DRAINAGE STRATEGY

Document Reference: 348 – R2

PROPOSED RESIDENTAL DEVELOPMENT
LOCATED AT 34 CADNANT PARK, CONWY

MÔN CIVILS
LIMITED

April 2024
Revision P03

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1.0 Introduction

This report contains a drainage strategy, for both surface water and foul effluent generated as a result of the proposed residential development located at 34 Cadnant Park, Conwy, LL32 8PE. The location and site boundary of the site is illustrated on the attached plan contained within **Appendix A**, coordinates for the development are provided within **Table 1**.

Table 1. Existing Site Details

OS Grid Reference:	SH 77523 77665
Easting (X)	277523
Northing: (Y)	377665
What3Words:	soups.silk.evoked
Site Area:	7,305.940m² - (0.73 Ha)

The proposed development involves the demolition of an existing property and the construction of 13 dwellings within grounds of the previous dwelling. the proposed development includes 2 affordable properties, with a population of 4persons and 5 persons. The remaining 11 properties are to be sold on the open market properties. The proposal also includes a length of private access road within the site.

Due to the topography of the site there are several large retraining structures throughout the site and several plots which are split level. A copy of the proposed architectural drawings for the site are contained within **Appendix B**.

1.1 Scope of Report

This report aims to provide a suitable drainage strategy for the discharge of surface water and foul effluent generated by the proposed development.

In accordance with The Welsh Ministers Standards for new gravity foul sewers and lateral drains 2012, any foul drainage which accommodates more than one property (sewer) or accommodates one property but laid within third party land (lateral Sewer) must be adopted by the sewerage undertaker that being Dwr Cymru / Welsh Water (DCWW).

For surface water, The Flood and Water Management Act 2010 (Schedule 3) came into effect in Wales on 7 January 2019, requiring all new developments which exceed 100m^2 or more than one property must include Sustainable Drainage Systems (SuDS) and the design of such systems must be approved by the SuDS approval Body (SAB). Any proposed surface water system or SuDS feature which accommodates more the one property must be adopted by the SAB.

Therefore, this report provides justification on the design of such systems and how the design meets the criteria set out the Welsh Government Statutory SuDS standard for Wales 2019 document and Sewers for Adoption 7th.

1.2 Existing Nearby Drainage

The Dwr Cymru / Welsh Water (DCWW) apparatus map contained within **Appendix C** indicates there is an existing combined public sewer network located within the highway fronting the site.

Due to the site's brownfield nature, there is an existing combined private drainage network within the development site, this has been confirmed by an onsite site drainage survey. It is also evident that this system accommodates a land drainage system which has a fair flow of water flowing through it. A copy of the existing site drainage layout is contained within **Appendix D**.

1.3 Site Hydrology

As noted above the surface water run-off from the hardstanding areas of the site are currently collected by the onsite combined drainage system which flows into the existing combined DCWW sewerage network.

The topography of the site generally falls towards the North, with a steep embankment between the northern boundary and 50m into the development site, with an elevation difference of approximately 12m. the northern boundary of the site is bounded by an unnamed watercourse. In its natural state, surface water run-off from the site and the surrounding area would have followed the contours of the land and flowed into the watercourse to the north therefore there is an established right to connect flows from the site to this watercourse.

There is also a land drainage feature within the site abutting the western boundary which flows to the watercourse to the north. The existing above ground flood routing indicating the current above ground flow paths is contained within **Appendix E**.

The access road to the site slopes steeply in an easterly direction from the site with residential properties on both sides, flows off the site into the existing highway where it is intercepted by the highway gullies which drain into the existing combined sewerage network. as a result of the proposed systems will need to be split into two separate systems, these have been indicated within **Figure 1** below.

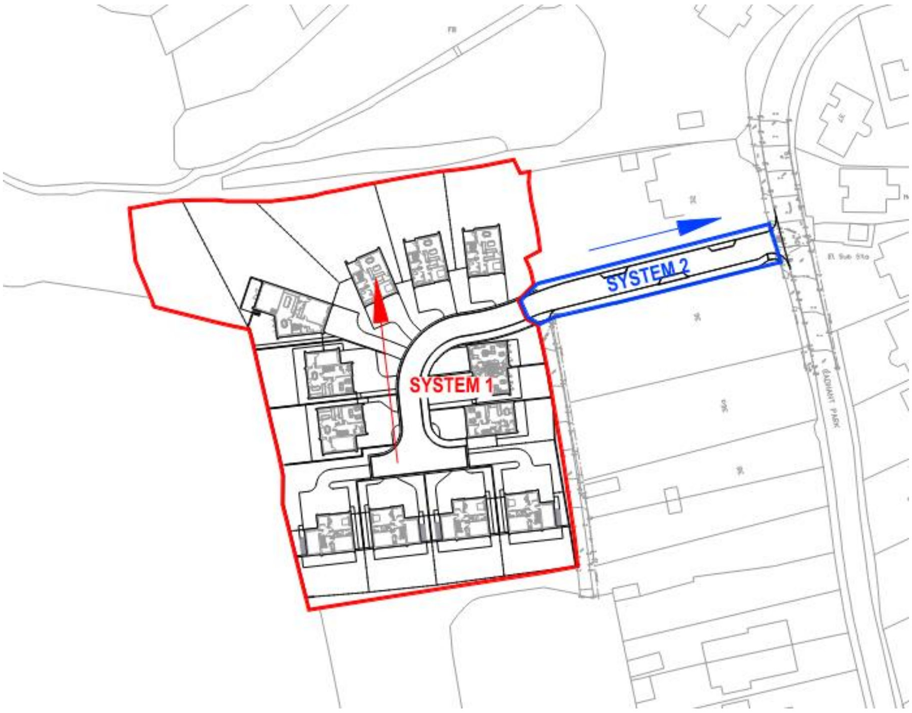


Figure 1. Drainage System Split.

2.0 Surface Water Design

2.1 Surface water runoff destination

In accordance with the SuDS Manual 2015 and the Statutory standards for sustainable drainage systems for Wales, surface water should be managed and discharged from a new development in line with the following hierarchy:

Priority level 1: Re-use of water;
Priority level 2: Infiltration into ground;
Priority level 3: Discharge to a water body;
Priority level 4: Discharge to a surface water run-off drain;
Priority level 5: Discharge to a combined surface water and foul drain.

Priority 1: Surface water reuse cannot be considered as the sole method of surface water disposal as it must be considered to be full during a rainfall event. However, attempts must be made to reduce overall site run-off and allow the property owners the ability to re-use surface water run-off. Therefore, a single above ground water butt at the base of a rainwater down pipe is to be provided for each property to allow the property owner the ability to reuse water for watering plants or recreational use within the garden. Additionally, rain gardens will be utilised which will help to reuse surface water run-off for feeding wildflowers without the need for human intervention.

Priority 2: Porosity testing has been undertaken on site as part of the initial site investigation. The result of the testing deemed the site is unsuitable for the use of infiltration systems, a separate report containing the results of the porosity testing can be made available upon request. Despite the poor infiltration rate the SAB guidance requires the design to attempt to utilise features which allow some losses from infiltration.

Priority 3: As noted within **Section 1.3** there is an existing watercourse located to the north of the site therefore the proposed development is to discharge flows at a controlled rate into this watercourse. However as noted in **Section 1.3** as the proposed access road slopes away from the site it is not possible to drain this area into the existing watercourse, therefore for this area of the site alternative means of surface water disposal should be considered.

Priority 4: there are no surface water drainage systems within Cadnant park to accommodate the flows from the proposed access.

Priority 5: As noted in **Section 1.2** there is a combined sewerage network located within the highway fronting the site and therefore all surface water run-off from the proposed length of access road be discharged to this.

DCWW prevent the proposed connection of surface water to a combined sewerage network in order to help reduce impact on their wastewater treatment works, unless it can be demonstrated that surface water from a development site already discharges to this point and betterment can be provided to the sewerage network as a result of the development.

As noted within **Section 1.2** all surface water run-off from the existing hardstanding areas of the site currently discharge to the combined sewer therefore it is proposed to connect the surface water flows from the proposed access road (System 2 in **figure 1.**) to the combined network but restricted to a provide DCWW a betterment on the current arrangement.

2.2 Proposed Discharge Rates

As the site is being split into two separate systems, the discharge rate calculations are to be separated in two, and a different method of determining the rate are being used for each. The discharge rate for the proposed development site, system 1, will be determined using greenfield run-off utilising the IHR124 method, and the proposed access road will utilise the brownfield method using the modified rational method, in order to determine the rate in which water currently enters the sewer from the site in order to determine the betterment provided to the system.

2.3 Greenfield Run-off Rates – System 1

Based upon existing site information an assessment of the site surface water greenfield run-off has been undertaken in accordance with IHR 124 in order to quantify the expected rate the surface water run-off the development site. The site has run-off has been based on the following parameters.

Total effective site area (ha) (1)	–	0.478 Ha
SAAR (mm)	–	961mm
Hydrological region	–	9
Specify SOIL type (2)	–	5
Standard percentage run-off	–	47%

1. Part of the site to the north will continue to flow directly into the existing watercourse to the north and is therefore not accounted for within the effective greenfield run-off area.
2. The soil value of the site has been increased from 2 to 5 due to the ground being very impermeable and the site being at a steep slope limiting the potential for surface water to infiltrate into the ground.

