Caulmert Limited

Engineering, Environmental & Planning
Consultancy Services

Land adjacent to H-Pack Davy Way, Llay, Wrexham LL12 0PG

H-Pack Packaging UK Ltd.

Erection of 1no B8 Storage and Distribution Building and Associated Access and External Works at Land adjacent to H-Pack, Davy Way, Llay

Drainage Strategy

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APPROVAL RECORD

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Drainage Strategy

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1.0 INTRODUCTION

1.1 Terms of Reference

Caulmert Ltd (Caulmert) is appointed by Liberty Properties Developments Ltd to carry out an outline Drainage Strategy for a proposed Industrial Development on Land off Davy Way (the Proposed Development) at the Llay Industrial Estate in Wrexham County.

The Drainage Strategy requires an assessment of the surface water runoff to ensure that this can be sustainably managed whilst demonstrating minimal off-site impacts. The main purpose of this Report is to:

- provide information about the design storm period and intensity, the method employed to delay and control the surface water discharged from the site and the measures taken to prevent pollution of the receiving groundwater and/or surface waters;
- provide a management and maintenance plan for the lifetime of the development which shall include the arrangements for adoption by any public authority or statutory undertaker and any other arrangements to secure the operation of the scheme throughout its lifetime.

A site-specific Flood Consequence Assessment (FCA) report and has been prepared by Caulmert Ltd dated August 2022. Reference should be made to this report where appropriate throughout the Drainage Strategy report.

1.2 Sources of Data

Data sources include but are not restricted to the following:

- Natural Resources Wales (NRW) online flood pluvial and fluvial flood maps;
- Welsh Government Sustainable Drainage (SuDS) Statutory Guidance;
- Wrexham CBC - SAB Application Guidance Notes;
- CIRIA C753 The SuDS Manual;
- Site plans of the Proposed Development;
- Site Walkover taken on 22nd June 2022;
- Contemporary Ordnance Survey mapping.

1.3 Limitations

Some of the aspects considered in this study are subject to change with time. Therefore, if the development is delayed or postponed, consideration should be given to reviewing such issues to confirm that no changes have taken place, either at the site, with flood and rainfall prediction, or within legislation.

The Drainage Strategy is based on the end use specified in the text. If this end use is changed then consideration should be given to re-visiting the findings of this document to ensure that they remain valid.

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2.0 SITE DETAILS

2.1 Location

The application site is within the northern area of the Llay Industrial Estate. The site encompasses an existing industrial unit plus an area of land to its west. The site can be accessed from Davy Way that has its junction with the B5373 (Rackery Lane) to the southeast. The site's post code is LL12 0PG and has a grid reference of SJ322568.

It is located on the north side of the Llay Industrial Estate. There are established industrial and commercial properties to the south and west of the site, with agricultural land to the north and east. Figure 1 shows the relative location of the site within the Industrial Estate.

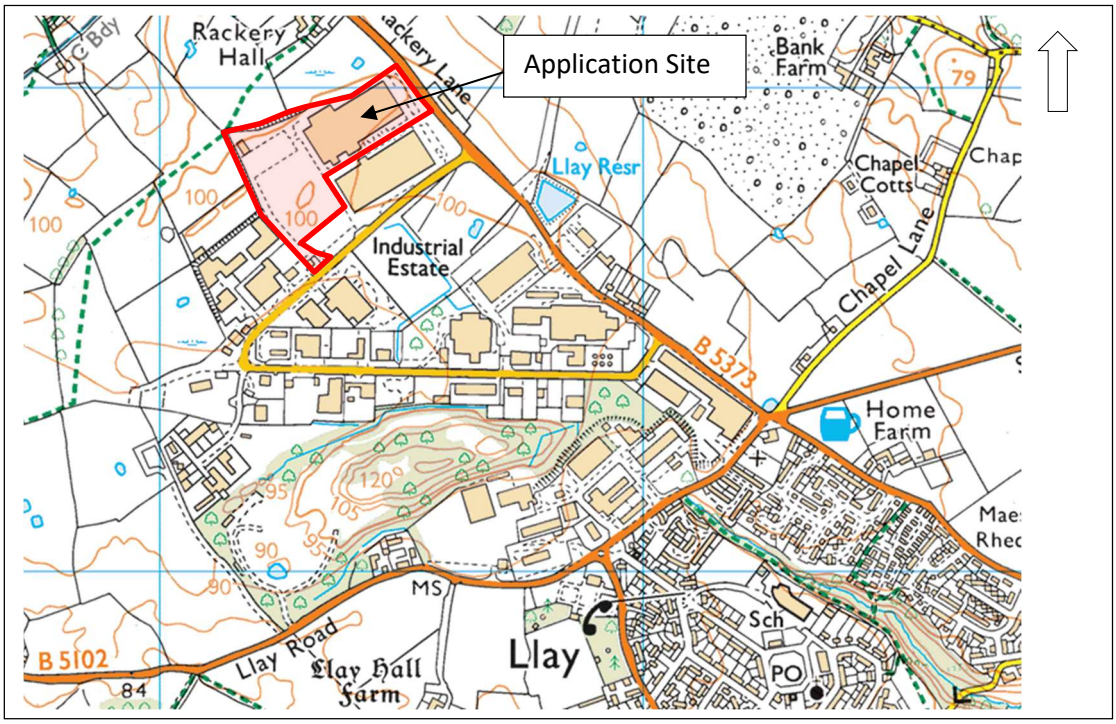


Figure 1: Site Location

The area of site ownership is an irregular shape that spans between the B5373 Rackery Road and Davy Way. The site ownership plan area is approximately 6.8ha. Within the ownership boundary are two application sites that forms the areas of proposed development:

- A new Highbay Warehouse in the west that has an area of approximately 3.5ha;
- A new entry to an existing car park in the east that has an area of approximately 0.2ha.

The site is bounded on three sides by security fencing. The fourth side is a shared vehicular access between two existing warehouse buildings. The general arrangement of the site is at Figure 2. There is an existing grassed area/playing field in the western area of the site that covers an area of around 1.7ha. The remaining areas of the site affected by proposed

development comprised existing impermeable surfaces of access road, parking, and hardstanding.

2.2 Topography and Existing Drainage

The Llay Industrial Estate is set at a relatively high level above the River Alyn. The river is approximately 1km to the west of the site. The application site is at the upper catchment boundary between an area that drains west towards the river at Cefn-y-bedd and an area that drains east towards a sub-catchment of Pulford Brook.

A topographic survey of the development site was carried out by Chris Partington Land Surveyors in June 2022. The survey shows that the grassed area is generally flat with a slight incline down and towards the west. The periphery of the grassed areas ramps down locally to adjacent hardstanding and roadway surfaces.

Outwith the grassed area, the existing site comprises engineered surfaces of roadways and hardstanding, the majority of which slope towards drainage channels and highway gullies. There is an overall slope across the northern part of the site towards the western boundary, and the southern area towards Davy Way. The highest part of the site is 100.3mAOD on the grassed area, and the lowest is at the site access off Davy Way at 96.4mAOD. The floor level of the existing warehouse building is shown on the topographic survey as 99.98mAOD.

The existing car park area at the east end of the site similarly comprises engineered surfaces that fall towards drainage channels and gullies. The car park surface is generally at 99.8mAOD and rises to higher ground at Rackery Lane. The highway level is at about 101.5mAOD.

It is apparent from the site services survey that the foul water and surface water generated within the application site drain separately and outfall to respective public sewers:

- There is a foul water drain alongside the existing warehouse buildings that drains to a public foul water sewer in Davy Way via a drain to the east of the grassed area;
- There are two surface water drains that outfall to a public surface water sewer within Davy Way via a route on either side of the grassed area.

A copy of the combined topographic and site services survey is in the Appendix.

2.3 Geology

The BGS's online Geology of Britain Viewer shows the bedrock geology of the site as the Etruria Formation described as mudstone, sandstone and conglomerate. There are superficial deposits of Till, Devensian diamicton. The BGS mapping shows a small section of alluvium (clay, silt, sand, and gravel) beneath the footprint of the existing warehouse buildings.

According to the Cranfield Soil and Agrifood Institute's Soilscapes, the site is located entirely within Soilscape 18. This zone is described as comprising slowly permeable seasonally wet loamy and clayey soils with impeded drainage.

It is anticipated that soils within the application site will offer 'impeded drainage' at or just below ground level and may not be suitable for shallow ground infiltration. No account has been taken of any made ground in these descriptors.

2.4 Hydrogeology

The groundwater vulnerability is low as presented by Envirocheck. There is a superficial aquifer and a bedrock aquifer identified at the site. Both aquifers are noted to be 'low vulnerability' secondary aquifers.

3.0 SUMMARY FLOOD RISK

3.1 Flood Consequences Assessment

A site-specific Flood Consequence Assessment (FCA) has been carried out for the proposed development. The FCA, produced by Caulmert Ltd and dated August 2022, concluded that the site is at a low risk of flooding.

