



Rossendale BESS Drainage Strategy

For Cubico UK Developments Ltd

Date 25 March 2025

Doc ref 34779-HYD-XX-XX-RP-D-0001

Document control sheet

Issued by	Hydrock, now Stantec 100 Barbirolli Square Manchester United Kingdom M2 3AB	T +44 (0)161 2458900 E manchestercentral@hydrock.com
Client	Cubico UK Developments Ltd	
Project name	Rossendale BESS	
Title	Drainage Strategy	
Doc ref	34779-HYD-XX-XX-RP-D-0001	
Project number	34779	
Status	Preliminary	
Date	25/03/2025	

Document production record

Issue number	P1	Name
Prepared by	Jay Kara, Civil Engineer	
Checked by	Chloe Fell, Principal Engineer	
Approved by	Neil Byrne, Technical Director	

Document revision record

Issue number	Status	Date	Revision details
P1	Preliminary	25/03/2025	First Issue

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

Contents

Executive Summary	1
1. Introduction	2
1.1 Development Context	2
1.2 Flood Risk	2
2. Development Description and Location	4
2.1 Site Location	4
3. Drainage Strategy	6
3.1 Existing surface water runoff	6
3.2 Infiltration	6
3.3 Sustainable Drainage Systems (SuDS)	6
3.4 Prevention and Source Control - Principles and Objectives	7
3.5 Surface Water Drainage Strategy	14
3.6 Water Quality	15
3.7 Foul Drainage Strategy	16
3.8 Management, Maintenance and Residual Risk	16

Tables

Table 1: Site referencing information	4
Table 2: SuDS Considerations	13
Table 3: Pollution Hazard Levels from CIRIA C753	15
Table 4: Mitigation Indices from CIRIA C753	15
Table 5: Drainage Maintenance	17

Figures

Figure 1: Fluvial flood risk map	2
Figure 2: Surface water flood risk map	3
Figure 3: Site location	5

Appendices

Appendix A	Site plans
Appendix B	Topographical survey
Appendix C	HR Wallingford GFR
Appendix D	Proposed Drainage Strategy
Appendix E	Hydraulic Calculations

Executive Summary

The proposed development consists of the construction, management and operation of a Battery Energy Storage System (BESS) with associated infrastructure, including access, drainage, security measures and landscaping and provision of a connecting cable to Croston Close Road substation. The proposed development is to be built on an existing area of grassland (BLO ORT), located west of Rochdale Road (A680), with Bamford Road to the South.

Although the planning boundary provides an area of 5.33ha, the total drained area covered within this report is 1.45ha. The surface water drainage hierarchy has been considered and the preferred drainage solution for disposal of surface water is to discharge to the nearest watercourse, Cheesden Brook, located approximately 200m southeast of the sites boundary, at a restricted rate of 19 L/s.

The use of Sustainable Drainage Systems (SuDS) has been considered. Pollution prevention and site control methods will be utilised prior to outfall.

Pollution treatment measures will be provided in the form of an attenuation pond and silt traps on drainage elements which will filter and trap silt and debris and mitigate against the risk of pollution entering the sewer network.

All drainage elements will be regularly maintained by a nominated management company on behalf of the client/occupier.

Foul water drainage is not required for this development.

1. Introduction

1.1 Development Context

This report has been prepared by Hydrock now Stantec on behalf of Cubico UK Developments Ltd. The proposed development consists of the construction, management and operation of a Battery Energy Storage System (BESS) with associated infrastructure, including access, drainage, security measures and landscaping and provision of a connecting cable to Croston Close Road substation. The proposed development is to be built on an existing area of grassland (BL0 0RT), located west of Rochdale Road (A680), with Bamford Road to the South. (See appendix A).

The site is 'greenfield.'

1.2 Flood Risk

- 1.2.1 Figure 1 below shows an extract from the UK Government flood map for planning service. It can be seen that the proposed development falls into Flood Zone 1, which has a low probability of flooding from rivers and the sea. Figure 2 below shows that the proposed development has no risk of flooding from surface water. A flood risk assessment has been conducted by Hydrock now Stantec (34779-HYD-XX-XX-RP-WENV-0001) which concludes that the proposals are safe and appropriate and do not increase flood risk.