The existing effective area provided are illustrated on the greenfield site area layout contained within **Appendix F**, with the remainder of the design petametres quoted within the hydraulic calculations contained within **Appendix G.**

The result of the calculations indicates the following discharge rate contained within **Table 2**.

Table 2. Greenfield runoff rates.

Return Period	Greenfield Runoff Rate
1:1-year return period	3.8 l/s
1:30-year return period	7.8 l/s
1:100-year return period + 30%	9.5 l/s

Therefore, the proposed discharge rate is to be set to be as close to the greenfield rates quoted above.

2.4 Brownfield Run-off Rates

Based upon existing site information an assessment of the site surface water brownfield run-off has been undertaken in accordance with the Modified Rational Method (MRM) in order to quantify the expected rate, the surface water currently discharges into the combined sewer. The existing measured brownfield areas and their run-off coefficients are summarised within **Table 3** below, and illustrated on the attached proposed impermeable area plan contained within **Appendix H**.

Table 3. Existing Brownfield areas.

Surface	Area (A)	Coefficient (C)	Effective Area (EA)
Concrete	56.351 m²	1.00	56.351 m²
Decking	152.665 m²	1.00	152.665 m²
Drainage Channels	9.652 m²	1.00	9.652 m²
Flags / Paving	281.948 m²	1.00	281.948 m²
Grass	469.282 m²	0.35	164.249 m²
Roof	310.723 m²	1.00	310.723 m²
Swimming Pool	41.543 m²	1.00	41.543 m²
Tarmacadam	589.435 m²	1.00	589.435 m²
Walls	58.438 m²	1.00	58.438 m²
Total	1,836.125 m²	1.00	1,671.876 m²

P_{imp} (%) = 91.1%

The results of the brownfield run-off calculations are contained within the brownfield run-off calculations attached in **Appendix I**, these are summarised within **Table 4** below.

Table 4. Brownfield Run-off Rates

Return Period	Discharge Rate
1:1-year return period	14.1 l/s
1:30-year return period	34.4 l/s
1:100-year return period	44.2 l/s

In order to help meet SAB and DCWW requirements a considerable betterment should be provided to the system, by reducing the discharge rate as low as possible and agreeing the betterment provided with DCWW as part of the pre-application process.

A hydraulic model of system 2 has been undertaken which demonstrates that no flooding occurred within the system based on the proposed discharges rates quoted within **Table 5** below, this table also provides the percentage betterment provided over the existing brownfield run-off rates determined within **Table 4**.

Table 5. Brownfield Run-off Rate - Betterment Provided.

Return Period	Proposed Discharge Rate	% betterment provided
1:1-year return period	2.0 l/s	85.8 %
1:30-year return period	3.2 l/s	90.7 %
1:100-year return period	3.5 l/s	92.1 %

As noted within **Section 1.2** and indicated on the existing drainage layout contained within **Appendix D**, there is a land drainage system which flows into the combined sewer which had a fair flow into the network on a dry day, as part of the development this land drainage system will be removed and therefore there will be a greater betterment provided to the DCWW combined sewerage network.

2.5 Hydraulic Modelling Parameters

As noted above the system has been split into two separate systems referenced System 1 and System 2, system 1 covers the main body of the site, while system 2 covers the access road up to the development.

The proposed calculated storage volumes for the storage structures are based upon the proposed hardstanding catchment areas as well as The Flood Studies Report (FSR) rainfall parameters for the site, these being:

M5-60^{min} - 19.2mm

r - 0.32

The hydraulic model has been undertaken in accordance with the Wallingford procedure using the Modified Rational Method (MRM), modelling the site during the 1:1-year return period, 1:30-year return period and the 1:100-year return period for a range of durations between 15 and 2880 minutes. An additional allowance of 40% is included for all return periods to account for increase in rainfall as a result of climate change, and additional 10% allowance is added to the proposed hardstanding areas to account for urban creep.

This section of the report should be read in conjunction with the proposed drainage layout contained within **Appendix L**.

2.6 System 1 – Hydraulic Calculations and storage Requirements

The catchment area of system 1 has been measured and is illustrated within **Appendix J** and summarised within **Table 6** below.

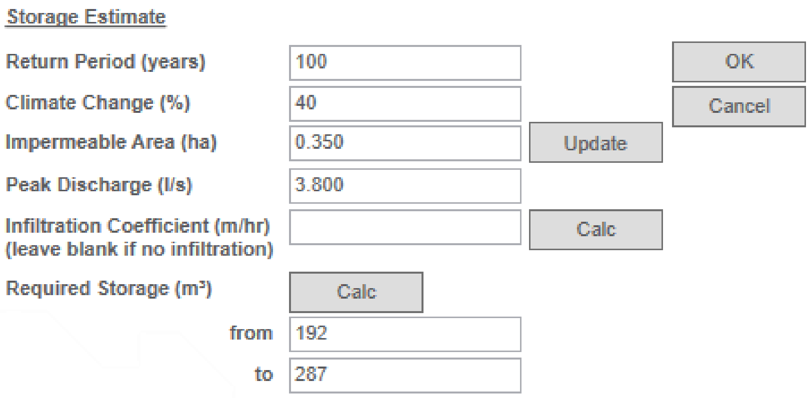
Table 6. System 1 - Proposed hardstanding areas.

Surface	Total Area
Grassed	3,383.188 m²
External Paths	460.688 m²
Parking	964.426 m²
Roof	1,188.454 m²
Tarmacadam	508.828 m²
Walls	84.740 m²
Total	6,590.324 m²
Grassed Surfaces Excluded *	**3,207.136 m²**
Total Plus 10% Urban Creep Allowance:	**3,527.850 m²**

* In accordance with the Modified Rational Method Grassed surfaces are not included within the proposed hardstanding catchment areas.

As the development is currently in the planning stages there is no requirement to undertake a full hydraulic model of the proposed system, as this will be undertaken during the detailed design stage and SAB full application.

An estimated flood volume has been calculated on causeway flow hydraulic modelling software this confirm a storage requirement of between **192m³** and **287m³** is required for the 1:100-year storm event plus an allowance of 30% for climate change based on a discharge rate of 3.8 l/s which replicated the 1:1 year return period. A screenshot of this calculation is indicated below.



Storage Estimate

Return Period (years)	100		OK
Climate Change (%)	40		Cancel
Impermeable Area (ha)	0.350	Update	
Peak Discharge (l/s)	3.800		
Infiltration Coefficient (m/hr) (leave blank if no infiltration)		Calc	
Required Storage (m³)	Calc		
from	192		
to	287		

Due to the steep sloping nature of the site, it is not possible to utilise large a large storage structure such as a swale or basin for the 1:100-year return period, therefore the proposal seeks to utilise individual below ground storage structures beneath the parking areas for each property, with individual flow controls into the main system within the highway.

The type of system will help to avoid the need for SAB adoption and will keep costs to a minimum whilst also managing water at source whilst dealing with a steeply sloping site, each property is to include rain gardens, porous paved driveways and above ground water butts in order to help reduce the overall volumetric run-off as well as providing treatment of the surface water and biodiversity and ecological enhancements.

Attenuation will also be provided beneath the highway within oversized pipework, and a final flow control at the point of discharge, controlling flows to mimic greenfield run-off rates. It is proposing for the hydrobrake flow control to discharge into a proposed conveyance swale down the embankment which flows to the existing watercourse this conveyance swale will provide the final treatment of the surface water before it enters the existing watercourse to the north, it will also provide the potential for losses from infiltration and transpiration.

2.7 System 2 – Hydraulic Calculations and storage Requirements

The catchment area of system 2 has been measured and is illustrated within **Appendix J** and summarised within **Table 7** below.

Table 7. System 2 - Proposed hardstanding areas.

Surface	Total Area
Grassed	74.966 m²
External Paths	19.514 m²
Access Road	407. m²
Total	520.170 m²
Grassed Surfaces Excluded *	**433.859 m²**
Total Plus 10% Urban Creep Allowance:	**477.245 m²**

* In accordance with the Modified Rational Method Grassed surfaces are not included within the proposed hardstanding catchment areas.

In order to determine the proposed discharge rate and betterment provided a full hydraulic model has been developed for system 2. A copy of the hydraulic model calculations is contained within **Appendix K**.

The local highway authority has requested that the access road is to be designed as a shared surface and brick paved with traffic calming features located within the shared surface. Due to the locality of the foul sewer, it was not possible to utilise a porous surface within this area. Two of the traffic calming features have been designed as rain gardens to intercept surface water run-off from the sheared surface. These features help to provide treatment as well as ecological and biodiversity enhancements, whilst also acting as a traffic calming to the access drive.

Storage of the surface water for the 1:100-year event plus climate change and urban creep is provided within a 600mm oversized pipe located beneath the shared surface. Flows are restricted into the combined sewer via a hydrobrake flow control device inline with the figures quoted in **Table 5**.