3.2 Fluvial Flood Risk

The Technical Advice Note 15 Developer's Advice Map extract shows that the development sites are wholly within Flood Zone A. This flood zone indicates that the area is at a very low risk of flooding from rivers with a probability of less than 1 in 1,000 (0.1%) chance of occurrence in any given year.

There are areas of higher flood risk within 1km of the application site and associated with the River Alyn. The river is topographically lower than the site and is therefore not considered to be a flood risk to the site.

The application site is not affected by tidal flood.

3.3 Surface Water and Small Watercourses Flood

NRW's Flood Risk Assessment Wales Map for Surface Water and Small Watercourses shows that there are parts of the development sites that have a high risk of surface water flood. A high risk means that an area has a chance of flooding greater than 1 in 30 (3.3%) in each year. NRW point out that this type of flooding can be difficult to predict as it is hard to forecast exactly where or how much rain will fall in any storm.

The areas of high risk of flood appear confined to topographically low spots of the roadway around the existing unit and along the access road between the unit and Davy Way. There are also flood risk areas indicated to be on or just beyond the application site boundary that are localised areas in topographically lower land.

4.0 PROPOSED DEVELOPMENT

4.1 The Proposed Development

The development proposal is for: (1) the erection of a new Warehouse Unit with associated vehicular parking, loading, and hardstanding areas; and (2) the provision of a new vehicular access to an existing car park.

The proposed warehouse comprises a steel framed structure that occupies a footprint of approximately 15,000m^2. The proposed warehouse will be serviced from HGV access loading bays along the south elevation via Davy Way. The existing access roadway will be modified to suit vehicle movements and incorporate a series of parking areas for light vehicles.

The existing car park at the east end of the existing unit is to have a dedicated access from the B5373 (Rackery Lane). This new access is being installed so that light and heavy vehicles will have separate access/egress points at the application site.

The general arrangement of the proposed developments is at Figure 2. A larger copy of the drawing is included in the Appendix.

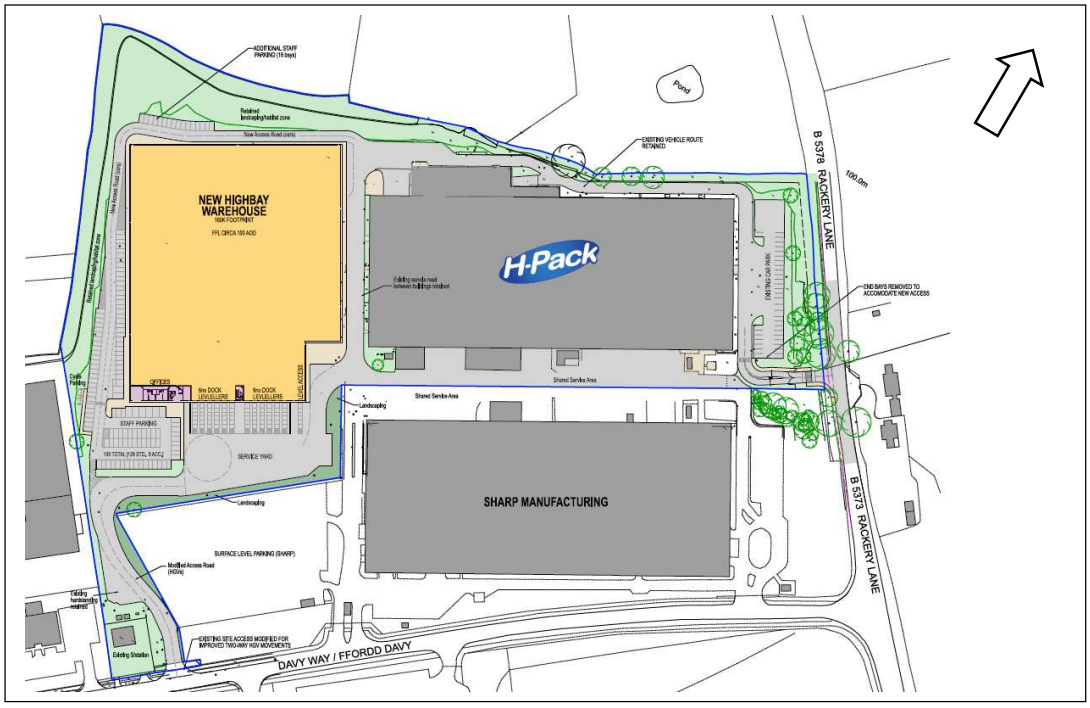


Figure 2: Proposed Development Layouts (Excerpt from RGP Drg No 11373/Pl/L08)

Table 1 compares the approximate areas of existing surfaces with the proposed areas, for both the Highbay Warehouse and Car Park Access. The table summarises impermeable and permeable surfaces for the existing and proposed development sites.

Landuse – Highbay Warehouse	**Existing** (m^2)	**Proposed** (m^2)
Building Roof	0	15,000
Hardstanding (car park/paved)	6,000	8,000
Vegetated	17,000	0
Total	**23,000**	**23,000**
Landuse – Car Park Access	**Existing** (m^2)	**Proposed** (m^2)
Building Roof	0	0
Hardstanding (car park/paved)	800	1,100
Vegetated	1,200	900
	2,000	**2,000**

Table 1: Landuse Comparison – Existing and Proposed Permeable and Impermeable Areas

The relative locations and plan area of each development site within the wider site is shown at Figure 3.

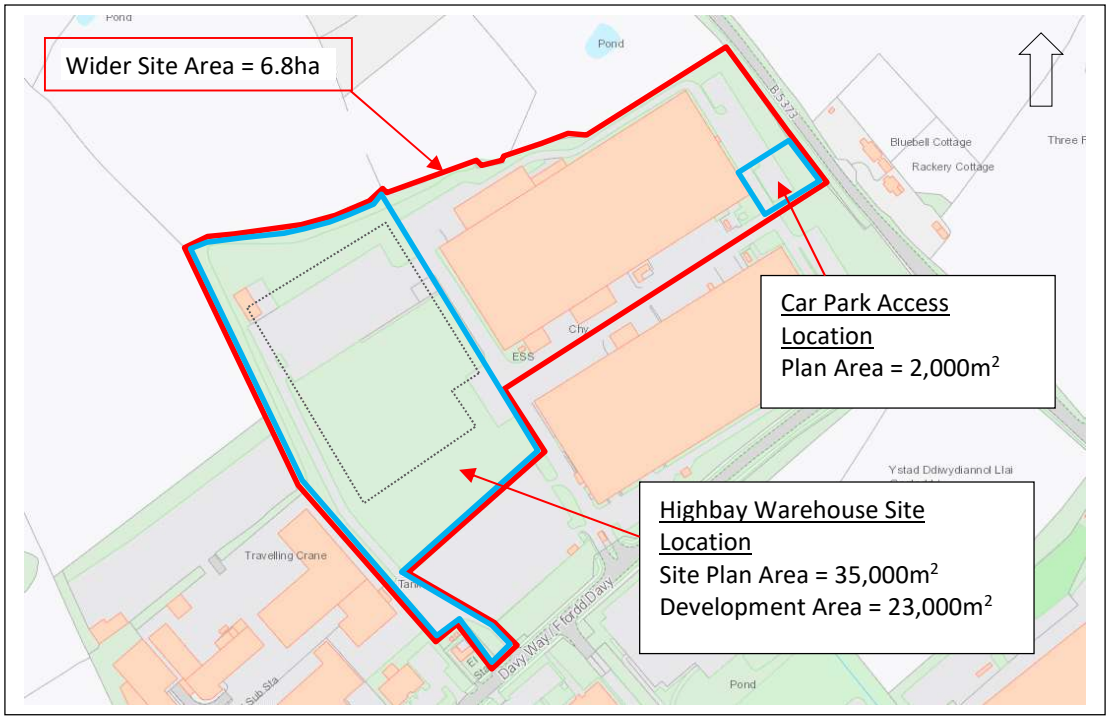


Figure 3: Site Layout Plan – Location and Plan Area of Proposed Development Sites

4.2 Site Development Impacts

The proposed Highbay Warehouse will replace the grassed area at the west of the site boundary. There will be a consequential alteration in the drainage of the developed site. Effective design and installation of appropriate surface water management should be used to mitigate deleterious effects of surface water drainage.

Existing ground levels across the site fall gently to the west and south of the site. It is proposed to maintain the current ground profile with the proposed development. The net effect of the development on ground levels will be minimal and will be compatible with surrounding ground levels.

Local alteration in ground levels may be necessary to allow tie-in to roadway and hardstandings each to to provide vertical alignment with the existing features.

4.3 Site Drainage

The proposed development will increase the coverage of impermeable surfaces. Surface water generated from new impermeable areas will be retained on site and discharged at or less than the current runoff rate from the area.

Initial ground investigation research has shown that relatively shallow ground infiltration may not satisfactory. A series of trial pits should be taken that should establish ground characteristics and quantify the proportion of surface water that may possibly be removed from discharge to public sewer.

