



Land off Maes Ffynnon,
Roch, Pembrokeshire
Drainage Strategy

*For Wakefield Developments Pembrokeshire
Limited*

Date: 6 September 2021

Doc ref: ROC-HYD-XX-XX-RP-C-0001

DOCUMENT CONTROL SHEET

Issued by	Hydrock Consultants Limited Castlebridge 5 5-19 Cowbridge Road East Cardiff CF11 9AB United Kingdom	T +44 (0)2920 023 665 E cardiff@hydrock.com www.hydrock.com
Client	Wakefield Developments Pembrokeshire Limited	
Project name	Land off Maes Ffynnon, Roch, Pembrokeshire	
Title	Drainage Strategy	
Doc ref	ROC-HYD-XX-XX-RP-C-0001	
Project no.	C-20198-C	
Status	For Information	
Date	06/09/2021	

Document Production Record		
Issue Number	P03	Name
Prepared by		Jessica Li - Assistant Engineer
Checked by		Chris Stone - Principal Engineer
Approved by		Chris Stone - Principal Engineer

Document Revision Record			
Issue Number	Status	Date	Revision Details
P01	For Information	08/10/2021	First Issue
P02	For Information	01/04/2022	Issued for SAB Pre-app
P03	For Information	26/04/2023	Issued for PAC

Hydrock Consultants Limited has prepared this report in accordance with the instructions of the above named client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

CONTENTS

INTRODUCTION.....	1
EXISTING SITE.....	2
1. SITE LOCATION.....	2
2. SITE DESCRIPTION.....	2
3. EXISTING DRAINAGE ARRANGEMENTS.....	2
4. EXISTING CONTRIBUTING AREAS AND RUN-OFF RATES.....	3
PROPOSED DEVELOPMENT.....	5
5. DEVELOPMENT PROPOSALS.....	5
6. FOUL DRAINAGE.....	5
7. SURFACE WATER.....	5
7.1 S1 – Surface Water Runoff Destination.....	6
7.2 S2 – Surface Water Runoff Hydraulic Control.....	7
7.3 S3 – Water Quality.....	10
7.4 S4 – Amenity.....	10
7.5 S5 – Biodiversity.....	10
7.6 S6 – Design of Drainage for Construction and Maintenance and Structural Integrity.....	11
CONCLUSION.....	12
8. FOUL DRAINAGE.....	12
9. SURFACE WATER DRAINAGE.....	12

Tables

Table 1: Greenfield Run-off Rates by Return Period.....	4
Table 2: Development Summary.....	8
Table 3: Existing and Proposed Pond Rates & Volumes.....	9

Figures

Figure 1 - Site Location Plan.....	2
Figure 2- Extract of DCWW Record Plan.....	3

Appendices

Appendix A - [Run-off Calculations](#)

Appendix B - [Infodrainage Indicative Storage Calculations: Proposed Only](#)

Appendix C - [Infodrainage Indicative Storage Calculations: Existing and Proposed Combined](#)

Appendix D - [DCWW Pre Planning Advice Letter](#)

Appendix E - [Site Investigation Photos and Plans](#)

Appendix F - [Site Plans](#)

Introduction

Hydrock have been commissioned by Wakefield Developments Pembrokeshire Limited to provide a drainage strategy report and preliminary design for the proposed residential development at the land of Maes Ffynonn, Roch, Pembrokeshire.

It is our understanding that the client is seeking to develop the current greenfield site allocated within the LDP into a residential development and that this report is required to support the future planning application and SAB pre-application submissions.

The objectives of the report are to;

- Review the existing drainage arrangements on site for both surface and foul water;
- Assess the feasibility of Sustainable Drainage Systems (SuDS) features within the development to control and discharge surface water runoff to comply with the requirements of the statutory National Standards for Sustainable Drainage Systems;
- Assess the options for the disposal of foul water from the development; and
- Provide a preliminary design for surface water (SuDS) systems including indicative sizing of storage/attenuation features and conceptual plan suitable for inclusion in a pre-application submission to the local authority's SuDS Approval Body (SAB).

The following tasks will be undertaken to complete this report;

- Undertake a desktop investigation of the site's existing foul and surface water drainage arrangements;
- Outline anticipated solutions for foul sewage disposal, surface water disposal. This will include preliminary calculations, in order that the conceptual designs may be agreed with the relevant authorities. In preparing the surface water drainage strategy, we will consider inundation of the floodplain and assess flood levels in the location of attenuation features;
- Determine the area of impermeable surfaces that will be added by the proposed development and estimate the equivalent greenfield and brownfield run-off rates for this area;
- Assess the feasibility of using infiltration as a disposal method, based on soakaway test results or any other available information on ground and site conditions;
- Estimate the size of storm water storage needed to manage run-off from the site post-development, using drainage design software (Infodrainage);
- Provide general information on the maintenance and adoption of SuDS via the SAB's approval process; and
- Give consideration to drainage exceedance. In particular, use topographic information to identify overland flow paths and areas susceptible to surface water ponding.

A number of sources have been used to compile this drainage strategy. Whilst Hydrock believe them to be trustworthy we are unable to guarantee the accuracy of the information that has been provided by others.

This report is based on information available at the time of preparation. Consequently, there is potential for further information to become available. These changes may lead to future alteration to the conclusions drawn in this report for which Hydrock cannot be held responsible.

Existing Site

1. SITE LOCATION

Figure 1 indicates the site location within the red circle, which is located off the A487 via Pilgrim's Way, Roch, Harverfordwest, SA62 6AJ (Approximate Grid Reference X-187447, Y-221279). ©OpenStreetMap contributors.

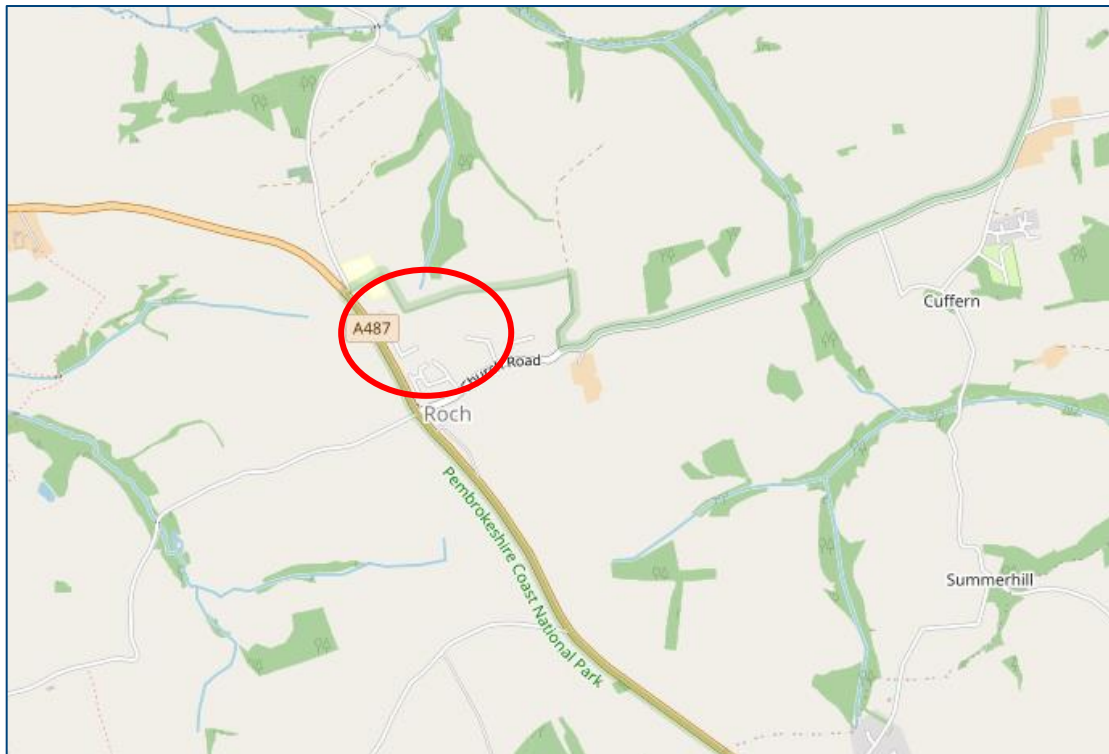


Figure 1 - Site Location Plan

2. SITE DESCRIPTION

The site is approximately 2.0 hectares (ha) of greenfield land which will be split into two catchments of the development. One catchment is 0.6ha in area and located to the east of the site off Pilgrims Way and the other catchment is 1.4ha on the western side of the site off Maes Ffynnon.

The site is bordered by existing dwellings on the eastern, southern and western boundaries, with greenfield land bordering the northern boundary of the site. The site has allowance for two direct vehicle accesses where one phase will be accessed via Pilgrim's Way, and the other phase will be accessed via Maes Ffynnon which are located to the west and east of the site respectively.

A copy of the existing site plan can be found in Appendix C of this report.

3. EXISTING DRAINAGE ARRANGEMENTS

From available mapping information it has been established that the nearest watercourse is located north of the site which flows south to north and lies within the site boundary. Additionally, there is an existing pond,

pumping station and tank located within the eastern portion of the site which discharge into the existing watercourse, these existing drainage elements currently serve a number of dwellings from Maes Ffynnon.

The nearest foul sewers are a public foul sewer 150mm in diameter flowing east to west located west of the site within Pilgrim’s Way, and an existing pumping station receiving flows from a number of dwellings from Maes Ffynnon via a public foul sewer 150mm in diameter flowing east to west and located within the eastern portion of the site's boundary. Figure 2 contains an extract of the Dwr Cymru Welsh Water (DCWW) asset plan for the area with the site boundary shown in green.

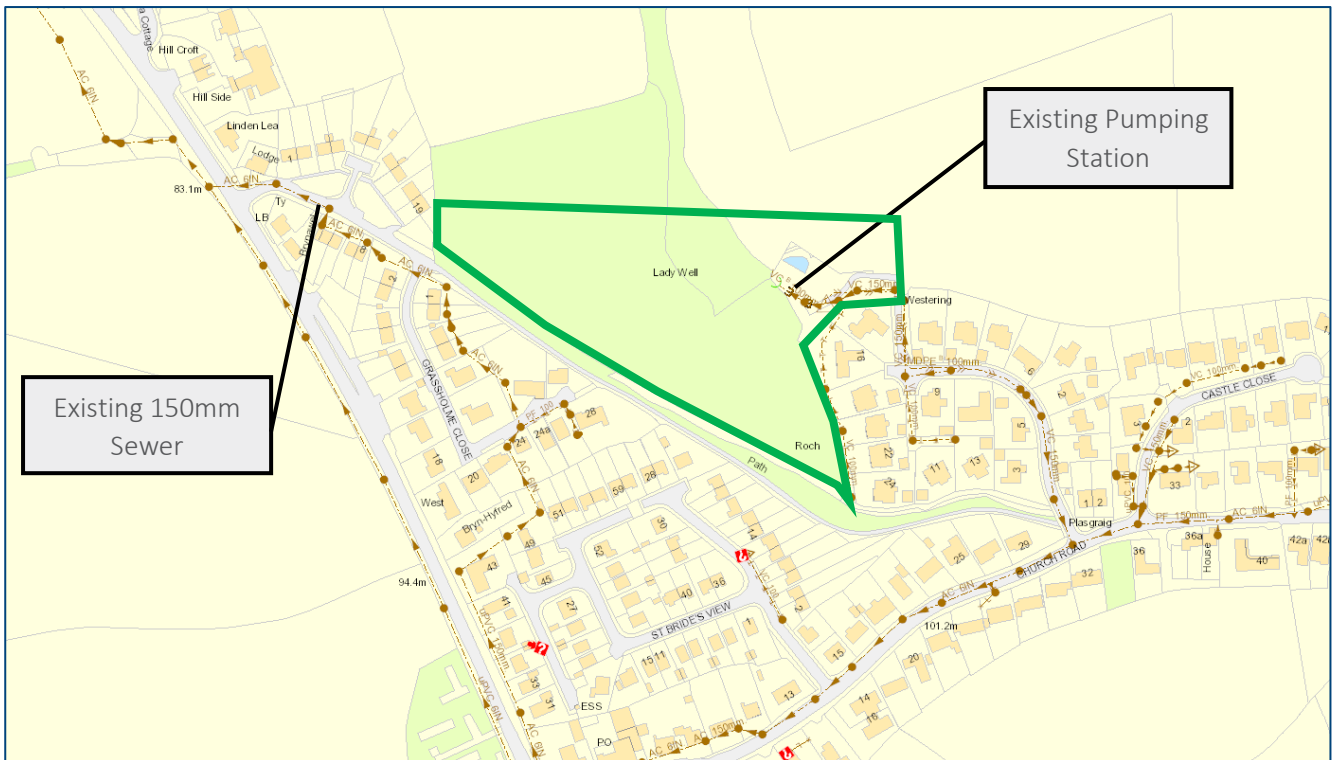


Figure 2- Extract of DCWW Record Plan

4. EXISTING CONTRIBUTING AREAS AND RUN-OFF RATES

The total site area is circa 2.0ha, the global greenfield run-off rates for the western (phase 1) and eastern (phase 2) areas have been calculated using the ICP SuDS method and table 1 summarises the runoff rates for each return period (1, 30 & 100). Calculations detailing the derivation of the values in these tables are available in Appendix A.

Table 1: Greenfield Run-off Rates by Return Period

Return Period	Western (Phase 1) Greenfield Run-off Rate (l/s) (Area 1)	Eastern (Phase 2) Greenfield Run-off Rate (l/s) (Area 2)	Total Site Area Run- off Rate (l/s)
1 YRP	2.9	7.1	10.0
30 YRP	5.9	14.2	20.1
100 YRP	7.3	17.5	24.8

Proposed Development

5. DEVELOPMENT PROPOSALS

For assessment purposes the development is a proposed residential development with associated infrastructure. The proposed new development will be split into two phases which be accessed via Pilgrim's Way and Maes Ffynnon respectively.

6. FOUL DRAINAGE

The proposed new development will be constructed on existing greenfield land with no existing gravity foul drainage outlet. There is an existing public pumping station located near the eastern boundary of the site which serves Maes Ffynnon. It is proposed to discharge the site to the existing public foul sewer west of the site located in Pilgrim's Way. Both phases of the development should be able to gravitate to this new outfall without the need for pumping. The existing foul pumping station located near the eastern boundary of the site that currently serves dwellings from Maes Ffynnon is proposed to be decommissioned and removed with the existing flows being diverted into the new gravity system, this option will need to be discussed further with DCWW at detailed design stage.

The capacity of the existing sewer to receive the flows from the proposed development has been confirmed by DCWW via a pre planning response (PPA0005824), a copy of the pre planning response from DCWW is included in Appendix D.

All on site sewerage systems will be designed and constructed to comply with building regulations requirements with any adopted elements in accordance with the latest edition of "Sewers for Adoption" and any of the adopting authority's (DCWW) specific requirements.

7. SURFACE WATER

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible and adopt the principles of water management schemes as stated in section 2 of the statutory "Sustainable Drainage Systems Standards for Wales" (SDSSW) document 2018. The previous sections of this report have established the current drainage arrangements on site and have also determined the current discharge rates for surface water leaving the site.

From 7th January 2019 Schedule 3 of the Flood and Water Management Act has been implemented by the Welsh Government which requires any development of more than 1 unit or where the construction area is greater than 100m² to comply with the SuDS Approving Bodies (SAB's) design guidance and ministers' standards which will require all sites to adopt SuDs in their design. The standards are listed below;

- S1 – Surface Water Runoff Destination
- S2 – Surface Water Runoff Hydraulic Control
- S3 – Water Quality
- S4 – Amenity
- S5 – Biodiversity
- S6 – Design of Drainage for Construction, Operation and Maintenance

The Standards listed will need to be met by the design in order to comply with the SDSSW. S1 is a hierarchy standard with standards S2-S6 being fixed.

7.1 S1 – Surface Water Runoff Destination

In determining a suitable methodology for disposal of surface water flows from this development, it is necessary to explore the technical options outlined under Standard S1 of the SDSSW 2018 document published by Welsh Government. This states that disposal should be made through the hierarchical approach which are, in order of preference; surface water runoff collected for use, infiltration methods, discharge to surface water body, discharge to a surface water sewer, highway sewer or another drainage system and finally discharge to a combined sewer. Each of these options are considered below.

