

Ionity - Wrexham

Surface Water Drainage Statement

Ionity GmbH

Project number: 60695026
AHH_ACM_P1_S1_RP_CE_001

March 2023

Quality information

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Revision History

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1. Introduction

1.1 Purpose of the report

AECOM have been appointed by Ionity GmbH to provide consultancy services to inform the detailed design and to support planning applications for a series of proposed Electric Vehicle (EV) charging stations throughout the UK.

The proposed EV charging sites are a series of proposed charging stations across the UK proposed to be developed by Ionity in 2023-2024. This report is tailored to suit the specific site referenced in the report title and should be read in conjunction with the associated planning drawings.

The objective of this report is to set out a drainage and surface water management strategy and provide an outline of the drainage system to be implemented for the proposed development. This report will support the application for planning permission lodged with the local planning authority, with the aim of setting out a suitable drainage solution for the development, ensuring compliance with national and local planning policies, current design guidance and best management practice.

This report identifies the drainage and sustainable urban drainage system (SuDS) features to be implemented to serve the proposed development. It is also to inform the client of foul, surface water and SuDS requirements which may influence the design of the development.

1.2 Proposed development: Wrexham

The proposed development will consist of a new off-street EV charging station with space for **12 No.** vehicles, and the associated charger-units and power-units.

Other appurtenant works: the EV charging station utilises the existing car park of a hotel; to compensate for the lost parking spaces an area of the hotel forecourt is to be re-laid as parking for 20 cars.

1.3 Drainage strategy requirements

Drainage is a material consideration in the determination of planning applications. An acceptable method of disposal for both foul water and surface water must be demonstrated.

This means that planning applications should be accompanied by a site-specific drainage strategy demonstrating that the proposed development drainage complies with the National planning Policy Framework (NPPF) and non-statutory technical standards.

This report will identify the existing hydrological regime and outline the proposed drainage and surface water management systems which will be designed in compliance with the policies and guidance documents outlined below:

- National Planning Policy Framework (Ministry of Housing, Communities & Local Government)¹,
- The SuDS Manual (CIRIA C753)²,
- Sustainable Drainage Systems Non-statutory technical standards³ (DEFRA), and;
- Statutory standards for sustainable drainage systems⁴

It should be noted that for the drainage and SuDS arrangements set out herein, ownership and maintenance will remain with the developer, and this document is an outline strategy and subject to refinement during the detailed design stages.

¹ *National Planning policy Framework*, Ministry of Housing, communities and Local Government, London, 2021

² Woods Ballard et al, *The SuDS Manual (CIRIA C753)*, CIRIA / DEFRA, London, 2015

³ *Sustainable Drainage Systems Non-statutory technical standards for sustainable drainage systems*, DEFRA, London 2015

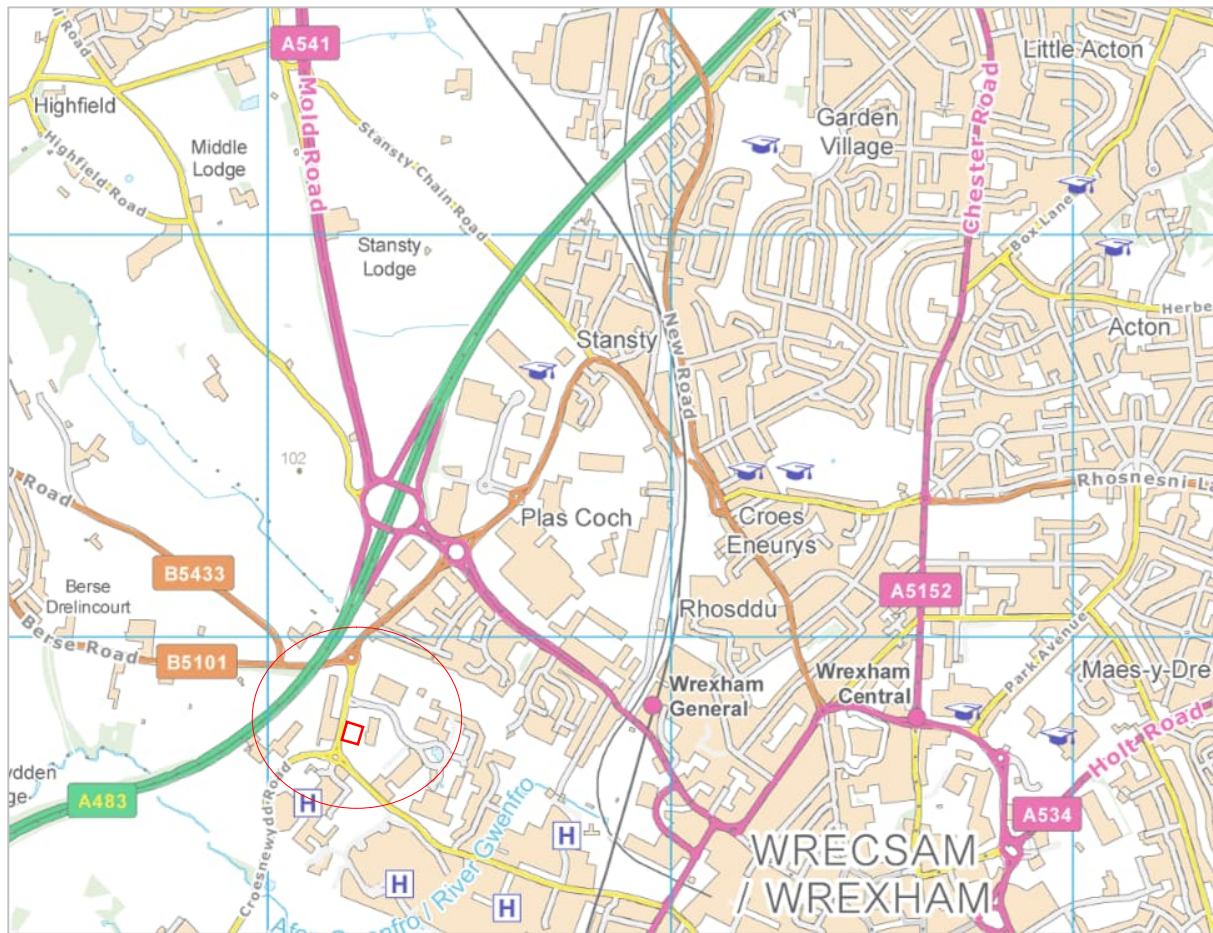
⁴ *Statutory standards for sustainable drainage systems*, Welsh government, Cardiff, 2018.

2. Existing conditions

2.1 Site location and topography

The site is located within the grounds of an existing hotel on the edge of Wrexham Technology Park on the west side of Wrexham in North Wales. The hotel is at Ellice Way, Wrexham, LL13 7YH National Grid Reference (NGR) SJ 322 507. The site location is presented in **Figure 2-1**.

The site is situated a short distance south of the A483 / A541 junction and is directly bounded on three sides by the existing hotel its car park and surrounding landscaped grounds, and to the west by Rhyd Broughton Lane.