2.8 Drainage System Maintenance

The statutory SuDS guidance for Wales 2018 document requires maintenance of the design drainage system to be considered for all elements of the surface water drainage network therefore tables for each element of the design have been complied to reflect this.

As this development falls within the requirement of SAB as outlined within **Section 1.1** of this report, any part of the system that accommodates more than one property (sewer) or accommodating one property laid in third party land (lateral sewer) must be adopted and maintained by the SAB and the developer must pay an upfront fee to the SAB for the ongoing maintenance of the system. the system has been designed in a manner which minimises the extent of adoption required by the SAB by using individual storage structures within the curtilage of each property.

Maintenance of the drainage system should be undertaken in accordance with the schedule shown in **Table 8 - 12** which have been derived in strict accordance with the SuDS Manual 2015 and from a risk-assessed approach during the design stage. These schedules are not exhaustive and should be reassessed at regular intervals to determine if any additional maintenance requirements are required to preserve the performance and condition of the site drainage system.

Provided preventive maintenance measures are undertaken in accordance with the frequencies recommended in **Table 8 - 12**, the need for corrective maintenance should rarely arise.

Maintenance activities should be detailed in the Principal Contractor's Health and Safety Plan and Risk Assessments and should be updated on a regular basis to ensure the continued performance and long-term condition of the drainage system.

Table 8. Operation and maintenance requirements for bioretention systems (rain gardens) in line with table 18.3 of the CIRIA C753 'The SuDS Manual'

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect infiltration surfaces for and ponding or displaced splash stones and/or soil.	Six Monthly.
	Check operation of under drains	Annually
	Inspect overflow pipe for blockages.	Six Monthly.
Regular Maintenance	Removal of litter and debris and weeds	Annually.
	Replace any plants, to maintain planting density.	As Required.
Occasional Maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required.	or as required
Corrective Maintenance	Remove and replace filter medium and vegetation above.	As Required.

Table 9. Operation and maintenance requirements for Swale in line with table 17.1 of the CIRIA C753 'The SuDS Manual 2015.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect Inlets & Outlets for blockages and clear if required.	Quarterly
	Record rate of sediment accumulation and establish appropriate silt removal frequency/maintenance plan.	Quarterly for first year, then annually or as required.
	Inspection of check dams to ensure they are intact are holding water back effectively	Annually.
Regular Maintenance	Removal of litter and debris.	as required.
	Cutting Grass in and around swale.	as required (Spring – before nesting season and autumn)
	Manage vegetation and removal nuisance plants.	Two monthly for 6 months, then annually.
	Remove sediments from inlets and outlets.	Annually or as required.
Occasional Maintenance	Reseed areas of poor vegetation growth.	As required.
Remedial Actions/ Corrective Maintenance	Repair erosion or other damage by reseeding or re-turfing.	As required.
	Repairing check dams if damaged.	As required.
	Repair/rehabilitation of inlets and outlets.	As required.
	Relevel uneven surfaces and reinstate design levels.	As required.

Table 10. Operation and maintenance requirements for porous paved surfaces in line with table 20.15 of the CIRIA C753 'The SuDS Manual 2015.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Initial inspection	Every 5 years (or as required)
	Inspect for evidence of poor operation and/or weed growth and take appropriate action if required.	Annually
	Inspect silt accumulation rates and establish appropriate brushing frequencies.	Annually
Regular Maintenance	Brushing and vacuuming over whole surface, (standard cosmetic sweep over whole surface).	Annually after autumn leaf fall, or reduce frequency as required based on site-specific observations of clogging or manufacturers recommendations – pay close attenuation to areas where water runs onto porous areas from adjacent impervious areas as this is most likely to collect the most sediments.
Occasional Maintenance	Removal of weeds or management using glyphospate applied directly into weeds by an applicator rather than spraying.	As Required.
	Stabilise and mow contributing and adjacent areas.	As Required.
Corrective Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised within 50mm of the level of the paving.	As Required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users and replace lost jointing material.	As Required.
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to clogging)

Table 11. Operation and maintenance requirements for attenuation storage tanks in line with table 21.3 of the CIRIA C753 'The SuDS Manual 2015.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Annually
	Inspect build-up of debris within sump of upstream and downstream catchpits.	Annually
	CCTV survey inside of tank to check for sediment build up.	Every 5 years.
Regular Maintenance	Remove any accumulation of silt, sediment, leaves, debris etc from sumps of catchpits.	Bi-annually
Occasional Maintenance	High-pressure water jet for removal of silt builds up.	As Required.
Corrective Maintenance	Repair/rehabilitate inlets, outlet, overflows and vents	As Required.

Table 12. Operation and maintenance requirements for chambers & pipes.

Maintenance Schedule	Required Action	Typical Frequency
Monitoring	Inspect using CCTV drain surveys to ensure they are in good condition and operating as designed.	Every 5 years (or as required)
	Inspect chambers to ensure they are in good condition and that accumulation of sediment, debris etc. is not preventing them from operating as designed.	Annually
Regular Maintenance	Remove any accumulation of silt, sediment, leaves, debris etc.	Bi-annually
Occasional Maintenance	High-pressure water jet for removal of silt builds up and avoid blockages, particularly at bends or changes in direction.	As Required.
Corrective Maintenance	High-pressure water jet to remove blockages.	As Required.

2.9 Water Quality

Under the Statutory SuDS guidance, it is also required to ensure the water quality is not affected because of the hardstanding surfaces and the risk of contamination associated with their use. Green SuDS features such as swales and bioretention systems etc. help to improve the quality of water whilst flows through the network.

As noted within Table 26.2 of SuDS Manual 2015 residential development with low traffic roads are classed as having a low – very low pollution hazard level, therefore there is little risk, although consideration must be given as the risk increases during lower probability storms.

The level of contaminates expected from this type of development are listed within **Table 13**, and the levels of treatment provided by each type of system is noted within **Table 14**.

Table 13. Pollution Hazard Indices

Land Use	**Pollution Hazard Level**	**Total Suspended Soils *(PMI_{TSS})***	***Hydrocarbons (PMI_{HM})***	***Heavy Metals (PMI_{PAH})***
Residential Roofs	Very Low	0.2	0.5	0.2
Low Traffic Roads / Residential Car Parks	Low	0.5	0.4	0.4

The features that have been included within the design of the drainage network within the site have been made bold within **Table 7** below.

Table 14. Pollution Mitigation Indices

SuDS Component	Pollution Mitigation Indices		
	Total Suspended Soils (PMI_{TSS})	**Heavy Metals (PMI_{PAH})**	**Hydrocarbons (PMI_{HM})**
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	**0.5**	**0.6**	**0.6**
Bioretention System	**0.8**	**0.8**	**0.8**
Porous Paving	**0.7**	**0.6**	**0.7**
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.5	0.5
Wet Land	0.8	0.8	0.8
Proprietary Treatment Systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1-year return period event, for inflow concentrations relevant to the contributing drainage.		

For System 1, All surface water flows from the private properties flow through bioretention systems before being discharged into the drainage system located within the proposed road. Therefore, in line with Table 13 & 14, bioretention systems provide sufficient treatment of surface water residential roofs, further treatment is provided within the porous paved parking areas.

The proposed site ultimately discharges into a conveyance swale which conveys water to the existing watercourse thus providing a sufficient treatment level for the access road as well as additional treatment of the water from the private properties which also flow through this swale.

System 2 includes rain garden bioretention systems for the interception of surface water run-off from the sheared surface access drive, therefore in line with Table 13 & 14, bioretention systems provide sufficient treatment of surface water from low trafficked roads.

3.0 Foul Drainage Design

Design of the foul sewer included within the proposal has been carried out in accordance with Approved Document H of the Building Regulations 2010 and other best practice documents, such as the 'Sewers for Adoption' 7th edition. In accordance with Approved Document H, the preference in terms of discharging foul effluent should be considered in line with the below hierarchy:

Priority level 1: Discharge to foul only public sewer;
Priority level 2: Discharge to combined public sewer;
Priority level 3: Discharge to ground via a septic tank
Priority level 4: Discharge to a watercourse via a treatment plant;

As indicated on the DCWW map contained within **Appendix C**, there are no foul only sewerage networks within the vicinity of the site however there is an existing combined public sewer network located within the highway to the east of the site which already accommodates the existing flows from the development site, therefore it is proposed to communicate flows to this.

As the proposal includes 13 properties the proposal will involve the construction of new lengths of 'sewers' which therefore requires adoption under section 104 of the Waters Industries Act 1991, it should be noted that no adoptable foul drainage is to be laid without the legal agreement in place.

A section 106 application will also be required for the physical connection to the sewer, a connection should not be sought without this in place.