7.1.1 *Collected for Use*

The suitability of this option will depend on the proposed water usage of the development, if the development has low grey water demand, as is typical of residential developments the collection of water for reuse would not be economical or feasible, however if the demand for grey water is deemed to be high then rainwater harvesting would be an appropriate solution for parts of the development. The use of rainwater harvesting would need to be used in conjunction with one of the below methods of discharge in order to cater for exceedance flows in extreme rainfall events where the rainfall volume exceeds the volume of surface water storage provided by the rainwater harvesting tanks. As the development is considered to have low demand for grey water the use of a grey water system would not be suitable due to there being periods of very low demand which may result in legionella issues. Basic forms of rainwater harvesting could be incorporated into the development in the form of rainwater butts that will collect water from rainwater downpipes and store it for irrigation of the soft landscaped areas and planting beds however the demand for this will again be low as the planted landscape areas will be accepting surface water runoff from the impermeable areas as part of the design. Based on this storing rain water runoff for reuse is not feasible on this scheme.

7.1.2 *Infiltration Methods*

Based on the site investigation works which were conducted on site on 21.02.2022, where trial holes were dug to a depth of 1m below existing ground level, refer to sketch in Appendix E for locations of trial holes. The results returned no infiltration on the test within Phase 1 and ground water was hit at a depth of approximately 800mm within the trial hole in Phase 2. Based on the findings of the testing we have concluded that soakaways are not feasible means of disposing surface water runoff generated from the site. Photos of the trial holes can be found in Appendix E of this report.

7.1.3 *Discharge to Surface Water Body*

Sequentially, the next consideration in the hierarchical approach is discharge to a surface water body. The nearest watercourse is located within the site boundary to the north of the site, this watercourse currently receives surface water runoff from the dwellings and infrastructure on Maes Ffynnon via an existing pond and tank. The proposed surface water drainage strategy will look to utilise two discharge points into the existing watercourse, one to serve the western portion and one to serve the eastern portion. As part of the proposed design, we would look to decommission the existing attenuation pond and divert the existing surface water flows from Maes Ffynnon into the proposed new system to free up development land within the eastern area of the site.

7.1.4 *Discharge to Surface Water Sewer*

Based on the above the proposed surface water drainage strategy will not be discharging into a surface water sewer network.

7.1.5 *Discharge to Combined Sewer*

Based on the above the proposed surface water drainage strategy will not be discharging into a combined sewer network.

7.2 S2 – Surface Water Runoff Hydraulic Control

This standard requires surface water to be managed to prevent as far as possible any discharge from the development for rainfall events of less than 5mm and that the surface water runoff rate and volume for up to a 1 in 100-year return period should be managed to protect people, properties and the receiving water body. Consideration is also required to the risk associated with runoff from events greater than 1 in 100-year return period with mitigating proposals developed for the scheme.

7.2.1 *Interception of Runoff*

Interception will need to be considered under the statutory standards. Interception aims to mimic greenfield runoff conditions by preventing runoff from the majority of all small rainfall events. This can contribute to reducing pollution load to receiving surface water bodies. Meeting the Interception criterion is not expected during particularly wet periods, when permeable surfaces and subsoils are saturated, so a suggested target is that 80% compliance should be achieved during the summer and 50% in winter. Refer to table G2.1 in the Statutory Standards for Sustainable Drainage Systems 2018 document published by Welsh Government for details of interception mechanisms and their assumed compliance with the standards. It is proposed that this scheme will utilise permeable paving, rain gardens and infiltration/attenuation pond to provide suitable levels of interception.

7.2.2 *Hydraulic Control and Storage*

For the purposes of this section of the report infiltration will not be accounted for as a means of disposing surface water runoff generated from the development, therefore the discharge volume for the site will not decrease. In order to meet the standards this report has adopted the simple approach outlined in the statutory standards of restricting all runoff from the development site for all return periods up to and including the 1 in 100-year event to the current 1 year return period rates as given in table 1 of this report which equates to a maximum discharge rate of 2.9 l/s and 7.1l/s for area 1 and area 2 of the development respectively.

In accordance with statutory guidelines, the development of this site should not increase flood risk elsewhere and as such, all runoff from attenuated areas on site should be contained within the site boundary for up to and including a 1 in 100 year design period storm, plus 40% climate change and urban creep allowance, these allowances will have to be agreed with the SAB prior to detailed design. It is proposed to discharge surface water runoff from the development via two gravity systems which ultimately discharge to the existing watercourse at separate locations to the north of the site with runoff rates being restricted to 2.9 l/s and 7.1l/s for the western and eastern portions of the site which will be referred to as area 1 and area 2 of the development site respectively for this section of the report, this will need to be agreed with the adopting SAB's authority.

Surface water flows from the proposed development would need to be attenuated via two separate flow control chambers, and two separate on-site storage systems provided for surface water runoff for all rainfall events up to and including a 1 in 100 year event with 40% allowance for climate change and urban creep.

Given the proposed site usage overland storage in the form of rain gardens, permeable paving and attenuation basins are achievable in areas across the site. These features will be both on plot and in public open spaces including adjacent the public highways across the site.

For the purposes of this report storage has been estimated using Infodrainage and below provides a summary of the features used and storage values.

For the purposes of this calculation the overall impermeable area for the development has been taken as 1.45ha as shown by the master plan and the maximum discharge rate assumed at 2.9l/s and 7.1l/s for area 1 and area 2 of the site respectively, for all rainfall events up to and including the 100 year return period with 40% allowance for climate change and urban creep, the storage volumes could be reduced by the use of alternative complex controls to satisfy clause G2.30 of the standards, liaison will need to be undertaken with the SAB and DCWW at detailed design stage to confirm the acceptability of the proposed runoff rates and the use of a complex control.

Appendix B contains the Infodrainage calculations for the proposed development and Appendix F contains the proposed layout plans.

Table 2: Development Summary

SuDS Feature	Approx. Area (sqm)		Attenuated Discharge Rate (l/s)		Indicative Storage Provided (m ³)	
	Area 1	Area 2	Area 1	Area 2	Area 1	Area 2
Paving Systems	-	328	-	-	-	49.2
Rain Gardens	157.6	203.1	-	-	47.3	60.9
Attenuation Basin	85.5	154	2.9	7.1	105	966
Cellular Storage Tank	164	-	2.9	-	234	-

7.2.3 Allowance of Existing Flows

As part of the proposed design, we would look to decommission the existing attenuation pond and divert the existing surface water flows from Maes Ffynnon into the proposed new system to free up development land within the eastern area of the site. The existing flows from Maes Ffynnon are proposed to be diverted into the proposed new area 2 system with the new northern attenuation basin catering for both the proposed and existing flows. Based on the design information received from the client the design volume of the existing basin is 185cu and the design discharge rate is 8.8 l/s, a copy of the existing design drawings can be found in Appendix F.

The proposed system will make an allowance for the existing flows by increasing the allowable discharge rate from 7.1l/s to 15.9l/s at the outfall to include the design discharge rate of the existing attenuation basin. Along with providing a minimum of 185cu of additional storage to compensate of the removal of the existing attenuation basin. Table 3 below provides a summary of the proposed discharge

rates and the indicative volumes of the proposed attenuation basin allowing for proposed and existing flows. Appendix C contains the Infodrainage calculations for the existing and proposed development.

Table 3: Existing and Proposed Pond Rates & Volumes

	Attenuated Discharge Rate (l/s)	Indicative Storage Provided (m ³)
Proposed Area 2 Only	7.1	781
Existing Basin	8.8	185
Proposed Combined Attenuation Basin	15.9	966

7.2.4 Exceedance Flows and Flood Pathways

“It is inevitable that as a result of extreme rainfall the capacities of sewers, covered watercourses and other drainage systems will be exceeded on occasion. Periods of exceedance occur when the rate of surface runoff exceeds the drainage system inlet capacity, when the pipe system becomes overloaded, or when the outfall becomes restricted due to flood levels in the receiving water. Underground conveyance cannot economically or sustainably be built large enough for the most extreme events and, as a result, there will be occasions when surface water runoff will exceed the design capacity of drains. When drainage exceedance capacity is exceeded the excess water (exceedance flow) is conveyed above ground, and will travel along streets and paths, between and through buildings and across open space. Indiscriminate flooding of property can occur when this flow of water is not controlled.” (CIRIA C753).

Flood-flow pathways would be designed to convey the overland flows from rainfall events above a 1in100 year return period to suitable areas of open space, such as landscaped areas, car parking areas and other hard surfaced areas in order to protect properties against flooding. Consideration should also be given to exceedance pathways from storage areas in the event of extreme rainfall or failure with allowance made to convey flows away from properties both on and off the site. These should be considered as part of the detailed drainage and levels design of the development.

7.2.5 Flood Risks to People

“People are at risk of suffering death or serious injury when flooding occurs. People are unable to stand in deep or fast flowing floodwater. Once they are unable to stand, there is a high risk of death or serious injury. Adults are unable to stand in still floodwater with a depth of about 1.5m or greater, although this is obviously affected by the height of a person. The depth of flowing floodwater where people are unable to stand is much less. For example, some people will be at risk when the water depth is only 0.5m, if the velocity is 1m/s (about 2 mph). If the velocity increases to 2m/s (about 4 mph) some people will be unable to stand in a depth of water of only 0.3m. Most people will be unable to stand when the velocity is 2m/s and the depth is 0.6m.” (Defra/ Environment Agency, FD2321/TR2)

During the detailed design, a hydraulic model will be built to assist the design of the proposed surface water drainage networks. When an extreme storm event is simulated within the model, potential flooding locations will become evident and the flood flow pathways can be designed/defined based on the proposed layout and levels of the hard areas and landscaping. The depth and velocity of the overland flood water can be determined and then compared with Figure 2.1 (Combinations of flood depth and velocity that cause danger to people) in the Defra / EA Flood Risks to People publication. The velocity and depth as described above would then give a category of flood hazard and the

corresponding risk to people. If the risk is deemed to be too high, then the design would require reassessment.

7.3 S3 – Water Quality

This standard requires treatment of surface water runoff to prevent negative impacts on the receiving water quality and/or protect downstream drainage systems including sewers. The only exception to this standard is where drainage connects directly to a combined sewer, where the quality requirements are limited to preventing the discharge of oil and sediments to the sewer system.

Whilst the development is connecting to the existing watercourse as best practice the aim of the surface water management strategy with regards to water quality is to follow the guiding principles of the SDSSW and use simple, natural processes that promote biodiversity and long-term sustainability. As such, it employs a SuDS management train approach, providing drainage components in series.

The management trains to be used on the project would have been assessed using the Simple Index Assessment (SIA) tool available publicly (<http://www.ukSuDS.com/drainage-calculation-tools/water-quality-assessment-for-SuDS-developments>) which is built around the principles for simple assessment outlined in CIRIA C753 to assess the levels of treatment provided by the proposals.

The possible impact of accidental spills will need to be addressed with the most vulnerable areas to a spill or other pollution incident being any car park areas and access roads, therefore the highway areas and parking will be drained into the permeable paving system or adjacent rain gardens, which will provide a level of treatment for pollution.

Planting within the SuDS features should form part of the water quality strategy. SuDS components like rain gardens provide water quality improvements by reducing sediment and contaminants from runoff either through settlement or biological breakdown of pollutants as part of their interceptor function, so only robust and tolerant species of planting should be specified. Once these species establish this will decrease the flow rate of water travelling through and filter pollutants and contaminants before entering the downstream network.

7.4 S4 – Amenity

This standard requires that the design of the surface water management system should maximise amenity benefits.

The primary amenity focus of the SuDS scheme should be to improve the health and well-being of the users. The scheme will need to be based on natural forms that mimic natural landscapes found within the region and the vegetated rain garden planting areas are designed with locally contextual species that will encourage natural colonisation. Other key amenity benefits should include improving air quality around the development, increasing carbon sequestration and improving water quality through removal of pollutants via rain gardens.

7.5 S5 – Biodiversity

This standard requires that the surface water management system should maximise biodiversity benefits.

The SuDS scheme biodiversity strategy should revolve around the creation of significant and varied habitat to increase the overall biodiversity of the site and ecological value. The inclusion of plant species that will enhance the general eco system and simultaneously act as a water filtration system to clean pollutants and contaminants should be used where possible.

The plant species selected should be both locally contextual and appropriate for the varied habitat zones including primary characteristics that shall ensure:

- Good soil binding and filtration species
- Minimised erosion
- Improved filtration via dense root and stem species
- Tolerance to seasonal variations including droughts and inundations
- Good suspended solids retention
- Pollutant tolerant
- Emergent and pioneering species for natural ecological colonisation
- The creation of diverse, self-sustaining and resilient ecosystems for high species biodiversity
- Support for local and regional habitat strategies

In general, the proposed rain gardens and basin will be the focal habitat for the site and will enhance the site over the current site layout by adding areas of water and damp soils. Exposed areas of rain gardens and ponds will attract certain species and shaded areas under adjacent buildings and trees will further enhance the varied ecosystem potential.

7.6 S6 – Design of Drainage for Construction and Maintenance and Structural Integrity

The surface water drainage system should be designed with the overriding ethos of simplicity in construction, use and maintenance. This then allows a very simple translation from the principles described within standard S6, namely that all elements of the surface water drainage system should be designed so that they can be constructed, as well as maintained and operated “...easily, safely, cost-effectively, in a timely manner, and with the aim of minimising the use of scarce resources and embedded carbon (energy).” (SDSSW).

The proposed system will be offered for adoption as it will serve more than one property, therefore the SAB will be responsible for the maintenance of the off-plot elements of the system to ensure it continues to comply with SuDS standards. In order for the drainage system to be adopted it must be designed and constructed in accordance with the SDSSW document and any conditions of approval stipulated by the SAB.

Information with regards to the construction methodology and requirements of the proposed system will be developed as part of the detailed design stage of the project, likewise the maintenance requirements and regime of the proposed system will be developed into the full maintenance strategy for the site during the next phase of design development. This will be developed in conjunction with the client’s maintenance team, as it is not considered appropriate for these details to be developed by the design team in isolation from the end users. This will then need to be confirmed and submitted for approval to the SAB prior to construction commencing on site.

Conclusion

8. FOUL DRAINAGE

The most sustainable method for the disposal of foul water discharge from the proposed development site is via the existing mains sewer network. The capacity of the sewer has been confirmed by DCWW for the proposed foul flows generated from the site a copy of the pre planning response from DCWW is included in Appendix D.

The new development will seek to discharge foul flows via gravity from the site to the public foul sewer located west of the site within Pilgrim's Way, the depth of the existing sewer should allow the whole development to discharge via gravity with no requirement for pumping.

The existing foul pumping station located near the eastern boundary of the site that currently serves dwellings from Maes Ffynnon is proposed to decommissioned and removed with the existing flows being diverted into the new gravity system, this option will need to be discussed further with DCWW at detailed design stage.

The capacity of the existing sewer to receive the flows from the proposed development has been confirmed by DCWW via a pre planning response (PPA0005824), a copy of the pre planning response from DCWW is included in Appendix D.

All on site sewerage systems will be designed and constructed to comply with building regulations requirements with any adopted elements in accordance with the latest edition of "Sewers for Adoption" and any of the adopting authority's (DCWW) specific requirements.

9. SURFACE WATER DRAINAGE

The aim of the surface water drainage strategy is to mimic the natural catchment processes as closely as possible and the proposed system will need to be designed in accordance with the statutory (SDSSW) document 2018 and any local authority's SAB requirements and CIRIA's C753 SuDS Manual as well as meeting the requirements of Building Regulations, Document H.

In determining a suitable methodology for disposal of surface water flows from this development, it is necessary to explore the technical options outlined under Standard S1 in the statutory (SDSSW) document 2018 published by the Welsh Government. Based on the hierarchy it is proposed to discharge surface water runoff from the development to the existing watercourse.

Surface water runoff is to be attenuated from area 1 and area 2 of the site to 2.9l/s and 15.9l/s respectively, the area 2 attenuated discharge rate is a combination of the proposed attenuated flows (7.1 l/s) and the existing flows (8.8 l/s) as described in section 7.2.3 on this report, this run-off rate will then be maintained for all rainfall events up to and including a 100YRP with 40% allowance for climate change and urban creep. Along with providing a minimum of 185cu of additional storage to compensate of the removal of the existing attenuation basin.

Given the proposed site layout storage could be provided in the form of rain gardens, areas of permeable paving, a cellular storage tank and attenuation basins. The main storage features for the site will be the attenuation ponds and a cellular storage tank, where the ponds will be located at the western part and northern part of the site and east and west of the existing watercourse respectively; and the cellular storage tank will be located within the centre of the site within phase 2 and southwest of the existing watercourse, with rain

gardens and permeable paving on each plot providing further storage upstream of the main feature. All drainage features will be developed further at detailed design stage.

As the scheme is a residential development it has been considered that the use of a grey water system would not be suitable due to there being periods of very low demand which may result in legionella issues however other basic forms of rainwater harvesting could be incorporated into the development in the form of rainwater butts that will collect water from rainwater downpipes and store it for irrigation of the soft landscaped areas and planting beds.

Amenity and biodiversity benefits to the site will be provided in the form of rain gardens which will be incorporated throughout the site and also form part of the attenuation storage for the site along with the main attenuation pond, these will maximise the available green infrastructure within the development site which will improve air quality and water quality of the site.