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Figure 2-1: Wrexham, Site Location

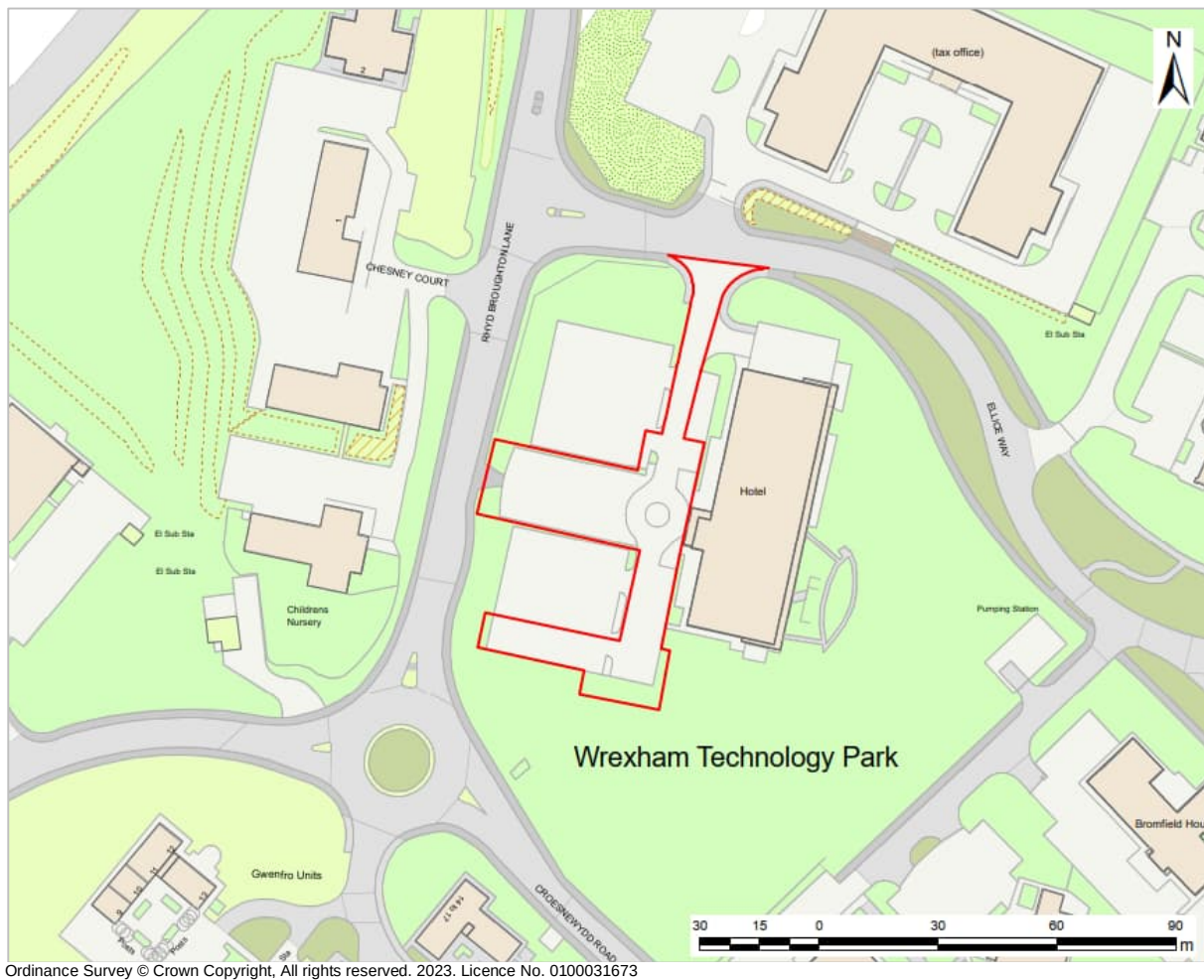


Figure 2-2: Wrexham, Site Plan

Topographic survey of the site was carried out by Malcolm Hughes in December 2022.

The existing car park slopes relatively steeply (approximate gradient 1 in 14) north-east away from the road towards the hotel building; the landscaped ground immediately south of the proposed EV charging bays rises steeply up to higher ground to the south.

2.2 Current land use

At the time of writing the site is within the grounds of an existing hotel, the charging bays occupying a portion at the southern end of the existing hotel carpark.

There is an existing vehicle access at the site directly from Ellice Way.

2.3 Geology and hydrogeology

Publicly available British Geological Survey (BGS) record information was reviewed to determine the soil types and classifications expected within the development site.

Bedrock geology is described as comprising of:

Pennine Lower Coal Measures Formation and Pennine Middle Coal Measures Formation (Undifferentiated)

Bedrock Engineering Geology is described as:

Strong Sandstone / Mudstone;

Medium strong to extremely strong medium to widely jointed thinly to thickly bedded fine to coarse-grained SANDSTONE may contain slate or mudstone and siltstone beds. Weathers to a loose to very

dense sand, gravel, or silty/clayey sand. Low to high permeability flow is through matrix and discontinuities. Includes GREYWACKES.

Very weak to medium strong usually fissured MUDSTONE. Weathers to a firm to stiff silty clay generally within 2-6 m of ground surface highly weathered mudstone clasts in a silt/clay matrix may occur to depths of 10-15 m. Generally low permeability, higher permeability in fissured near-surface material flow dominantly through discontinuities. Includes SILTSTONE and calcareous types.

Superficial geology is described as:

Glaciofluvial sheet deposits. Sand and gravel.

Superficial Engineering Geology is described as:

Very soft to very stiff sometimes sandy CLAY or SILT. Desiccation of top few metres may result in firm to stiff material overlying soft to very soft deposits at depth. Generally very low to moderate permeability flow dominantly through fissures. Includes lacustrine deposits, glaciolacustrine deposits, fine marine deposits, estuarine alluvium, and lowland river alluvium (any of which may contain peat beds or lenses) and loess/loessic soils.

There is no available data on the water table at the site.

Hydrogeology for the site is described as WARWICKSHIRE GROUP: Moderately productive aquifer. Regional, cyclic multi-layered aquifer with moderate to large yields from sandstones.

The site is within an area highlighted as “high vulnerability, Secondary aquifer” for groundwater vulnerability.

2.4 Existing drainage

Based on the information available at the time of writing, underground services survey from Hughes surveys (Dec 2022), existing drainage features on the site are summarised below.

Surface water is drained from the existing car park and roadways via channel drains and road gullies. The main surface water sewer for the site flows north beneath the access road to connect to the public sewer in Ellice Way.

The nearest watercourse to the site is a minor tributary of the River Gwenfro which flows from Moss Valley to the north-west and sinks on the opposite side of the A483 approximately 500 m north-west from the site. It is assumed that this watercourse through a culvert system flowing west to east immediately north of Wrexham Technology Park.

3. Planning and regulatory process

3.1 Planning

As part of all planning applications, the developer will be expected to demonstrate an awareness of the local site conditions (e.g. contamination, geological, topographical, hydrological and site orientation factors) and how they have been considered in their proposals for site drainage and why the different types of Sustainable urban Drainage Systems (SuDS) are, or are not, considered to be appropriate for the site

3.1.1 Legislation and policy

The 2010 Flood and Water Management Act addresses flood risk by clarifying responsibilities and encouraging the use of SuDS by ending the automatic right to connect to sewers. Under the Water Industry Act 1991, developers have a limited right to connect developments to the drainage network which encourages developers to include SuDS within new developments.

The 2010 Flood & Water Management Act proposed that SuDS should be incorporated into most development and this was confirmed in a government statement in 2015 which introduced non-technical standards for SuDS.

The Flood and Water Management Act also sets out that the Councils will become the SuDS Approving Body (SAB) to review and approve drainage schemes in-line with these standards, and check that schemes are properly constructed and maintained.

The National Planning Policy Framework (NPPF) 2019, requires that Local Planning Authorities should ensure that flood risk is not increased elsewhere, and that it incorporates sustainable drainage systems, unless there is clear evidence that this would be inappropriate

Major developments should incorporate sustainable drainage systems, the systems used should:

- take account of advice from the lead local flood authority;
- have appropriate proposed minimum operational standards;
- have maintenance arrangements in place to ensure an acceptable standard of operation for the lifetime of the development; and
- where possible, provide multifunctional benefits.