APPENDICES

APPENDIX A
Site Location Plan

GRID REFERENCE	SH 77522 77663
EASTING	277522
NORTHING	377663
POSTCODE	LL32 8PE

REV	DATE	DESCRIPTION	BY	APP
P01	26.04.2024	PRELIMINARY ISSUE	KB	BT

SCALE @ A3:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:1,250	K.Blackwell	K.Blackwell	B.Thorne	B.Thorne	APRIL 2024

PROJECT: 34 CADNANT PARK

TITLE: SITE LOCATION PLAN

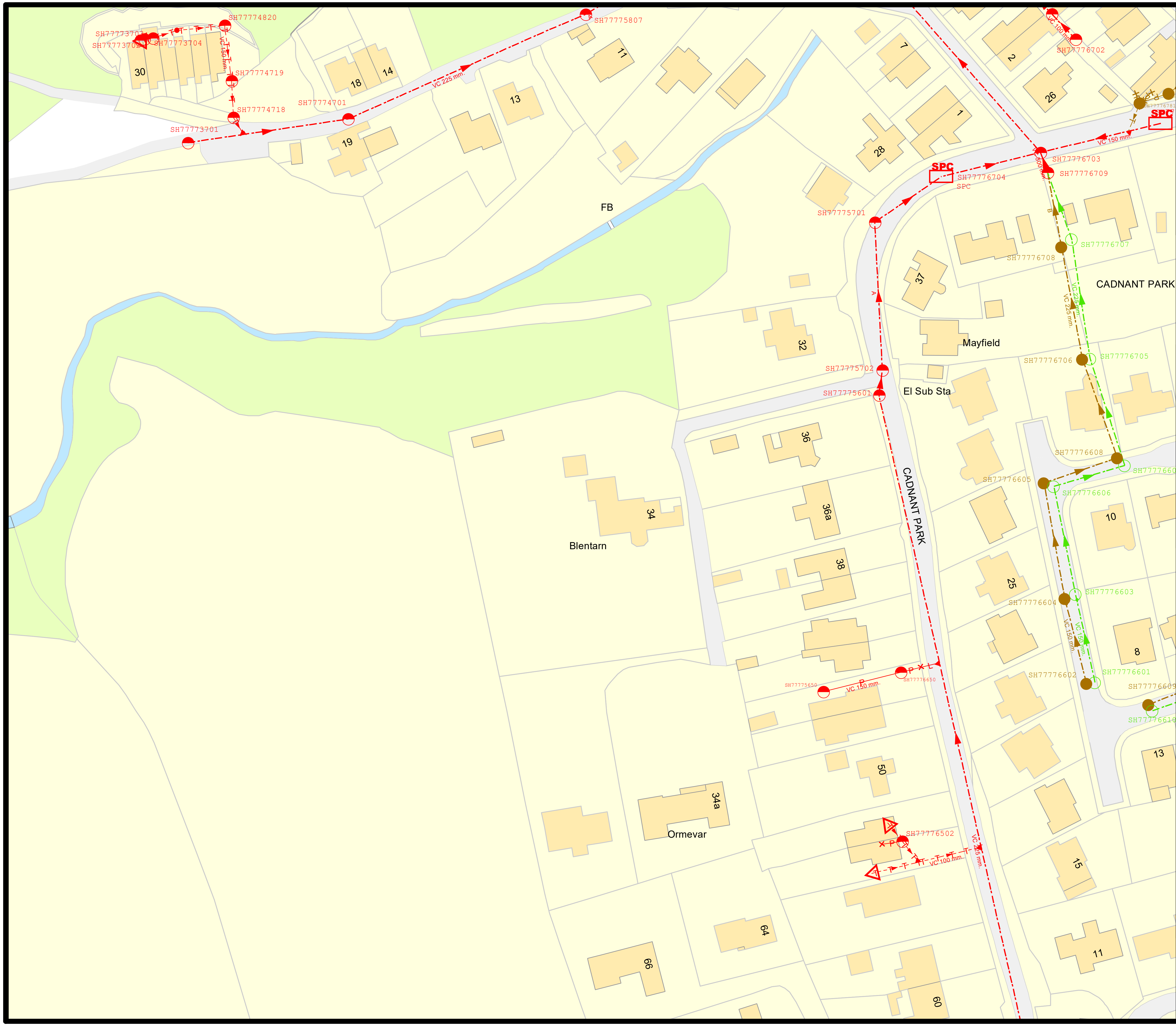
STATUS:	PROJECT No:	DRAWING No:	REV:
S2	348	001	P01

MÔN CIVILS LIMITED

APPENDIX B
Proposed Site Layout

APPENDIX C

Dŵr Cymru / Welsh Water Apparatus Map



Dŵr Cymru
Welsh Water

34 Cadnant Park Site, Cadnant Park, Conwy LL32 8PE

N
W E
S

LEGEND(Representative of most common features)

Waste network:

- Foul chamber
- Surface water chamber
- Combined chamber
- Combined sewer overflow
- Special purpose chamber
- Treatment works
- Pumping station
- Outfall
- Lamphole
- Storm Overflow
- Rising main
- Gravity sewer
- Private sewer
- S 104 Private sewer subject to Sect. 104 adoption agreement
- Private Sewer Transfer
- Lateral Drain
- Inspection Chamber

NB: Sewer symbol colour indicates the type.

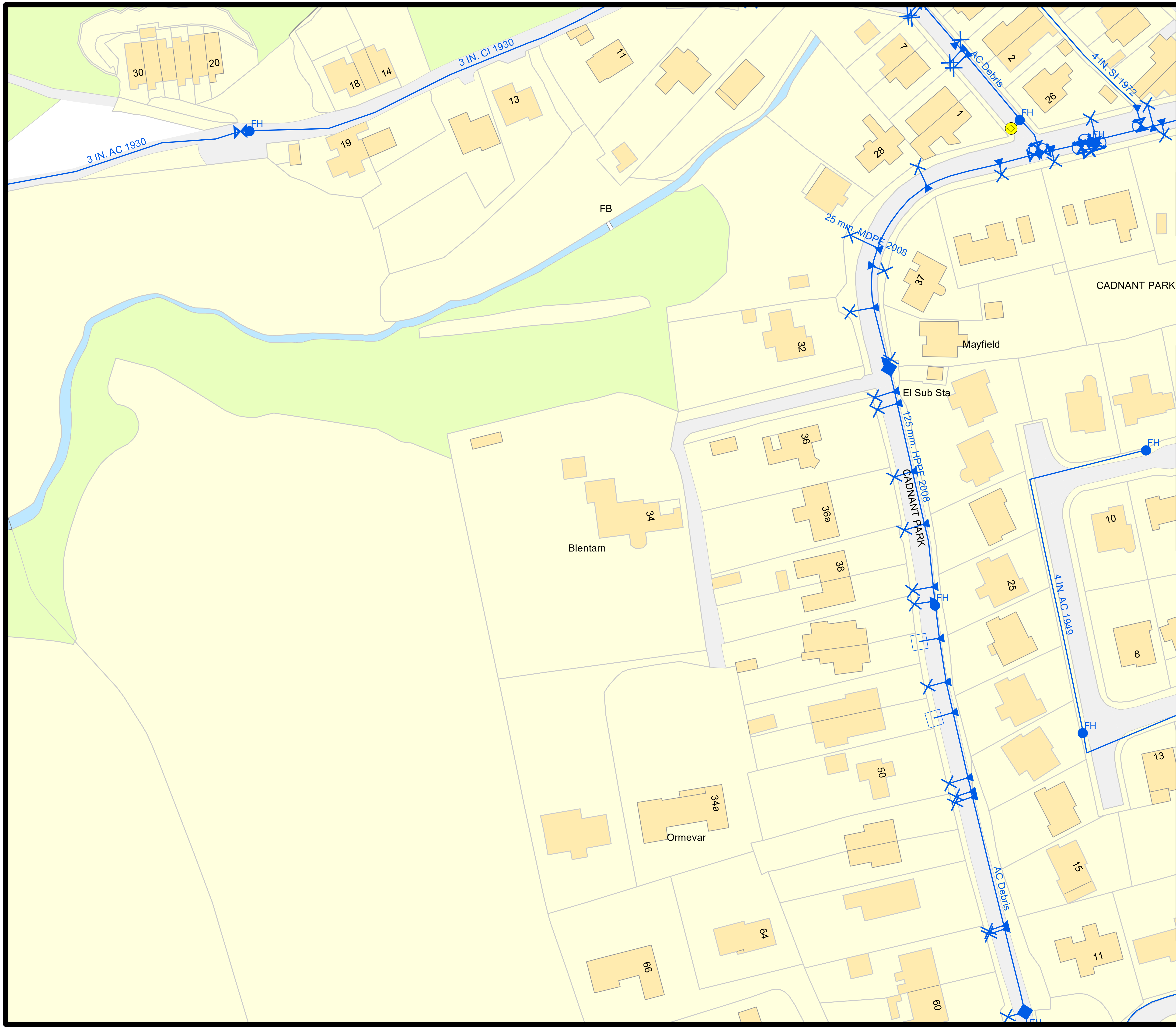
RED - Combined
GREEN - Surface Water
BROWN - Foul
Purple - Former S24 sewers (for indicative purposes only)

Notes:

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

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	277514,377662
Map scale:	1:1000
Printed by:	Trisha Sherman
Printed on:	25 Apr 2024



Dŵr Cymru
Welsh Water

34 Cadnant Park Site, Cadnant Park, Conwy
LL32 8PE

N
W E
S

LEGEND

Clean network:

Sluice valve	Stop tap
Pressure reducing valve	Water Treatment Works
Meter	Water Pumping Station
Bulk meter	Existing main
Hydrant (FH)	Non-operational main
Cap end	Raw Water
Air valve	

NB: Water main symbol colour indicates the type.