All on site surface water drainage systems will be designed and constructed to comply with the (SDSSW) and building regulations requirements. The detailed design of the scheme will incorporate the philosophies outline in this report regarding standards S1-S6 listed in section 7 of this report.

Refer to drawings in Appendix C for further details of the proposed layout and features to be used across the site.

Appendix A

Run-off Calculations

Residential Development: Roch Area 1 Runoff Rates	Date: 24/04/2023		
	Designed by: JSL	Checked by:	Approved By:
Report Details: Type: UK and Ireland Rural Runoff Calculator	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




ICP SUDS / IH 124

Details

Method	ICP SUDS
Area (ha)	0.60
SAAR (mm)	1063.0
Soil	0.4
Region	Region 9
Urban	0
Return Period (years)	0

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 9	3.3	3.3	2.9	5.9	7.3

Residential Development: Roch Area 2 Runoff Rates	Date: 24/04/2023			
	Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: UK and Ireland Rural Runoff Calculator	3rd Floor, Wharton Place. 13 Wharton Street Cardiff			

ICP SUDS / IH 124

Details


Method	ICP SUDS
Area (ha)	1.449
SAAR (mm)	1063.0
Soil	0.4
Region	Region 9
Urban	0
Return Period (years)	1

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 9	8.0	8.0	7.1	7.1	14.2	17.5

Appendix B

Infodrainage Indicative Storage Calculations: Proposed Only

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Storm Phase: Phase	3rd Floor, Warton Place: 13 Wharton Street Cardiff		



Catchment Area

Type : Catchment Area

Area (ha)	0.257
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100




Catchment Area (1)

Type : Catchment Area

Area (ha)	0.23
-----------	------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.840
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
Report Details: Type: Junctions Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Warton Place: 13 Wharton Street Cardiff	

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
Manhole	Manhole	187405.627	221251.394	89.000	2.316	86.684	Circular	1.200
Manhole (1)	Manhole	187418.211	221247.975	89.500	2.903	86.597	Circular	1.200
Manhole (2)	Manhole	187498.957	221252.194	89.500	3.442	86.058	Circular	1.200
Manhole (3)	Manhole	187506.056	221263.850	87.000	1.000	86.000	Circular	1.200

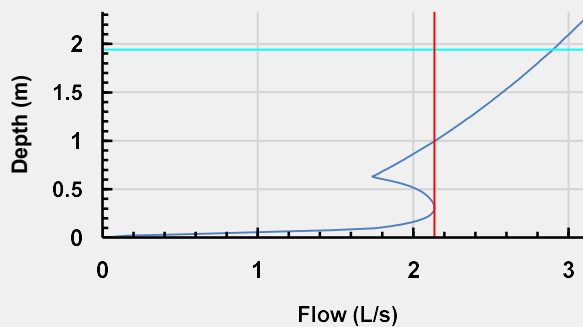
Name	Lock
Manhole	None
Manhole (1)	None
Manhole (2)	None
Manhole (3)	None


Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
Manhole	Inlet	Pipe	(None)	No Restriction
Manhole (1)	Inlet	Pipe (1)	(None)	No Restriction
Manhole (2)	Inlet	Pipe (2)	(None)	No Restriction
	Inlet (1)	Pipe (4)	(None)	No Restriction
Manhole (3)	Inlet	Pipe (3)	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
Manhole	Outlet	Pipe (1)	Free Discharge
Manhole (1)	Outlet	Pipe (2)	Free Discharge
	Outlet	Pipe (3)	Hydro-Brake®
Manhole (2)	Invert Level (m)	86.058	
	Design Depth (m)	1.942	
	Design Flow (L/s)	2.9	
	Objective	Minimise Upstream Storage Requirements	
	Application	Surface Water Only	
	Sump Available	<input checked="" type="checkbox"/>	
	Unit Reference	SHE-0070-2900-1942-2900	



Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023			
	Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: Stormwater Controls Storm Phase: Phase	3rd Floor, Warton Place: 13 Wharton Street Cardiff			



Pond

Type : Pond

Dimensions

Exceedance Level (m)	88.000
Depth (m)	1.200
Base Level (m)	86.800
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.058
Total Volume (m³)	104.827

Depth (m)	Area (m²)	Volume (m³)
0.000	34.857	0.000
1.200	153.955	104.827

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction


Outlets

Outlet

Outgoing Connection	Pipe
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	14.738
Friction Scheme	Manning's n
n	0.04

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023			
	Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: Stormwater Controls Storm Phase: Phase	3rd Floor, Warton Place: 13 Wharton Street Cardiff			



Tank

Type : Tank

Dimensions

Exceedance Level (m)	89.500
Depth (m)	3.000
Base Level (m)	86.500
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	95
Average Slope (1:X)	0.00
Total Volume (m³)	235.200

Depth (m)	Area (m²)	Volume (m³)
0.000	164.00	0.000
1.500	164.00	233.700

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area (1)
Bypass Destination	(None)
Capacity Type	No Restriction


Outlets

Outlet

Outgoing Connection	Pipe (4)
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	11.059

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023			
	Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: Outfall Details Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff			

Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Manhole (3)	Free Discharge		

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Rainfall Analysis Criteria	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	<input type="checkbox"/>

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Winter	0.26	128.1	59.490
Catchment Area (1)	FSR: 100 years: +40 %: 15 mins: Winter	0.23	114.7	53.244

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Warton Place: 13 Wharton Street Cardiff		



FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 30 years: +40 %: 15 mins: Winter	0.26	99.4	46.194
Catchment Area (1)	FSR: 30 years: +40 %: 15 mins: Winter	0.23	89.0	41.340

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area	FSR: 1 years: +40 %: 15 mins: Winter	0.26	40.6	18.917
Catchment Area (1)	FSR: 1 years: +40 %: 15 mins: Winter	0.23	36.3	16.930

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Junctions Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m ³)	Max. Flooded Volume (m ³)	Max. Outflow (L/s)	Total Discharge Volume (m ³)	Status
Manhole	FSR: 100 years: +40 %: 960 mins: Winter	89.00 0	86.68 4	87.998	1.314	5.9	1.486	0.000	5.6	214.332	Surcharged
Manhole (1)	FSR: 100 years: +40 %: 960 mins: Winter	89.50 0	86.59 7	87.998	1.401	5.6	1.584	0.000	5.2	210.970	Surcharged
Manhole (2)	FSR: 100 years: +40 %: 960 mins: Winter	89.50 0	86.05 8	87.998	1.940	5.2	2.194	0.000	2.9	322.876	Surcharged
Manhole (3)	FSR: 100 years: +40 %: 960 mins: Winter	87.00 0	86.00 0	86.041	0.041	2.9	0.000	0.000	2.9	285.643	OK

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Junctions Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth


Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m ³)	Max. Flooded Volume (m ³)	Max. Outflow (L/s)	Total Discharge Volume (m ³)	Status
Manhole	FSR: 30 years: +40 %: 960 mins: Winter	89.00 0	86.68 4	87.679	0.995	6.0	1.126	0.000	5.7	185.880	Surcharged
Manhole (1)	FSR: 30 years: +40 %: 960 mins: Winter	89.50 0	86.59 7	87.679	1.082	5.7	1.224	0.000	5.3	182.474	Surcharged
Manhole (2)	FSR: 30 years: +40 %: 960 mins: Winter	89.50 0	86.05 8	87.679	1.621	5.3	1.833	0.000	2.6	296.568	Surcharged
Manhole (3)	FSR: 30 years: +40 %: 960 mins: Winter	87.00 0	86.00 0	86.039	0.039	2.6	0.000	0.000	2.6	262.535	OK

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Junctions Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m ³)	Max. Flooded Volume (m ³)	Max. Outflow (L/s)	Total Discharge Volume (m ³)	Status
Manhole	FSR: 1 years: +40 %: 960 mins: Winter	89.00 0	86.68 4	87.000	0.316	4.3	0.358	0.000	4.1	98.158	Surcharged
Manhole (1)	FSR: 1 years: +40 %: 960 mins: Winter	89.50 0	86.59 7	87.001	0.404	4.1	0.456	0.000	3.8	97.864	Surcharged
Manhole (2)	FSR: 1 years: +40 %: 960 mins: Winter	89.50 0	86.05 8	87.000	0.942	3.8	1.066	0.000	2.1	200.366	Surcharged
Manhole (3)	FSR: 1 years: +40 %: 960 mins: Winter	87.00 0	86.00 0	86.035	0.035	2.1	0.000	0.000	2.1	184.765	OK

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Wahrton Place: 13 Wharton Street Cardiff	




**FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By:
Max. Avg. Depth**

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 100 years: +40 %: 960 mins: Winter	87.998	87.998	1.198	1.198	1.198	11.1	104.529	0.000	0.000	5.9	216.527	0.285
Tank	FSR: 100 years: +40 %: 960 mins: Winter	87.998	87.998	1.498	1.498	1.498	12.2	233.356	0.000	0.000	1.7	118.571	0.784

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



Status
OK
OK

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		




FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 30 years: +40 %: 960 mins: Winter	87.679	87.679	0.879	0.879	0.879	8.8	62.060	0.000	0.000	6.0	186.995	40.798
Tank	FSR: 30 years: +40 %: 960 mins: Winter	87.679	87.679	1.179	1.179	1.179	10.3	183.709	0.000	0.000	1.6	120.264	21.892

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



Status
OK
OK

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		




FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 1 years: +40 %: 960 mins: Winter	87.001	87.001	0.201	0.201	0.200	4.3	8.349	0.000	0.000	4.3	97.980	92.035
Tank	FSR: 1 years: +40 %: 960 mins: Winter	87.000	87.000	0.500	0.500	0.500	5.8	77.927	0.000	0.000	2.0	102.476	66.868

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		




Status
OK
OK

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
Report Details: Type: Connections Summary Storm Phase: Phase	Designed by: JSL		
3rd Floor, Wahrton Place: 13 Wharton Street Cardiff			



FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow


Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Pond	Manhole	88.000	87.234	0.300	48.354	0.9	0.67	60.3	Surcharged
Pipe (1)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Manhole	Manhole (1)	89.000	87.188	0.300	46.826	1.1	0.64	58.2	Surcharged
Pipe (2)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	Manhole (1)	Manhole (2)	89.500	87.150	0.300	43.574	0.9	0.61	55.5	Surcharged
Pipe (3)	FSR: 100 years: +40 %: 960 mins: Winter	Pipe	Manhole (2)	Manhole (3)	89.500	87.998	0.041	285.643	0.5	0.04	2.9	Surcharged
Pipe (4)	FSR: 100 years: +40 %: 30 mins: Winter	Pipe	Tank	Manhole (2)	89.500	87.259	0.300	0.647	0.7	0.06	5.1	Surcharged

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
Report Details: Type: Connections Summary Storm Phase: Phase	Designed by: JSL		
3rd Floor, Wahrton Place: 13 Wharton Street Cardiff			



FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow


Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	Pond	Manhole	88.000	87.099	0.300	40.606	0.9	0.72	64.9	OK
Pipe (1)	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	Manhole	Manhole (1)	89.000	87.061	0.300	39.368	1.0	0.63	57.1	Surcharged
Pipe (2)	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	Manhole (1)	Manhole (2)	89.500	87.029	0.300	36.344	0.8	0.56	50.6	Surcharged
Pipe (3)	FSR: 30 years: +40 %: 960 mins: Winter	Pipe	Manhole (2)	Manhole (3)	89.500	87.679	0.040	262.535	0.5	0.04	2.6	Surcharged
Pipe (4)	FSR: 30 years: +40 %: 15 mins: Winter	Pipe	Tank	Manhole (2)	89.500	86.949	0.300	0.053	0.4	0.08	7.1	Surcharged

Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
Report Details: Type: Connections Summary Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Wahrton Place: 13 Wharton Street Cardiff	



FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 1 years: +40 %: 15 mins: Winter	Pipe	Pond	Manhole	88.000	86.929	0.124	18.188	1.0	0.32	28.7	OK
Pipe (1)	FSR: 1 years: +40 %: 30 mins: Winter	Pipe	Manhole	Manhole (1)	89.000	86.808	0.124	25.286	1.0	0.3	27.3	OK
Pipe (2)	FSR: 1 years: +40 %: 15 mins: Winter	Pipe	Manhole (1)	Manhole (2)	89.500	86.722	0.300	17.244	0.6	0.3	27.1	OK
Pipe (3)	FSR: 1 years: +40 %: 960 mins: Winter	Pipe	Manhole (2)	Manhole (3)	89.500	87.000	0.036	184.765	0.5	0.03	2.1	Surcharged
Pipe (4)	FSR: 1 years: +40 %: 15 mins: Winter	Pipe	Tank	Manhole (2)	89.500	86.671	0.222	0.508	0.7	0.05	4.9	OK


Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



Phase
FSR: 100 years: Increase Rainfall (%): +40: 960 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Manhole (3)			2.9	285.643
TOTAL	21.1	481.213	2.9	285.643


Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Warton Place: 13 Wharton Street Cardiff		



Phase
FSR: 30 years: Increase Rainfall (%): +40: 960 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Manhole (3)			2.6	262.535
TOTAL	16.7	379.552	2.6	262.535


Residential Development: Roch Proposed Development (Area 1)	Date: 20/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wahrton Place: 13 Wharton Street Cardiff		



Phase
FSR: 1 years: Increase Rainfall (%): +40: 960 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Manhole (3)			2.1	184.765
TOTAL	8.2	185.609	2.1	184.765

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Catchment Area

Type : Catchment Area

Area (ha)	0.973
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	10.000
Depth (m)	1.500
Base Level (m)	8.500
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.465
Total Volume (m³)	1041.535

Depth (m)	Area (m²)	Volume (m³)
0.000	467.00	0.000
1.500	950.00	1041.535

Inlets

Inlet

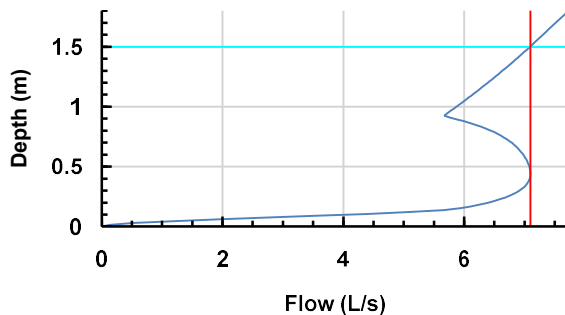
Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction


Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	8.500
Design Depth (m)	1.500
Design Flow (L/s)	7.1
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	<input checked="" type="checkbox"/>


Unit Reference SHE-0117-7100-1500-7100




Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		

Advanced

Perimeter	Circular
Length (m)	68.357
Friction Scheme	Manning's n
n	0.04

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflow Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Pond		Time of Concentration	0.973	100	0	100	0.973
TOTAL		0.0		0.973				0.973

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023			
	Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: Outfall Details Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff			


Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Pond	Free Discharge		

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Rainfall Analysis Criteria	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	<input type="checkbox"/>

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow


Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Winter	0.97	570.0	266.840

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow


Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 30 years: +40 %: 15 mins: Winter	0.97	442.0	207.209

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 1 years: +40 %: 15 mins: Winter	0.97	179.9	84.934

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 100 years: +40 %: 960 mins: Winter	9.774	9.774	1.274	1.274	1.274	50.6	836.049	0.000	0.000	7.1	673.079	19.729

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Status
OK

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 30 years: +40 %: 960 mins: Winter	9.505	9.505	1.005	1.005	1.005	39.9	616.104	0.000	0.000	7.1	673.427	40.847

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Status
OK

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 1 years: +40 %: 480 mins: Winter	8.918	8.918	0.418	0.418	0.418	30.3	219.318	0.000	0.000	7.1	311.257	78.943

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Status
OK


Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Phase
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Pond			7.1	9.299
TOTAL	570.2	266.840	7.1	9.299


Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Phase
FSR: 30 years: Increase Rainfall (%): +40: 240 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Pond			7.1	165.025
TOTAL	105.0	602.325	7.1	165.025

Residential Development: Roch Proposed Development Only (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




Phase
FSR: 1 years: Increase Rainfall (%): +40: 480 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Pond			7.1	311.257
TOTAL	30.3	345.468	7.1	311.257

Appendix C

Infodrainage Indicative Storage Calculations: Existing and Proposed Combined

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Catchment Area

Type : Catchment Area

Area (ha)	0.973
-----------	-------

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	1.000
Winter Volumetric Runoff	1.000
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	10.000
Depth (m)	1.500
Base Level (m)	8.500
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.465
Total Volume (m³)	1041.535