3.1.2 Local planning policy

Wrexham Local Development Plan is in the process of being drafted and is undergoing consultations.

Planning Policy Wales states that planning authorities should secure better management of drainage and surface water so as to tackle diffuse pollution and surface water flooding issues by:

- ensuring sustainable drainage systems are incorporated into development enabling surface water to be managed close to or at source; and
- ensuring connection to the sewer in sewered areas and by minimising the proliferation of private sewage systems.

4. SuDS strategy

4.1 Drained Area and Discharge location

The proposed EV charging bays are within an existing car park. New drainage is only required for the proposed car park extension which replaces the partially paved and gravelled decorative forecourt of the hotel.

It is proposed to discharge surface water via one of the following in order of preference: discharge to ground via infiltration, discharge to natural surface water, or if the former options are impractical: discharge to a sewer system. There is no suitable watercourse within the direct vicinity of the site.

Given the anticipated ground conditions described above, the disposal of surface water via infiltration would appear to be a suitable solution for the development. In the event that infiltration is deemed unsuitable, it is proposed to discharge any new surface water drainage from the site to the existing surface water sewer that flows north past the front of the hotel.

For the purpose of this drainage strategy the following is assumed: the runoff from the developed site must mimic the quality and quantity of the runoff from the site in its greenfield state. An image of the site layout used for the basis of this drainage strategy is presented in **Figure 4-1**.

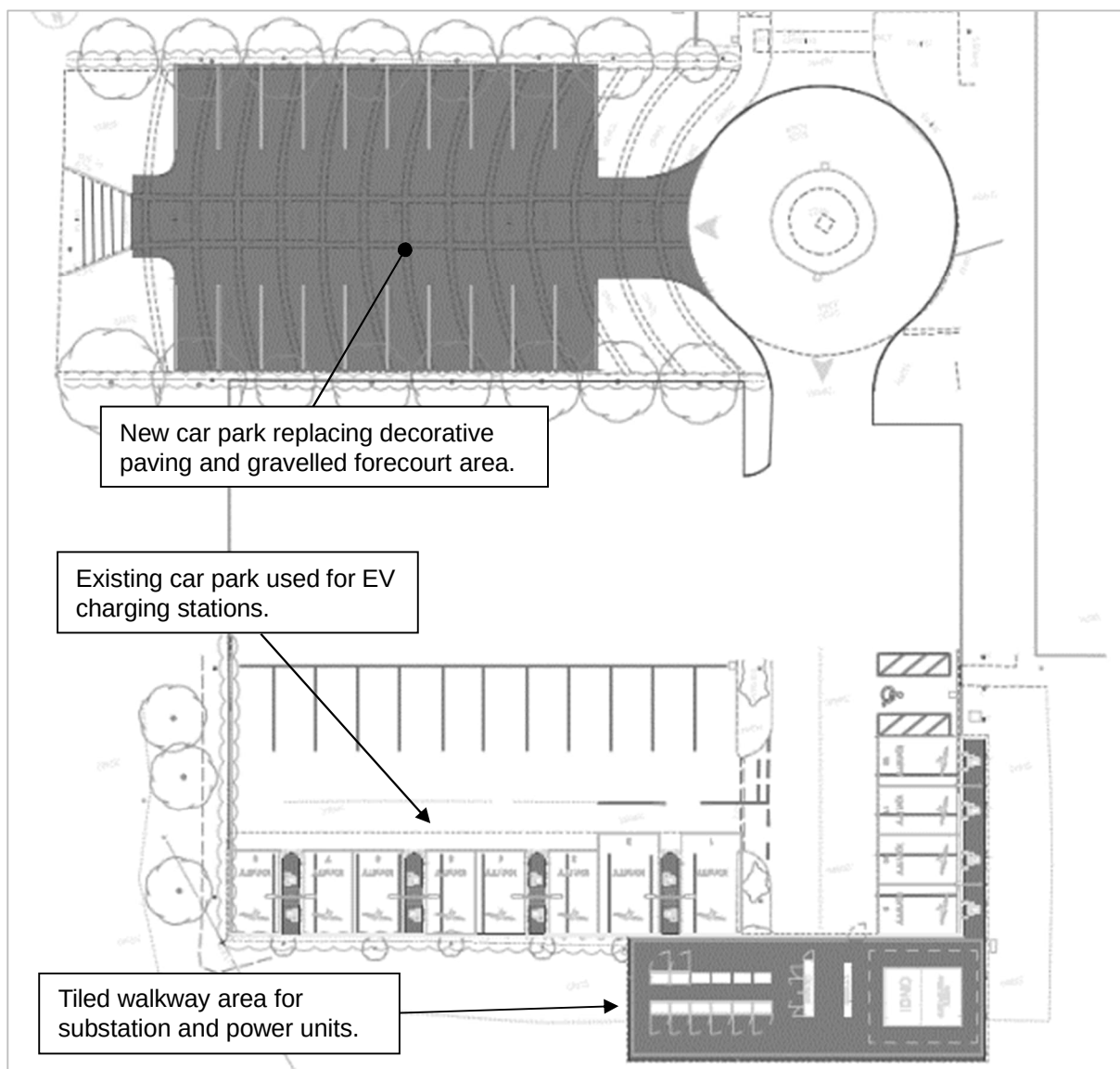


Figure 4-1: Site Layout

4.2 Treatment and water quality

SuDS are to be designed in accordance with the guidance set out in CIRIA C753 The SuDS Manual, and Sustainable Drainage Systems Non-statutory technical standards from DEFRA.

The main drivers for SuDS are to protect water quality, and to avoid new development having an adverse impact on flood risk to others through increasing the rate and volume of runoff.

In accordance with current guidance, the Simple Index Approach is used to confirm suitable SuDS features that could be utilised in the development to provide treatment prior to discharge to the water environment. This is explained further below.

4.2.1 Surface water management train

The philosophy of the SuDS 'Management Train' is to mimic natural drainage processes as closely as possible. This concept is fundamental to the design and implementation of a successful SuDS scheme where drainage techniques are used in series to incrementally reduce pollution, flow rates and volumes.

4.2.2 Source control

It is proposed to use permeable paving on all new parking bays to minimise the amount of impermeable surface area, and to provide attenuation and treatment for runoff from adjacent surfaces.

4.2.3 Water quality treatment

CIRIA C753 The SuDS Manual (Chapter 26) provides guidance on the methods that should be used to design SuDS to meet water quality requirements.

For the basis of assessing the water quality risk management, the "simple index approach" was used. This approach can be categorised by three main steps:

- Allocate suitable pollution hazard indices for the proposed land use.
- Select SuDS elements to form a management train with a total pollution mitigation index that equals or exceeds the pollution hazard index.
- Where the discharge is to protect surface waters or groundwater, consider the need for a more precautionary approach.

The results are presented in the tables below.

The land use for the simple index approach is taken to be equivalent to a "low traffic road" which is appropriate for less than 300 traffic movements per day.

The Simple Index Approach shows that Permeable Paving is adequate to serve the development. For precautionary reasons a filter layer and loamy soil layer is to be incorporated into the permeable paving makeup to allow surface water to be discharged to groundwater in an area of high groundwater risk.

A summary of the simple index approach is shown in the tables below and the completed simple index approach tool is shown in Appendix B.

Table 4-1 Pollution Hazard Index

Runoff Area Land Use Description	Total Suspended Solids	Metals	Hydrocarbons
Low Traffic Roads	0.5	0.4	0.4

Table 4-2 Pollution Mitigation Index

Runoff Area Land Use Description	Total Suspended Solids	Metals	Hydrocarbons
Pervious Pavement	0.7	0.6	0.7
Total SuDS mitigation index	0.7	0.6	0.7

4.3 Attenuation and discharge

For the new EV charging area there is no new drainage proposed.