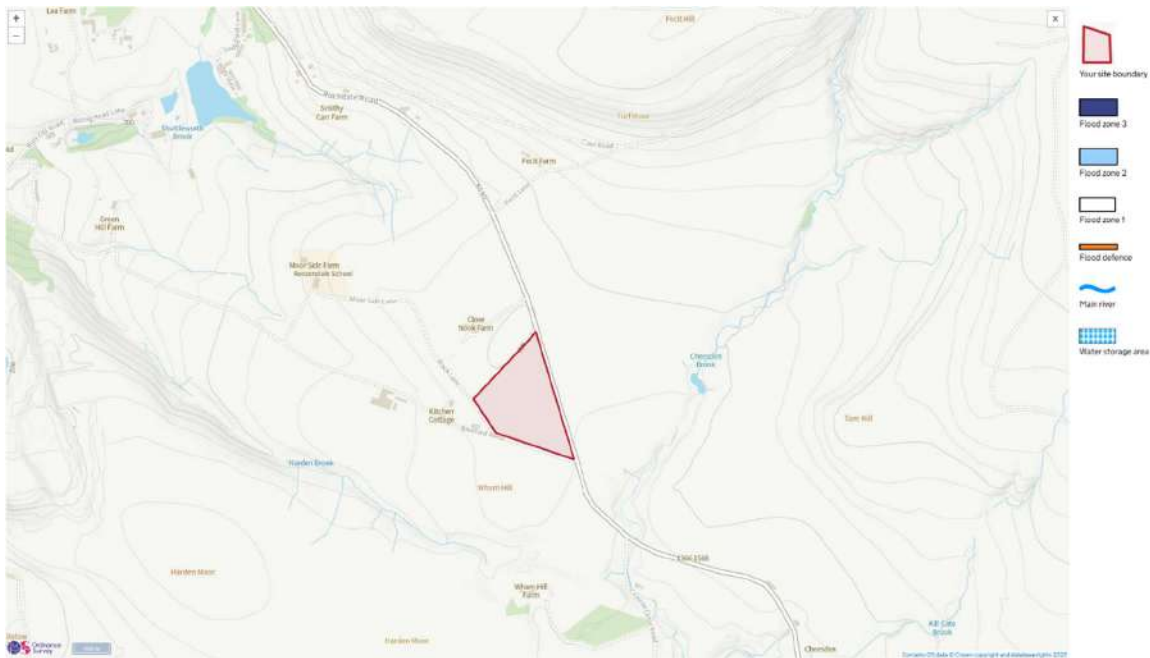


Figure 1: Fluvial flood risk map

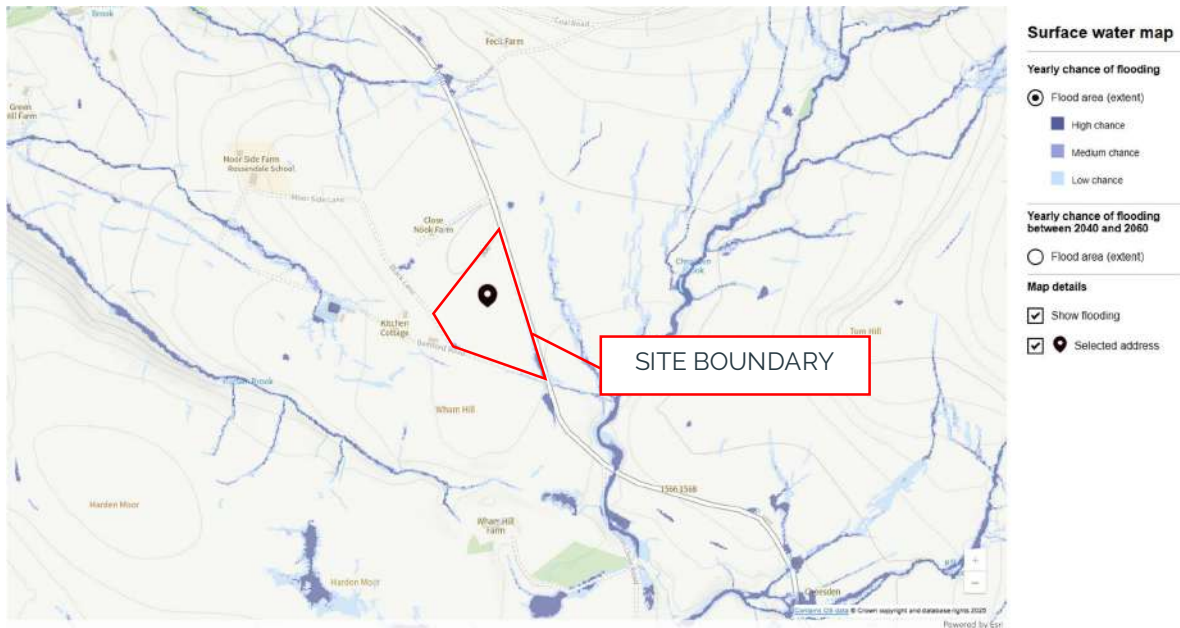


Figure 2: Surface water flood risk map

- 1.2.2 Figure 2 shows medium/high risk of surface water flooding in small areas of the site. The existing areas of surface water flooding are localised depressions within the site, no flow paths exist through the site. The provision of a new surface water drainage system and reprofiling of the levels will remove this flooding risk.

2. Development Description and Location

2.1 Site Location

2.1.1 This site is referenced in Table 1, and a location plan is provided in Figure 3.

Site Referencing Information	
Site Name	Rossendale BESS
Site Address & Location	Bamford Road, Ramsbottom, Bury, BL0 0RT
Council Area	Lancashire County Council
Approximate Grid Reference	382000E, 426908N
Site Area	The total site area is 5.33ha, of which 1.45ha is drained area.
Boundaries & Surrounding Land	The site is bound by private land to the north, Rochdale Road (A680) to the east, Bamford Road to the South and Black Lane/Private Land to the west.
Existing Land Use and Access	The site is currently grassland
Elevation and Topography	A topographical survey has been undertaken and indicates that the existing grassland falls Northwest to Southeast, from a level of ~299.32m AOD to ~290.30m AOD. See Appendix B for the full topographical survey.
Development Proposals	The proposed development consists of the construction, management and operation of a Battery Energy Storage System (BESS) with associated infrastructure, including access, drainage, security measures and landscaping and provision of a connecting cable to Croston Close Road substation.
Vehicular access	There is one point of vehicular access, along the eastern boundary of the site, located off Rochdale Road

Table 1: Site referencing information



Figure 3: Site location

3. Drainage Strategy

3.1 Existing surface water runoff

- 3.1.1 The existing site is grassland, consisting of permeable area and is therefore considered to be greenfield.'
- 3.1.2 The existing site currently free discharges via infiltration into the ground and there are no existing drainage structures present within the site's boundary. The proposed development runoff will be attenuated before discharging into the Cheesden Brook watercourse, located approximately 200m Southeast of the site's boundary.
- 3.1.3 The greenfield run off rate has been calculated using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com
- 3.1.4 The total greenfield runoff rate for the proposed development is 19l/s based on Qbar. (see Appendix C)
- 3.1.5 Although the planning boundary provides an area of 5.33ha, the proposed drained area of the site is to be approximately 1.45ha. This is what has been considered when calculating the greenfield run off rate of the site.