Depth (m)	Area (m²)	Volume (m³)
0.000	467.00	0.000
1.500	950.00	1041.535

Inlets

Inlet

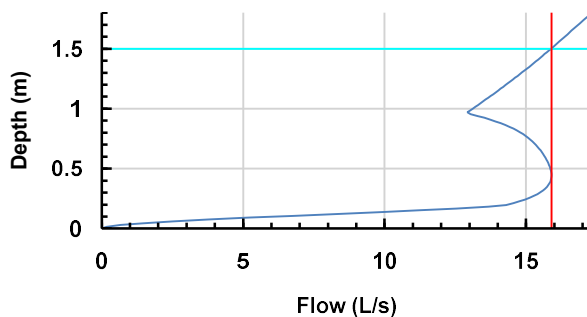
Inlet Type	Point Inflow
Incoming Item(s)	Catchment Area
Bypass Destination	(None)
Capacity Type	No Restriction


Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Hydro-Brake®
Invert Level (m)	8.500
Design Depth (m)	1.500
Design Flow (L/s)	15.9
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	<input checked="" type="checkbox"/>


Unit Reference SHE-0172-1590-1500-1590




Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		

Advanced

Perimeter	Circular
Length (m)	68.357
Friction Scheme	Manning's n
n	0.04

Residential Development: Roch Existing and Proposed Combined (Area 2)		Date: 19/04/2023			
		Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: Inflow Summary Storm Phase: Phase		3rd Floor, Wharton Place: 13 Wharton Street Cardiff			

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	Pond		Time of Concentration	0.973	100	0	100	0.973
TOTAL		0.0		0.973				0.973

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023			
	Designed by: JSL	Checked by: CS	Approved By: CS	
Report Details: Type: Outfall Details Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff			


Outfalls

Outfall	Outfall Type	Fixed Surcharged Level (m)	Level Curve
Pond	Free Discharge		

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Rainfall Analysis Criteria	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	<input type="checkbox"/>

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
Report Details: Type: Inflows Summary Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Wharton Place: 13 Wharton Street Cardiff	



FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow


Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 100 years: +40 %: 15 mins: Winter	0.97	570.0	266.853

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow


Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 30 years: +40 %: 15 mins: Winter	0.97	442.0	207.214

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Inflows Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m ³)
Catchment Area	FSR: 1 years: +40 %: 15 mins: Winter	0.97	179.9	84.934

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Wharton Place: 13 Wharton Street Cardiff	




FSR: 100 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 100 years: +40 %: 360 mins: Winter	9.534	9.535	1.034	1.035	1.034	102.8	638.978	0.000	0.000	15.9	555.971	38.650

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Status
OK

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Wharton Place: 13 Wharton Street Cardiff	




FSR: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 30 years: +40 %: 360 mins: Winter	9.269	9.268	0.769	0.768	0.768	79.4	442.746	0.000	0.000	15.9	584.866	57.491

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Status
OK

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		




FSR: 1 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Avg. Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)
Pond	FSR: 1 years: +40 %: 240 mins: Winter	8.809	8.807	0.309	0.307	0.308	46.7	156.772	0.000	0.000	15.5	244.195	84.948

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL	Checked by: CS	Approved By: CS
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Status
OK


Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Phase
FSR: 100 years: Increase Rainfall (%): +40: 15 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Pond			15.9	20.611
TOTAL	570.2	266.853	15.9	20.611


Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
	Designed by: JSL		
Report Details: Type: Phase Management Storm Phase: Phase	3rd Floor, Wharton Place: 13 Wharton Street Cardiff		



Phase
FSR: 30 years: Increase Rainfall (%): +40: 30 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Pond			15.9	44.415
TOTAL	309.3	284.737	15.9	44.415

Residential Development: Roch Existing and Proposed Combined (Area 2)	Date: 19/04/2023		
Report Details: Type: Phase Management Storm Phase: Phase	Designed by: JSL		
		3rd Floor, Wharton Place: 13 Wharton Street Cardiff	



Phase
FSR: 1 years: Increase Rainfall (%): +40: 240 mins: Winter

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m ³)	Max. Outflow (L/s)	Total Outflow Volume (m ³)
Pond			15.5	244.195
TOTAL	46.7	267.941	15.5	244.195

Appendix D

DCWW Pre Planning Advice Letter



Dŵr Cymru
Welsh Water

Developer Services
PO Box 3146
Cardiff
CF30 0EH

Tel: +44 (0)800 917 2652
Fax: +44 (0)2920 740472
E.mail: developer.services@dwrwymru.com

Gwasanaethau Datblygu
Blwch Post 3146
Caerdydd
CF30 0EH

Ffôn: +44 (0)800 917 2652
Ffacs: +44 (0)2920 740472
E.bost: developer.services@dwrwymru.com

Miss Jessica Li
Hydrock
Castlebridge 5
Cowbridge Road East
Cardiff
Glamorgan
CF11 9AB

Date: 30/06/2021
Our Ref: PPA0005824

Dear Miss Li,

Site Address: Roch
Development: Residential

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

SEWERAGE

Firstly, we note that the proposal relates to a development of 55 dwellings and acknowledge the is allocated (Ref: HSG/114/LDP-01) within the Local Development Plan (LDP). In reference to our representations during the LDP consultation process, namely the 'Statement of Common Ground', we can confirm that an assessment has been undertaken of the public sewerage system to accommodate 55 dwellings and informs our appraisal as follows.

Public Sewerage Network

The proposed development site is located in the immediate vicinity of a foul only sewerage system, which drains to Newgale Waste water Treatment Works (WwTW).

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



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

We welcome correspondence in
Welsh and English

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

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

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

Please be mindful that under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Surface Water Drainage

As of 7th January 2019, this proposed development is subject to Schedule 3 of the Flood and Water Management Act 2010. The development therefore requires approval of Sustainable Drainage Systems (SuDS) features, in accordance with the 'Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems'. As highlighted in these standards, the developer is required to explore and fully exhaust all surface water drainage options in accordance with a hierarchy which states that discharge to a combined sewer shall only be made as a last resort. Disposal should be made through the hierarchical approach, preferring infiltration and, where infiltration is not possible, disposal to a surface water drainage body in liaison with the Land Drainage Authority and/or Natural Resources Wales.

It is therefore recommended that the developer consult with Pembrokeshire County Council as the determining SuDS Approval Body (SAB), in relation to their proposals for SuDS features. Please note, DCWW is a statutory consultee to the SAB application process and will provide comments to any SuDS proposals by response to SAB consultation. Please refer to further detailed advice relating to surface water management included in our attached Advice & Guidance note.

In addition, please note that no highway or land drainage run-off will be permitted to discharge directly or indirectly into the public sewerage system.

Foul Water Drainage – Sewerage Network

We have considered the impact of foul flows generated by the proposed development and concluded that flows can be accommodated within the foul sewerage system. We advise that the flows should be connected to the foul sewer located in Pilgrims Way at manhole SM87213207.

Should a planning application be submitted for this development we will seek to control these points of communication via appropriate planning conditions and therefore recommend that any drainage layout or strategy submitted as part of your application takes this into account. However, should you wish for an alternative connection point to be considered please provide further information to us in the form of a drainage strategy, preferably in advance of a planning application being submitted.

You may need to apply to Dwr Cymru Welsh Water for any connection to the public sewer under Section 106 of the Water industry Act 1991. However, if the connection to the public sewer network is either via



a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Foul Sewers and Lateral Drains and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of www.dwrcymru.com.

SEWAGE TREATMENT

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

WATER SUPPLY

A water supply can be made available to service this proposed development. However, this would require the installation of off-site mains from our 6" diameter watermain located in Pilgrims Way. Under Sections 40 - 41 of the Water Industry Act 1991 the above cost is requisitionable and, subject to us receiving your detailed site layout plan and your programme for construction, we would be able to provide a more accurate assessment of the developer's contribution. These details should be sent to the above address.

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

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

Please quote our reference number in all communications and correspondence.

Yours faithfully,



Owain George
Planning Liaison Manager
Developer Services



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



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

We welcome correspondence in
Welsh and English

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

Rydym yn croesawu gohebiaeth yn y
Gymraeg neu yn Saesneg

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

Appendix E

Site Investigation Photos and Plan

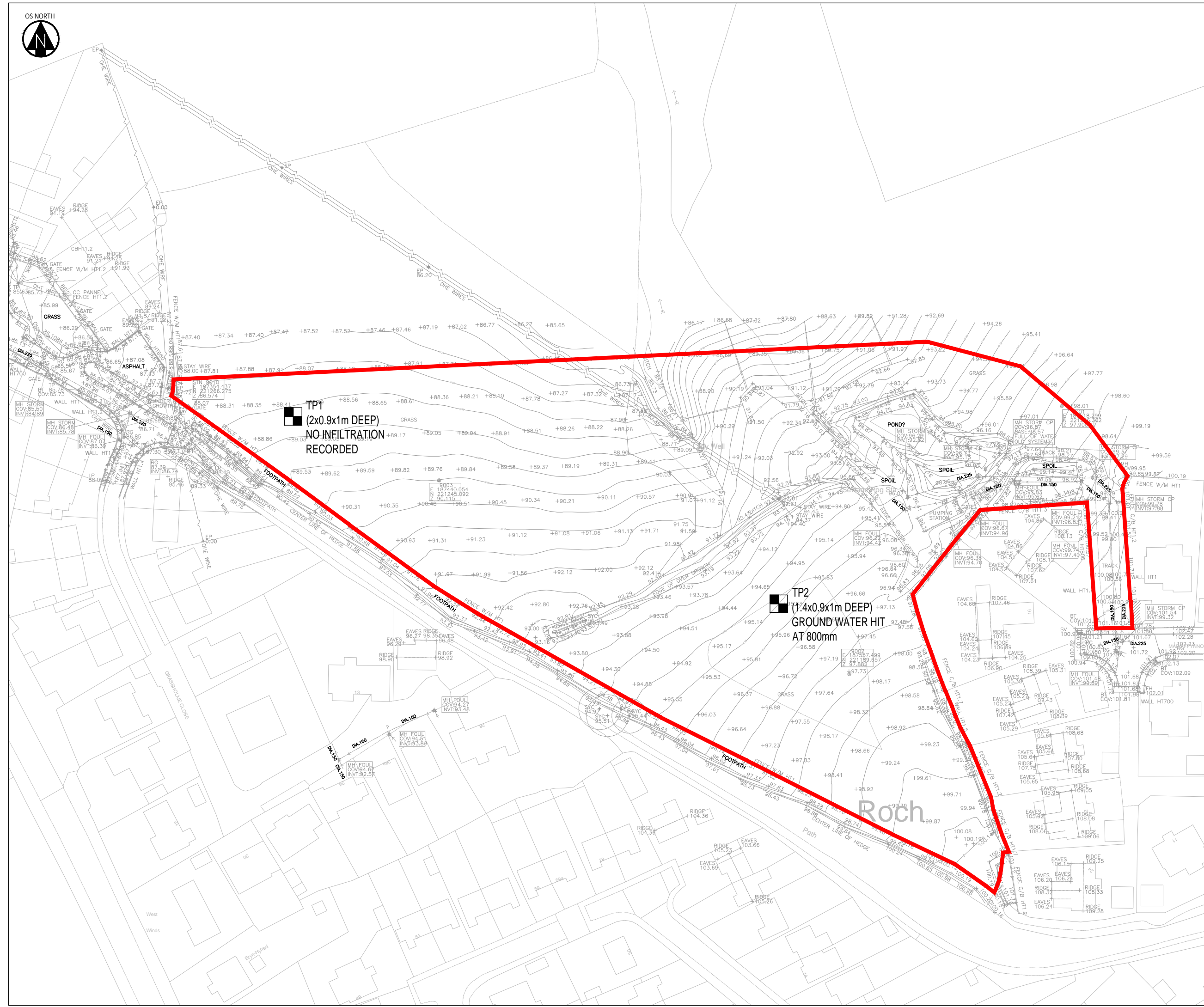
OS NORTH



KEY
SITE BOUNDARY

General Notes:

- Drawing to be read in conjunction with all other relevant project drawings
- Use of this drawing does not absolve the client from his responsibilities under the Health and Safety: The Construction Design and Management Regulations 2015. The Principal Designer is required to contact Hydrock Consultants prior to permitting this drawing to be used in connection with any construction works.
- The drawing shall be read in conjunction with the health and safety information provided and/or within the pre-construction information.
- Before commencement of works associated with the drawing refer to all relevant health and safety information for the works including residual risk information.
- The drawing has been based on information provided by other parties and Hydrock do not warrant the accuracy of this information.
- The drawing indicates the design intent for the works and items/service routes in such detail as to indicate the design. The drawing does not show all components that may be necessary to locate services in a fully coordinated manner.
- It is known that existing utility company underground services and apparatus is present within the proposed works area and it is the Contractors responsibility to locate existing services on site accurately. The Contractor should comply with h(s)g) 47 "Avoiding Danger from Underground Services" when excavating around existing services.
- The Contractor is to verify the line, level and diameter of existing sewers before commencing drainage works.
- The contractor should allow for all necessary investigative work (cat detection, trial holes, etc.) to determine route and depth of all underground services to avoid damage and preserve supplies to existing users
- The drawing shall be used for the intended purpose only and Hydrock does not warrant the accuracy of this information.
- Dimensions shall not be scaled from the drawing and the contractor shall be responsible for obtaining all dimensions and levels on site for the actual setting out of the works.
- Hydrock is not responsible for checking dimensions on site.
- Hydrock is not responsible for setting out grid lines, building line etc
- Hydrock is not responsible for dimensions used in the ordering and manufacturing of equipment and this shall be the responsibility of the contractor.
- All figured levels are in metres and related to existing survey grid & datum unless noted otherwise
- All figured dimensions are in metres unless noted otherwise.



REVISIONS

P01	01/04/22	First Issue.	JSL	CS	CS
-----	----------	--------------	-----	----	----

Rev	Date	Description	By	Ckd	App

Hydrock
 FIRST FLOOR, CASTLEBRIDGE 5
 CASTLEBRIDGE
 5-19 COWBRIDGE ROAD EAST
 CARDIFF
 CF11 9AB
 t: +44 (0) 2920 023665
 e: cardiff@hydrock.com

CLIENT
**WAKEFIELD DEVELOPMENTS
 PEMBROKESHIRE LIMITED**

PROJECT
**RESIDENTIAL DEVELOPMENT AT
 LAND OFF MAES Y FFYNNON, ROCH,
 PEMBROKESHIRE**

TITLE
SITE INVESTIGATION PLAN

HYDROCK PROJECT NO. C-20198-C	SCALE @ A1 1 : 500	STATUS S2
STATUS DESCRIPTION INFORMATION	REVISION P01	
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) ROC-HYD-XX-XX-DR-C-1300		







Appendix F

Site Plans

NOTES:

THE PROPERTY OF THIS DRAWING AND DESIGN IS KEPT IN ROGER CASEY ASSOCIATES AND MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THE WRITTEN CONSENT OF ROGER CASEY ASSOCIATES.