For the accommodation works: the new car park to replace the decorative forecourt, it is proposed to discharge surface water to ground via a permeable paving within the new parking bays and temporary sub-surface water storage.

In the event that discharge to the sewer system is required; discharge is to be limited to release surface water at a rate equivalent to a pre-development “greenfield runoff” rate as set out in Sustainable Drainage Systems Non-statutory technical standards.

4.4 Approvals, adoption and maintenance

The proposed drainage and SuDS systems for the development will not be adopted as a public sewer, ownership and maintenance will remain with the landowner and developer.

Approval of the design is sought, via this strategy document, from the local council as SuDS Approving Body (SAB) via the planning application process.

4.5 Construction

Construction and temporary drainage arrangements are not covered within this report; it is considered that the proposed permanent SuDS and drainage infrastructure are entirely commonplace and can be constructed by a competent contractor without undue risk to the environment.

5. Drainage design

5.1 Proposed development

The charging station has no new drained area. The walkway containing the new sub-station is to be paved with concrete tiles, this area will not be positively drained, and rainfall may run off this area onto the adjacent grassed and landscaped ground.

The new car park has a total drained area of approximately 0.05 ha: (250 m² of new asphalt paving, plus 250 m² of new parking bays) which replaces the previously gravel and concrete tiled area in front of the hotel building.

The drainage areas and SuDS design presented in this document should be read in conjunction with the proposed indicative masterplan, as shown in Appendix A.

5.2 Foul drainage

Foul drainage is not required for this development.

5.3 Surface water drainage

Surfacing for the vehicle charging bays is unchanged.

New car parking bays are to be surfaced using permeable block paving.

Runoff from the new paved area will be directed towards the parking bays and the surface water runoff taken into the attenuation and infiltration strata below.

Treatment is provided by incorporating a filter layer below the permeable paving through which surface water will pass into the below-ground attenuation. In accordance with SUDS design guidance, a minimum 300 mm thick layer of loamy soils below the attenuation tank is to be incorporated to prevent potential contaminants escaping to groundwater.

Below ground storage, in the form of a gravel-filled or open cellular tank, will be installed to hold temporary storage of surface water before discharge to ground.

Site testing and verification of the Infiltration rates, and the final sizing of the below ground storage, is to be carried out at the detailed design stage.

Table 5-1 Greenfield Runoff Rates

Return Period (years)	Greenfield Runoff Rate (l/s)
1	0.22
2	0.23
30	0.45
100	0.55

Greenfield Runoff Rates are derived using the loH 124 method, applied to a 50 ha area and area-weighted to the site area of **0.05 ha**.

The results show that for the 1 in 100 year event, the runoff from the undeveloped site area is estimated to be 0.55 l/s.

The attenuation requirements for the development site have been calculated using InfoDrainage software for the 1 and 100 year storm events.

The values for the post development runoff have been calculated assuming that 95% of the rainfall falling on impermeable drained areas will be collected by the system and directed into the attenuation storage area.

Calculations were undertaken to determine the volume of storage required for the site when runoff from the development is limited to the predevelopment runoff for rainfall up to the 1 in 100 year event. The results are presented in the table below. The hydraulic calculations and InfoDrainage modelling outputs are also included in Appendix C.

The development plan is shown on the drainage drawing in Appendix A.

Table 5-2 Storage Volumes

Return Period (years)	Outflow (l/s)	Storage Volume (m ³)
1	0.4	6.1
100	0.7	21.7

The attenuation storage volume is sized to accommodate the predicted attenuation for the developed site assuming water is released at greenfield runoff rates. This is a preliminary estimate, the actual volume of storage will be determined more accurately after site infiltration testing has been carried out.

5.4 Overland flow and flood risk

The proposed drainage strategy is designed to avoid the potential to increase flood risk to property downstream through the incremental increase in runoff rates and volumes associated with new development and increased drained impermeable surfaces. This is achieved through providing surface water drainage attenuation and discharge at pre-development "greenfield runoff" rates.

However, the proposed development and its drainage arrangement must not create any flood risk arising from rainfall in excess of the capacity of the drainage system. A drainage network check must therefore also be performed to ensure that surface water flooding and overland flow posed by a 1 in 100 year return period storm does not cause flood risk to persons or property.

The proposed development does not alter the existing topography or overland flow paths within or around the site.

From the topography and the site layout it can be seen that surface water runoff in excess of the capacity of the drainage and SuDS system can shed around the building and off the site to the north and east onto open ground .

There are no existing buildings or properties downstream of the site that are at risk from overland flow arising from the proposed development. It is therefore considered that the proposed drainage arrangement does not increase flood risk to others.

6. Conclusions

The drainage strategy set out in this report details proposed drainage arrangements for the Wrexham Electric Vehicle charging station at Ellice Way, Wrexham Technology Park.

In compliance with national and local policy it is proposed that the surface water from the site will be attenuated and treated via Sustainable Drainage Systems (SuDS) located on the site.

6.1 Site Specific Proposals:

The EV charging station utilises an existing car park; there are no drainage alterations proposed for this component of the development.

It is proposed that runoff from the new car parking bays is collected to a below ground infiltration system via permeable paving within the parking bays.

Site testing of infiltration rates has not yet been carried out. In the event that infiltration is deemed impractical, drainage will be discharged to the existing surface water sewer system via below ground attenuation beneath the permeable paving.

The drained surface areas and approximate attenuation volumes are summarised below:

Table 6-1 SuDS summary

Development	SuDS systems	Discharge location and type	Drained Area (m ²)	Storage Volume (m ³)*
Charging station, including charging bays.	n/a	Existing car park drainage	-	-
New car park	Permeable paving	Infiltration to groundwater	500	21.7

* Volumes to be confirmed post site testing.

Final size and volume of the SuDS elements will be determined after onsite testing of soil infiltration rates has been carried out.

The simple index approach has been carried out showing that this system will provide adequate treatment for the proposed charging station.

From the topography and the site layout it can be seen that surface water runoff in excess of the capacity of the drainage and SuDS system can shed off the site and away from nearby buildings. Therefore, it is concluded that the proposed drainage arrangement does not increase flood risk to others.

The site drainage infrastructure will remain with the developer for ownership and maintenance.

Appendix A : Drawings and Documents

Drawing / Document Number	Title	Author	Date
60695026_ACM_CDE_WRE_SK_AR_0001_07	Wrexham Sketch	AECOM	20/02/2023
59538/UG	Underground services survey	Malcolm Hughes Surveys	21/12/2022

PROJECT
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LEGEND

- Ionity proposal
- Property line
- Scope of works
- Demolition
- Property line
- EV Charger unit
- Power units
- IDNO substation
- Street markings
- Light pole
- Bollard
- Walkway - Concrete Tiles
- Street - Asphalt
- Grass
- Kerbs
- Access road

ISSUE/ REVISION		
07	20.02.2023	Rearrange equipment
06	02.02.2023	Rearrange parking spots
05	25.01.2023	Rearrange equipment
04	20.01.2023	Rearrange parking layout
03	10.01.2023	Added parking spots
02	19.12.2022	Design changes
01	09.12.2022	Added topo survey
00	06.12.2022	First Release
Revision	Date	Description