Subject to the above, surface water discharges from the developed site will continue to outfall to public surface water sewer, subject to application with Welsh Water. Refer to Section 6 of this report for an assessment of sustainable drainage solutions.

Foul water discharge from the Warehouse development is to be accommodated by connection to existing public foul water sewer, subject to application with Welsh Water.

5.0 HYDROLOGY ASSESSMENT

5.1 Greenfield Runoff Calculations

The undeveloped greenfield runoff calculations have been estimated using the online tool available at uksuds.com. Analysis using both the IH124 and the FEH methodologies have been used in order to obtain notional upper and lower bounds of runoff values for the area.

Table 2 presents the greenfield runoff rates as the unit per hectare, in addition to the total rate over the whole application site of 6.80ha.

Methodology	Return Period (year)	Greenfield runoff rate (l/s/ha)	Greenfield runoff rate (l/s)
IH124	1 in 1	4.72	32.05
	1 in 30	9.55	64.82
	1 in 100	11.69	79.38
FEH	1 in 1	5.70	38.71
	1 in 30	11.53	78.29
	1 in 100	14.12	95.88

Table 2 - Greenfield runoff rates (IH124 and FEH)

The greenfield run off rates presented in Table 1 are based on a total area of 6.788ha with a Standard Average Annual Rainfall (SAAR) of 766mm. For the IH124 estimate, calculation assumed a SOIL type 4 and a SPR/SPRHOST value of 0.47. For the FEH estimate, calculation assumed a HOST class of 23 and a base flow index (BFIHOST) of 0.30.

For the purposes of this outline drainage strategy, and following a precautionary approach, the lower values of greenfield runoff derived from the IH124 methodology will be used where appropriate.

5.2 Ground Investigations

There has not been a ground investigation carried out at time of writing this report.

6.0 DRAINAGE STRATEGY

6.1 Sustainable Drainage Standards - SuDS

This section summarises an outline design for the disposal of surface water from the proposed development sites. The approach outlined in the Sustainable Drainage Systems Standards for Wales (SuDS Standards) and the CIRIA C753 SuDS manual seek to manage the quality and quantity of rainwater runoff close to where it falls and to allow its use in a manner which provides amenity benefits to site users and encourages biodiversity.

The statutory SuDS Standards are contained within Welsh Government guidance notes, summarised in the six points listed as:

- S1 - Runoff Destination
- S2 - Hydraulic Control
- S3 - Water Quality
- S4 - Amenity
- S5 - Biodiversity
- S6 - Construction, Operation and Maintenance

Subsequent paragraphs of this section of the report outline how these standards can be achieved within the outline drainage design for the proposed developments.

6.2 S1 - Runoff Destination

The statutory standards have five priority levels for surface water runoff. In order of high to low priority, these priority levels are:

- Priority 1: Surface water runoff collected for use
- Priority 2: Surface water runoff is infiltrated to ground
- Priority 3: Surface water runoff is discharged to a surface water body
- Priority 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system
- Priority 5: Surface water runoff is discharged to a combined water sewer

Information has been gathered specific to the proposed developments and is considered against these priorities, below:

Priority 1: Runoff Collected for Use

There is no rainwater harvesting proposed for the development as the demand for non-potable water on site is limited to toilet flushing. The provision of rainwater harvesting would not be cost-effective for the demand generated.

Water butts were considered for installation at rainwater outlet points. Nevertheless, there is no subsequent use for collected water within the proposed development, and their

compatibility with the syphonic drainage proposed for the large roof area is potentially problematic.

Priority 2: Infiltration to Ground

Ground investigation trial pits have yet to be carried out and so the characteristics of the ground cannot be quantified with certainty.

The Phase 1 Geo-Environmental Report carried out for the proposed development provides information on the superficial engineering geology. This is described as being a firm to very stiff or hard slightly gravelly sandy clay with interbeds of laminated clay/silt and beds/lenses of sand and gravel. There are probable fissures, particularly in the upper few metres, that may provide a low to high permeability flow dominantly through lenses/interbeds of sand and gravel. Ground contamination has yet to be carried out on the insitu soils.

Notwithstanding the predicted slow nature of ground infiltration characteristics anticipated within the application site, it is anticipated that low intensity, frequent, and shallow depths of rainfall up to 5mm can be retained on site by using a drainage system that is, where appropriate, “leaky”. This will provide opportunity for such rainfall to slowly soak into the ground.

Priority 3: Discharge to a Surface Water Body

Contemporary Ordnance Survey mapping show that there is a body of water just to the north of the application site and on third party land. It is believed that this body of water has no outlet and is therefore not considered suitable to receive runoff from the application site. During the site walkover in July 2022 this body of water appears to be ephemeral and forms a ‘habitat area’ for the adjacent managed agricultural land

The existing ditchcourse to the west and north of the site is not considered suitable to receive discharge from the proposed development. The ditchcourse does not appear to have a positive outlet and a subsequent receptor from the ditch could not be identified from the site walkover visit.

Priority 4: Discharge to a Surface Water Sewer

There is a public surface water sewer shown to cross the south of the application site and close to Davy Way – see Appendix. Archive record drawings and sub-surface scans show that existing surface water outlets from across the site connect to this sewer at several connection points. It is anticipated that surface water from the proposed new impermeable areas can be collected and discharged to the surface water sewer, subject to application with Welsh Water.

Priority 5: Discharge to a Combined Sewer

There is a separate foul water sewer parallel to the surface water sewer at the south of the site. There is no combined water sewer indicated on the public sewer record. The connection of surface water to foul water sewer is not an acceptable practice.

6.3 S2 - Hydraulic Control

The current runoff from the site is made up of surface water flow from the grassed area and from runoff from adjacent paved areas (access road and parking/hardstandings). Site walkover observations noted that the paved areas drain positively via highway gullies and channel drains to buried surface water drains. In turn the drains outfall to the public surface water sewer at the south of the site. It is anticipated that runoff from the grassed area contributes to the volume of water entering the gullies.

It is possible to estimate the runoff from paved areas, and the contribution from grassed areas, using the Modified Rational Method formula Q=2.78CiA. The assumed value for coefficient C is 0.95 for impermeable surfaces, and 0.20 for the grassed surface. The rainfall intensity is taken as 50mm/hr.

(1) Highbay Warehouse area:

- The area of paving is approximately 0.8ha, which produces a runoff rate of 105l/s
- The grassed area is approximately 1.7ha, which produces a runoff rate of 47l/s.

(2) Car Park Access area:

- The area of paving is approximately 0.08ha, which produces a runoff rate of 10l/s
- The grassed area is approximately 0.12ha, which produces a runoff rate of 3l/s

The total rate or runoff is then estimated to be 152l/s for the Highbay Warehouse and 13l/s for the car park access. These values are considered to be maximum theoretical discharge rates to public sewer from the application site's areas. Given that the discharge is through two 300mm diameter pipes, this discharge rate is proportionately correct.

It is anticipated that a reduction in flow rate from the proposed development to public combined sewer should be acceptable. Providing a reduction in runoff rate from the site would equate to a lower flow rate presented to public sewer. Typically, a limited flow rate can be achieved by installing a vortex flow control unit within the final chamber before the outfall to public sewer. A flow rate reduction of 30% between existing and proposed development is appropriate for Brownfield sites.

A reduction in flow rate leaving the site will require the storage of surface water within the site's footprint. Such attenuated storage can be provided by a combination of a) granular material beneath porous paving, b) vegetated swale, c) subterranean cellular storage, d)

above ground storage in a designated sacrificial area, e) over sized pipes, and f) detention basin(s).

Surface water storage at the development site will be designed to control runoff for rainfall events with a return period of 1 in 100 plus a 30% climate change allowance. A 100% run-off value will be assumed for roof and external hard standing, and a 20% run-off value for the soft landscaping areas where they slope towards SuDS features.

Storage for up to 1 in 30 years return period would be stored below ground in porous subbase and in cellular storage units. For storm events greater than 1 in 30 years, surface water will be designed to pond on surfaces remote from buildings, generally in designated areas of hardstanding and car park.

Based on reducing the existing site runoff to a total of 70% of 165l/s (to be agreed with Welsh Water) an estimated storage volume of 485m^3 would be required. This volume could be achieved in, for example, cellular storage tanks with a configuration of 35m x 18m x 0.8m deep.

6.4 S3 - Water Quality

The quality of the surface water to be discharged from the site shall be assessed using the simple index approach described in Section 26.7 of CIRIA C753 'The SUDS Manual'. The sources of rainwater discharges and their potential for contamination will be assessed and relevant pollution mitigation measures will be researched and specified.

Heavy goods vehicle delivery and manoeuvring areas will drain initially to a bioremediation channel, such as the D-Rainclean bioremediation channel (Stormwater Management Limited) shown in Figure 6. Other suppliers of similar channels should be assessed at detailed design.