LIGHT BLUE - Trunk
DARK BLUE - Distribution
YELLOW - Raw Water

Notes:

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

Dŵr Cymru Cyfyngedig ('the Company') gives this information as to the position of its underground apparatus by way of general guidance only and on the strict understanding that it is based on the best information available and no warranty as to its correctness is relied upon in the event of excavations or other works made in the vicinity of the company's apparatus. The onus of locating apparatus before carrying out any excavations rests entirely on you. The information which is supplied by the Company, is done so in accordance with statutory requirements of sections 198 and 199 of the Water Industry Act 1991 which is based upon the best Information available and, in particular, but without prejudice to the generality of the foregoing, it should be noted that the records that are available to the Company may not disclose the existence of a water main, service pipe, sewer, lateral drain or disposal main and any associated apparatus laid before 1 September 1989, or, if they do, the particulars thereof including their position underground may not be accurate. It must be understood that the furnishing of this information is entirely without prejudice to the provision of the New Roads and Street Works Act 1991 and the Company's right to be compensated for any damage to its apparatus.

Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

Map Ref:	277513,377663
Map scale:	1:1000
Printed by:	Trisha Sherman
Printed on:	25 Apr 2024

APPENDIX D

Existing Site Drainage Layout

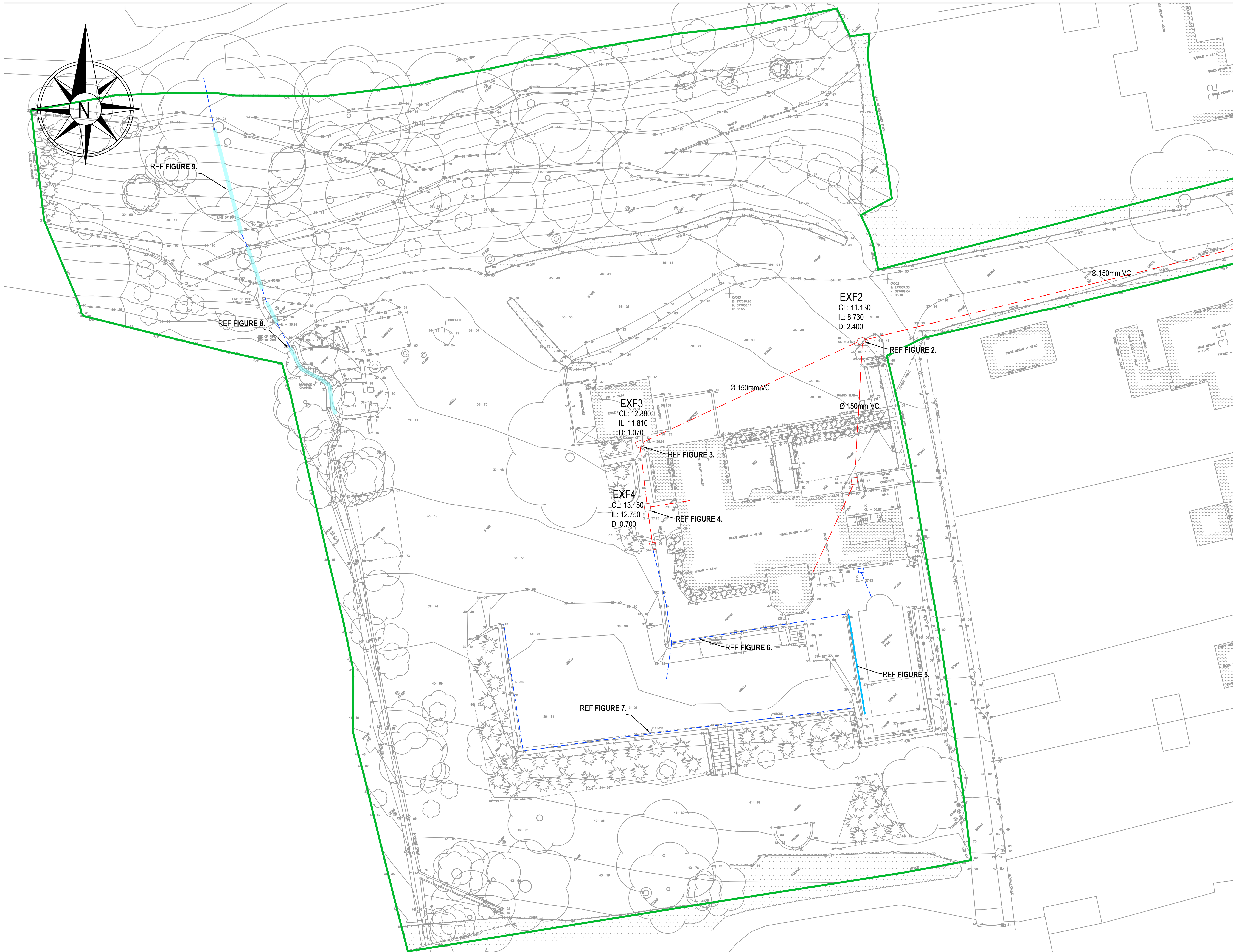


FIGURE 9. LAND DRAIN

FIGURE 8. LAND DRAIN

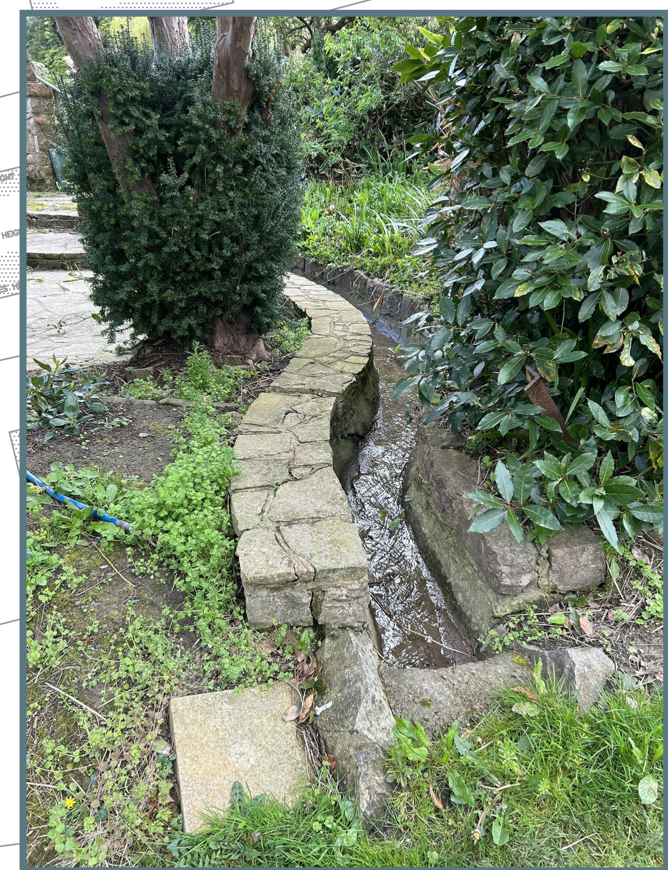


FIGURE 7. FILTER DRAIN

FIGURE 6. LAND DRAIN

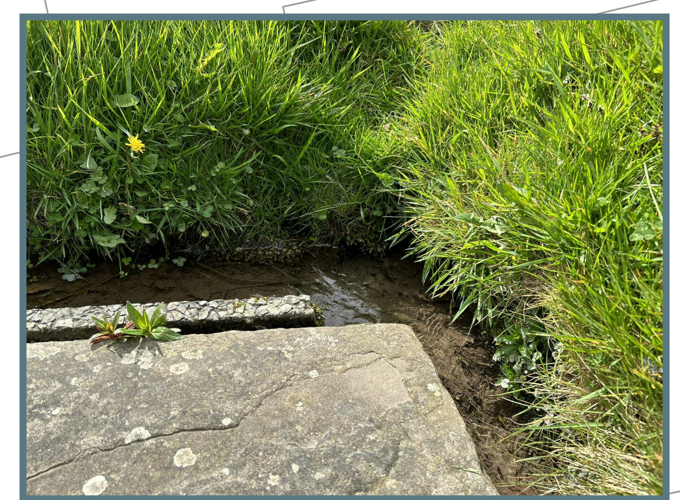


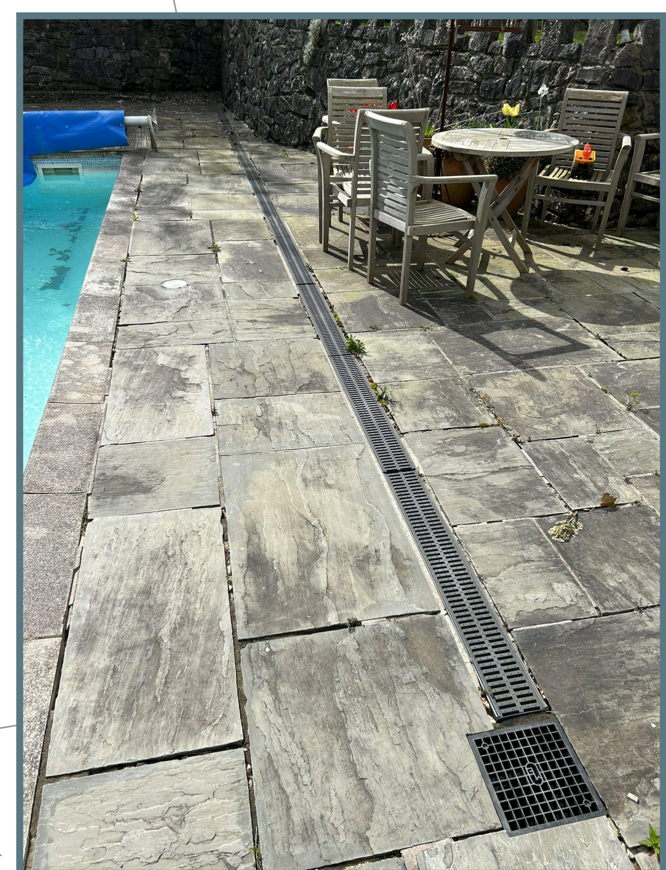
FIGURE 1. CHAMBER EXF1

FIGURE 2. CHAMBER EXF2

FIGURE 3. CHAMBER EXF3

FIGURE 4. CHAMBER EXF4

FIGURE 5. ACO DRAIN



GENERAL

G1 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G2 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G3 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G4 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITECT.

LEGEND

- PROPOSED SITE BOUNDARY.
- PROPOSED COMBINED WATER CHAMBER AND PIPE RUN.
- PROPOSED SURFACE WATER CHAMBER AND PIPE RUN
- EXISTING ACO CHANNEL DRAINAGE.
- EXISTING LAND DRAIN

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	26.04.2024	FIRST ISSUE	KB	BT	BT

DRAWING STATUS: **PRELIMINARY**

CLIENT: VECTOREX

ARCHITECT: SAER ARCHITECTS

PROJECT: 34 CADNANT PARK

TITLE: EXISTING DRAINAGE LAYOUT

STATUS:	PROJECT No.		REV:
S2	348	005	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:250	BT	KB	KB	BT	APRIL 2024

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APPENDIX E