PROJECT NUMBER

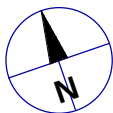
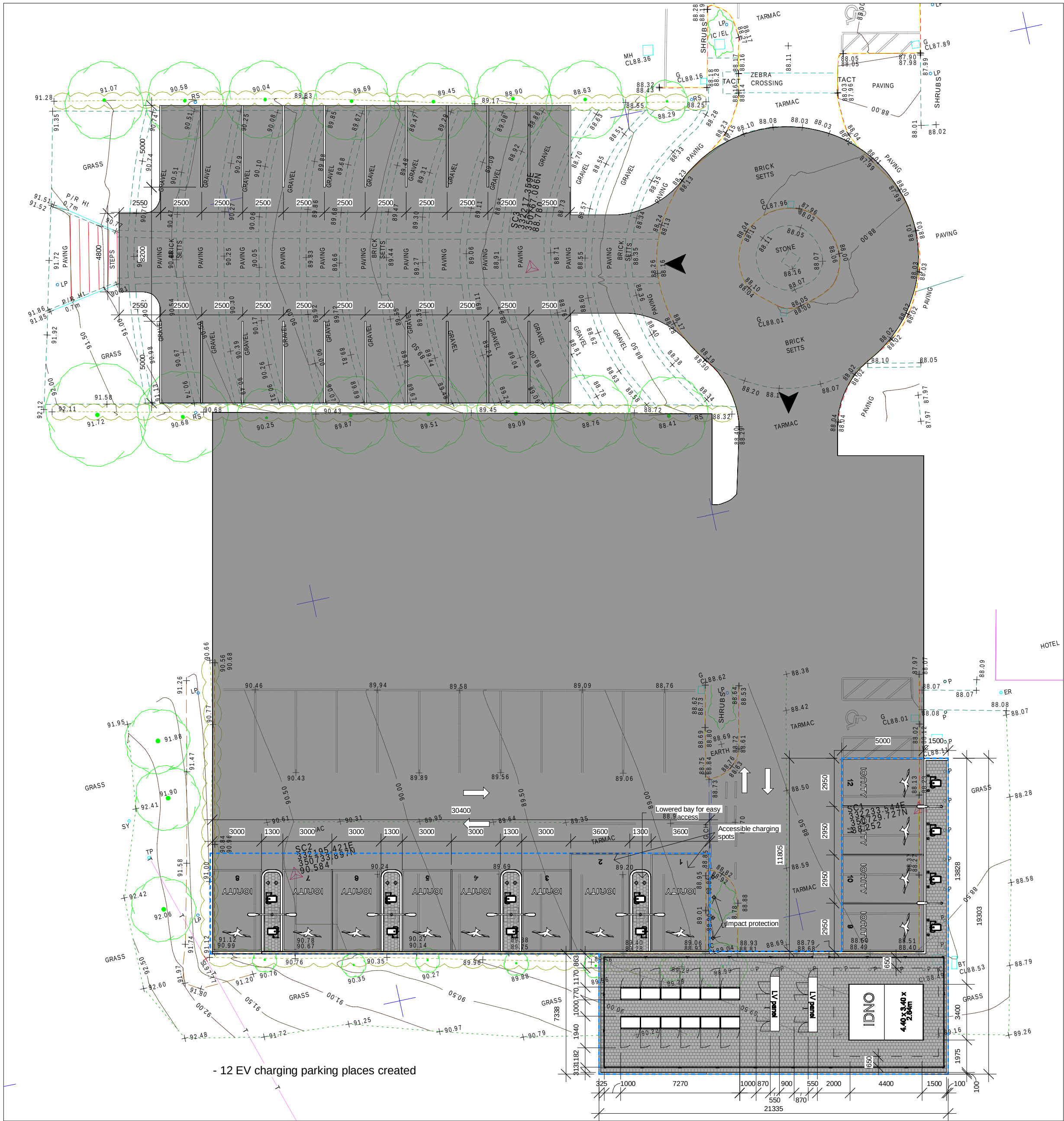
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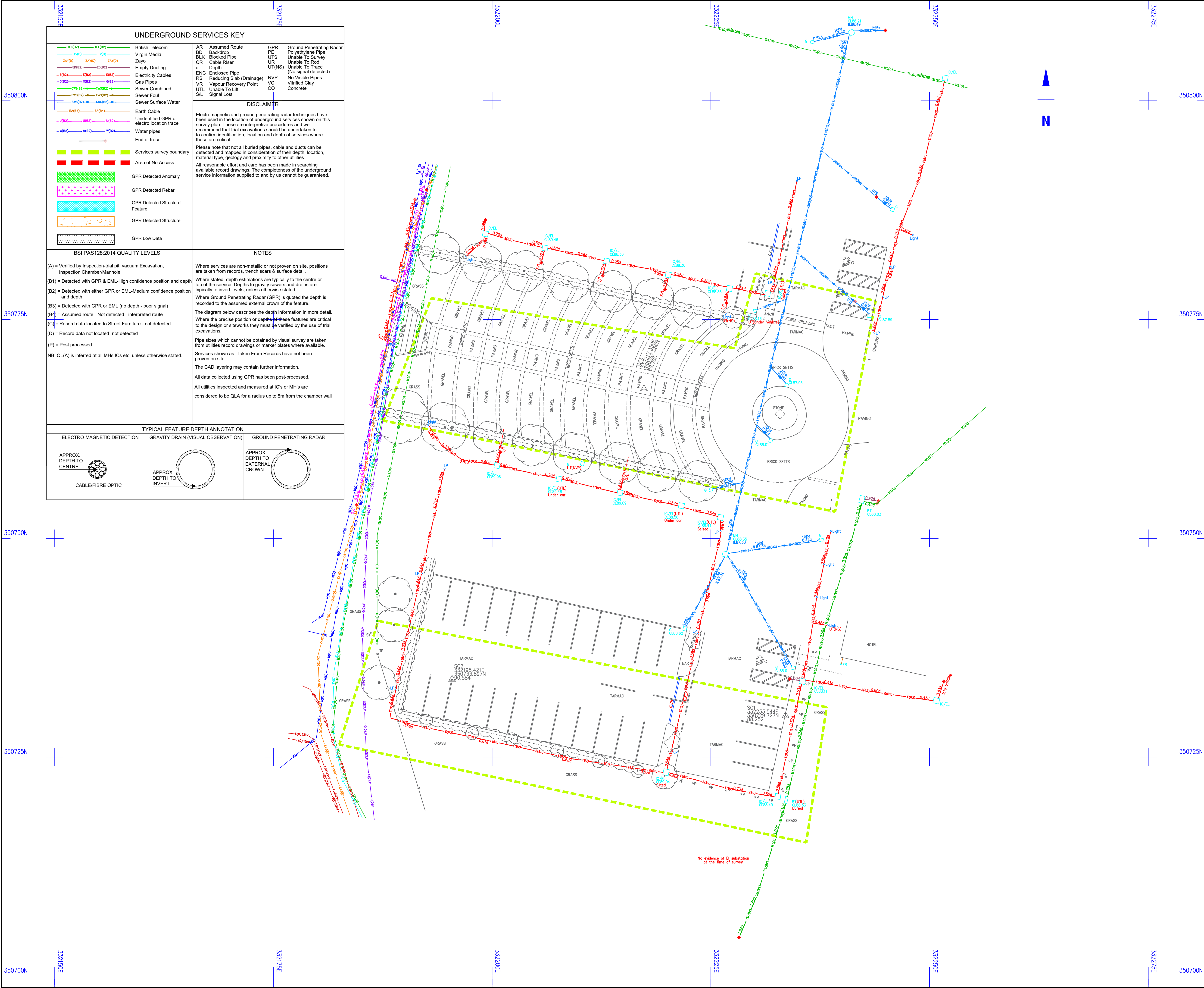
SHEET TITLE

WREXHAM SKETCH

SHEET NUMBER

60695026_ACM_CDE_WRE_SK_AR_0001_07





Survey Notes
Grid: Local plan metric related to National Grid at survey point SC1
Levels: Related to OS datum from GNSS positioning, converted using the National Geoid Model OSGM15.

