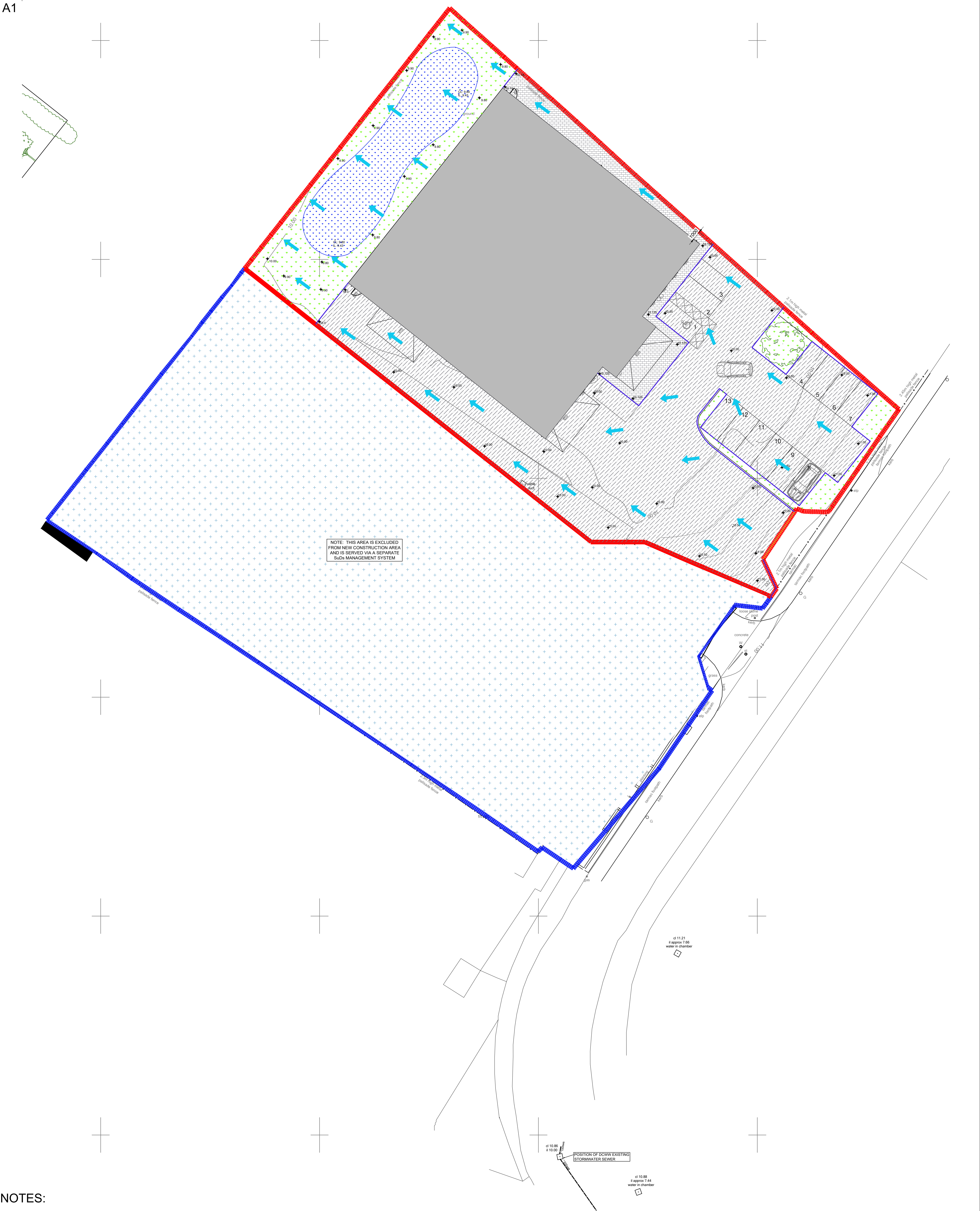
Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	8.193	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)		Depth (m)	0.800
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.90	Length (m)	16.000		

Appendix G

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type	Commercial/Industrial roofing: Low potential for metal leaching	This classification should be informed by an assessment of the leachability of metals from the adopted roofing materials. Particular risks are likely to be posed by materials that include copper and galvanised steel			
Pollution Hazard Level	Low				
Pollution Hazard Indices					
TSS	0.3				
Metals	0.4	SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Hydrocarbons	0.05				
SuDS components proposed					
Component 1	Bioretention system (where the system is not designed as an infiltration component)				
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices					
TSS	0.8				
Metals	0.8				
Hydrocarbons	0.8				
Groundwater protection type	Bioretention component underlain by 300 mm minimum depth of soils with good contamination attenuation potential	All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		
Groundwater protection					
Pollution Mitigation Indices					
TSS	0.8				
Metals	0.8	Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			
Hydrocarbons	0.8				
Combined Pollution Mitigation Indices					
TSS	>0.95				
Metals	>0.95				
Hydrocarbons	>0.95				
Acceptability of Pollution Mitigation					
TSS	Sufficient				
Metals	Sufficient				
Hydrocarbons	Sufficient				