Existing Above Ground Flood Routing

GENERAL

G1 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G2 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G3 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G4 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITECT.

LEGEND

ROUTE OF ABOVE GROUND FLOW ROUTES

PROPOSED SITE BOUNDARY

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	26.04.2024	FIRST ISSUE	KB	BT	BT

DRAWING STATUS: **PRELIMINARY**

CLIENT: VECTOREX

ARCHITECT: SAER ARCHITECTS

PROJECT: 34 CADNANT PARK

TITLE: EXISTING FLOOD ROUTING PLAN

STATUS:	PROJECT No.		REV:
S2	348	006	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:250	BT	KB	KB	BT	APRIL 2024

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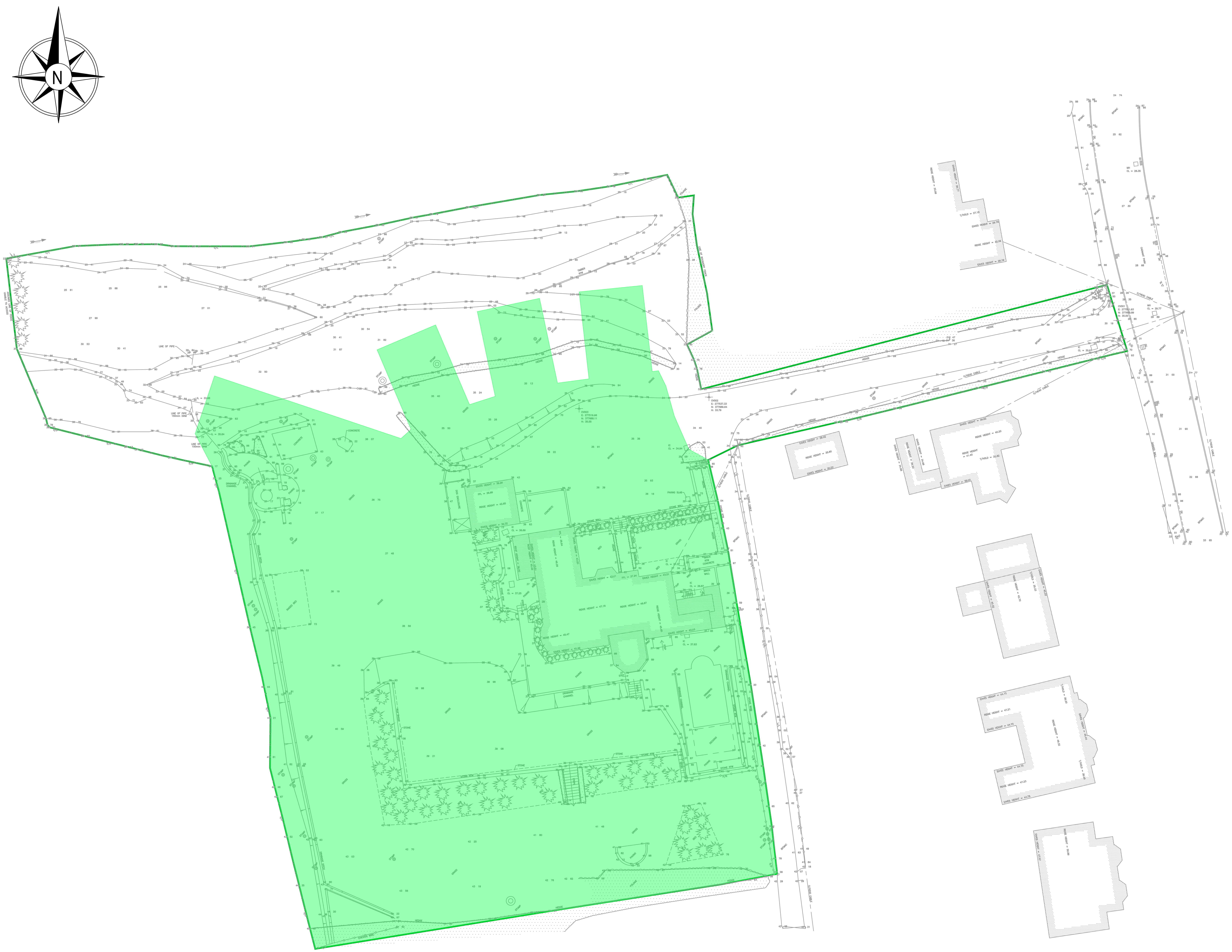
APPENDIX F
System 1 Greenfield Run Off Areas



GENERAL

G1 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G2 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G3 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G4 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITECT.

LEGEND

EXISTING GRASSED AREA

EXISTING AREAS	
SURFACE	TOTAL AREA
GRASSED	4780.159 m²

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	26.04.2024	FIRST ISSUE	KB	BT	BT

DRAWING STATUS:

PRELIMINARY

CLIENT:

VECTOREX

ARCHITECT:

SAER ARCHITECTS

PROJECT:

34 CADNANT PARK

TITLE:

SYSTEM 1 GREENFIELD RUN-OFF AREAS

STATUS:	PROJECT No.		REV:
S2	348	**003**	**P01**

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:250	BT	KB	KB	BT	APRIL 2024

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APPENDIX G

System 1 Greenfield Run Off Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)		Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)		Minimum Backdrop Height (m)	0.200
Ratio-R		Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)		Enforce best practice design rules	✓

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.200	Check Discharge Rate(s)	✓
Ratio-R	0.320	1 year (l/s)	3.8
Summer CV	0.750	30 year (l/s)	7.8
Winter CV	0.840	100 year (l/s)	9.5
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	x		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	40	10	0
30	40	10	0
100	40	10	0

Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	1.80
Greenfield Method	IH124	Growth Factor 100 year	2.18
Positively Drained Area (ha)	0.478	Betterment (%)	0
SAAR (mm)	961	QBar	4.3
Soil Index	5	Q 1 year (l/s)	3.8
SPR	0.53	Q 30 year (l/s)	7.8
Region	9	Q 100 year (l/s)	9.5
Growth Factor 1 year	0.88		

APPENDIX H
System 2 Brownfield Run Off Areas

GENERAL

G1 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G2 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G3 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G4 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITECT.