Notes

Topographical Survey Legend

BUILDINGS AND WALLS	GENERAL INFORMATION
Building Open Road Run Passage Wall with height Retaining Wall	Petrol Pump Basement Light Footbridge Dish Type Channel Spot Type Channel Grate Type Channel Tactile Paving Crown Barrier Columns Staircase Car Vacuum Air Valve Trough Chimney Telephone Call Box
FENCE STYLES AND DESCRIPTIONS	OVERHEAD FEATURES
Close Boarded Corrugated Iron Chainlink Paving Quadrant Handrail Hill Iron Railings Lattice Miscellaneous PAL Post & Rail Post & Wire Post & Barbed Wire Wire mesh Silt Gate Fence line style	Electricity Pylon Electricity Telephone
ROADS	WATER FEATURES
Kerbs Edge of Surfacing Pedestrian Crossing Track Footpath	Canal Stream Ditch Weir Culvert Slip (and Drains) Spring
STREET FURNITURE	RELIEF AND VEGETATION
Belted Beacon Bus Stop Bollard Coffin Cool Chute Closed Circuit TV Drain Electricity Pole Flood Light Flag Staff Lamp Post Letter Box Name Plate (street) Mast Mile Post or Mooring Post Service Marker Mile Stone Post Parking Meter Reflector Post Riding Eye Road Sign Speed Camera Information Sign Stop Traffic Light Telephone Pole Traffic Light Push Button Post Traffic Light Control Control Box British Telecom Box Electricity Box Gas Box	Hedge Edge of wood/Bushes Shrub Individual Tree Slopes with Height Greater than 1m Cliff Face Marsh Reeds
INSPECTION CHAMBERS AND PIPES	LEVEL AND HEIGHT INFORMATION
Inspection Cover (Dra) Manhole British Telecom Cover Inspection Cover (Comms) Cable TV Inspection Cover Traffic Signals Gully Kerb Outlet Vent Pipe Down Pipe Rain Water Pipe Soil Pipe Gas Pipe Unable to lift cover Stop Top Stop Valve Longhole Hydrant Earth Pit Gas Valve Water Meter Washout Riding Eye	Standard Spot Height Precision Spot Height Bed Level Water Level Soffit Level Threshold Level Cover Level Invert Level Pipe Soffit Level Floor Level Finished Floor Level Top of Tank Level Eave Level Ridge Level Roof Hip Level Flat Roof Level Top of Canopy Level Underline of Canopy Level Window Sill Level Window Head Level Springing Level Arch Level Cable Level Top of Wall Level Underline of Beam Level General Height
TYPICAL FEATURE DEPTH ANNOTATION	SURVEY INFORMATION SIGNS
ELECTRO-MAGNETIC DETECTION APPROX. DEPTH TO CENTRE CABLE/FIBRE OPTIC	Permanent Ground Marker O.S. Trip Station O.S. Bench Mark
GRAVITY DRAIN (VISUAL OBSERVATION) APPROX. DEPTH TO INVERT	
GROUND PENETRATING RADAR APPROX. DEPTH TO EXTERNAL CROWN	
UNDERGROUND SERVICES KEY	GEOTECHNICAL INFORMATION
British Telecom Virgin Media Zero Empty Ducting Electricity Cables Gas Pipes Sewer Combined Sewer Foul Sewer Surface Water Earth Cable Unidentified GPR or electro location trace Water pipes End of trace Services survey boundary Area of No Access GPR Detected Anomaly GPR Detected Rebar GPR Detected Structural Feature GPR Detected Structure GPR Low Data	Borehole Test Pit Monitor Pin Probe Hole Mud Sample
BSI PAS128:2014 QUALITY LEVELS	
(A) = Verified by Inspection-trial pit, vacuum Excavation, Inspection Chamber/Manhole (B1) = Detected with GPR & EML-High confidence position and depth (B2) = Detected with either GPR or EML-Medium confidence position and depth (B3) = Detected with GPR or EML (no depth - poor signal) (B4) = Assumed route - Not detected - interpreted route (C) = Record data located to Street Furniture - not detected (D) = Record data not located- not detected (P) = Post processed NB: QL(A) is inferred at all MHs ICs etc. unless otherwise stated. The CAD layering may contain further information. All data collected using GPR has been post-processed. All utilities inspected and measured at IC's or MH's are considered to be QLA for a radius up to 5m from the chamber wall	
DISCLAIMER	
Electromagnetic and ground penetrating radar techniques have been used in the location of underground services shown on this survey plan. These are interpretive procedures and we recommend that trial excavations should be undertaken to confirm identification, location and depth of services where these are critical. Please note that not all buried pipes, cable and ducts can be detected and mapped in consideration of their depth, location, material type, geology and proximity to other utilities. All reasonable effort and care has been made in searching available record drawings. The completeness of the underground service information supplied to and by us cannot be guaranteed.	
NOTES	
Where services are non-metallic or not proven on site, positions are taken from records, trench scars & surface detail. Where stated, depth estimations are typically to the centre or top of the service. Depths to gravity sewers and drains are typically to invert levels, unless otherwise stated. Where Ground Penetrating Radar (GPR) is quoted the depth is recorded to the assumed external crown of the feature. The diagram below describes the depth information in more detail. Where the precise position or depth of these features are critical to the design or siteworks they must be verified by the use of trial excavations. Pipe sizes which cannot be obtained by visual survey are taken from utilities record drawings or marker plates where available. Services shown as Taken From Records have not been proven on site. All data collected using GPR has been post-processed. All utilities inspected and measured at IC's or MH's are considered to be QLA for a radius up to 5m from the chamber wall	

Accreditations

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THE SURVEY ASSOCIATION
ICES

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Edinburgh, EH3 5DA

Project
Ionity Charging Site
Rhyd Broughton Lane
Wrexham, LL13 7YP

Drawing Title
Underground services
survey

Drawn By PS 21/12/22
Checked by DJ 21/12/22
Scale A1@1:200
Survey Date November 2022
Revision

Rev. **Date** **Description**

Drawing No 59538/UG

Appendix B : SuDS Simple Index Approach Tool

1. The steps set out in the tool should be applied for each inflow

2. The supporting 'Design Conditions' stated by the tool must be

3. Relevant design examples are included in the SuDS Manual At

4. Each of the steps below are part of the process set out in the flowchart on Sheet 3.

5. Sheet 4 summarises the selections made below and indicates the acceptability of the proposed SuDS components.

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separately discharging to a SuDS component).

RELEVANT INPUTS NEED TO BE SELECTED FROM THESE LISTS, FOR EACH STEP

USER ENTRY

USER ENTRY CELLS ARE ONLY REQUIRED WHERE INDICATED BY THE TOOL

STEP 1: Determine the Pollution Hazard Index for the runoff area discharging to the proposed SuDS scheme

This step requires the user to select the appropriate land use type for the area from which the runoff is occurring

If the land use varies across the 'runoff area', either:

- use the land use type with the highest Pollution Hazard Index
- apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all. If it is not, consider collecting more hazardous runoff separately and providing additional treatment.

If the generic land use types suggested are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in the row below the drop down lists.