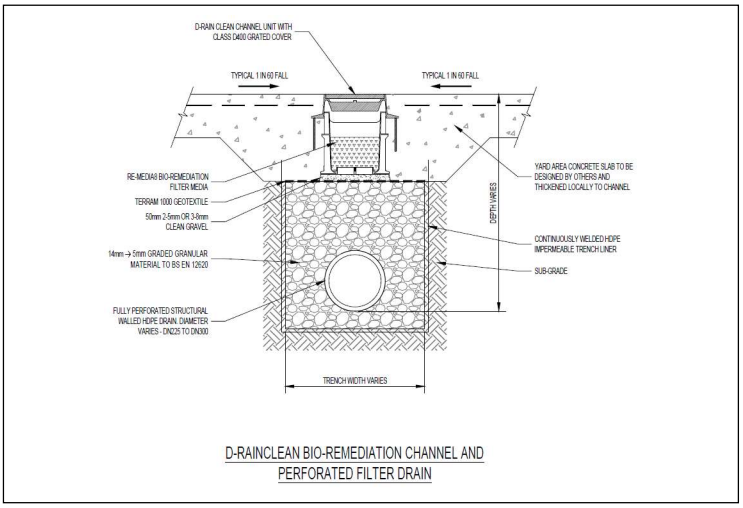


Figure 6: Bioremediation Channel – typical detail

Car parking areas will drain via porous paving and supplemented where possible into pipework. Bioremediation of surface water is created within the granular matrix.

It should also be possible to create modest levels of 'over-the-edge' flow routes from the access road towards the existing ditchcourse via vegetated fringes.

It is not possible to provide source control drainage at the Highbay Warehouse building. The dimensions of the Warehouse make it suitable for syphonic roof drainage, which is not compatible for SuDS features at rainwater pipe outlets.

6.5 S4 - Amenity and S5 - Biodiversity

The Amenity and Biodiversity standards can be achieved in a number of ways. Existing vegetated areas to the west and north of the site can benefit from over-the-edge runoff from the access road to the existing ditchcourse to encourage insects and perpetuate character with a wider variety of vegetation. There is also potential to irrigate planted areas by installing hand-operated pumps fed from subterranean tanks.

6.6 S6 - Construction, Operation and Maintenance

The SuDS proposed for the development will be readily manageable and will be retained within the ownership of the developer.

Inspection and maintenance guidance will be prepared for the SuDS system and issued to the developer and as part of a full SAB application.

6.7 Surface Water Drainage Strategy

The table below summarises how the drainage strategy for the proposed development will address the standards and priorities contained in the Sustainable Drainage System Standards for Wales.

Standard	Comments
S1 – Destination	
Priority 1 – Re-use	• Limited demand for non-potable water • Rainwater harvesting not cost effective • No requirements for irrigation • Not compatible with syphonic drainage
Priority 2 – Infiltration	• Unlikely to be suitable ground for significant infiltration • Locally permeable parking areas and adjacent ditchcourse will allow infiltration of shallow depth rainfall
Priority 3 – Discharge to surface water body	• There is no suitable watercourse receptor close to the site

Priority 4 – Discharge to surface water sewer	• There is a surface water sewer within the site that should be suitable for accepting surface water from the proposed development
Priority 5 – Discharge to combined sewer	• This Priority is not considered.
S2 – Runoff Hydraulic Control	
	• It is proposed to reduce the runoff from the developed site to a lower rate than currently achieved from the site. • The developed site runoff would be limited to 30% of the existing runoff • Attenuation would be hydraulically achieved with the use of vortex-type control(s) • A combination of above and below ground storage would be provided
S3 – Water Quality	
	• Heavy goods vehicle areas would be protected by a bio-remediation channel such as D-Rainclean. • Light vehicle parking areas will drain through porous paving to a granular subbase. • Secondary over-the-edge drainage to the existing ditchcourse will be provided at sections of the access road
S4 - Amenity & S5 - Biodiversity	
	• Existing vegetated areas to be enhanced with species-rich seeds and incorporated into the SuDS solution. • Opportunities for staff to visit landscaped areas for breaks and wellbeing.
S6 - Construction, Operation & Maintenance	
	• Detailed design is subject to SAB approval • Development owner and operator to be provided with maintenance guidance document

6.8 Exceedance Routing

The existing landuse slopes from the north to the south and towards public highway. This flow path should be allowed to continue by the developed site as it would maintain a preferred route for exceedance flow.

6.9 SuDS Inspection and Maintenance

The installed sustainable drainage infrastructure will require to be inspected and maintained at regular intervals so that it operates in an efficient and effective way consistent with design assumptions. The installed drainage is expected to be managed by the developer or appointed agent.

A draft Maintenance Plan is included in the Appendix that describes the key SuDS and general drainage elements, setting out the frequency and nature of inspections that are proposed and the maintenance activities that will be required.

6.10 Surface Water Management During Construction

The management of construction surface water runoff should take account of methodologies in separating flows - keeping clean water clean by avoiding disturbance to natural drainage features and collecting any drainage waters from works areas within the site that might carry silt and to route them towards stilling ponds for onwards disposal. There should be no direct discharge of construction water to existing surface waters and sewers.

Proposals to manage the potential for sediment transfer during construction activities should be incorporated into the overarching Construction Environmental Management Plan (CEMP) for the development. The development and implementation of a bespoke CEMP is a requirement for site construction and should be instrumental in the ongoing operation and maintenance of the development via the O&M manual.

Construction activities may have an adverse effect on newly installed SuDS components and appropriate measures should be taken to safeguard their structural and operational condition during and after construction activities.

6.11 Foul Water Drainage

The proposed development will generate domestic-equivalent foul water flows from the office welfare areas. The foul water will be connected to the public combined water sewer crossing the site via existing foul water drainage systems.

7.0 SUMMARY AND RECOMMENDATION

7.1 Summary

This Drainage Strategy provides an overview of existing drainage characteristics of the application site and discusses in outline how surface water from the proposed development should be assessed and catered for in the two development areas.

It should be possible to provide positive surface water drainage infrastructure that discharges primarily to surface water sewerage, and secondary to ground infiltration.

The final layout arrangement of buildings and access routes should be set at a level that controls surface water leaving the site up to the 1 in 100 year plus climate change rainfall event whilst avoiding surface water ponding against buildings and in key access routes.

The proposed land use will increase the proportion of impermeable surface. This surface has potential to cause surface water to run off quicker and in an uncontrolled manner to third party land. The proposed drainage strategy allows for subterranean storage cells and above ground storage that captures water and releases it in a controlled manner to the public surface water sewer.

7.2 Recommendation

A detailed design of surface water management should be carried out in accordance with CIRIA C753 The SuDS Manual and the lead local flood authority's considerations and design guidance.

The developed design of surface water management will require approval from the SAB Officer under mandatory legislation prior to the start of site construction activities.

8.0 REFERENCES

1) CIRIA C753 The SuDS Manual

2) Greenfield runoff rate estimation (uksuds.com)

3) Welsh Government Sustainable Drainage (SuDS) Statutory Guidance;

4) Wrexham CBC - SAB Application Guidance Notes;

5) Site plans of the Proposed Development;

6) Site Walkover taken on 22nd June 2022;