3.2 Infiltration

- 3.2.1 A Phase 1 Ground Conditions Desk Study completed by Hydrock now Stantec (34779-HYD-XX-XX-RP-GE-0001) suggests that the site has low infiltration values based on data gathered from the British Geological Survey, the Environment Agency and Natural Resources Wales.
- 3.2.2 The report also highlighted that northwestern side of the site is permeable, with the rest of the site (where the development is located) being impermeable. As the development is located at a lower elevation to where the permeable ground is, a pumping station would be required to pump surface water run off to a soakaway. Therefore, this solution has been discounted.
- 3.2.3 Additionally, it has been suggested that further soil infiltration rate testing will be required as part of the further works. Therefore, for this application, it has been assumed that infiltration is not feasible for this site.

3.2.4

3.3 Sustainable Drainage Systems (SuDS)

- 3.3.1 Sustainable drainage developed in line with the ideals of sustainable development is collectively referred to as Sustainable Drainage Systems (SuDS). At a particular site, these systems are designed to manage both the environmental risks resulting from the urban runoff and to contribute, wherever possible, to environmental enhancement. Therefore, SuDS objectives are to minimise the impacts from the development on the quantity and quality of the runoff and maximise amenity and biodiversity opportunities (CIRIA C753, 2015).
- 3.3.2 SuDS help to mimic the natural flow of water ensuring that both the quantity and quality of the surface water is dealt with before feeding it into the drainage network. SuDS features usually come with added maintenance; however, the benefits they reap are considered to

outweigh this. The selection of the most appropriate SuDS features should consider constraints, requirements and maintenance of the site. It should be remembered that Local Planning Authorities expect SuDS to be investigated on construction projects. The implementation of SuDS features can assist in achieving the drainage requirements set out in the National Planning Policy Framework.

- 3.3.3 A strong design theme is essential if maximum aesthetic benefits are to be gained from the SuDS approach. At a more local scale SuDS should link with the individual plot structure, planting and amenity areas, gaining multiple benefits from a limited area of land.
- 3.3.4 The 'Management Train Approach' should be central to the surface water drainage strategy of a proposed site. The main objective is the treatment and control of runoff as near to source as possible, thus protecting downstream habitats and further enhancing the amenity value of the site. This concept uses a hierarchy of drainage techniques to incrementally reduce pollution, flow rates and volumes of storm water discharge from the site, and is as follows:
 - » Prevention - The use of good site design and housekeeping measures to prevent runoff and pollution (e.g. rainwater re-use).
 - » Source Control - Control of runoff at source or as close to source as possible (e.g. soakaways, green roofs, pervious pavements).
 - » Site Control - Management of water in a local area (e.g. ground storage/attenuation, detention ponds/basins).
 - » Regional Control - Management of water from a site or various sites (e.g. wetlands, balancing ponds).
- 3.3.5 The SuDS philosophy for a development site is the promotion of Pollution Prevention and Site Control Techniques. The following design philosophy is proposed:
 - » Surface water treatment using the 'Management Train' approach to remove and isolate contamination at all SuDS facilities prior to conveyance.
 - » Surface water discharge into the Cheesden Brook Watercourse.
 - » Site Control features (attenuation) to accommodate the additional surface water runoff generated by the development site before discharging into the watercourse.
 - » Aim to limit, where possible, the impermeable fraction of development.
- 3.3.6 It is proposed that the development site has one level of treatment. The use of an attenuation pond is considered as the only level of treatment. Due to spatial constraints, the use of raingardens, permeable paving, swales etc. are not considered feasible.
- 3.3.7 A review of the possible SuDS solutions that are feasible include: Refer to Table 2 below for SuDS Considerations for this proposed development.
 - » Attenuation Pond

3.4 Prevention and Source Control - Principles and Objectives

- 3.4.1 The main objective of prevention and source control is the treatment and control of runoff as near to source as possible. Application of these techniques will require reduction of impermeable areas and techniques to restrict the runoff rates.

- 3.4.2 Prevention measures to be considered, where possible, as part of the overall approach to the management train at this site include rainwater harvesting. Typical examples are given in the SuDS Manual (Ciria C697) and are briefly described in Table 2 below. It must be noted that the effectiveness of each system is dependent on the final design as well as the actual site conditions.

SuDS Group	Technique	Image	Description	Advantages	Disadvantages	Suitable for use on site?
Retention	Balancing Pond/Swale		Provides both storm water attenuation and treatment. Run-off from each rain event is detained and treated in the pool. The retention time promotes pollutant removal through sedimentation.	Good removal of pollutants, can be used where groundwater is vulnerable, good community acceptability, high ecological, and amenity benefits.	No reduction in run-off volume, land take may limit use in high density sites.	Can be used
	Sub-Surface Attenuation		Oversized pipes, tank systems and modular geo-cellular systems that can be used to create a below ground storage structure.	Modular and flexible, dual usage (infiltration/storage, high void ratios), can be installed beneath trafficked and soft landscaped areas.	No water quality treatment.	Not considered due to spatial constraints.
Infiltration	Infiltration Trench		Surface water run-off can be discharged directly to ground for infiltration by soakaways, basins, or trenches. A prerequisite is that both groundwater and ground conditions are appropriate to receive the quality and quantity of water generated.	Reduces the volume of run-off, effective at pollutant removal, contributes to groundwater recharge, simple and cost effective, easy performance observation.	Requires appropriate pre-treatment, basins require a large flat area, offset from foundations.	Infiltration is not considered to be feasible given the ground conditions.
	Infiltration Basin					
	Soakaway					