NO.	REVISION	DATE
1	ISSUED FOR TENDERS	11/06/2003
2	REVISED TO SHOW PUMP STATION	11/06/2003
3	REVISED TO SHOW MANHOLE SCHEDULES	11/06/2003
4	REVISED TO SHOW ROAD WORKS	11/06/2003
5	REVISED TO SHOW FENCING	11/06/2003
6	REVISED TO SHOW LIGHTING	11/06/2003
7	REVISED TO SHOW FOOTPATHS	11/06/2003
8	REVISED TO SHOW HEDGES	11/06/2003
9	REVISED TO SHOW TRIAL HOLES	11/06/2003
10	REVISED TO SHOW DRIVE ACCESS	11/06/2003
11	REVISED TO SHOW POWER POLES	11/06/2003
12	REVISED TO SHOW WET WELLS	11/06/2003
13	REVISED TO SHOW FENCING	11/06/2003
14	REVISED TO SHOW LIGHTING	11/06/2003
15	REVISED TO SHOW FOOTPATHS	11/06/2003
16	REVISED TO SHOW HEDGES	11/06/2003
17	REVISED TO SHOW TRIAL HOLES	11/06/2003
18	REVISED TO SHOW DRIVE ACCESS	11/06/2003
19	REVISED TO SHOW POWER POLES	11/06/2003
20	REVISED TO SHOW WET WELLS	11/06/2003
21	REVISED TO SHOW FENCING	11/06/2003
22	REVISED TO SHOW LIGHTING	11/06/2003
23	REVISED TO SHOW FOOTPATHS	11/06/2003
24	REVISED TO SHOW HEDGES	11/06/2003
25	REVISED TO SHOW TRIAL HOLES	11/06/2003
26	REVISED TO SHOW DRIVE ACCESS	11/06/2003
27	REVISED TO SHOW POWER POLES	11/06/2003
28	REVISED TO SHOW WET WELLS	11/06/2003
29	REVISED TO SHOW FENCING	11/06/2003
30	REVISED TO SHOW LIGHTING	11/06/2003
31	REVISED TO SHOW FOOTPATHS	11/06/2003
32	REVISED TO SHOW HEDGES	11/06/2003
33	REVISED TO SHOW TRIAL HOLES	11/06/2003
34	REVISED TO SHOW DRIVE ACCESS	11/06/2003
35	REVISED TO SHOW POWER POLES	11/06/2003
36	REVISED TO SHOW WET WELLS	11/06/2003
37	REVISED TO SHOW FENCING	11/06/2003
38	REVISED TO SHOW LIGHTING	11/06/2003
39	REVISED TO SHOW FOOTPATHS	11/06/2003
40	REVISED TO SHOW HEDGES	11/06/2003
41	REVISED TO SHOW TRIAL HOLES	11/06/2003
42	REVISED TO SHOW DRIVE ACCESS	11/06/2003
43	REVISED TO SHOW POWER POLES	11/06/2003
44	REVISED TO SHOW WET WELLS	11/06/2003
45	REVISED TO SHOW FENCING	11/06/2003
46	REVISED TO SHOW LIGHTING	11/06/2003
47	REVISED TO SHOW FOOTPATHS	11/06/2003
48	REVISED TO SHOW HEDGES	11/06/2003
49	REVISED TO SHOW TRIAL HOLES	11/06/2003
50	REVISED TO SHOW DRIVE ACCESS	11/06/2003

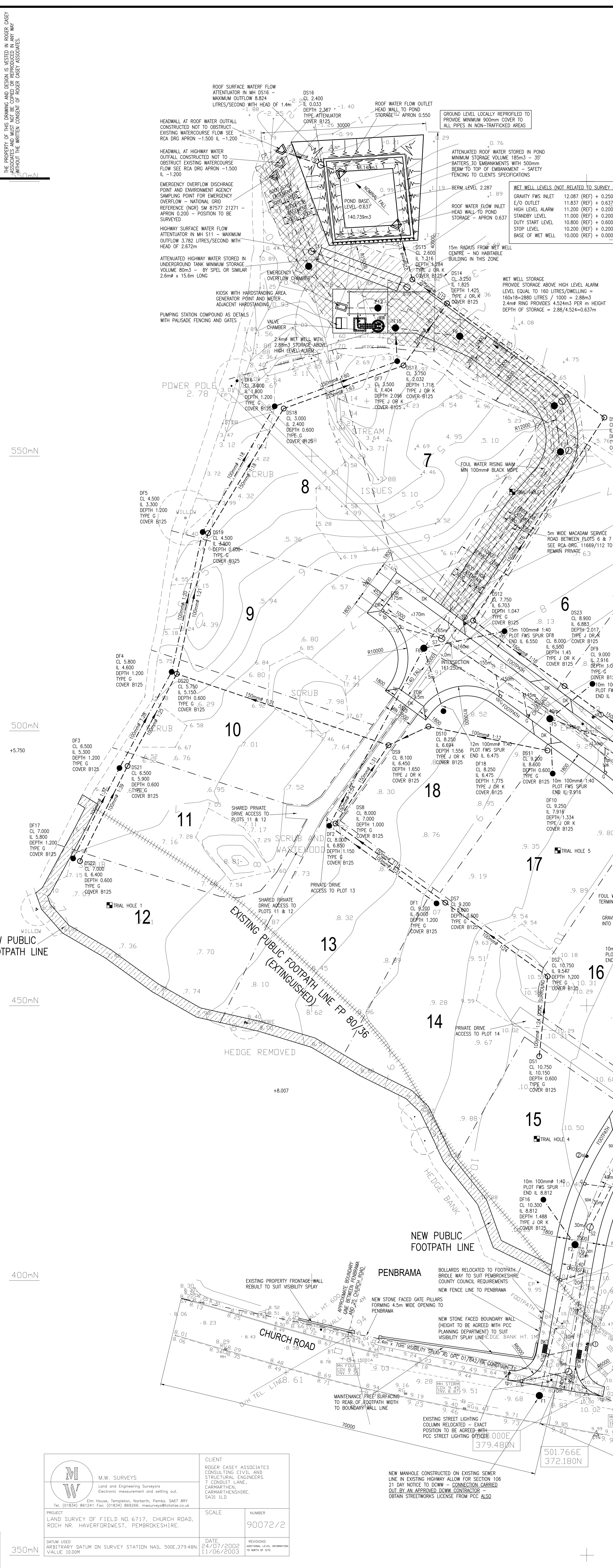
Roger Casey Associates
Consulting Civil & Structural Engineers
1 Condon Lane, Consett, Co. Durham, SA1 1LD
Tel: 44 (0) 191 22 28 46
Fax: 44 (0) 191 22 23 77
Email: rca@rca-ang.co.uk

Mr & Mrs EDMONDS

RESIDENTIAL DEVELOPMENT AT OS 6717, CHURCH ROAD, ROCH, HAVERFORDWEST, PEMBS.

ROAD & DRAINAGE SITE PLAN

CLIENT: Mr & Mrs EDMONDS
PROJECT: RESIDENTIAL DEVELOPMENT AT OS 6717, CHURCH ROAD, ROCH, HAVERFORDWEST, PEMBS.
DRAWING TITLE: ROAD & DRAINAGE SITE PLAN
DATE: 09/11/02
CHECKED BY: RSC
DRAWN BY: PWJL
SCALE: 1:250
DRAWING NO: 11669/100
ORIGINAL DRAWING NO: 1



THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER R.C.A. AND ARCHITECTS DRAWINGS

KEY

- TP - CURVE TANGENT POINT
- DK - DROP KERBS
- DKT - DROP KERB CROSSING POINT WITH MINIMUM 8 No. TACTILE PAVING SLABS TO EACH SIDE OF ROAD - TO BE MARSHALLS TACTILE BUSTER PAVING 400x400x55mm DP BUFF COLOURED OR SIMILAR APPROVED Laid ON 25mm DP CLASS 1 MORTAR (PAVING SLABS IN LIEU OF BASE AND WEARING COURSE TO FOOTPATH AREA) CROSSING POINT TO HAVE DROPPED BOLLICED KERBS WITH 5mm KERB FACE STEP TO CARRIAGEWAY - SEE CONSTRUCTION DETAILS
- — — FOUL WATER SEWER
- — — SURFACE WATER SEWER
- — — PROPOSED STREET LIGHTING CABLE ROUTE
- — — PROPOSED DUCTED STREET LIGHTING CABLE ROUTE
- F1 - FOUL WATER MANHOLE AND REFERENCE
- S1 - SURFACE WATER MANHOLE AND REFERENCE
- G - ROAD GULLY
- - STREET LIGHTING COLUMN
- - STREET LIGHTING FEED PILLAR

ANY DISCREPANCIES IN INFORMATION CONTAINED IN THIS DRAWING & ANY PROPOSED ALTERATIONS TO ROAD ALIGNMENT OR DRAINAGE MUST BE REPORTED TO ENGINEER FOR REVISION TO ADOPTION AGREEMENT DRAWINGS

FOUL WATER & SURFACE WATER SEWER ALL PIPES AND FITTINGS TO BE OSMA ULTRA-RIB MANUFACTURED IN UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U) JVC DRAINAGE SYSTEMS WITH FLEXIBLE JOINTS TO BS 4660 OR BS 5481. JVC PIPES INSTALLED BY PLASTIC PIPE MANUFACTURER / DCW APPROVED INSTALLERS

THE DEVELOPER MUST SELF-TEST AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED POTENTIALLY ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN 'SEWERS FOR ADOPTION - A DESIGN AND CONSTRUCTION GUIDE FOR DEVELOPERS' 5th EDITION AND THE REQUIREMENTS OF THE STATUTORY UNDERTAKER AND CONFIRM THE SAME IN WRITING TO THE ADOPTION AUTHORITY.

M.W. SURVEYS
Land and Engineering Surveys
Electronic measurement and setting out
Elm House, Tompston, Northth, Pembs, SA67 8BY
Tel: (01834) 881241 Fax: (01834) 889266 m.w.surveys@btinternet.com

CLIENT
ROGER CASEY ASSOCIATES
CONSULTING CIVIL AND STRUCTURAL ENGINEERS
7, CONDUIT LANE,
CARMARTHEN,
CARDIGANSHIRE,
SA31 1LD

PROJECT
LAND SURVEY OF FIELD NO. 6717, CHURCH ROAD,
ROCH NR. HAVERFORDWEST, PEMBROKESHIRE.

SCALE
90072/2

NUMBER
90072/2

DATE
24/07/2002

REVISIONS
REVISION LEVEL INFORMATION
NO. DATE BY

DATUM USED
ARBITRARY DATUM DN SURVEY STATION NAIL 5006.379.48N
VALUE 10.00M

DO NOT SCALE

NEW MANHOLE CONSTRUCTED ON EXISTING SEWER LINE
IN EXISTING HIGHWAY ALLOW FOR SECTION 106 21 DAY NOTICE TO DCW - CONNECTION CARRIED OUT BY AN APPROVED LICENSE CONTRACTOR - OBTAIN STREETWORKS PERMITS FROM PCC ALSO

NEW PUBLIC FOOTPATH LINE
FP 80/15

EXISTING PUBLIC FOOTPATH LINE
FP 80/15

CHURCH ROAD

CHURCH CLOSE

PENBRAMA
BOLLARDS RELOCATED TO FOOTPATH / SINGLE WAY TO SUIT PENBRAMA/COUNTY COUNCIL REQUIREMENTS
NEW FENCE LINE TO PENBRAMA
NEW STONE FACED GATE PILLARS FORMING 4.5m WIDE OPENING TO PENBRAMA
NEW STONE FACED BOUNDARY WALL (HEIGHT TO BE AGREED WITH PCC PLANNING DEPARTMENT) TO SUIT VISIBILITY SPLAY LINE - SEE BANK HT. 11.1M

PLASGRUG
BRICK WALL

TRIAL HOLE 1

TRIAL HOLE 2

TRIAL HOLE 3

TRIAL HOLE 4

501.766E
372.180N

379.480N

550mN

500mN

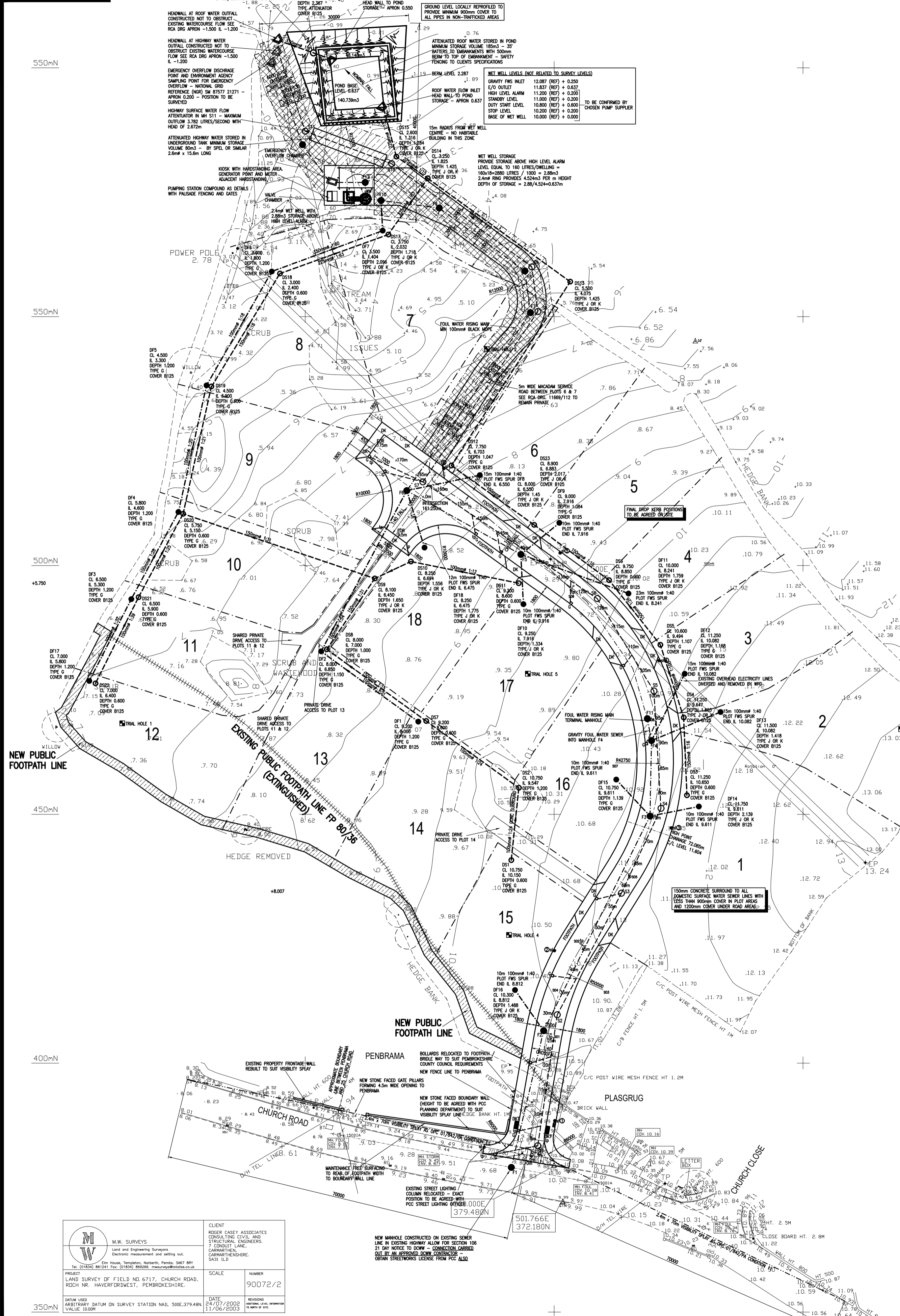
+5.750

450mN

400mN

350mN

DO NOT SCALE



ADOPTABLE SURFACE WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	COMMENTS	MANHOLE TYPE	DIAMETER (or) SIZE	COVER (150mm DP)	STEPS
S1	9.896	8.546	1.650	SUMP 8.246	CATCHPIT	1200mmØ	D400	YES
S2	10.657	8.368	2.589	SUMP 8.068	CATCHPIT	1200mmØ	D400	YES
S3	11.448	8.181	3.567	SUMP 7.881	CATCHPIT	1200mmØ	D400	YES
S4	11.588	8.058	3.830	SUMP 7.758	CATCHPIT	1200mmØ	D400	YES
S5	10.981	7.902	3.379	SUMP 7.602	CATCHPIT	1200mmØ	D400	YES
S6	9.910	7.761	2.449	SUMP 7.461	CATCHPIT	1200mmØ	D400	YES
S7	7.760	5.560	2.500	SUMP 5.260	CATCHPIT	1200mmØ	D400	YES
S8	5.552	4.127	1.725	SUMP 3.827	CATCHPIT	1200mmØ	D400	YES
S9	4.944	3.519	1.725	SUMP 3.219	CATCHPIT	1200mmØ	D400	YES
S10	2.583	1.367	1.516	SUMP 1.067	CATCHPIT	1200mmØ	D400	YES
S11	2.414	-1.090	3.504	ATTENUATOR	1200mmØ	D400	YES	

ADOPTABLE FOUL WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	COMMENTS	MANHOLE TYPE	DIAMETER (or) SIZE	COVER (150mm DP)	STEPS
F1	9.755	8.092	1.663		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F2	10.552	8.562	1.990		TYPE B	1200mmØ	D400	NO
F3	11.600	9.361	2.239		TYPE B	1200mmØ	D400	NO
F4	11.184	9.707	1.477		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F5	9.017	7.666	1.351		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F6	7.679	6.175	1.504		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F7	5.637	3.696	1.941		TYPE B	1200mmØ	D400	NO
F8	5.062	3.211	1.851		TYPE B	1200mmØ	D400	NO
F9	3.610	1.986	1.624		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F10	2.799	1.302	1.497		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F11	11.003	9.736	1.267		TERMINAL (E)	1350mmØ	D400	NO
F12	2.677	0.982	1.691		TYPE C or E	1350mmØ 1240x675mm	D400	NO
WW	2.677	-0.805	3.482		WET WELL	2400mmØ	D400	NO

NOTES:

THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN ROGER CASEY ASSOCIATES AND MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THE WRITTEN CONSENT OF ROGER CASEY ASSOCIATES.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER R.C.A. AND ARCHITECTS DRAWINGS

- KEY**
- TP - CURVE TANGENT POINT
 - DK - DROP KERBS
 - DKT - DROP KERB CROSSING POINT WITH MINIMUM 8 No. TACTILE PAVING SLABS TO EACH SIDE OF ROAD - TO BE MARSHALLS TACTILE BLISTER PAVING 400x400x65mm DP CLASS 1 MORTAR (PAVING SLABS IN LIEU OF BASE AND WEARING COURSE TO FOOTPATH AREA) CROSSING POINT TO HAVE DROPPED BULLNOSED KERBS WITH 5mm KERB FACE STEP TO CARRIAGEWAY - SEE CONSTRUCTION DETAILS

- - - - - FOUL WATER SEWER
- - - - - SURFACE WATER SEWER
- SL - PROPOSED STREET LIGHTING CABLE ROUTE
- SLD - PROPOSED DUCTED STREET LIGHTING CABLE ROUTE
- F1 - FOUL WATER MANHOLE AND REFERENCE
- S1 - SURFACE WATER MANHOLE AND REFERENCE
- G - ROAD GULLY
- - STREET LIGHTING COLUMN
- ⊞ - STREET LIGHTING FEED PILLAR

ANY DISCREPANCIES IN INFORMATION CONTAINED IN THIS DRAWING & ANY PROPOSED ALTERATIONS TO ROAD ALIGNMENT OR DRAINAGE MUST BE REPORTED TO ENGINEER FOR REVISION TO ADOPTION AGREEMENT DRAWINGS

FOUL WATER & SURFACE WATER SEWER ALL PIPES AND FITTINGS TO BE OSMIA ULTRA-RIB MANUFACTURED IN UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U). uPVC DRAINAGE SYSTEMS WITH FLEXIBLE JOINTS TO BS.4660 OR BS.5481. uPVC PIPES INSTALLED BY PLASTIC PIPE MANUFACTURER / DCWW APPROVED INSTALLERS.

THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED POTENTIALLY ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN "SEWERS FOR ADOPTION - A DESIGN AND CONSTRUCTION GUIDE FOR DEVELOPERS" 5th EDITION AND THE REQUIREMENTS OF THE STATUTORY UNDERTAKER AND CONFIRM THE SAME IN WRITING TO THE ADOPTION AUTHORITY.

REV	DESCRIPTION	DATE	CHECKED	DRAWN
H	PUMPING STATION ACCESS ROAD WIDENED TO SUIT DCWW NDC REQUIREMENTS	18/12/08	PWJL	PWJL
G	DOMESTIC SURFACE WATER SEWER LINES REVISED PROPOSED FOOTPATH REALIGNED	13/08/09	PWJL	PWJL
F	PRIVATE PLOT SURFACE WATER LINES REVISED TO SUIT S104 EASEMENT ZONE	01/09/09	PWJL	PWJL
E	S104 & S38 EASEMENTS ADDED TO DRAWING	13/03/09	PWJL	PWJL
D	FURTHER INFORMATION ADDED TO POND AREA	13/07/08	PWJL	PWJL
C	DRAWING UPDATED TO SUIT CURRENT CLIENT PROPOSALS	11/07/08	PWJL	PWJL
B	DRAWING UPDATED TO SUIT CURRENT CLIENT PROPOSALS	12/05/08	PWJL	PWJL
A	DRAWING UPDATED WITH BOX CULVERT STORAGE SYSTEM	31/01/08	PWJL	PWJL
REV	DESCRIPTION	DATE	CHECKED	DRAWN



Roger Casey Associates
 Consulting Civil & Structural Engineers
 7 Conduit Lane, Carmarthen, Carmarthenshire SA31 1LD
 Tel: +44 (0) 1267 22 26 46
 Fax: +44 (0) 1267 22 13 77
 Email: office@rca-eng.co.uk

CLIENT:
Mr & Mrs EDMONDS

PROJECT:
RESIDENTIAL DEVELOPMENT AT OS 6717, CHURCH ROAD, ROCH, HAVERFORDWEST, PEMBS.

DRAWING TITLE:
1:500 ROAD & DRAINAGE SITE PLAN

DRAWN BY: PWJL	DESIGN BY: PWJL	CHECKED BY: RSC	DATE: 27/11/02
-------------------	--------------------	--------------------	-------------------

SCALES: 1:500	DRAWING No.:	REVISION:
------------------	--------------	-----------

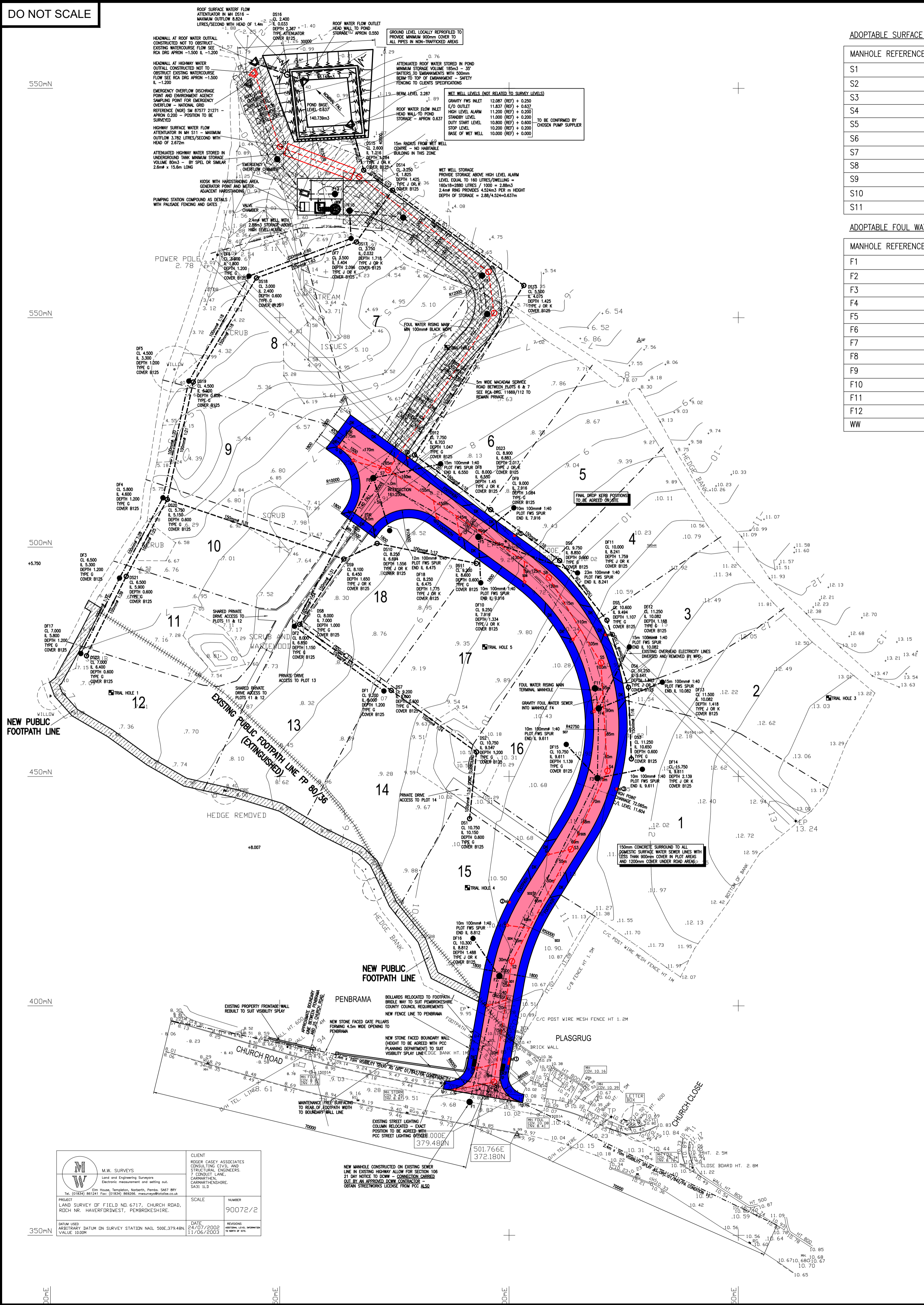
ORIGINAL DRAWING A1

11669/101 H

M.W. SURVEYS
 M.W. SURVEYS
 Land and Engineering Services
 100, High Street, Carmarthen, Carmarthenshire, SA31 1LD
 Tel: 01267 221377
 Fax: 01267 221377
 Email: office@mcw-surveys.co.uk

CLIENT: ROGER CASEY ASSOCIATES CONSULTING CIVIL AND STRUCTURAL ENGINEERS
 PROJECT: LAND SURVEY OF FIELD NO. 6717, CHURCH ROAD, ROCH, HAVERFORDWEST, PEMBROKESHIRE.
 SCALE: 1:500
 NUMBER: 90072/2
 DATE: 24/07/2008
 DRAWN BY: PWJL
 CHECKED BY: RSC
 DATE: 27/11/02

DO NOT SCALE



ADOPTABLE SURFACE WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	COMMENTS	MANHOLE TYPE	DIAMETER (or) SIZE	COVER (150mm DP)	STEPS
S1	9.896	8.546	1.650	SUMP 8.246	CATCHPIT	1200mmØ	D400	YES
S2	10.657	8.368	2.589	SUMP 8.068	CATCHPIT	1200mmØ	D400	YES
S3	11.448	8.181	3.567	SUMP 7.881	CATCHPIT	1200mmØ	D400	YES
S4	11.588	8.058	3.830	SUMP 7.758	CATCHPIT	1200mmØ	D400	YES
S5	10.981	7.902	3.379	SUMP 7.602	CATCHPIT	1200mmØ	D400	YES
S6	9.910	7.761	2.449	SUMP 7.461	CATCHPIT	1200mmØ	D400	YES
S7	7.760	5.560	2.500	SUMP 5.260	CATCHPIT	1200mmØ	D400	YES
S8	5.552	4.127	1.725	SUMP 3.827	CATCHPIT	1200mmØ	D400	YES
S9	4.944	3.519	1.725	SUMP 3.219	CATCHPIT	1200mmØ	D400	YES
S10	2.583	1.367	1.516	SUMP 1.067	CATCHPIT	1200mmØ	D400	YES
S11	2.414	-1.090	3.504	ATTENUATOR	1200mmØ	D400	YES	

ADOPTABLE FOUL WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	COMMENTS	MANHOLE TYPE	DIAMETER (or) SIZE	COVER (150mm DP)	STEPS
F1	9.755	8.092	1.663		TYPE C or E	1350mmØ	1240x675mm	D400
F2	10.552	8.562	1.990		TYPE B	1200mmØ	D400	NO
F3	11.600	9.361	2.239		TYPE B	1200mmØ	D400	NO
F4	11.184	9.707	1.477		TYPE C or E	1350mmØ	1240x675mm	D400
F5	9.017	7.666	1.351		TYPE C or E	1350mmØ	1240x675mm	D400
F6	7.679	6.175	1.504		TYPE C or E	1350mmØ	1240x675mm	D400
F7	5.637	3.696	1.941		TYPE B	1200mmØ	D400	NO
F8	5.062	3.211	1.851		TYPE B	1200mmØ	D400	NO
F9	3.610	1.986	1.624		TYPE C or E	1350mmØ	1240x675mm	D400
F10	2.799	1.302	1.497		TYPE C or E	1350mmØ	1240x675mm	D400
F11	11.003	9.736	1.267		TERMINAL (E)	1350mmØ	D400	NO
F12	2.677	0.982	1.691		TYPE C or E	1350mmØ	1240x675mm	D400
WW	2.677	-0.805	3.482		WET WELL	2400mmØ	D400	NO

NOTES:

THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN ROGER CASEY ASSOCIATES AND MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THE WRITTEN CONSENT OF ROGER CASEY ASSOCIATES.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER R.C.A. AND ARCHITECTS DRAWINGS

KEY

- TP - CURVE TANGENT POINT
- DK - DROP KERBS
- DKT - DROP KERB CROSSING POINT WITH MINIMUM 8 No. TACTILE PAVING SLABS TO EACH SIDE OF ROAD - TO BE MARSHALLS TACTILE BLISTER PAVING 400x400x65mm DP BUFF COLOURED OR SIMILAR APPROVED LAID ON 25mm DP CLASS 1 MORTAR (PAVING SLABS IN LIEU OF BASE AND WEARING COURSE TO FOOTPATH AREA) CROSSING POINT TO HAVE DROPPED BULLNOSED KERBS WITH 5mm KERB FACE STEP TO CARRIAGEWAY - SEE CONSTRUCTION DETAILS

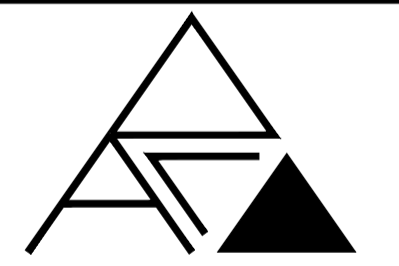
- F - FOUL WATER SEWER
- S - SURFACE WATER SEWER
- SL --- PROPOSED STREET LIGHTING CABLE ROUTE
- SLD --- PROPOSED DUCTED STREET LIGHTING CABLE ROUTE
- F1 - FOUL WATER MANHOLE AND REFERENCE
- S1 - SURFACE WATER MANHOLE AND REFERENCE
- G - ROAD GULLY
- - STREET LIGHTING COLUMN
- ⊠ - STREET LIGHTING FEED PILLAR

ANY DISCREPANCIES IN INFORMATION CONTAINED IN THIS DRAWING & ANY PROPOSED ALTERATIONS TO ROAD ALIGNMENT OR DRAINAGE MUST BE REPORTED TO ENGINEER FOR REVISION TO ADOPTION AGREEMENT DRAWINGS

FOUL WATER & SURFACE WATER SEWER ALL PIPES AND FITTINGS TO BE OSMIA ULTRA-RIB MANUFACTURED IN UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U). uPVC DRAINAGE SYSTEMS WITH FLEXIBLE JOINTS TO BS.4660 OR BS.5481. uPVC PIPES INSTALLED BY PLASTIC PIPE MANUFACTURER / DCWW APPROVED INSTALLERS.

THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED POTENTIALLY ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN "SEWERS FOR ADOPTION - A DESIGN AND CONSTRUCTION GUIDE FOR DEVELOPERS" 5th EDITION AND THE REQUIREMENTS OF THE STATUTORY UNDERTAKER AND CONFIRM THE SAME IN WRITING TO THE ADOPTION AUTHORITY.

REV	DESCRIPTION	DATE	BY	CHECKED
H	PUMPING STATION ACCESS ROAD WIDENED TO SUIT DCWW INDC REQUIREMENTS	28/07/08	PWJL	PWJL
G	DOMESTIC SURFACE WATER SEWER LINES REVISED PROPOSED FOOTPATH REALIGNED	22/07/08	PWJL	PWJL
F	PRIVATE PLOT SURFACE WATER LINES REVISED TO SUIT S104 EASEMENT ZONE	07/07/08	PWJL	PWJL
E	S104 & S38 EASEMENTS ADDED TO DRAWING	13/07/08	PWJL	PWJL
D	FURTHER INFORMATION ADDED TO POND AREA	13/07/08	PWJL	PWJL
C	DRAWING UPDATED TO SUIT CURRENT CLIENT PROPOSALS	11/07/08	PWJL	PWJL
B	DRAWING UPDATED TO SUIT CURRENT CLIENT PROPOSALS	22/07/08	PWJL	PWJL
A	DRAWING UPDATED WITH BOX CULVERT STORAGE SYSTEM	21/07/08	PWJL	PWJL
REV	DESCRIPTION	DATE	BY	CHECKED



Roger Casey Associates

Consulting Civil & Structural Engineers

7 Conduit Lane Carmarthen Carmarthenshire SA31 1LD

Tel: +44 (0) 1267 22 26 46

Fax: +44 (0) 1267 22 13 77

Email: office@rca-eng.co.uk

CLIENT:

Mr & Mrs EDMONDS

PROJECT:

RESIDENTIAL DEVELOPMENT AT OS 6717, CHURCH ROAD, ROCH, HAVERFORDWEST, PEMBS.