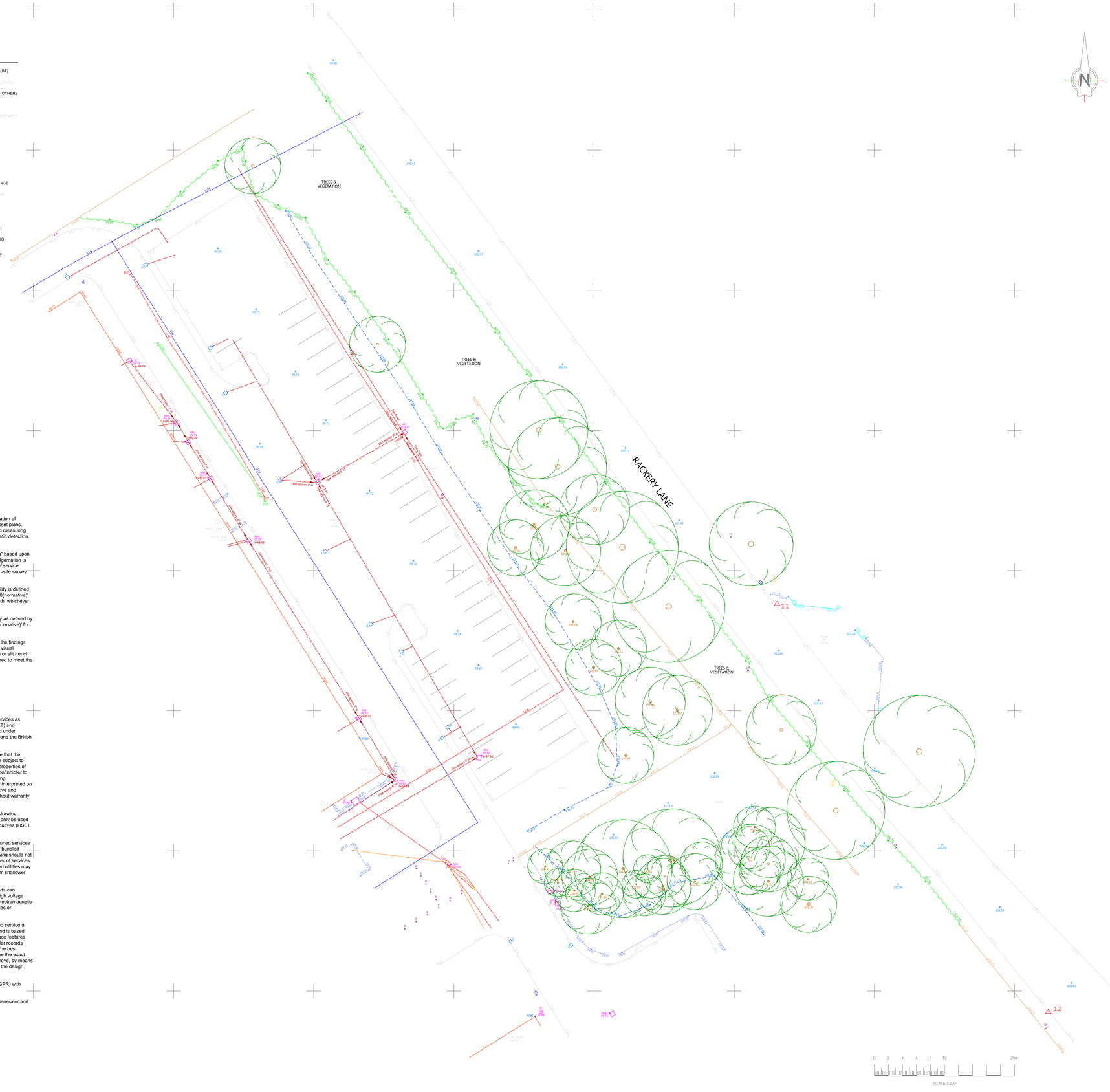
7) Contemporary Ordnance Survey mapping.

APPENDICES

BURIED ASSETS DETECTED ON SITE:

LINETYPE	SERVICE DESCRIPTION
BT BT	TELECOMMUNICATIONS (BT)
CATV	TELECOMMUNICATIONS (CATV)
TELE	TELECOMMUNICATIONS (OTHER)
G G	GAS
TCSU	TRAFFIC CONTROL SENSOR UNIT
SL SL	STREET LIGHTING
LV	LOW VOLTAGE
HV	HIGH VOLTAGE
W W	WATER
FWD	FOUL WATER DRAINAGE
SWD	SURFACE WATER DRAINAGE
FWRM	FOUL WATER RISING MAIN
CS	COMBINED SEWER
OF	OIL/FUEL
U(GPR)	UNKNOWN UTILITY (GPR)
U(EML)	UNKNOWN UTILITY (RADIO)

EOT END OF TRACE A/R ASSUMED ROUTE



Station	Easting	Northing	Level
4	332302.351	356683.785	97.621
6	332237.091	356733.812	98.465
7	332195.266	356854.804	98.316
8	332285.357	356918.237	99.788
11	332566.104	356975.224	101.548
12	332604.807	356916.986	101.445
C2	332627.387	356888.972	101.464

Abbreviations/Symbols (Measured Building Surveys):

C:	Window Cill Height
H:	Window Head Height
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DH:	Door Height
COL:	Column
SVP:	Soil Vent Pipe
FL:	Floor Level
TH:	Threshold Level
2.5m	Floor to Ceiling Height
	Vaulted Ceiling

Line types

	Hedge Lines
	Drainage Runs
	Overhead Electricity Cables
	Overhead Telephone Cables

Symbols

	Tree/Bush		Glass House
	Control Station		Osbm
	Borehole		
	Trial Hole		

Abbreviations (Topographic Survey):

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BOL:	Bollard
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BS:	Bus Stop
BS/LP:	Bus Stop / Lamp Post
CATV:	CATV Inspection Chamber
CCTV:	Closed Circuit Television
CL:	Cellar Light
C_PIT:	Catch Pit
ER:	Earth Rod
EC:	Electricity Inspection Chamber
EP:	Electricity Pole
FH:	Fire Hydrant
FP:	Flag Pole
GV:	Gas Valve
G:	Gully
iC:	Inspection Chamber
KO:	Kerb Outlet
LP:	Lamp Post
LB:	Letter Box
LC:	Lighting Column
MKR:	Marker
MH:	Manhole
MP:	Mooring Point
MS:	Mile Stone
NYNEX:	Nynex Inspection Chamber
O/H:	Over Hang
P:	Post
PO/IC:	Post Office Inspection Chamber
R/S:	Road Sign
RE:	Rodding Eye
RTW:	Retaining Wall
S/P:	Sign Post
SNP:	Street Name Plate
ST:	Stop Tap
SV:	Stop Valve
T:	Telecom Inspection Chamber
TCB:	Telephone Call Box
TH:	Threshold Level
TL:	Traffic Light
TP:	Telegraph Pole
TROUGH:	Trough
WO:	Water Outlet
WM:	Water Meter

Fence Descriptions:

B/W:	Barbed Wire
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C/BARRIER:	Crash Barrier
C/L:	Chain Link
C/P:	Chestnut Paling
C/I:	Corrugated Iron
I/R:	Iron Railing
MISC:	Miscellaneous
P/R:	Post & Rail
P/W:	Post & Wire
P/C:	Post & Chain
S/PAL:	Steel Palisade
W/M:	Wire Mesh

Quality Level of Utility Survey Outputs:

The drawing has been derived from the amalgamation of several data sets: utility service provider buried asset plans, visual confirmation by way of lifting manholes, and measuring depth, type and location of services, electromagnetic detection, and GPR scans.

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Equipment Deployed:

IDS Dual Frequency Ground Penetrating Radar (GPR) with on-site operator interpretation.

Radiodetection RD8000 & T10 Electromagnetic Generator and Precision Cable Locator.

Survey Notes:

Coordinates and Levels related to Ordnance Survey Datum - GPS OSGB36

Revision	Date	Description

CPLS
Chris Partington Land Surveyors
44a Green Lane
Sale
Cheshire
M33 5PP
t: 0161 976 1194
www.cpls.co.uk e:survey@cpls.co.uk

ices

Client

Liberty properties

Project

H Pack, Davy Way, Llay, Wrexham
Site Utilities Survey

Scale	1:200	Surveyed By	CW
		Date	24.06.22
Drawing No.	090522JC-01	Checked By	CPLS
		Date	27.06.22
		Drawn By	CW
		Date	27.06.22

BURIED ASSETS DETECTED ON SITE:

LINETYPE	SERVICE DESCRIPTION
BT BT	TELECOMMUNICATIONS (BT)
CATV	
TELE	
G G	GAS
TCBU	
SL SL	STREET LIGHTING
LV	LOW VOLTAGE
HV	HIGH VOLTAGE
W W	WATER
FWD	FOUL WATER DRAINAGE
SWD	
FWRM	FOUL WATER RISING MAIN
CS	COMBINED SEWER
OF	OILFUEL
U(GPR)	UNKNOWN UTILITY (GPR)
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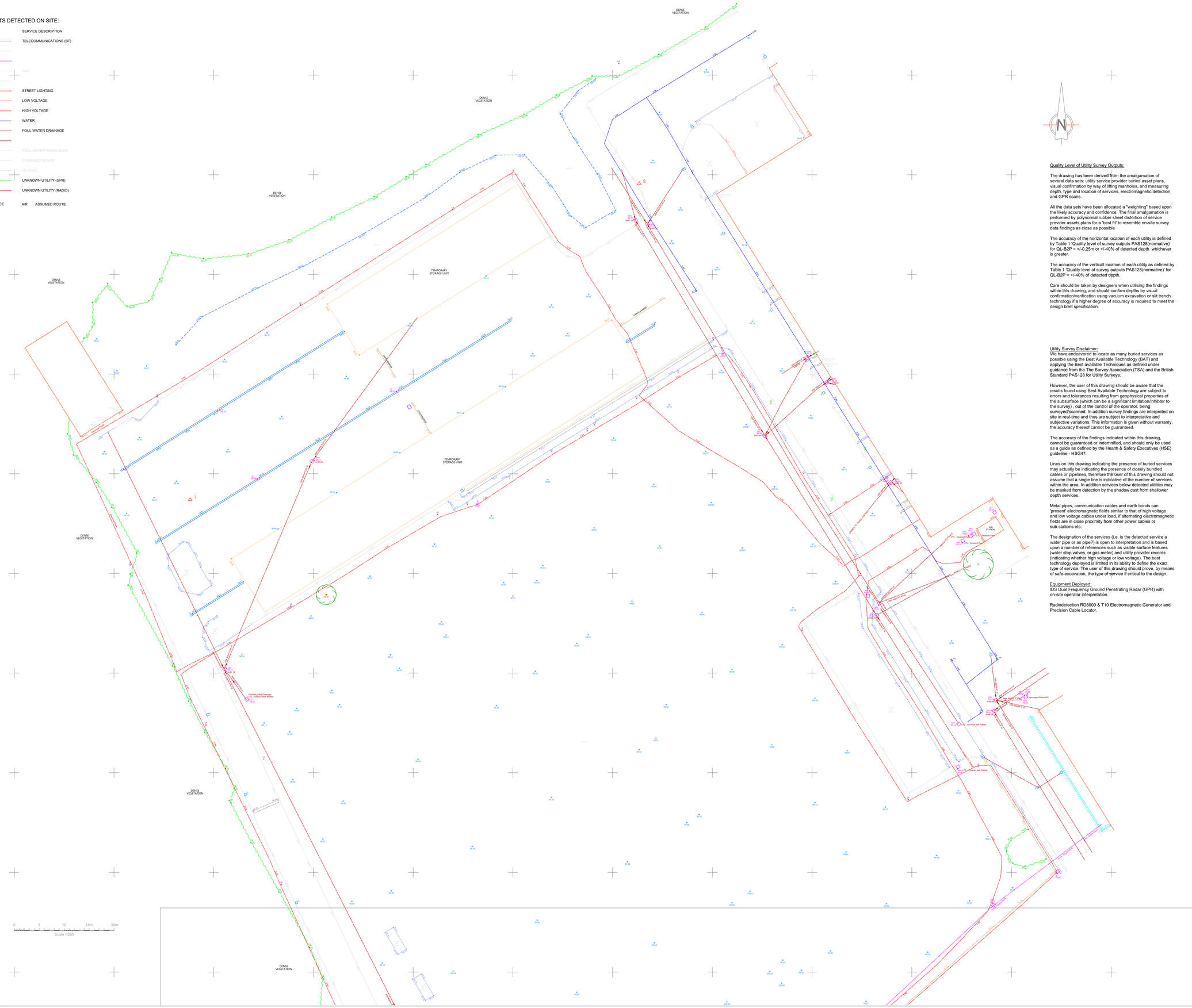