	Porous Paving		Block or porous paving allows run-off to infiltrate through to sub base layer. Water can then be infiltrated into ground or conveyed into storage or drainage systems.	Reduces the volume of run-off and if designed for infiltration contributes towards groundwater recharge. Easy to install and retrofit. Simple to manage. If lined can be used where groundwater is sensitive.	Not suitable for heavily trafficked areas or adoptable roads. Requires regular sweeping to prevent clogging with dirt.	Permeable Paving can be used however not required as pond provides sufficient attenuation
	Permeable Paving					
Detention	Detention Basin		Surface storage basins that provide flow control through attenuation. Normally dry and in certain situations the land may also function as a recreational facility.	Cater for a wide range of rainfall events, can be used where groundwater is vulnerable, potential for dual land use, easy to maintain.	Land take, little reduction in run-off volume, detention depths constrained by levels.	Unsuitable due to lack of available land.
	Enhanced Dry Swale		Swales are linear vegetated drainage features in which surface water can be stored or conveyed. They can be designed to allow infiltration, where appropriate.	Incorporate into landscaping, good removal of pollutants, reduces run-off rates and volumes, low cost.	Not suitable for steep areas, significant land take, not suitable in areas with roadside parking.	Unsuitable due to lack of available land.
	Enhanced Wet Swale					

Source Control	Rainwater Harvesting		Similar to the use of water butts this prevention method stores rainwater runoff from roofs and external areas in below ground tanks. The water can then be used for irrigation purposes to the soft landscaping areas or alternatively pumped to an internal storage tank where the 'Grey' water can be used for WC's and washing machines.	Harvested grey water will collect and automatically be used for various systems, such as toilet flushing, outside taps etc. The result will be less water usage and cheaper bills and a greener building or commercial premises.	Rainfall is hard to predict and sometimes little or no rainfall can limit the supply of rainwater. It also should have a "mains water" top up to ensure that you don't run out of water.	Rainwater reuse is not required for this site.
	Surface Sand Filter		Structures designed to treat surface water run-off through filtration using a sand bed filter medium. The filters can be designed with or without infiltration. Temporary storage of run-off is achieved through ponding above the filter layer. They are used where particularly high pollutant removal is required.	Flexibility of design, efficient in removing pollutants, suitable for retrofits and in tightly constrained urban locations.	Not for high sediment content, detention times can support algae growth, minimum hydraulic head of 1.2m required, possible odour problems, high capital and maintenance cost.	There is no requirement for high pollution reduction at this site.
Filtration	Sub-surface Sand Filter					
	Perimeter Sand Filter					

	Bioretention/ filter swale		Vegetated strips of land designed to accept run-off as overland sheet flow between a hard-surfaced area and a receiving system.	Landscaping features, effective in removing pollutants, flexible layout to fit into landscape, suited for highly impervious areas, good retrofit, capability, effective pre-treatment option.	Requires landscaping and management, large land required, not suitable for steep sites; no significant attenuation or reduction of flows.	No requirement for high pollution reduction; large land areas not available.
	Filter trench/drain		Shallow excavations filled with rubble or stone that create temporary subsurface storage for filtration of storm water run-off. Receive lateral inflow from an adjacent impermeable surface.	Hydraulic benefits achieved with filter trenches, trenches can be incorporated into site landscaping and fit well beside roads and car parks.	High clogging potential without effective pre-treatment, limited to small catchments, high cost of replacing filter material.	Filter drains not required as run off is attenuated and pollutants are removed via attenuation pond
Conveyance	Conveyance Swales		Formal linear drainage features in which surface water can be stored or conveyed. They can be	Negate the need for underground pipework. Can provide some	Potential trip/wheel hazard, disabled access issues.	Could be used where conveyance is required,

	Rills		incorporated with water features such as ponds or waterfalls where appropriate.	attenuation. Possible reduction in run-off volume via plant uptake and infiltration.		however kerb drains are preferred.
Wetland	Shallow Wetland		Wetlands provide storm water attenuation and treatment. They comprise shallow ponds and marshy areas, covered in aquatic vegetation. Wetlands detain flows for an extended period to allow sediments to settle and to remove contaminants. They can provide significant ecological benefits.	Good pollutant removal and if lined can be used where groundwater is vulnerable. Good community acceptability, ecological and amenity benefits.	Land take is high, requires base flow, little reduction in run-off volume, not suitable for steep sites.	Unsuitable due to lack of available land.
	Extended Detention Wetland					
	Pond Wetland					
	Pocket Wetland					
	Submerged Gravel Wetland					
	Wetland Channel					

Table 2: SuDS considerations

3.5 Surface Water Drainage Strategy

3.5.1 Surface Water Drainage Strategies must follow the hierarchy of surface water disposal as set out in Building Regulations - Approved Document H, as listed below;

- » **Option 1** - Into the ground (infiltration)
- » **Option 2** - To a watercourse
- » **Option 3** - To a public/private sewer

1.1.1 It has been assumed that Infiltration is not considered feasible based on Hydrock now Stantec report 34779-HYD-XX-XX-RP-GE-0001. Further testing is required to confirm this.

1.1.2 The closest watercourse is located approximately 200m southeast of the site. To discharge to this watercourse, a drainage run will be built within Rochdale Road (A680), with flow being restricted at a discharge rate of 19 l/s.

3.5.2 A hydraulic model has been created using drainage software as part of the preliminary drainage design, which defines pipe sizes and attenuation volumes. Hydraulic calculations have been provided in Appendix E. It is noted that these rates and volumes are preliminary and may change at detailed design stage when more specific information is available.