LEGEND

- EXISTING CONCRETE
- EXISTING DECKING AREA
- EXISTING DRAINAGE CHANNELS
- EXISTING FLAGS / PAVED AREA
- EXISTING GRASSED AREA
- EXISTING ROOF AREA
- EXISTING SWIMMING POOL AREA
- EXISTING TARMAC AREA
- EXISTING WALLS AREA

EXISTING AREAS

SURFACE	TOTAL AREA
CONCRETE	56.351 m²
DECKING	18.753 m²
DRAINAGE CHANNELS	9.652 m²
FLAGS / PAVING	281.948 m²
GRASSED	469.282 m²
ROOF	310.723 m²
SWIMMING POOL	41.543 m²
TARMAC	589.435 m²
WALLS	58.438 m²
TOTAL	1,836.125 m²

REV	DATE	DESCRIPTION	BY	CHK	APP
P01	26.04.2024	FIRST ISSUE	KB	BT	BT

DRAWING STATUS: **PRELIMINARY**

CLIENT: VECTOREX

ARCHITECT: SAER ARCHITECTS

PROJECT: 34 CADNANT PARK

TITLE: SYSTEM 2 BROWNFIELD RUN-OFF AREAS

STATUS:	PROJECT No.		REV:
S2	348	004	P01

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:200	BT	KB	KB	BT	APRIL 2024

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APPENDIX I

System 2 Brownfield Run Off Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)		Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)		Minimum Backdrop Height (m)	0.200
Ratio-R		Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)		Enforce best practice design rules	✓

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.200	Check Discharge Rate(s)	✓
Ratio-R	0.320	1 year (l/s)	3.8
Summer CV	0.750	30 year (l/s)	7.8
Winter CV	0.840	100 year (l/s)	9.5
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	x		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	40	10	0
30	40	10	0
100	40	10	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Time of Concentration (mins)	12.00
Brownfield Method	MRM	Betterment (%)	0
Contributing Area (ha)	0.184	Q 1 year (l/s)	14.1
PIMP (%)	91	Q 30 year (l/s)	34.4
CV	0.750	Q 100 year (l/s)	44.2

APPENDIX J
Proposed Hardstanding Areas

GENERAL

G1 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G2 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G3 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G4 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITECT.

LEGEND

- PROPOSED GRASSED AREA (SYSTEM 1)
- PROPOSED HOUSEPATH AREA (SYSTEM 1)
- PROPOSED PARKING AREA (SYSTEM 1)
- PROPOSED ROOF AREA (SYSTEM 1)
- PROPOSED TARMAC AREA (SYSTEM 1)
- PROPOSED WALL AREA (SYSTEM 1)
- PROPOSED GRASSED AREA (SYSTEM 2)
- PROPOSED PLANTER AREA (SYSTEM 2)
- PROPOSED TARMACR AREA (SYSTEM 2)

SYSTEM 1 AREAS

SURFACE	TOTAL AREA
GRASSED	3383.188 m²
HOUSEPATH	460.688 m²
PARKING	964.426 m²
ROOF	1188.454 m²
TARMAC	508.828 m²
WALLS	84.740 m²
TOTAL	6590.324 m²

SYSTEM 2 AREAS

SURFACE	TOTAL AREA
GRASSED	74.966 m²
PLANTER	19.514 m²
TARMAC	407.239 m²
TOTAL	501.719 m²

REV	DATE	DESCRIPTION	BY	CHK	APP
P02	10.05.2024	UPDATED TO SUIT REVISED LAYOUT	KB	BT	BT
P01	26.04.2024	FIRST ISSUE	KB	BT	BT

DRAWING STATUS:

PRELIMINARY

CLIENT:

VECTOREX

ARCHITECT:

SAER ARCHITECTS

PROJECT:

34 CADNANT PARK

TITLE:

PROPOSED AREAS PLAN

STATUS:	PROJECT No.		REV:
S2	348	007	P02

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:250	BT	KB	KB	BT	APRIL 2024

MÔN CIVILS LIMITED

APPENDIX K
System 2 Hydraulic Model Calculations

Design Settings

Rainfall Methodology	FSR
Return Period (years)	100
Additional Flow (%)	40
FSR Region	England and Wales
M5-60 (mm)	19.200
Ratio-R	0.320
CV	0.750
Time of Entry (mins)	5.00

Maximum Time of Concentration (mins)	30.00
Maximum Rainfall (mm/hr)	50.0
Minimum Velocity (m/s)	1.00
Connection Type	Level Soffits
Minimum Backdrop Height (m)	1.000
Preferred Cover Depth (m)	1.200
Include Intermediate Ground	✓
Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S3	0.040	5.00	31.856	1500	277562.576	377694.219	2.556
S2			29.963	1500	277588.068	377700.568	1.698
S1			29.910	1200	277592.062	377698.991	1.698
S4			29.797	1200	277596.898	377700.882	1.650

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S3	S2	26.271	0.600	29.300	28.265	1.035	25.4	600	5.09	50.0
1.001	S2	S1	4.294	0.600	28.265	28.212	0.053	81.0	150	5.15	50.0
1.002	S1	S4	5.193	0.600	28.212	28.147	0.065	79.9	150	5.23	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	4.846	1370.1	7.6	1.956	1.098	0.040	0.0	31	1.343
1.001	1.117	19.7	7.6	1.548	1.548	0.040	0.0	65	1.047
1.002	1.125	19.9	7.6	1.548	1.500	0.040	0.0	64	1.050

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	26.271	25.4	600	Circular	31.856	29.300	1.956	29.963	28.265	1.098
1.001	4.294	81.0	150	Circular	29.963	28.265	1.548	29.910	28.212	1.548
1.002	5.193	79.9	150	Circular	29.910	28.212	1.548	29.797	28.147	1.500

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S3	1500	Manhole	Adoptable	S2	1500	Manhole	Adoptable
1.001	S2	1500	Manhole	Adoptable	S1	1200	Manhole	Adoptable
1.002	S1	1200	Manhole	Adoptable	S4	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S3	277562.576	377694.219	31.856	2.556	1500	0	1.000	29.300	600
S2	277588.068	377700.568	29.963	1.698	1500	1	1.000	28.265	600
						0	1.001	28.265	150
S1	277592.062	377698.991	29.910	1.698	1200	1	1.001	28.212	150
						0	1.002	28.212	150
S4	277596.898	377700.882	29.797	1.650	1200	1	1.002	28.147	150

Simulation Settings

Rainfall Methodology	FSR	Drain Down Time (mins)	240
FSR Region	England and Wales	Additional Storage (m³/ha)	20.0
M5-60 (mm)	19.200	Check Discharge Rate(s)	✓
Ratio-R	0.320	1 year (l/s)	14.1
Summer CV	0.750	30 year (l/s)	34.4
Winter CV	0.840	100 year (l/s)	44.2
Analysis Speed	Normal	Check Discharge Volume	x
Skip Steady State	x		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	40	10	0
30	40	10	0
100	40	10	0

Pre-development Discharge Rate

Site Makeup	Brownfield	Time of Concentration (mins)	12.00
Brownfield Method	MRM	Betterment (%)	0
Contributing Area (ha)	0.184	Q 1 year (l/s)	14.1
PIMP (%)	91	Q 30 year (l/s)	34.4
CV	0.750	Q 100 year (l/s)	44.2

Node S2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	28.265	Product Number	CTL-SHE-0076-2000-0400-2000
Design Depth (m)	0.400	Min Outlet Diameter (m)	0.100
Design Flow (l/s)	2.0	Min Node Diameter (mm)	1200

Results for 1 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S3	10	29.332	0.032	7.7	0.0674	0.0000	OK
30 minute winter	S2	26	28.584	0.319	6.1	0.5631	0.0000	SURCHARGED
240 minute summer	S1	132	28.246	0.034	2.0	0.0383	0.0000	OK
240 minute summer	S4	132	28.179	0.032	2.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S3	1.000	S2	7.6	0.695	0.006	1.8683	
30 minute winter	S2	Hydro-Brake®	S1	2.0				
240 minute summer	S1	1.002	S4	2.0	0.700	0.101	0.0149	9.3

Results for 30 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	S3	45	29.374	0.074	10.4	0.1571	0.0000	OK
60 minute winter	S2	47	29.375	1.110	10.4	1.9619	0.0000	SURCHARGED
60 minute winter	S1	47	28.255	0.043	3.2	0.0491	0.0000	OK
60 minute winter	S4	47	28.188	0.041	3.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	S3	1.000	S2	10.4	0.610	0.008	3.9629	
60 minute winter	S2	Hydro-Brake®	S1	3.2				
60 minute winter	S1	1.002	S4	3.2	0.793	0.161	0.0209	15.3

Results for 100 year +40% CC +10% A Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
60 minute winter	S3	48	29.628	0.328	13.7	0.6921	0.0000	OK
60 minute winter	S2	49	29.631	1.366	13.7	2.4137	0.0000	SURCHARGED
60 minute winter	S1	48	28.258	0.046	3.5	0.0517	0.0000	OK
60 minute winter	S4	48	28.190	0.043	3.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
60 minute winter	S3	1.000	S2	13.7	0.648	0.010	5.7689	
60 minute winter	S2	Hydro-Brake®	S1	3.5				
60 minute winter	S1	1.002	S4	3.5	0.813	0.177	0.0224	20.1

APPENDIX L
Proposed Site Drainage Layout

GENERAL

G1 DO NOT SCALE FROM THIS DRAWING.

G2 ALL LEVELS IN METRES UNLESS NOTED OTHERWISE ON DRAWING.

G3 THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEER'S AND ARCHITECT'S DRAWINGS AND RELEVANT SPECIFICATION CLAUSES.

G4 PLEASE REFER TO ARCHITECTS DRAWINGS FOR FINAL BUILDING LOCATION.

G6 ALL PROPOSED LEVELS ARE TO BE CONFIRMED BY THE ARCHITCT.