DRAWING TITLE:

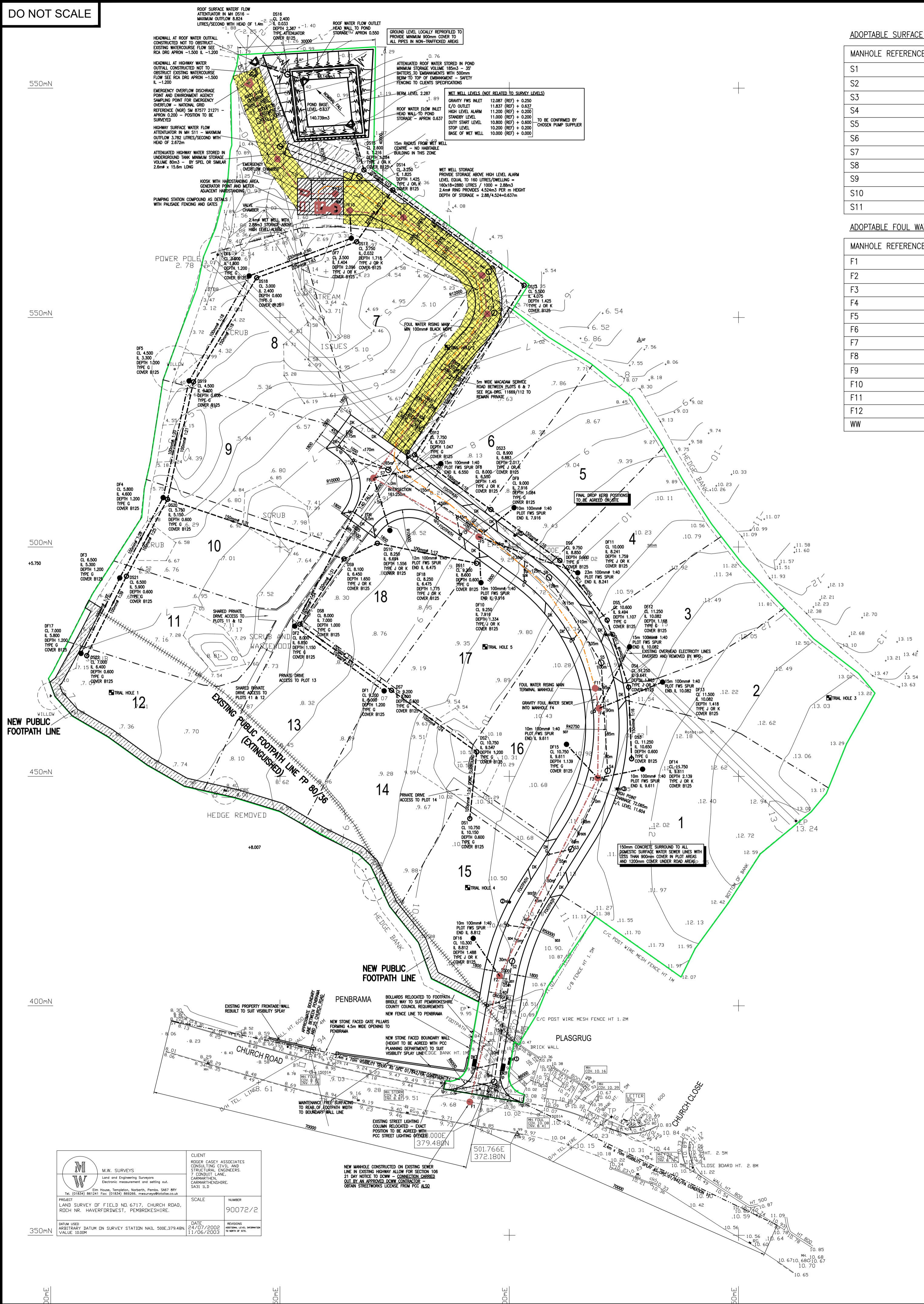
1:500 ROAD & DRAINAGE SITE PLAN

DRAWN BY:	DESIGN BY:	CHECKED BY:	DATE:
PWJL	PWJL	RSC	27/11/02

SCALE:	DRAWING No:	REVISION:
1:500	11669/101	H

ORIGINAL DRAWING A1

DO NOT SCALE



ADOPTABLE SURFACE WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	COMMENTS	MANHOLE TYPE	DIAMETER (or) SIZE	COVER (150mm DP)	STEPS
S1	9.896	8.546	1.650	SUMP 8.246	CATCHPIT	1200mmØ	D400	YES
S2	10.657	8.368	2.589	SUMP 8.068	CATCHPIT	1200mmØ	D400	YES
S3	11.448	8.181	3.567	SUMP 7.881	CATCHPIT	1200mmØ	D400	YES
S4	11.588	8.058	3.830	SUMP 7.758	CATCHPIT	1200mmØ	D400	YES
S5	10.981	7.902	3.379	SUMP 7.602	CATCHPIT	1200mmØ	D400	YES
S6	9.910	7.761	2.449	SUMP 7.461	CATCHPIT	1200mmØ	D400	YES
S7	7.760	5.560	2.500	SUMP 5.260	CATCHPIT	1200mmØ	D400	YES
S8	5.552	4.127	1.725	SUMP 3.827	CATCHPIT	1200mmØ	D400	YES
S9	4.944	3.519	1.725	SUMP 3.219	CATCHPIT	1200mmØ	D400	YES
S10	2.583	1.367	1.516	SUMP 1.067	CATCHPIT	1200mmØ	D400	YES
S11	2.414	-1.090	3.504	ATTENUATOR	1200mmØ	D400	YES	

ADOPTABLE FOUL WATER MANHOLE SCHEDULE

MANHOLE REFERENCE	COVER LEVEL	INVERT LEVEL	DEPTH	COMMENTS	MANHOLE TYPE	DIAMETER (or) SIZE	COVER (150mm DP)	STEPS
F1	9.755	8.092	1.663		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F2	10.552	8.562	1.990		TYPE B	1200mmØ	D400	NO
F3	11.600	9.361	2.239		TYPE B	1200mmØ	D400	NO
F4	11.184	9.707	1.477		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F5	9.017	7.666	1.351		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F6	7.679	6.175	1.504		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F7	5.637	3.696	1.941		TYPE B	1200mmØ	D400	NO
F8	5.062	3.211	1.851		TYPE B	1200mmØ	D400	NO
F9	3.610	1.986	1.624		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F10	2.799	1.302	1.497		TYPE C or E	1350mmØ 1240x675mm	D400	NO
F11	11.003	9.736	1.267		TERMINAL (E)	1350mmØ	D400	NO
F12	2.677	0.982	1.691		TYPE C or E	1350mmØ 1240x675mm	D400	NO
WW	2.677	-0.805	3.482		WET WELL	2400mmØ	D400	NO

NOTES:

THE PROPERTY OF THIS DRAWING AND DESIGN IS VESTED IN ROGER CASEY ASSOCIATES AND MUST NOT BE COPIED OR REPRODUCED IN ANY WAY WITHOUT THE WRITTEN CONSENT OF ROGER CASEY ASSOCIATES.

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER R.C.A. AND ARCHITECTS DRAWINGS

KEY

- TP - CURVE TANGENT POINT
- DK - DROP KERBS
- DKT - DROP KERB CROSSING POINT WITH MINIMUM 8 No. TACTILE PAVING SLABS TO EACH SIDE OF ROAD - TO BE MARSHALLS TACTILE BLISTER PAVING 400x400x65mm DP BUFF COLOURED OR SIMILAR APPROVED LAID ON 25mm DP CLASS 1 MORTAR (PAVING SLABS IN LIEU OF BASE AND WEARING COURSE TO FOOTPATH AREA) CROSSING POINT TO HAVE DROPPED BULLNOSED KERBS WITH 5mm KERB FACE STEP TO CARRIAGEWAY - SEE CONSTRUCTION DETAILS

- F - FOUL WATER SEWER
- S - SURFACE WATER SEWER
- SL --- PROPOSED STREET LIGHTING CABLE ROUTE
- SLD --- PROPOSED DUCTED STREET LIGHTING CABLE ROUTE
- F1 - FOUL WATER MANHOLE AND REFERENCE
- S1 - SURFACE WATER MANHOLE AND REFERENCE
- G - ROAD GULLY
- - STREET LIGHTING COLUMN
- ⊠ - STREET LIGHTING FEED PILLAR

ANY DISCREPANCIES IN INFORMATION CONTAINED IN THIS DRAWING & ANY PROPOSED ALTERATIONS TO ROAD ALIGNMENT OR DRAINAGE MUST BE REPORTED TO ENGINEER FOR REVISION TO ADOPTION AGREEMENT DRAWINGS

FOUL WATER & SURFACE WATER SEWER ALL PIPES AND FITTINGS TO BE OSMA ULTRA-RIB MANUFACTURED IN UNPLASTICIZED POLYVINYL CHLORIDE (PVC-U) uPVC DRAINAGE SYSTEMS WITH FLEXIBLE JOINTS TO BS.4660 OR BS.5481. uPVC PIPES INSTALLED BY PLASTIC PIPE MANUFACTURER / DCWW APPROVED INSTALLERS.

THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED POTENTIALLY ADOPTABLE SEWERS ARE IN ACCORDANCE WITH THOSE SET OUT IN "SEWERS FOR ADOPTION - A DESIGN AND CONSTRUCTION GUIDE FOR DEVELOPERS" 5th EDITION AND THE REQUIREMENTS OF THE STATUTORY UNDERTAKER AND CONFIRM THE SAME IN WRITING TO THE ADOPTION AUTHORITY.

REV	DESCRIPTION	DESIGNED	CHECKED	DATE
H	PUMPING STATION ACCESS ROAD WIDENED TO SUIT DCWW NDC REQUIREMENTS	PWJL	PWJL	28/07/08
G	DOMESTIC SURFACE WATER SEWER LINES REVISED PROPOSED FOOTPATH REALIGNED	PWJL	PWJL	23/07/08
F	PRIVATE PLOT SURFACE WATER LINES REVISED TO SUIT S104 EASEMENT ZONE	PWJL	PWJL	01/07/08
E	S104 & S38 EASEMENTS ADDED TO DRAWING	PWJL	PWJL	01/07/08
D	FURTHER INFORMATION ADDED TO POND AREA	PWJL	PWJL	13/07/08
C	DRAWING UPDATED TO SUIT CURRENT CLIENT PROPOSALS	PWJL	PWJL	11/07/08
B	DRAWING UPDATED TO SUIT CURRENT CLIENT PROPOSALS	PWJL	PWJL	22/07/08
A	DRAWING UPDATED WITH BOX CULVERT STORAGE SYSTEM	PWJL	PWJL	21/07/08



Roger Casey Associates

Consulting Civil & Structural Engineers

7 Conduit Lane Carmarthen Carmarthenshire SA31 1LD

Tel: +44 (0) 1267 22 26 46

Fax: +44 (0) 1267 22 13 77

Email: office@rca-eng.co.uk

CLIENT:

Mr & Mrs EDMONDS

PROJECT:

RESIDENTIAL DEVELOPMENT AT OS 6717, CHURCH ROAD, ROCH, HAVERFORDWEST, PEMBS.

DRAWING TITLE:

1:500 ROAD & DRAINAGE SITE PLAN

DRAWN BY:	DESIGN BY:	CHECKED BY:	DATE:
PWJL	PWJL	RSC	27/11/02

SCALES:	DRAWING No:	REVISION:
1:500	11669/101	H

ORIGINAL DRAWING A1

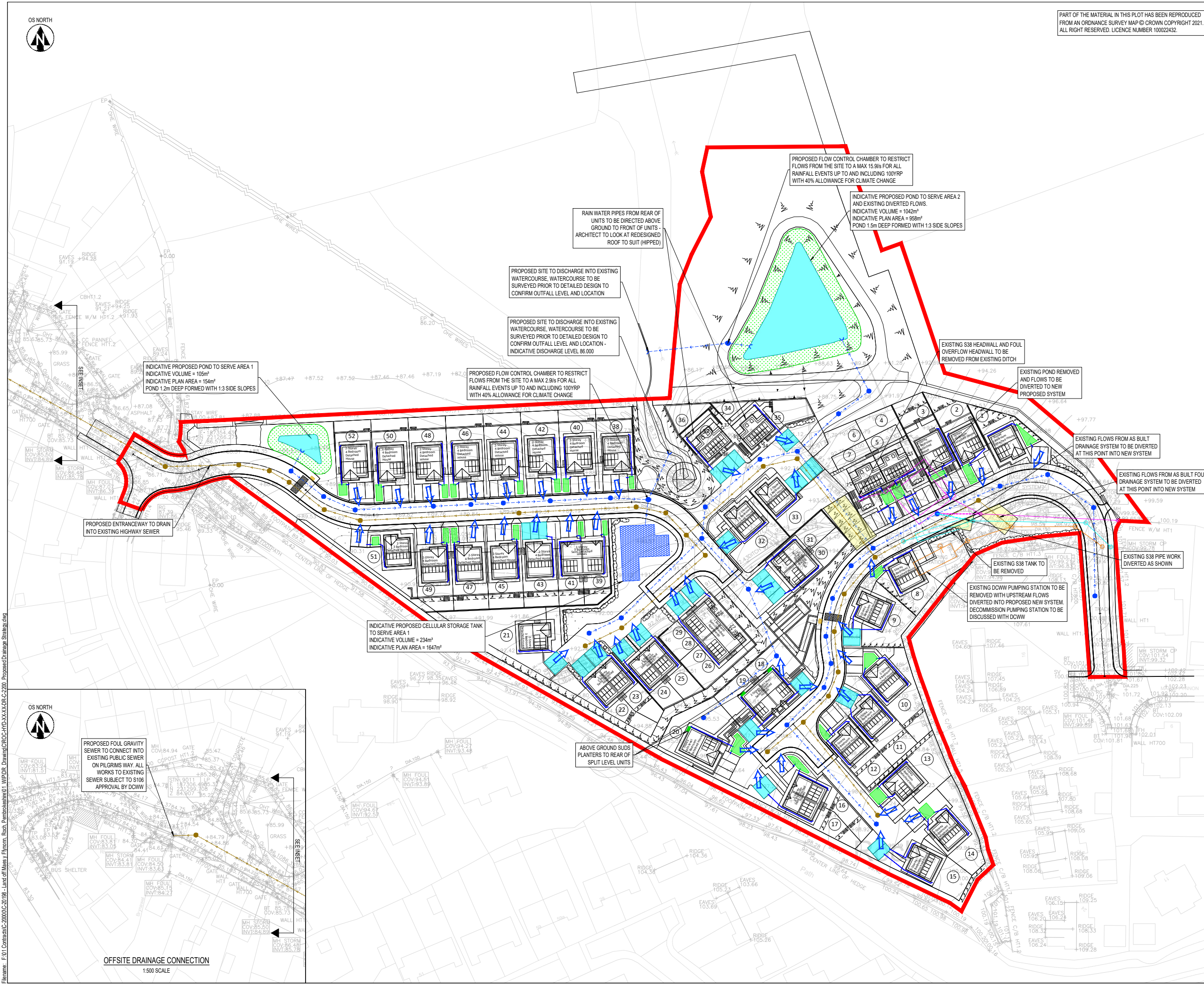
M.W. M.W. SURVEYS
 Land and Engineering Surveys
 7 Conduit Lane, Carmarthen, Carmarthenshire, SA31 1LD
 Tel: 01267 86241 Fax: 01267 86242 Email: info@mw-surveys.co.uk

CLIENT: ROGER CASEY ASSOCIATES
 CONSULTING CIVIL AND STRUCTURAL ENGINEERS
 7 CONDUIT LANE, CARMARTHEN, CARMARTHENSHERE, SA31 1LD

SCALE: 90072/2

PROJECT: LAND SURVEY OF FIELD NO 6717, CHURCH ROAD, ROCH NR. HAVERFORDWEST, Pembrokeshire.

DATE: 11/06/2003



PART OF THE MATERIAL IN THIS PLOT HAS BEEN REPRODUCED FROM AN ORDNANCE SURVEY MAP © CROWN COPYRIGHT 2021. ALL RIGHTS RESERVED. LICENCE NUMBER 100022432.

DRAINAGE KEY	
[Red line]	SITE BOUNDARY
[Blue dashed line]	PROPOSED SURFACE WATER PIPES, POSITIONS ARE INDICATIVE
[Yellow dashed line]	PROPOSED FOUL WATER PIPES, POSITIONS ARE INDICATIVE
[Blue dashed line with dots]	PROPOSED PRECAST CONCRETE INLET/OUTLET HEADWALL
[Blue dashed line]	EXISTING SURFACE WATER PIPES, OUTFALL TO EXISTING DITCH VIA POND, POSITIONS FROM TOPO
[Blue dashed line]	EXISTING SURFACE WATER PIPES, OUTFALL TO EXISTING DITCH VIA TANK, POSITIONS FROM TOPO
[Orange dashed line]	EXISTING FOUL WATER PIPES AND PUMPING STATION, POSITIONS FROM TOPO
[Blue dashed line]	PROPOSED SURFACE WATER DIVERSION, VIA POND, POSITIONS INDICATIVE
[Blue dashed line]	PROPOSED SURFACE WATER DIVERSION, VIA TANK, POSITIONS INDICATIVE
[Yellow shaded area]	EXISTING EASEMENT TO S38 SURFACE WATER SYSTEM
[Green shaded area]	PROPOSED RAIN GARDENS, POSITIONS ARE INDICATIVE
[Light blue shaded area]	PROPOSED PERMEABLE SURFACING AND SUB-BASE SYSTEM
[Blue dashed line with dots]	PROPOSED ATTENUATION BASIN
[Blue dashed line with dots]	PROPOSED CELLULAR STORAGE TANK
[Green shaded area]	PROPOSED SUDS PLANTER

- General Notes:**
- Drawing to be read in conjunction with all other relevant project drawings
 - Use of this drawing does not absolve the client from his responsibilities under the Health and Safety, The Construction Design and Management Regulations 2015. The Principal Designer is required to contact Hydrock Consultants prior to permitting this drawing to be used in connection with any construction works.
 - The drawing shall be read in conjunction with the health and safety information provided and/or within the pre-construction information. Before commencement of works associated with the drawing refer to all relevant health and safety information for the works including residual risk information.
 - The drawing has been based on information provided by other parties and Hydrock do not warrant the accuracy of this information.
 - The drawing indicates the design intent for the works and items/service routes in such detail as to indicate the design. The drawing does not show all components that may be necessary to locate services in a fully coordinated manner.
 - It is known that existing utility company underground services and apparatus is present within the proposed works area and it is the Contractor's responsibility to locate existing services on site accurately.
 - The Contractor should comply with hsg(j) 47 "Avoiding Danger from Underground Services" when excavating around existing services.
 - The Contractor is to verify the level, line and diameter of existing sewers before commencing drainage works.
 - The contractor should allow for all necessary investigative work (cat detection, trial holes, etc.) to determine route and depth of all underground services to avoid damage and preserve supplies to existing users.
 - The drawing shall be used for the intended purpose only and Hydrock does not warrant the accuracy of this information.
 - Dimensions shall not be scaled from the drawing and the contractor shall be responsible for obtaining all dimensions and levels on site for the actual setting out of the works.
 - Hydrock is not responsible for checking dimensions on site.
 - Hydrock is not responsible for setting out grid lines, building line etc.
 - Hydrock is not responsible for dimensions used in the ordering and manufacturing of equipment and this shall be the responsibility of the contractor.
 - All figured levels are in metres and related to existing survey grid & datum unless noted otherwise.
 - All figured dimensions are in metres unless noted otherwise.