3.5.3 A climate change allowance of 40% has been applied.

3.5.4 The proposed drainage layout is designed in accordance with Design and Construction Guidance. No above ground flooding for the 1 in 30-year storm event should occur. An assessment of extreme storm event, the 100-year event plus 40% climate change has been carried out, which also has no exceedance/above ground flooding. See Appendix E for calculations.

3.5.5 As part of the drainage strategy, we are proposing the following:

- » The proposed drainage system will be a managed gravity system passing through an attenuation pond before discharging into the Cheesden Brook watercourse.
- » Surface water run off will be attenuated and discharged at a restricted flow rate of 19 l/s.
- » Pollution treatment measures will be provided in the form of an attenuation pond and silt traps on drainage elements which will filter and trap silts and debris and mitigate against the risk of pollution entering the sewer network.

3.6 Water Quality

- 3.6.1 The primary pollution control measure for the development will be in the form of an attenuation pond. Further pollution control will be provided in the form of silt traps.
- 3.6.2 The site includes internal roads which will be used by maintenance vehicles once a month. Therefore, the proposed development is assumed to have low pollution hazard levels in accordance with CIRIA C753 table 3 as below.

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

Table 3: Pollution Hazard Levels from CIRIA C753

- 3.6.3 Appropriate SuDS mitigation indices will be provided for each area of the development in accordance with CIRIA C753 table 4 as below.

Type of SuDS component	Mitigation indices ¹		
	TSS	Metals	Hydrocarbons
Filter strip	0.4	0.4	0.5
Filter drain	0.4 ²	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention system	0.8	0.8	0.8
Permeable pavement	0.7	0.6	0.7
Detention basin	0.5	0.5	0.6
Pond ⁴	0.7 ³	0.7	0.5
Wetland	0.8 ³	0.8	0.8
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Table 4: Mitigation Indices from CIRIA C753

- 3.6.4 Therefore, using the CIRIA C753 table 26.3 as above, the indicative SuDS mitigation indices are 0.7 TSS, 0.7 Metals and 0.5 Hydrocarbon based on the attenuation pond, which is more than the pollution hazard levels for this development. It is anticipated that during construction adequate provisions will be put in place to ensure that any construction silts, spillages will be prevented from the entering the downstream drainage network. This will be included in the Construction Environmental Management Plan (CEMP).

3.7 Foul Drainage Strategy

- 3.7.1 There is no foul water drainage required for this development.

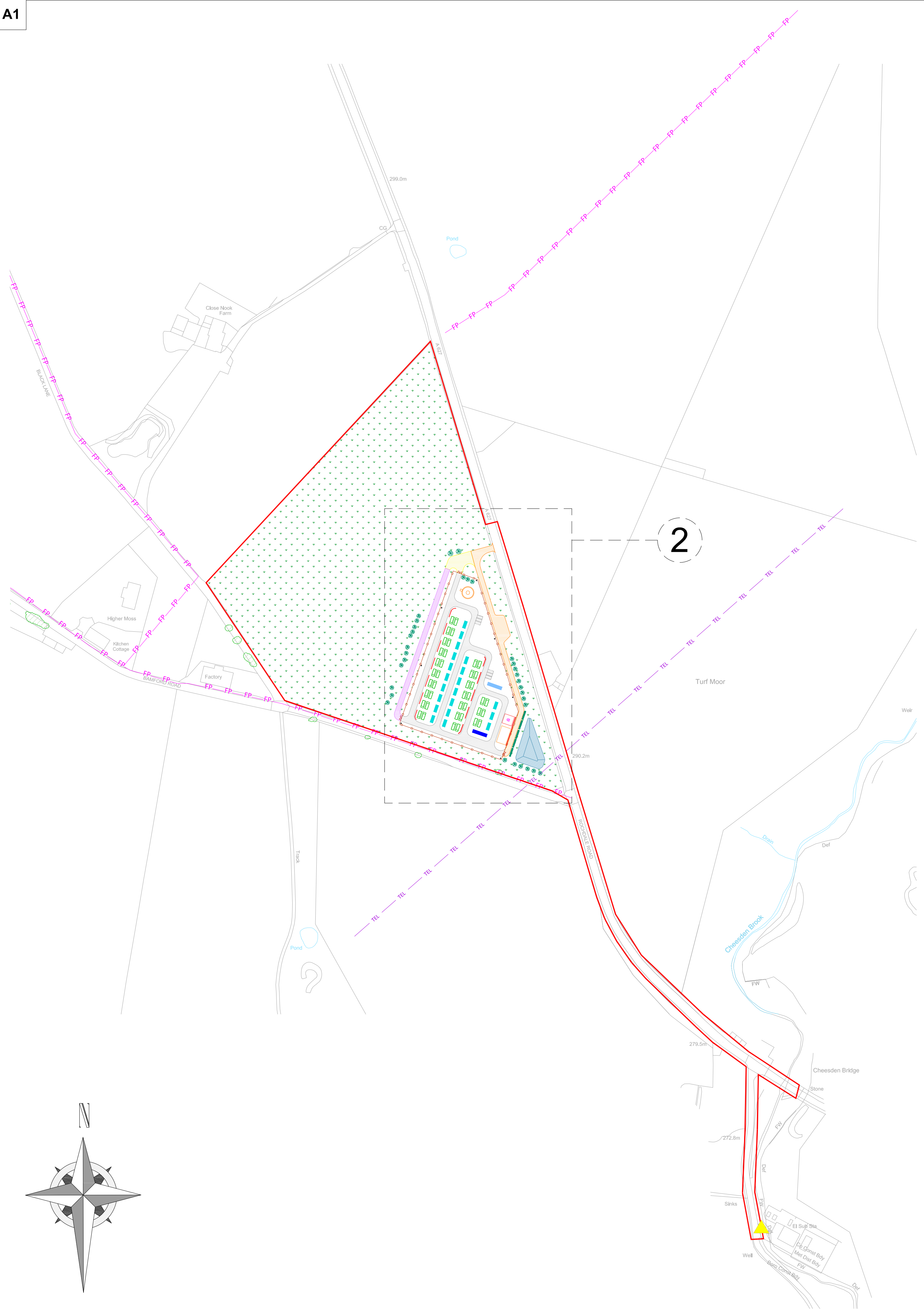
3.8 Management, Maintenance and Residual Risk