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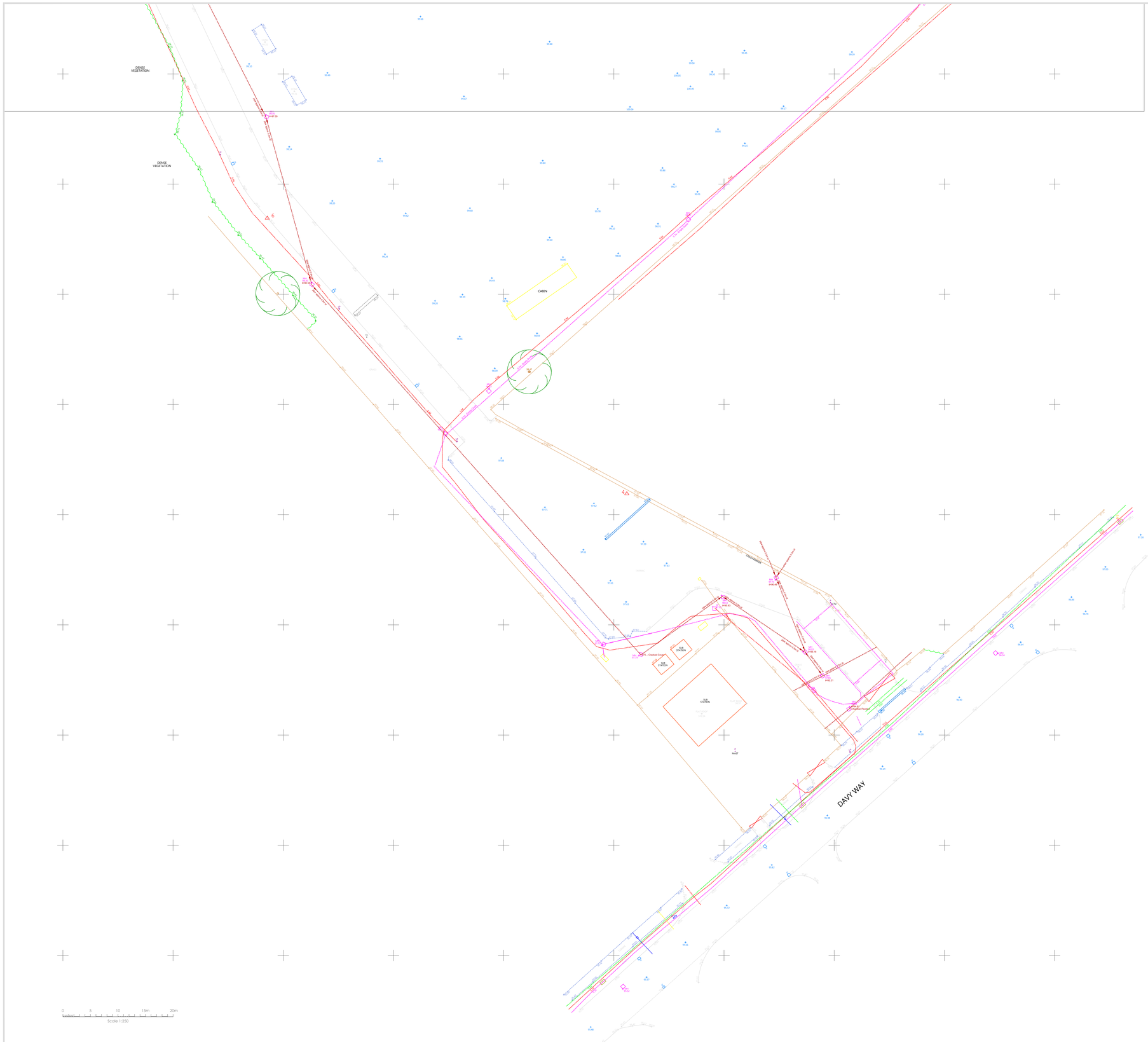

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Client
Liberty properties

Project
H Pack, Davy Way, Llay, Wrexham
Site Utilities Survey

Scale	1:250	Surveyed By	CW
Drawing No.	090522JC-03	Checked By	CPLS
		Drawn By	CW
		Date	24.06.22
		Date	27.06.22
		Date	27.06.22

SITE SPECIFIC HAZARDS

IN ACCORDANCE WITH THE REQUIREMENTS OF THE CDM REGULATIONS 2015 THE FOLLOWING SIGNIFICANT RESIDUAL HAZARDS HAVE NOT BEEN DESIGNED OUT OF THIS PROJECT AND MUST BE TAKEN INTO CONSIDERATION BY CONTRACTORS PLANNING TO UNDERTAKE THE WORKS SHOWN ON THIS DRAWING:

DRAWING PRODUCED BASED ON OS DATA

Pond

100.0m

B 5373 RACKERY LANE

APPLICATION SITE
0.15 Ha 0.37 Ac

SITE AREA - 6.8 HA

N

APPLICATION BOUNDARY

OWNERSHIP BOUNDARY

H-Pack

Chy

ESS

SHARP MANUFACTURING

APPLICATION SITE
circa 3.6 Ha 8.9 Ac

Travelling Crane

MARLIN INDUSTRIES

Tank

Pencadlys Yr Heddlu

DAVY WAY / FFORDD DAVY

El Sub Sta

ELSTEEL UK

ELITE GROUP

PARK ELECTRICAL SERVICES

El Sub Sta

NORTH WALES POLICE

REV. DATE NOTES INIT.

CLIENT / PROJECT

H-Pack Liberty Properties

DAVY WAY, WREXHAM

DRAWING TITLE

SITE LOCATION PLAN

STATUS

PLANNING

DATE	DRAWN	SCALE @ A2
SEPT. '22	AJP	1:1250

PROJECT NUMBER	UNIT / BLOCK	CI / SFB CODE	TYPE & NUMBER	REVISION LETTER
11373		PL	L01	

Site Location Plans	L	GA Plans	P	Elevations	E
Sections	S	Details	D	Prefix: Colour	C

THE RATCLIFFE GROVES PARTNERSHIP

MANCHESTER
105 MANCHESTER ROAD
BURY LANCASHIRE BL9 0TD
T. 0161 797 6000 E. manchester@rgp.uk.com
www.rgp.uk.com

LONDON
19 BEDFORD ROW
LONDON WC1R 4EB
T. 020 7600 6666 E. london@rgp.uk.com

RGP architects

John.bartelker Wrexham - H-Pack Storage Facility 26/09/2022 16/12/18 P:\Apps\100\11300-11399\11373\1-Sheets\R-LAND\SG\11373-R-L01.dgn

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SCALE 1:1000

0m 10 20 30 40 50 60

N

LEGEND

OWNERSHIP BOUNDARY

NOTES

1. DRAWING PRODUCED BASED UPON OS AND TOPOGRAPHICIAL SURVEY DATA.
2. LAYOUT SUBJECT HAS BEEN SUBJECT TO VEHICLE TRACKING
3. REFER TO DRAWING 11373-PL-L10 FOR DETAILED SITE PLAN TO WESTERN PORTION OF SITE
4. FOR PROPOSED LANDSCAPING REFER TO SEPARATE LANDSCAPE PROPOSALS SUBMITTED WITH THIS APPLICATION