Select land use type from the drop down list (or 'Other' if none applicable)

If the generic land use types in the drop down list above are not applicable, select 'Other' and enter a description of the land use of the runoff area and agreed user defined indices in this row:

Runoff Area Land Use Description

Low traffic roads (e.g. residential roads and general access roads, < 300 traffic movements/day)

n/a

Hazard Level

Low

Pollution Hazard Indices

Total Suspended Solids

0.5

Metals

0.4

Hydrocarbons

0.4

Landuse Pollution Hazard Index

Low

0.5

0.4

0.4

DESIGN CONDITIONS

1

2

STEP 2A: Determine the Pollution Mitigation Index for the proposed SuDS components

This step requires the user to select the proposed SuDS components that will be used to treat runoff - before it is discharged to a receiving surface waterbody or downstream infiltration component

If the runoff is discharged directly to an infiltration component, without upstream treatment, select 'None' for each of the 3 SuDS components and move to Step 2B

This step should be applied to evaluate the water quality protection provided by proposed SuDS components for discharges to receiving surface waters or downstream infiltration components (note: in England and Wales this will include components that allow any amount of infiltration, however small, even where infiltration is not specifically accounted for in the design).

If you have fewer than 3 components, select 'None' for the components that are not required

If the proposed component is bespoke and/or a proprietary treatment product and not generically described by the suggested components, then 'Proprietary treatment system' or 'User defined indices' should be selected and a description of the component and agreed user defined indices should be entered in the rows below the drop down lists

Select SuDS Component 1 (i.e. the upstream SuDS component) from the drop down list:

Select SuDS Component 2 (i.e. the second SuDS component in a series) from the drop down list:

Select SuDS Component 3 (i.e. the third SuDS component in a series) from the drop down list:

If the proposed SuDS components are bespoke/proprietary and/or the generic indices above are not considered appropriate, select 'Proprietary treatment system' or 'User defined indices' and enter component descriptions and agreed user defined indices in these rows:

SuDS Component Description

Pervious pavement (where the pavement is not designed as an infiltration component)

None

None

n/a

Pollution Mitigation Indices

Total Suspended Solids

0.7

Metals

0.6

Hydrocarbons

0.7

Aggregated Surface Water Pollution Mitigation Index

0.7

0.6

0.7

DESIGN CONDITIONS

1

2

3

SuDS components can only be assumed to deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters of the SuDS Manual. See also checklists in Appendix B

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

Is the runoff now discharged to an infiltration component?

Yes ? [Go to Step 2B](#)

No ? [Go to Step 2C](#)

STEP 2C: Determine the Combined Pollution Mitigation Indices for the Runoff Area

This is an automatic step which combines the proposed SuDS Pollution Mitigation Indices with any Groundwater Protection Pollution Mitigation Indices

Combined Pollution Mitigation Indices

Total Suspended Solids

Metals

Hydrocarbons

Combined Pollution Mitigation Indices for the Runoff Area

>0.95

0.85

>0.95

Note: If the total aggregated mitigation index is > 1 (which is not a realistic outcome), then the outcome is fixed at ">0.95". In this scenario, the proposed components are likely to have a very high mitigation potential for reducing pollutant levels in the runoff and should be sufficient for any proposed land use (note: where risk assessment is required, this outcome would need more detailed verification).

STEP 2D: Determine Sufficiency of Pollution Mitigation Indices for Selected SuDS Components

This is an automatic step which compares the Combined Pollution Mitigation Indices with the Land Use Hazard Indices, to determine whether the proposed components are sufficient to manage each pollutant category type

When the combined mitigation index exceeds the land use pollution hazard index, then the proposed components are considered sufficient in providing pollution risk mitigation.

In England and Wales, where the discharge is to protected surface waters or groundwater, an additional treatment component (ie over and above that required for standard discharges), or other equivalent protection, is required that provides environmental protection in the event of an unexpected pollution event or poor system performance. Protected surface waters are those designated for drinking water abstraction. In England and Wales, protected groundwater resources are defined as Source Protection Zone 1. In Northern Ireland, a more precautionary approach may be required and this should be checked with the environmental regulator on a site by site basis.

Sufficiency of Pollution Mitigation Indices

Total Suspended Solids

Metals

Hydrocarbons

Sufficient

Sufficient

Sufficient

DESIGN CONDITIONS

1

Reference to local planning documents should also be made to identify any additional protection required for sites due to habitat conservation (see Chapter 7 The SuDS design process). The implications of developments on or within close proximity to an area with an environmental designation, such as a Site of Special Scientific Interest (SSSI), should be considered via consultation with relevant conservation bodies such as Natural England

Appendix C : Info-Drainage Calculations

Project: WREXHAM Drainage attenuation storage Greenfield Runoff	Date: 30/01/2023			
Report Details: Type: Inflows Storm Phase: Phase	Designed by: WHR	Checked by: DH	Approved By: DH	
	Company Address: AECOM 1 Tanfield Edinburgh EH3 5DA			



Catchment Area

Type : Catchment Area

Area (ha)	0.051
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Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.950
Winter Volumetric Runoff	0.950
Time of Concentration (mins)	5
Percentage Impervious (%)	100

Project: WREXHAM Drainage attenuation storage Greenfield Runoff	Date: 30/01/2023			
Report Details: Type: Stormwater Controls Storm Phase: Phase	Designed by: WHR	Checked by: DH	Approved By: DH	
	Company Address: AECOM 1 Tanfield Edinburgh EH3 5DA			



Porous Paving

Type : Porous Paving

Dimensions

Exceedence Level (m)	90.500
Depth (m)	1.200
Base Level (m)	89.300
Paving Layer Depth (mm)	100
Membrane Percolation (m/hr)	1000.0
Porosity (%)	30
Length (m)	10.000
Long. Slope (1:x)	300.00
Width (m)	25.000
Total Volume (m³)	82.500

Outlets

Outlet

Outgoing Connection	(None)
Outlet Type	Orifice
Diameter (m)	0.025
Coefficient of Discharge	0.600
Invert Level (m)	89.300

Advanced

Conductivity (m/hr)	10000.0
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Project: WREXHAM Drainage attenuation storage Greenfield Runoff	Date: 30/01/2023		
	Designed by: WHR	Checked by: DH	Approved By: DH
Report Title: Rainfall Analysis Criteria	Company Address: AECOM 1 Tanfield Edinburgh EH3 5DA		



Runoff Type	Dynamic
Output Interval (mins)	2
Time Step	Reduced
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FEH	Type: FEH
Site Location	GB 332600 350700 SJ 32600 50700
Rainfall Version	1999
C (1km)	-0.026
D1 (1km)	0.349
D2 (1km)	0.392
D3 (1km)	0.318
E (1km)	0.288
F (1km)	2.414
Summer	☒
Winter	☒

Return Period

Return Period (years)	Increase Rainfall (%)
100.0	0

Storm Durations

Duration (mins)	Run Time (mins)
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320

Project: WREXHAM Drainage attenuation storage Greenfield Runoff	Date: 30/01/2023	
Report Title: UK and Ireland Rural Runoff Calculator	Designed by: WHR Checked by: DH Approved By: DH	
Company Address: AECOM 1 Tanfield Edinburgh EH3 5DA		

ICP SUDS / IH 124

Details

Method	IH 124
Area (ha)	50.00
SAAR (mm)	680.0
Soil	0.47
Region	Region 1
Urban	0
Return Period (years)	2

Results

Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 2 (years) (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)
Region 1	233.3	233.3	212.1	198.3	440.9	578.7

Project: WREXHAM Drainage attenuation storage Greenfield Runoff		Date: 30/01/2023			
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Designed by: WHR	Checked by: DH		Approved By: DH
		Company Address: AECOM 1 Tanfield Edinburgh EH3 5DA			