- 3.8.1 The proposed drainage layout will be designed in accordance with building regulations. SuDS guidance will be taken from Ciria C753.
- 3.8.2 Run-off from roads and other external areas will be managed via an attenuation pond.
- 3.8.3 A private management company will maintain the drainage infrastructure as part of a site-wide management and maintenance schedule as shown in Table 5.
- 3.8.4 Access and egress arrangements to and from the new development, should exceedance flooding occur, will be via the proposed access road located east of the site, from Rochdale Road (A680).
- 3.8.5 Flood risk to people and property can be managed but it can never be completely removed. Residual risk remains after flood management or mitigation measures have been put in place. This relates to a rainfall event beyond what can be fully quantified.

Item	Maintenance	Frequency per year
Surface Water Manholes, Flow Controls	As Above All catch pits/Vortex Separators to have silt/solid accumulation removed & base jetted clean.	1
Drainage Channels	All catch/access pits to have silt/solid accumulation removed. Channel run to be jetted through between access points. Any channel grates to be inspected for damage & replaced as necessary.	2
Attenuation Pond	Remove litter and debris, Cut Grass – for access routes and around basin, manage other vegetation and nuisance plants, Inspect inlets and outlets for blockages – clear if required. Inspect Banksides, structures, pipework for evidence of physical damage, Inspect inlets and facility surface for silt accumulation.	12

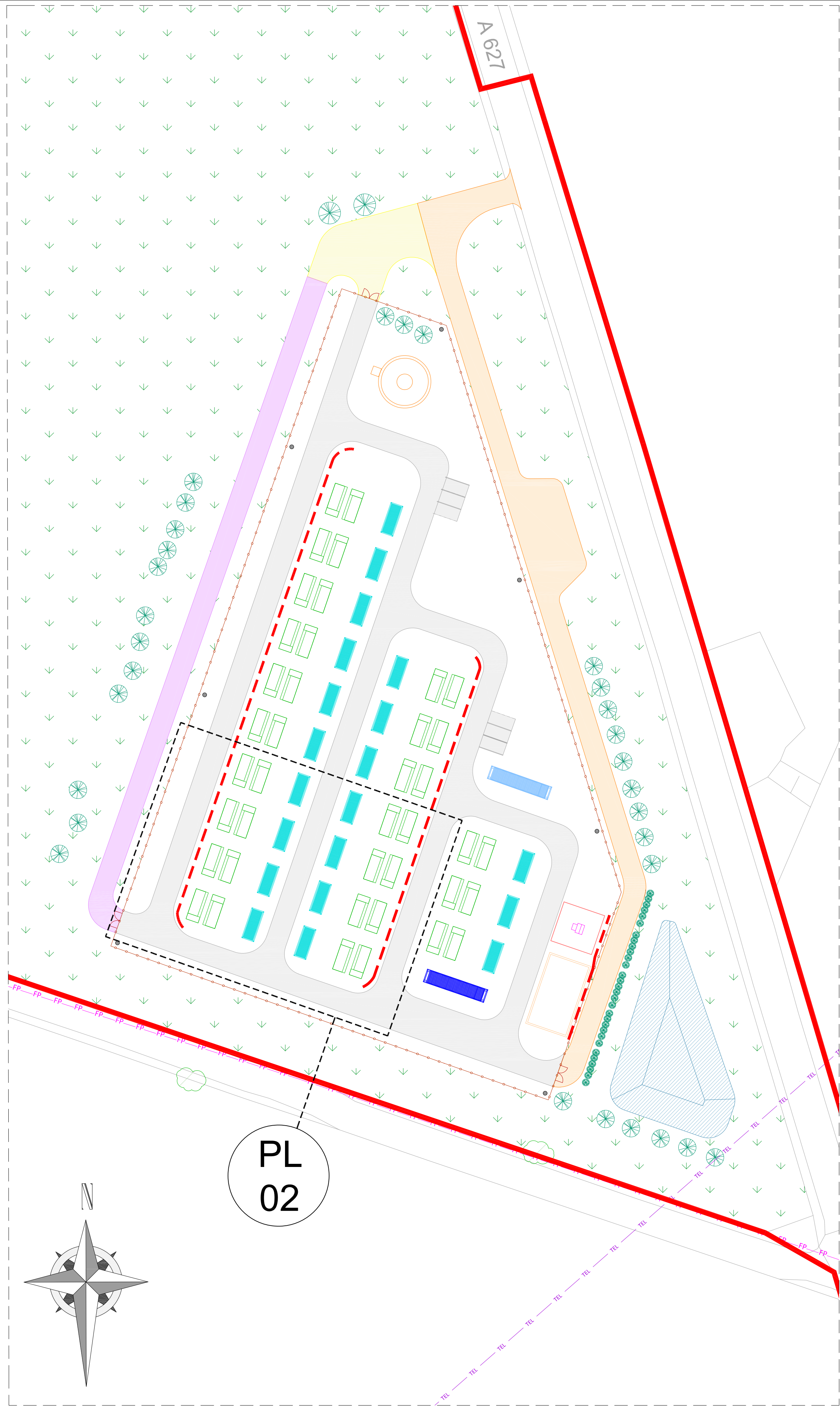
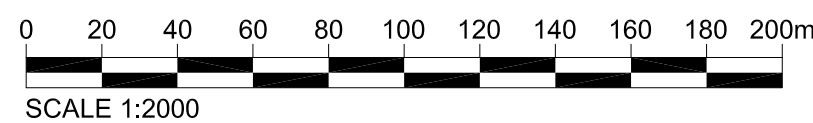
Table 5: Drainage maintenance