REVISIONS				
POS	Red Line Boundary Updated			
S2	JSL	04/05/23	ML	04/05/23
P04	Issued as part of Planning Pack			
S2	JSL	26/04/23	ML	26/04/23
P03	Issued as pre-SAB application			
S2	JSL	01/04/22	CS	01/04/22
P02	Updated to suit new layout			
S2	JSL	26/03/22	CS	26/03/22
P01	First Issue			
S2	JSL	08/10/21	CS	08/10/21



CLIENT
WAKEFIELD DEVELOPMENTS
PEMBROKESHIRE LIMITED

PROJECT
RESIDENTIAL DEVELOPMENT AT
LAND OFF MAES Y FFYNNON, ROCH,
PEMBROKESHIRE

TITLE PROPOSED DRAINAGE STRATEGY	
HYDROCK PROJECT NO. C-20198	SCALE @ A1 1:500
STATUS DESCRIPTION FOR INFORMATION	STATUS S2
DRAWING NO. (PROJECT ORIGINATOR ZONE LEVEL TYPE ROLE NUMBER) ROC-HYD-XX-XX-DR-C-2200	REVISION P05

Filename: F:\01 Contract\C-2000\C-20198 - Land off Maes y Ffynnon, Roch, Pembroekshire\01_WIP\DR_Drawing\ROC-HYD-XX-XX-DR-C-2200_Proposed Drainage Strategy.dwg

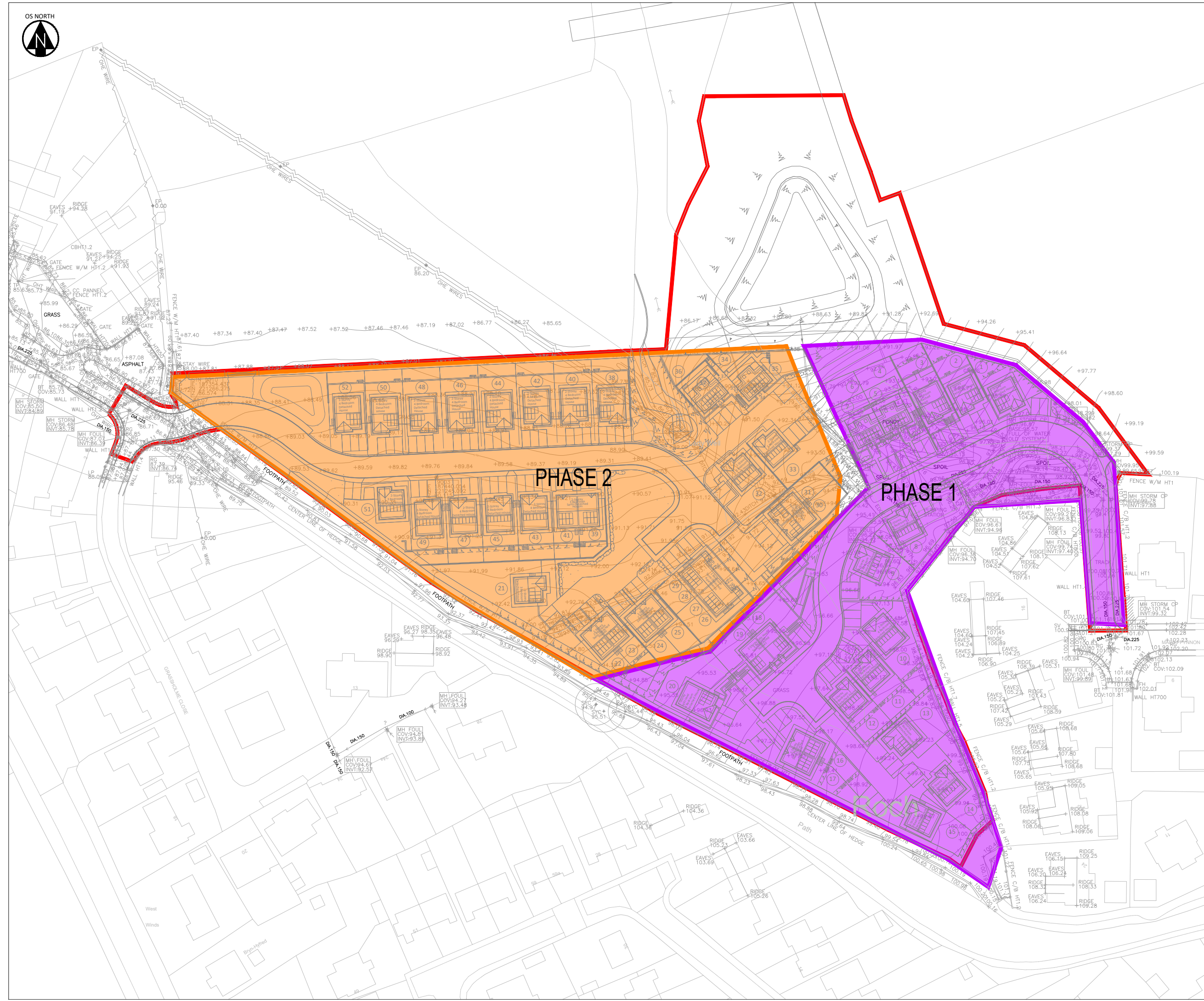


OFFSITE DRAINAGE CONNECTION
 1:500 SCALE



KEY
— SITE BOUNDARY

- General Notes:
- Drawing to be read in conjunction with all other relevant project drawings
 - Use of this drawing does not absolve the client from his responsibilities under the Health and Safety: The Construction Design and Management Regulations 2015. The Principal Designer is required to contact Hydrock Consultants prior to permitting this drawing to be used in connection with any construction works.
 - The drawing shall be read in conjunction with the health and safety information provided and/or within the pre-construction information.
 - Before commencement of works associated with the drawing refer to all relevant health and safety information for the works including residual risk information.
 - The drawing has been based on information provided by other parties and Hydrock do not warrant the accuracy of this information.
 - The drawing indicates the design intent for the works and items/service routes in such detail as to indicate the design. The drawing does not show all components that may be necessary to locate services in a fully coordinated manner.
 - It is known that existing utility company underground services and apparatus is present within the proposed works area and it is the Contractor's responsibility to locate existing services on site accurately.
 - The Contractor should comply with hsl(g) 47 "Avoiding Danger from Underground Services" when excavating around existing services.
 - The Contractor is to verify the line, level and diameter of existing sewers before commencing drainage works.
 - The contractor should allow for all necessary investigative work (cat detection, trial holes, etc.) to determine route and depth of all underground services to avoid damage and preserve supplies to existing users
 - The drawing shall be used for the intended purpose only and Hydrock does not warrant the accuracy of this information.
 - Dimensions shall not be scaled from the drawing and the contractor shall be responsible for obtaining all dimensions and levels on site for the actual setting out of the works.
 - Hydrock is not responsible for checking dimensions on site.
 - Hydrock is not responsible for setting out grid lines, building line etc
 - Hydrock is not responsible for dimensions used in the ordering and manufacturing of equipment and this shall be the responsibility of the contractor.
 - All figured levels are in metres and related to existing survey grid & datum unless noted otherwise
 - All figured dimensions are in metres unless noted otherwise.



Rev	Date	Description	By	Ckd	App
P03	04/05/23	Red Line Boundary Updated	JSL	CS	CS
P02	26/04/23	Updated to Architect's Latest Layout	JSL	CS	CS
P01	01/04/22	First Issue.	JSL	CS	CS

Hydrock
 FIRST FLOOR, CASTLEBRIDGE 5
 CASTLEBRIDGE
 5-19 COWBRIDGE ROAD EAST
 CARDIFF
 CF11 9AB
 t: +44 (0) 2920 02965
 e: cardiff@hydrock.com

CLIENT
**WAKEFIELD DEVELOPMENTS
 PEMBROKESHIRE LIMITED**

PROJECT
**RESIDENTIAL DEVELOPMENT AT
 LAND OFF MAES Y FFYNNON, ROCH,
 PEMBROKESHIRE**

TITLE
PROPOSED PHASING PLAN

HYDROCK PROJECT NO. C-20198-C	SCALE @ A1 1 : 500	STATUS S2
STATUS DESCRIPTION INFORMATION	REVISION P03	
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) ROC-HYD-XX-XX-DR-C-2201		

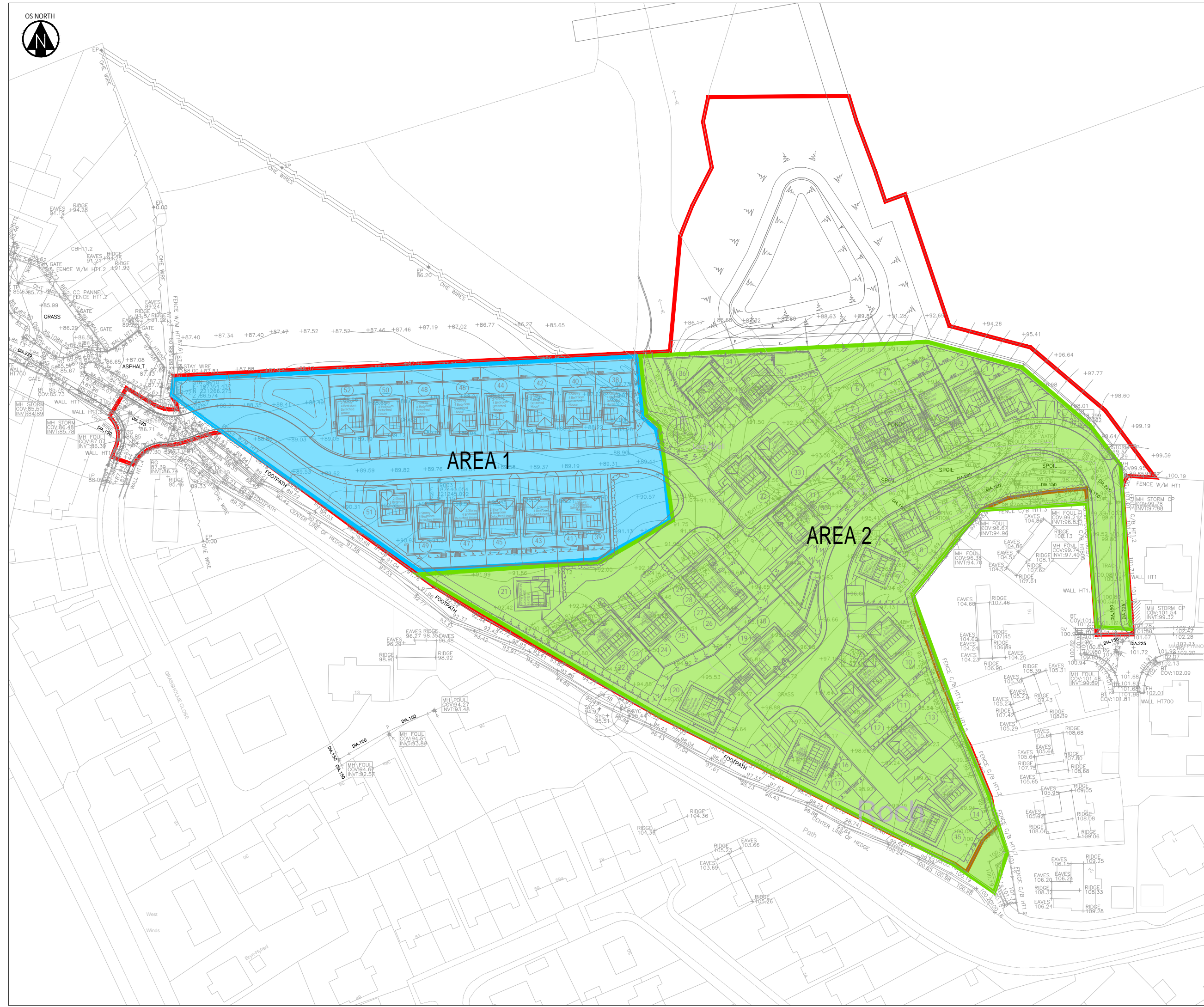
OS NORTH



KEY
SITE BOUNDARY

General Notes:

- Drawing to be read in conjunction with all other relevant project drawings
- Use of this drawing does not absolve the client from his responsibilities under the Health and Safety, The Construction Design and Management Regulations 2015. The Principal Designer is required to contact Hydrock Consultants prior to permitting this drawing to be used in connection with any construction works.
- The drawing shall be read in conjunction with the health and safety information provided and/or within the pre-construction information.
- Before commencement of works associated with the drawing refer to all relevant health and safety information for the works including residual risk information.
- The drawing has been based on information provided by other parties and Hydrock do not warrant the accuracy of this information.
- The drawing indicates the design intent for the works and items/service routes in such detail as to indicate the design. The drawing does not show all components that may be necessary to locate services in a fully coordinated manner.
- It is known that existing utility company underground services and apparatus is present within the proposed works area and it is the Contractors responsibility to locate existing services on site accurately. The Contractor should comply with h(s)g) 47 "Avoiding Danger from Underground Services" when excavating under existing services.
- The Contractor is to verify the line, level and diameter of existing sewers before commencing drainage works.
- The contractor should allow for all necessary investigative work (cat detection, trial holes, etc.) to determine route and depth of all underground services to avoid damage and preserve supplies to existing users
- The drawing shall be used for the intended purpose only and Hydrock does not warrant the accuracy of this information.
- Dimensions shall not be scaled from the drawing and the contractor shall be responsible for obtaining all dimensions and levels on site for the actual setting out of the works.
- Hydrock is not responsible for checking dimensions on site.
- Hydrock is not responsible for setting out grid lines, building line etc
- Hydrock is not responsible for dimensions used in the ordering and manufacturing of equipment and this shall be the responsibility of the contractor.
- All figured levels are in metres and related to existing survey grid & datum unless noted otherwise
- All figured dimensions are in metres unless noted otherwise.



Rev	Date	Description	By	Ckd	App
P03	04/05/23	Red Line Boundary Updated	JSL	CS	CS
P02	26/04/23	Updated to Architect's Latest Layout	JSL	CS	CS
P01	01/04/22	First Issue.	JSL	CS	CS

Hydrock
 FIRST FLOOR, CASTLEBRIDGE 5
 CASTLEBRIDGE
 5-19 COWBRIDGE ROAD EAST
 CARDIFF
 CF11 9AB
 T: +44 (0) 2920 02865
 e: cardiff@hydrock.com

CLIENT
**WAKEFIELD DEVELOPMENTS
 PEMBROKESHIRE LIMITED**

PROJECT
**RESIDENTIAL DEVELOPMENT AT
 LAND OFF MAES Y FFYNNON, ROCH,
 PEMBROKESHIRE**

TITLE
PROPOSED CATCHMENT PLAN

HYDROCK PROJECT NO. C-20198-C	SCALE @ A1 1 : 500
STATUS DESCRIPTION INFORMATION	STATUS S2
DRAWING NO. (PROJECT CODE-ORIGINATOR-ZONE-LEVEL-TYPE-ROLE-NUMBER) ROC-HYD-XX-XX-DR-C-2202	REVISION P03