G7 FINAL LOCATIONS AND DETAILS OF SOIL VENT PIPES, STUB STACKS, RAINWATER DOWN PIPES, GULLIES ETC. TO BE CONFIRMED BY REFERENCE TO ARCHITECT' DRAWINGS.

G8 ALL THRESHOLD DRAIN DETAILS TO BE TO ARCHITECT' DETAILS.

DRAINAGE

D1 ALL DRAINAGE COMPONENTS ARE TO COMPLY WITH CURRENT BRITISH STANDARDS.

D2 DRAIN PIPE THROUGH WALLS OR BENEATH FOUNDATIONS (SPREAD ONLY) TO HAVE REINFORCED CONCRETE BRIDGE LINTELS OVER AND PIPE SURROUNDED IN FLEXIBLE MATERIAL (50mm).

D3 ALL PIPES INTO CHAMBERS TO SOFFIT TO SOFFIT U.N.O.

D4 AT ALL OUTFALL POINTS TO AN EXISTING NETWORK, THE POSITION AND INVERT LEVEL OF EXISTING DRAINS MUST BE CONFIRMED WELL IN ADVANCE OF THE PROGRAMMED DATE FOR INSTALLING ANY OF THE UPSTREAM DRAINAGE, OR ORDERING OF ANY MATERIALS IN ORDER TO ALLOW TIME FOR ANY NECESSARY REVISIONS TO THE HYDRAULIC DESIGN.

D5 ALL GRAVITY UPVC PIPEWORK TO BE TO BS 4660 OR BS 5481 WHERE RELEVANT UNLESS NOTED OTHERWISE.

D6 ALL NON ADOPTABLE DOMESTIC FOUL AND SURFACE WATER PIPE RUNS SHALL CONSIST OF 100mm DIA. PIPES LAID AT NO FLATTER THAN 1 IN 80 FALLS U.N.O.

D7 A SEWER OR LATERAL DRAIN WITH A NOMINAL INTERNAL DIAMETRE OF 100mm, OR A LATERAL DRAIN SERVING TEN OR LESS PROPERTIES IS LAID TO A GRADIENT NOT FLATTER THAN 1:80, WHERE THERE IS AT LEAST ONE WC CONNECTED AND 1:40 IF THERE IS NO WC CONNECTED.

D8 THERMOPLASTIC PIPES, JOINTS & FITTINGS FOR GRAVITY SEWERS SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 1401-1, BS EN 1852 & BS EN 12666-1.

D9 THERMOPLASTIC STRUCTURED WALL PIPE:
THERMOPLASTIC STRUCTURED WALL SEWER PIPE SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 13476-1 & WIS 4-35-01 AND BS EN 13476-2 OR BS EN 13476-3. PIPES SHALL BE BSI KITEMARKED OR HAVE EQUIVALENT THIRD PART CERTIFICATION. PIPES LESS THAN OR EQUAL TO 500mm IN DIAMETRE SHALL HAVE NOMINAL SHORT-TERM RING STIFFNESS NOT LESS THAN 8KN/m² (SN8) OR BE SUBJECT TO A QUALITY SYSTEM FOR STORAGE & EMBEDMENT.

Nom. SHORT TERM RING STIFFNESS OF 2KN/m² (SN2) IS ACCEPTABLE FOR PIPES GREATER THAN Ø 500mm, SUBJECT TO SUPPORTING STRUCTURAL DESIGN LOAD CALCULATIONS BEING PROVIDED.

TRANSPORTATION, HANDLING, STORAGE AND LAYING SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTION.

WHERE A FITTING IS INSTALLED ON A SEWER LENGTH, IT SHALL HAVE THE SAME INTERNAL BORE AS THE SEWER. Max. LENGTH OF PIPE FOR LAYING IS 3.0m OR Ø x 10, WHICHEVER IS THE GREATER, UNLESS WELDED JOINTS ARE USED.

D10 OPTIMUM TRENCH WIDTH = PIPE + 300mm. CONTRACTOR TO ENSURE TRENCH WALLS ARE SUITABLY PROPPED.

D11 BACKFILLING TO PIPE TRENCHES BENEATH ROADS, CAR PARKING AND STRUCTURES TO BE M.O.T. TYPE 1 GRANULAR MATERIAL UP TO FORMATION LEVEL FROM THE TOP OF THE SPECIFIED PIPE SURROUND (WELL COMPACTED IN 150mm LAYERS).

D12 BACKFILLING TO PIPE TRENCHES BENEATH LANDSCAPED AREAS TO BE SELECTED EXCAVATED MATERIAL FREE FROM LARGE STONES GREATER THAN 75mm, LUMPS OF CLAY OVER 100mm, ANY TIMBER, FROZEN MATERIAL OR VEGETATION MATTER UP TO FORMATION / GROUND LEVEL FROM THE TOP OF THE SPECIFIED PIPE SURROUND (WELL COMPACTED IN 150mm LAYERS).

D13 GRANULAR MATERIAL NOMINAL SIZE 10mm SINGLE SIZED OR 14mm TO 5mm GRADED.

D14 BACKFILL MUST NOT BE LACED ON CONCRETE BEDDING OR SURROUND UNTIL THE CONCRETE COMPRESSIVE STRENGTH HAS REACHED 15N/mm².

D15 BRICKS OR BLOCKS MUST NOT BE PLACED IN THE BEDDING MORTAR FOR SETTING THE PIPES TO LEVEL .

D16 ROCKER PIPES TO BE PROVIDED AT TYPE 2 CONCRETE CHAMBERS AND AT TRANSITION FROM CONCRETE SURROUND (TYPE Z) TO GRANULAR SURROUND (TYPE S).ALL ROCKER PIPE LENGTHS TO BE 600mm.

D17 MAX DISTANCE FROM FACE OF CONCRETE SURROUND TO FIRST FLEXIBLE JOINT TO BE 150mm.

D18 MANHOLE COVERS AND FRAMES
MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF THE BS EN 124,M BS 7903 AND HIGHWAYS AGENCY GUIDANCE DOCUMENT HA 104/09. THEY SHALL BE OF NON ROCKING DESIGN WHICH DOES NOT RELAY TO THE CUSHION INSERTS.

MANHOLE COVER ON FOUL ONLY SEWERS SHALL BE OF LOW LEAKAGE TYPES IN ORDER TOP PREVENT EXCESSIVE SURFACE WATER INGRESS

AS A MINIMUM, CLASS D400 SHALL BE USED IN CARRIAGEWAYS OR ROADS (INCLUDING PEDESTRIAN STREETS), HARD SHOULDERS AND PARKING AREAS USED BY ALL TYPES OF VEHICLES.

D19 THE PROPOSED LANDSCAPING SHOULD CONFORM TO CLAUSE B3.1.13 OF SEWERS FOR ADOPTION 7TH EDITION ENSURING THERE IS NO PLANTING/TREES/BUSHES/SHRUBS WITHIN 3m OF THE FOUL SEWER, OR WITHIN THE EXTENT OF A CANOPY.

ADOPTION

A1 CONNECTION TO THE PUBLIC SEWER
SUBJECT TO A SECTION 104 ADOPTION AGREEMENT BEING COMPLETE, A SECTION 106 APPLICATION TO CONNECT MUST BE MADE TO DCWW. THE DEVELOPER SHALL GIVE 21 DAYS' NOTICE PRIOR TO CONNECTION. THE WORKS MAY ONLY BE UNDERTAKEN BY AN SSIP HEALTH & SAFETY APPROVED CONTRACTOR.

A2 CONSTRUCTION OF SEWER TO BE IN ACCORDANCE WITH WELSH MINISTERS STANDARDS AND SFA 7TH EDITION.

A3 THE DEVELOPER MUST SELF-VET AND CERTIFY THAT THE DESIGN CRITERIA, MATERIAL STANDARDS AND WORKMANSHIP SPECIFICATIONS FOR THE PROPOSED ADOPTABLE LATERAL DRAIN ARE IN ACCORDANCE WITH THOSE SET OUT IN 'SEWERS FOR ADOPTION' 7TH EDITION, THE WELSH MINISTERS STANDARDS AND THE REQUIREMENTS OF DCWW AS THE STATUTORY SEWERAGE UNDERTAKER.

A4 ALL ADOPTABLE MATERIALS & WORKMANSHIP TO CONFORM TO PART E OF SEWERS FOR ADOPTION 7TH EDITION.

REV	DATE	DESCRIPTION	BY	CHK	APP
P02	08.05.2024	SITE LAYOUT UPDATED.	KB	BT	BT
P01	26.04.2024	FIRST ISSUE	KB	BT	BT

DRAWING STATUS:
PRELIMINARY

CLIENT:
VECTOREX

ARCHITECT:
SAER ARCHITECTS

PROJECT:
34 CADNANT PARK

TITLE:
PROPOSED DRAINAGE LAYOUT

STATUS:	PROJECT No.		REV:
S2	348	008	P02

SCALE @ A1:	DESIGNED:	DRAWN:	CHECKED:	APPROVED:	DATE:
1:250	BT	KB	KB	BT	APRIL 2024

MÔN CIVILS LIMITED