APPENDIX A



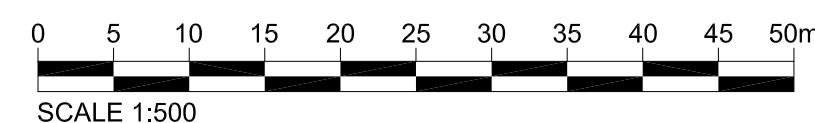
PROPOSED SITE LAYOUT PLAN (OVERALL)

Scale: 1:2000@A1



PROPOSED SITE LAYOUT PLAN (BESS)

Scale: 1:500@A1



This drawing is the copyright of Cubico Sustainable Investments LTD and must not be reproduced in whole or in part or used in any manner without their written permission.
Scaled dimensions must not be taken from this drawing. All dimensions are to be confirmed on site prior to commencement of work.

Revisions:

Revision	Date	Revision Notes	Drawn	Inspected
01	13.12.24	First Issue	OM	PR
02	18.12.24	BNG Area Added, RLB Amended	OB	PR
03	27.02.25	Technology Changed	RR	PR
04	06.03.25	Layout, Legend & Title Updated	RL	PR

LEGEND:

WATER COURSE	BOUNDARY
DNO ACCESS ROUTE	SITE ACCESS
INTERNAL ACCESS	EMERGENCY ACCESS
2.4m HIGH WIRE MESH PERIMETER FENCELINE	EXISTING PROW
EXISTING TELECOMS	RETAINING WALL

SITE INFRASTRUCTURE:

SECURITY GATE	240,000L WATER TANK
33kV SUBSTATION	WATER HYDRANT
BATTERY UNIT	CCTV CAMERA
TRANSFORMER	AUX TRANSFORMER
CUSTOMER SWITCHGEAR	ATTENUATION POND
SPARE PARTS CONTAINER	POC

VEGETATION:

EXISTING VEGETATION	BNG AREA	PROPOSED VEGETATION
---------------------	----------	---------------------

Status:

PLANNING

Project:

Rossendale BESS
Rochdale Road, Turn Village

Client:

Cubico
SUSTAINABLE INVESTMENTS
Tel: 020 3805 3800
www.cubicoinvest.com

Drawn by:

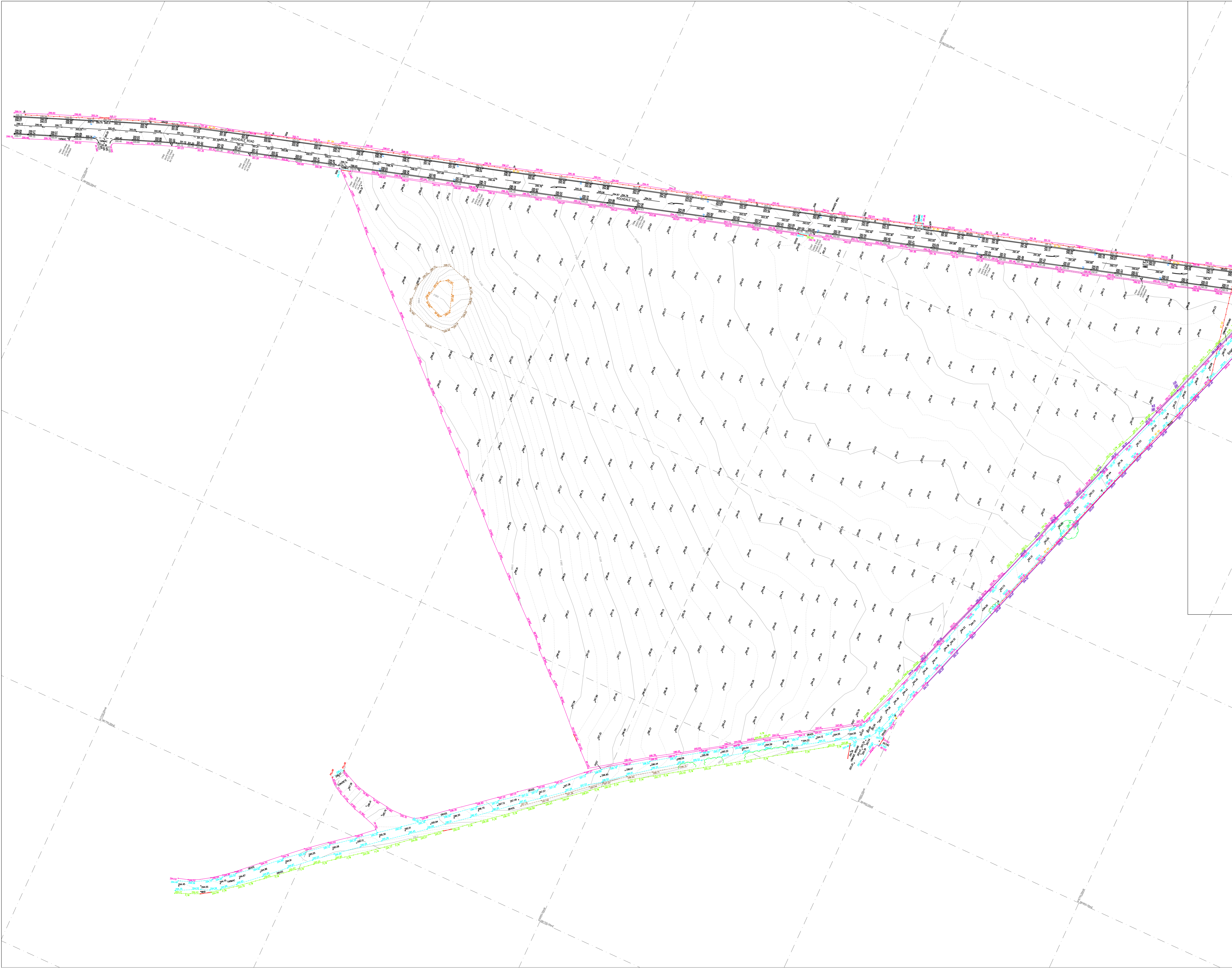
CADmando
2D, 3D CAD & BIM SERVICES
CADmando Design & Draughting Solutions Ltd
Unit B2, The Courtyard, Sevens Drive, Tewkesbury Business Park, GL20 0SD
Tel: +44 (0) 1684 850019
Mob: +44 (0) 7914438910