ADDITIONAL STAFF PARKING (16 bays)
Retained landcaping/habitat zone
New Access Road (cars)
Pond
EXISTING VEHICLE ROUTE RETAINED
B 5373 RACKERY LANE
100.0m
NEW HIGHBAY WAREHOUSE
160K FOOTPRINT
FFL CIRCA 100 AOD
Retained landcaping/habitat zone
New Access Road (cars)
H-Pack
Existing servcie road between buildings retained
EXISTING CAR PARK
END BAYS REMOVED TO ACCOMODATE NEW ACCESS
NEW VEHICLE ACCESS FORMED FOR MOTORISTS & CYCLISTS ONLY (ACCESS & EGRESS) REFER TO SEPARATE DETAILS
Cycle Parking
OFFICES
6no DOCK LEVELLERS
6no DOCK LEVELLERS
LEVEL ACCESS
Shared Service Area
Shared Service Area
Landscaping
STAFF PARKING
135 TOTAL [126 STD. 9 ACC.]
SERVICE YARD
SHARP MANUFACTURING
Landscaping
SURFACE LEVEL PARKING (SHARP)
Modified Access Road (HGVs)
Existing hardstanding retained
Existing S/station
EXISTING SITE ACCESS MODIFIED FOR IMPROVED TWO-WAY HGV MOVEMENTS
DAVY WAY / FFORDD DAVY
B 5373 RACKERY LANE
Pencadlys

REV.	DATE	NOTES	INIT.

CLIENT / PROJECT

H-Pack Liberty Properties

DAVY WAY, WREXHAM

DRAWING TITLE

WIDER SITE PLAN

STATUS

PLANNING

DATE	DRAWN	SCALE @ A2
SEPT. '22	AJP	1:1000

PROJECT NUMBER	UNIT / BLOCK	CI / SFB CODE	TYPE & NUMBER	REVISION LETTER

DRAWING NO.

11373 PL L08

Site Location Plans	L	GA Plans	P	Elevations	E
Sections	S	Details	D	Prelim. Colour	C

THE RATCLIFFE GROVES PARTNERSHIP

MANCHESTER
105 MANCHESTER ROAD
BURY LANCASHIRE BL9 0TD
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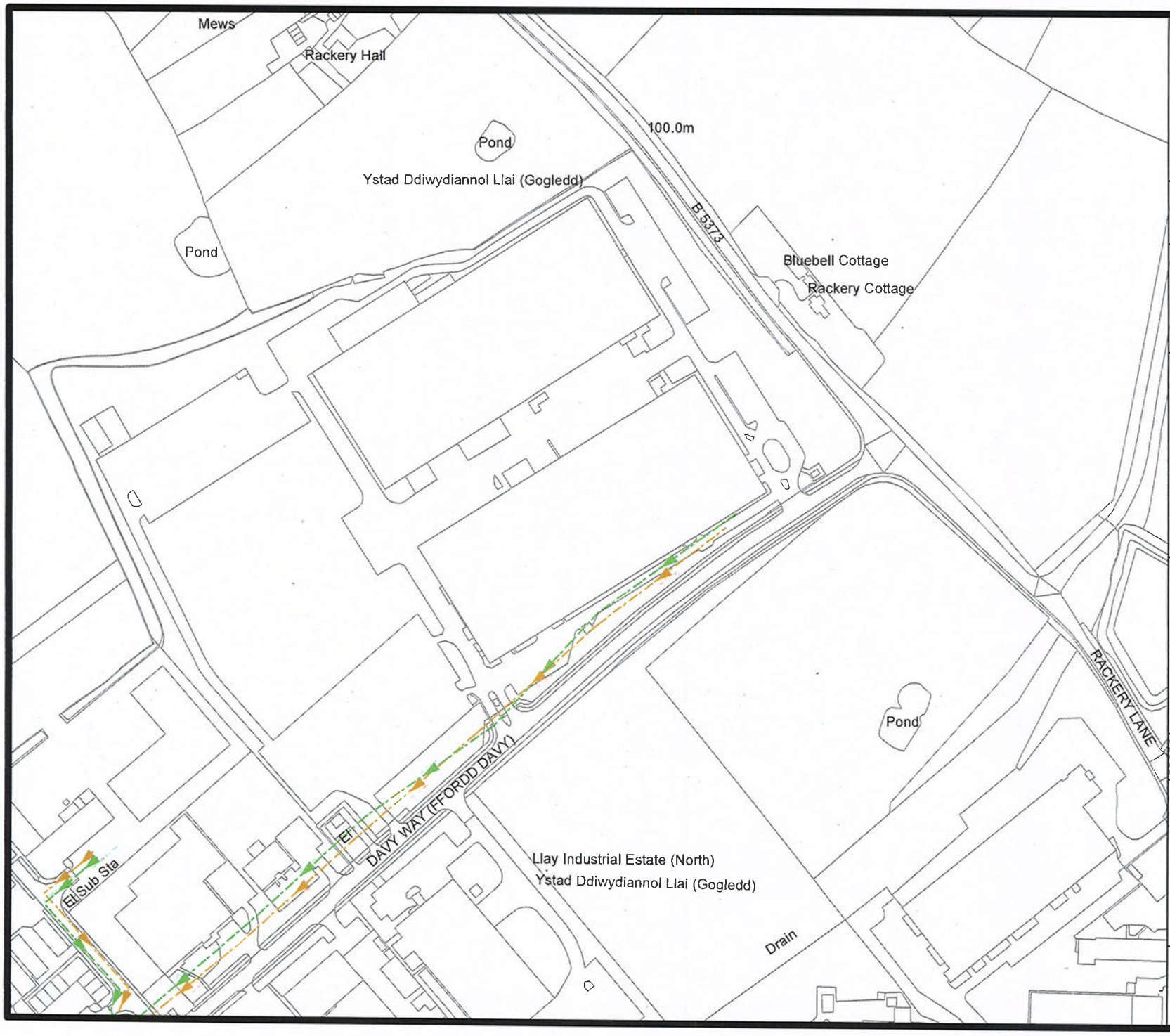
John.Jackaman Wrexham - H-Pack Storage Facility 26/09/2022 16/12/24 P:\DOCS\11000\11300-11399\11373\1-Sheets\PLANNING\11373-PL-L05.dgn



Dŵr Cymru
Welsh Water

Factory, Sharp House

N
W E
S

LEGEND(Representative of most common features)

Waste network:

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

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

Dwr Cymru Cyf gives this information as to the position of its underground apparatus by way of general guidance only 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 and any onus of locating the apparatus before carrying out any excavations rests entirely on you. It must be understood that the furnishing of the information is entirely without prejudice to the provision of the New Roads and Streetworks Act 1991 and of 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:	332467,356832
Map scale:	1:3,000
Printed by:	cw
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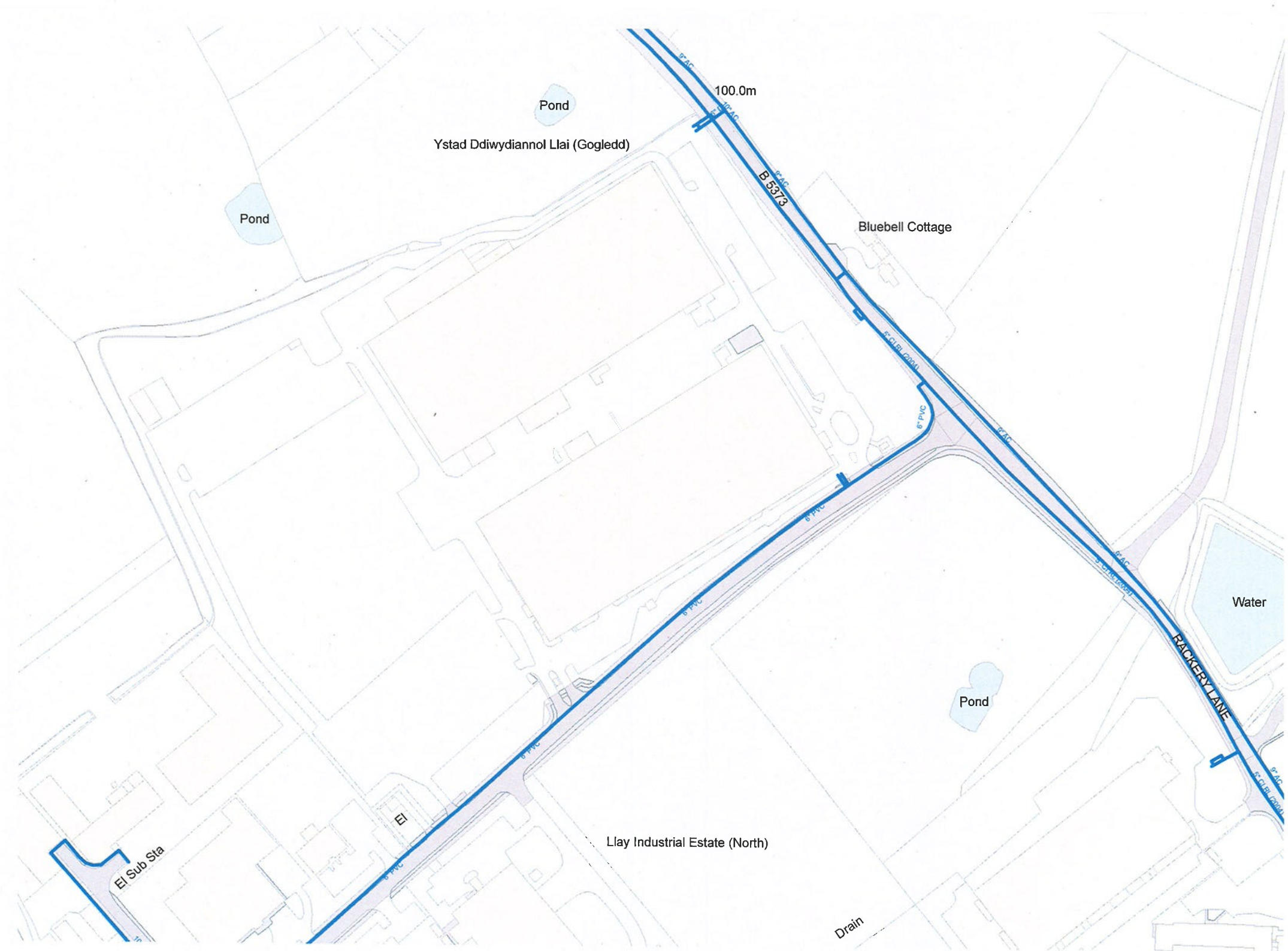
100.0m
Pond
Ystad Ddiwydiannol Llai (Gogledd)
Pond
B 5373
Bluebell Cottage
Water
RACKERY LANE
Pond
El
El Sub Sta
Llay Industrial Estate (North)
Drain