SUMMARY TABLE		DESIGN CONDITIONS			
		1	2	3	4
Land Use Type Pollution Hazard Level Pollution Hazard Indices TSS Metals Hydrocarbons	Standard commercial yard or delivery area Medium 0.7 0.6 0.7	This classification is not appropriate for haulage yards, lorry parks, waste management areas, or chemical storage/handling zones			
SuDS components proposed		SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B			
Component 1	Pervious pavement (where the pavement is not designed as an infiltration component)				
Component 2	None				
Component 3	None				
SuDS Pollution Mitigation Indices TSS Metals Hydrocarbons	0.7 0.6 0.7				
Groundwater protection type Groundwater protection Pollution Mitigation Indices TSS Metals Hydrocarbons	Pervious pavement underlain by 300 mm minimum depth of soils with good contamination attenuation potential 0.7 0.6 0.7	All designs must include a minimum of 1 m unsaturated depth of subsoil or aquifer material between the infiltration surface and the maximum likely groundwater level. Infiltration components should always be preceded by upstream component(s) that trap(s) silt, or designed specifically to retain sediment in a separate lined zone, easily accessible for maintenance, such that the sediment will not be re-suspended in subsequent events	The permeable pavement must include a suitable filtration layer provides treatment and must include a geotextile at the base separating the foundation from the sub-grade. The underlying soils must provide good contaminant attenuation potential (eg as recommended in Sniffer 2008 (a) and (b) / Scott Wilson (2010) or other appropriate guidance). Alternative depth and soil combinations must provide equivalent protection to the underlying groundwater		
Combined Pollution Mitigation Indices TSS Metals Hydrocarbons Acceptability of Pollution Mitigation TSS Metals Hydrocarbons	>0.95 >0.95 Sufficient Sufficient Sufficient	0.9 Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England			

Appendix H



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELATED WL², ARCHITECTS & SUB-CONTRACTORS DRAWINGS. IN THE CASE OF DISCREPANCIES BETWEEN DRAWING REFER TO WL² FOR CLARIFICATION.
2. THIS DRAWING IS BASED ON SITE LAYOUTS AND FLOOR PLANS PRODUCED BY ARCHITECTS.
3. ALL EXTERNAL DRAINAGE WORKS TO BE CONSTRUCTED IN ACCORDANCE WITH 'CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY' 7TH EDITION, BS EN 752 & PART H OF THE CURRENT BUILDING REGULATIONS.
4. ALL BUILDING DRAINAGE TO BE INSTALLED AND TESTED IN COMPLIANCE WITH THE BUILDING REGULATIONS 2000 DRAINAGE AND WASTE DISPOSAL APPROVED DOCUMENT H 2002 EDITION. ALL DRAINAGE WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH LATEST EDITION OF 'SEWERS FOR ADOPTION'.
5. ALL COMPONENTS AND MATERIALS ARE TO BE MANUFACTURED AND SUPPLIED IN ACCORDANCE WITH THE RELEVANT BRITISH STANDARDS, AND LAID AND BACKFILLED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS AND THE RELEVANT BRITISH STANDARDS.
6. THE CONTRACTOR SHALL, BEFORE COMMENCING THE WORKS, VERIFY ALL SITE AND SETTING DIMENSIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE TRUE AND PROPER SETTING OUT OF THE WORKS AND FOR THE CORRECTNESS OF THE POSITIONS, LEVELS, DIMENSIONS, AND ALIGNMENT OF ALL PARTS OF THE WORKS.
7. SMALL LIGHTWEIGHT ACCESS COVERS SHOULD BE SECURED) FOR EXAMPLE WITH SCREWS TO DETER UNAUTHORISED ACCESS.
8. INSPECTION CHAMBERS AND MANHOLES IN BUILDING TO HAVE MECHANICALLY FIXED AIRTIGHT COVERS UNLESS THE DRAIN ITSELF HAS WATERTIGHT ACCESS COVERS.
9. MANHOLES DEEPER THAN 1M TO HAVE GALVANISED STEEL STEP IRONS OR FIXED LADDERS.
10. ALL INSITU CONCRETE USED TOR DRAINAGE WORKS SHALL BE GEN1 C20 MIX AND COMPLY WITH BS EN 206-1 AND BS8500.
11. ALL GRAVITY SEWER PIPES ARE TO BE LAID USING PIPE LENGTHS NOT EXCEEDING 3m AND CONSTRUCTED USING UPVC PIPES AND SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1401-1, BS EN 1852 AND BS EN 12666-1.
12. ALL NEW PIPES LAID OUTSIDE SITE BOUNDARY TO BE ENCASED IN 100mm CONCRETE BED AND SURROUND (GRADE GEN3 (C16/C20)).

Drawing Status Pre-App SAB		WL Squared Consulting Civil & Structural Engineers Email: projects@wlsquared.com 47 Park Street Telephone: 01656 469867 Bridgend CF31 4AX	Job Title Testing House, Kenfig Ind Estate	
Client R-Tech Group			Drawing Title Stormwater Flood Exceedence Plan	
Architects RA Architects Ltd				
Checked DG			Scale 1:200	Originator JH
Job No. 2025_109		Approved DG	Date 07/05/26	
		Drawing No. A002	Rev.	