Critical Storm

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residual Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Porous Paving	FEH: 100 years: +0 %: 240 mins: Winter	89.607	89.605	0.274	0.305	4.9	21.712	0.000	0.000	0.7	15.385	74	OK

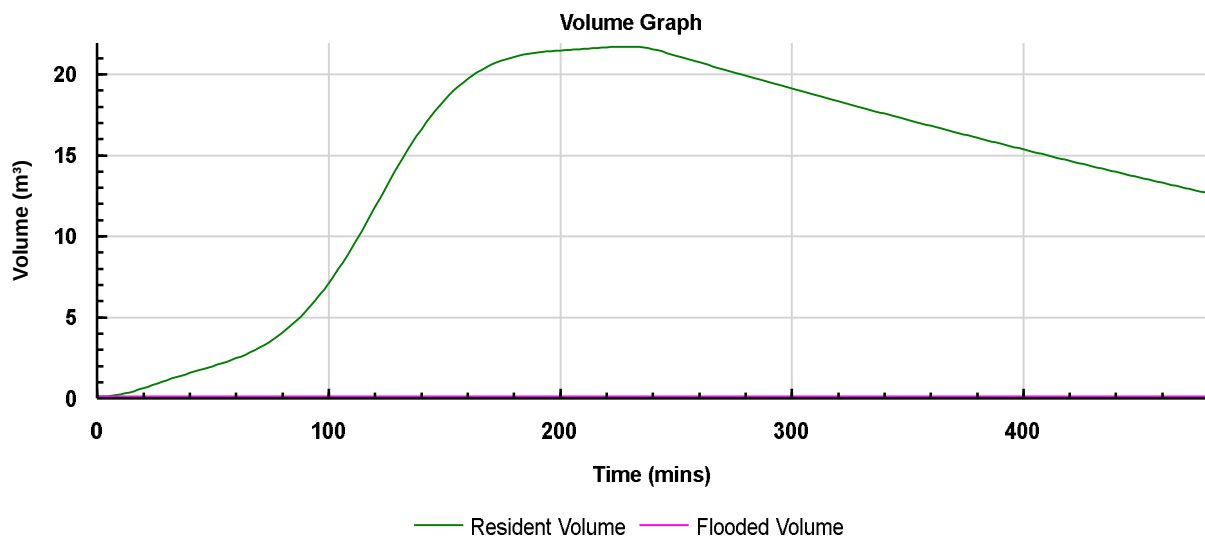
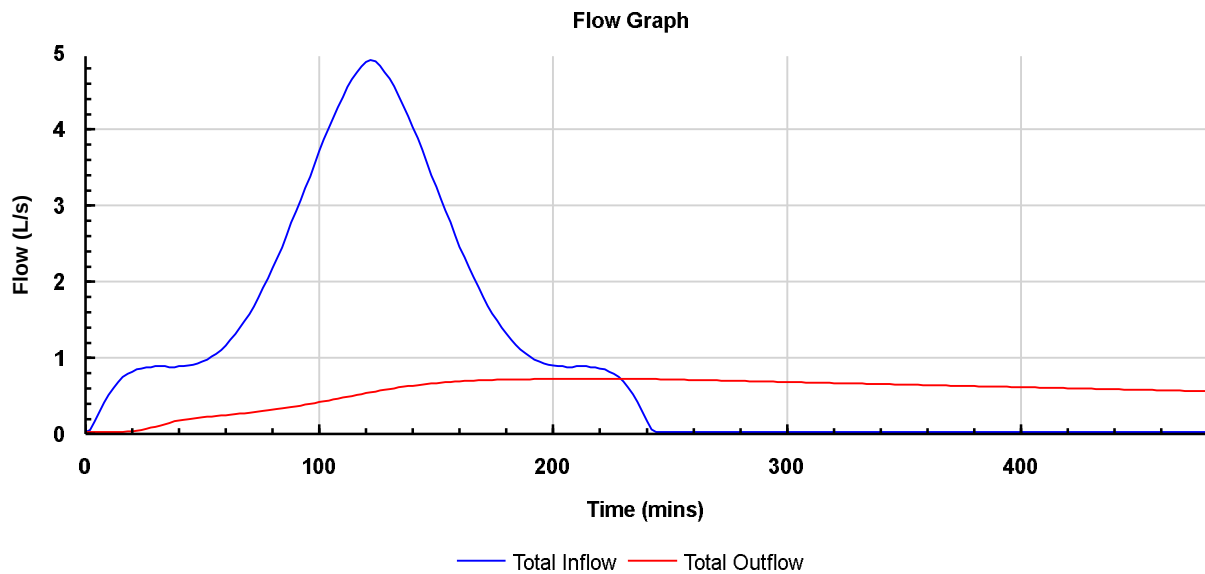
Project: WREXHAM		Date: 30/01/2023			
Drainage attenuation storage Greenfield Runoff		Designed by: WHR	Checked by: DH		Approved By: DH
Report Details: Type: Stormwater Control Results Storm Phase: Phase		Company Address: AECOM 1 Tanfield Edinburgh EH3 5DA			



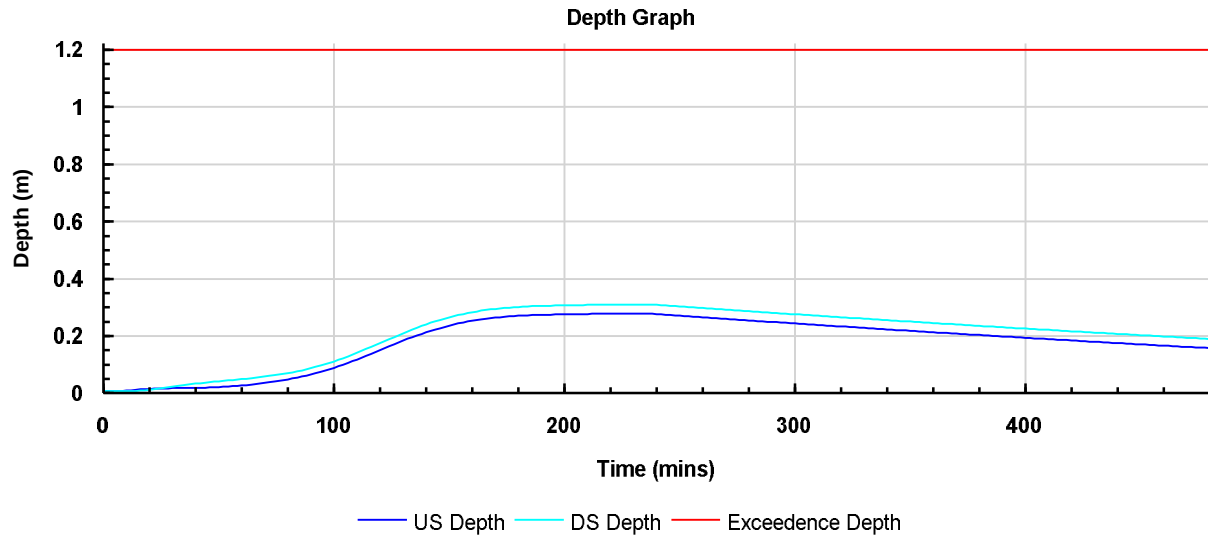
Porous Paving
Critical Storm: FEH: 100 years: Increase Rainfall (%): +0: 240 mins: Winter

Type : Porous Paving

Graphs



Project: WREXHAM Drainage attenuation storage Greenfield Runoff	Date: 30/01/2023			
	Designed by:	Checked by:	Approved By:	
	WHR	DH	DH	
Report Details:			Company Address:	
Type: Stormwater Control Results Storm Phase: Phase	AECOM 1 Tanfield Edinburgh EH3 5DA			



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