DRAFT OUTLINE SURFACE WATER DRAINAGE MAINTENANCE PLAN

1.0 Introduction

This document sets out the principles for the long-term management and maintenance of the surface water Sustainable Drainage Systems (SuDS) to be constructed as part of the proposed H-Pack Highbay Warehouse and Car Park Extension at Davy Way on the Llay Industrial Estate.

To be effective, SuDS schemes require a robust inspection and maintenance programme, ensuring the optimum operation of the surface water drainage network is continually maintained for the lifetime of the development, and to prevent the increased risk of flooding both on and offsite.

The activities listed in this document are generic to the relative SuDS types and represent the minimum maintenance and inspection requirements. Specific maintenance needs of the SuDS elements should be monitored, and maintenance schedules adjusted to suit requirements.

All those responsible for maintenance should follow relevant Health and Safety legislation (Health and Safety at Work Regulations) for all activities listed within this report including lone working, if relevant) and risk assessments should always be undertaken.

Periodic maintenance shall be carried out in accordance with the schedules listed in this report. Inspection checks shall be carried out by a qualified and competent person, at the minimum intervals listed within the schedules and the appropriate work carried out.

This drainage maintenance plan will be incorporated within the Operation and Maintenance (O&M) manual for the development and be accessible to those who undertake maintenance.

2.0 Overview of Maintenance

All drainage systems, whether piped systems or SuDS systems, require regular maintenance. The maintenance of the SuDS system should be included alongside other regular maintenance tasks. The table below gives an overview of typical maintenance tasks and the frequency with which they need to be undertaken.

Activity	Indicative frequency	Typical tasks
Routine/regular maintenance	Monthly to annually (for normal care of SuDS)	Litter picking Inspection of inlets, outlets and control structures Routine landscape maintenance of planted areas (including raingardens and tree pits)
Occasional maintenance	Annually up to 25 years (dependent on the design)	Silt control around components Vegetation management around components

		Silt removal from catchpits, and cellular storage
Remedial maintenance	As required (tasks to repair problems due to damage or vandalism)	Inlet/outlet repair Erosion repairs Reinstatement of edgings Reinstatement following pollution Removal of silt build up

The required maintenance for each of the elements that make up the SuDS system is scheduled in the tables below. The following guidance is based on CIRIA C753 – The SuDS Manual.

3.0 Attenuation Storage Systems

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the stone attenuation cell from above, check surface for blockage by sediment, or other matter; remove sediment and or replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures and/ or internal forebays	Annually, or as required
Remedial Maintenance	Repair/rehabilitation of inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually and after large storms

	Survey inside of tank for sediment build up and remove if necessary	Every 5 years or as required

4.0 Flow Control Devices – Hydro Brake, Orifice Plates

Maintenance to be undertaken according to manufacturer's specification. As a general guide, this should include the following:

Maintenance Schedule	Required Action	Typical Frequency
Routine Maintenance	Inspection	Quarterly
	Litter / debris removal	Monthly or as required
Occasional Maintenance	Sediment removal	6 monthly
Remedial Maintenance	Repair (as a result of damage or vandalism)	As required

5.0 Silt Traps

These features are catchpits within inspection chambers and gully traps at the foot of rainwater pipes around the building and road gullies (including raingarden overflows).

Maintenance Schedule	Required Action	Typical Frequency
Routine Maintenance	Inspection	Monthly
	Litter / debris removal	Monthly or as required
Occasional Maintenance	Sediment removal – silt stores should be emptied.	6 monthly
Remedial Maintenance	Repair (as a result of damage or vandalism)	As required

6.0 Rain Gardens and Tree Pits

As rain gardens and tree pits are planted features, they require more attention during the establishment period (years 1 and 2) than during the remainder of their life; heavier maintenance is required at 10 to 15 year intervals to de-silt and re-plant them as necessary.

Maintenance Schedule (During establishment period, years 1 & 2)	
Required Action	**Typical Frequency**
Watering	Weekly during dry period

Weeding	3- monthly
Litter picking	3- monthly
Pruning/ trimming	3- monthly
Check/ clean inlets/ outlets	3- monthly
Mulching	Annually (or as required)

Maintenance Schedule (Following establishment period, year 3 onwards)	
Required Action	**Typical Frequency**
Weeding	6- monthly
Litter picking	6- monthly
Pruning/ trimming	6- monthly
Check/ clean inlets/ outlets	6- monthly
Re-planting	Annually (or as required)

Maintenance Schedule (every 10 – 15 years)	
Required Action	**Typical Frequency**
Remove silt	10 – 15 years
Re-planting	6- monthly

7.0 Flood Routes

Flood routes (exceedance routes) allow water volumes that exceed the capacity of the SuDS system to pass through or round the site without causing damage to property. These routes must be clear of obstructions at all times.

Maintenance Schedule	Required Action	Typical Frequency
Routine Maintenance	Inspection	Monthly

	Litter / debris removal	Monthly or as required
Occasional Maintenance	Check route is not blocked by new fences, walls, stored materials, soil or other rubbish. Remove as necessary	Monthly
Remedial Maintenance	Repair (as a result of damage or vandalism)	As required

8.0 Sustainable Drainage (SuDS) features checklist

SuDS techniques include landscape features and control structures to manage runoff as it flows to the site outfall. The following lists the features which may be found throughout the development:

- Porous Pavements and Filter drains clean, store and convey water to another feature or allow it to soak into the ground. They are stone filled blankets or trenches, sometimes with a perforated pipe in the bottom. These may be enlarged to treat dirty water, as treatment trenches, or increase soakage into the ground, as infiltration features.
- Inlets and outlets structures are often conveyance pipes protected with mesh guards. They must be free from obstruction at all times to allow free flow through the SuDS.
- SuDS flow control structures are usually vortex controls, small orifices in control chamber, slots or V notches in weirs. They are usually near the surface so are accessible and easy to maintain. They may be in baskets, in small chambers or in the open.
- Inspection chambers, catchpit chambers and rodding eyes are used on bends or where pipes come together. They allow cleaning of the system if necessary.
- Flood routes (exceedance routes) allow water volumes exceeding the capacity of the system to escape from the site without causing damage to property. This route must be clear of obstructions at all times.

9.0 Spillage – Emergency Action

Most spillages are of compounds that do not pose a serious risk to the environment if they enter the drainage in a slow and controlled manner with time available for natural breakdown in a treatment system. Therefore small spillages of oil, milk or other known organic substances should be removed where possible using soak mats as recommended by the Natural Resource Wales with residual spillage allowed to bio-remediate in the drainage system.

In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chamber(s) downstream of the spillage with a bung(s). (A bung for blocking pipes may be made by wrapping soil or turf in a plastic sheet or close woven fabric.)

Contact the Natural Resources Wales immediately.

10.0 Updates (Installation Construction)

11.0 Revisions (Post Installation)

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