Drawing Title:

**Rossendale BESS - Indicative
Proposed Site Layout Plan**

Drawn: OM	Checked: PR	First Issued: 13.12.2024
Project Code: CUB001-	Drawing Number: PL-03	
Sheet Size: A1	Scale: A.N	Revision: 04

APPENDIX B



Site Grid North

Symbols/Abbreviations (Where Applicable):

+AV: AIR VALVE

+BB: BELISHA BEACON

+BH: BOREHOLE

+BM: BENCH-MARK

+BOL: BOLLARD

+B/S: BUS STOP

+CAM: CAMERA

+CS: CABLE STAY

+CATV: CATV INSPECTION CHAMBER

+CBOX: ELECTRICITY BOX, CABLE BOX, ETC.

+CCTV: C.C.T.V. CAMERA

+C-FIT: CATCH PIT

+EC: ELECTRICITY COVER

+EP: ELECTRICITY POLE

+ER: EARTH ROD

+FH: FIRE HYDRANT

+FP: FLAG POLE

+G: GULLY

+G: GULLY (ROUND)

+GV: GAS VALVE

+IC: INSPECTION COVER (SQUARE)

+IC: INSPECTION COVER (ROUND)

+IL: INVERT LEVEL

+KO: KERB OUTLET

+LB: LETTER BOX

+LC: LIGHTING COLUMN

+LP: LAMP POST

+LP/BS: LAMP POST/BUS STOP

+MH: MANHOLE (SQUARE)

+MH: MANHOLE (ROUND)

+MKR: MARKER

+O.P: POST

+RE: RUDDING EYE

+R/S: ROAD SIGN

+S/P: SIGN POST

+SNP: STREET NAME PLATE

+ST: STOP TAP

+SV: STOP VALVE

+TCB: TELEPHONE CALL BOX

+TL: TRAFFIC LIGHT

+TP: TELEGRAPH POLE

+TP/EP: TELEGRAPH POLE/ELECTRIC POLE

+T/C: TELECOM INSPECTION COVER

+WO: WATER OUTLET

+WM: WATER METER

+GATE: GATE

+X: DEFINED POINT

+C: CONTROL POINT

+T: TREE (CONIFEROUS)

+D: TREE (DECIDUOUS)

+F: FOLIAGE

+H: HEDGE

+DPC 99.99m: DAMP PROOF COURSE LEVEL

+EL 99.99m: EAVES LEVEL

+FL 99.99m: FLOOR LEVEL

+RL 99.99m: RIDGE LEVEL

+SL 99.99m: SOFFIT LEVEL

+TL 99.99m: THRESHOLD LEVEL

FENCE DESCRIPTIONS:

B/W: BARBED WIRE FENCE

C/B: CLOSE BOARDED FENCE

C/L: CHAIN LINK FENCE

C/P: CHESTNUT PALING FENCE

CONC/P: CONCRETE PANEL FENCE

I/R: IRON RAILING FENCE

P/R: POST AND RAIL FENCE

P/W: POST AND WIRE FENCE

P/C: POST AND CHAIN FENCE

S/PAL: STEEL PALISADE FENCE

S/B: SAFETY BARRIER

T/PAL: TIMBER PALISADE FENCE

SITE LAYOUT:

Revision Information

Rev	Date	Description

INFORMATION

1) Ordnance Survey co-ordinates and level are derived from OSTN15 and OSGM15, transformed from WGS84.

2) Only services located during the site survey are shown on this plan. Further investigation may be required to ascertain the full extent of the site services.

3) Copyright of this drawing remains the property of PM Surveys UK Ltd. Do not scale from this drawing. In the event of any discrepancy, refer query to PM Surveys UK Ltd.

NOTES

PM Surveys UK Ltd

Unit 3, Queensferry Industrial Estate

Pentre

Flintshire, CH5 2DJ

Tel: 01244 952477

Email: info@pmsurveys.co.uk

Client Info

Cubico

Arrive, Blue Building

Media City UK

Salford

Tel: Joe.Chambers@cubicoinvest.com

Project

A680 Rossendale Road

Cheesden

Project No

PMS24131

Sheet

A0

Scale

1:500

Surveyed By

TW KR

Drawn By

JW

Approved By

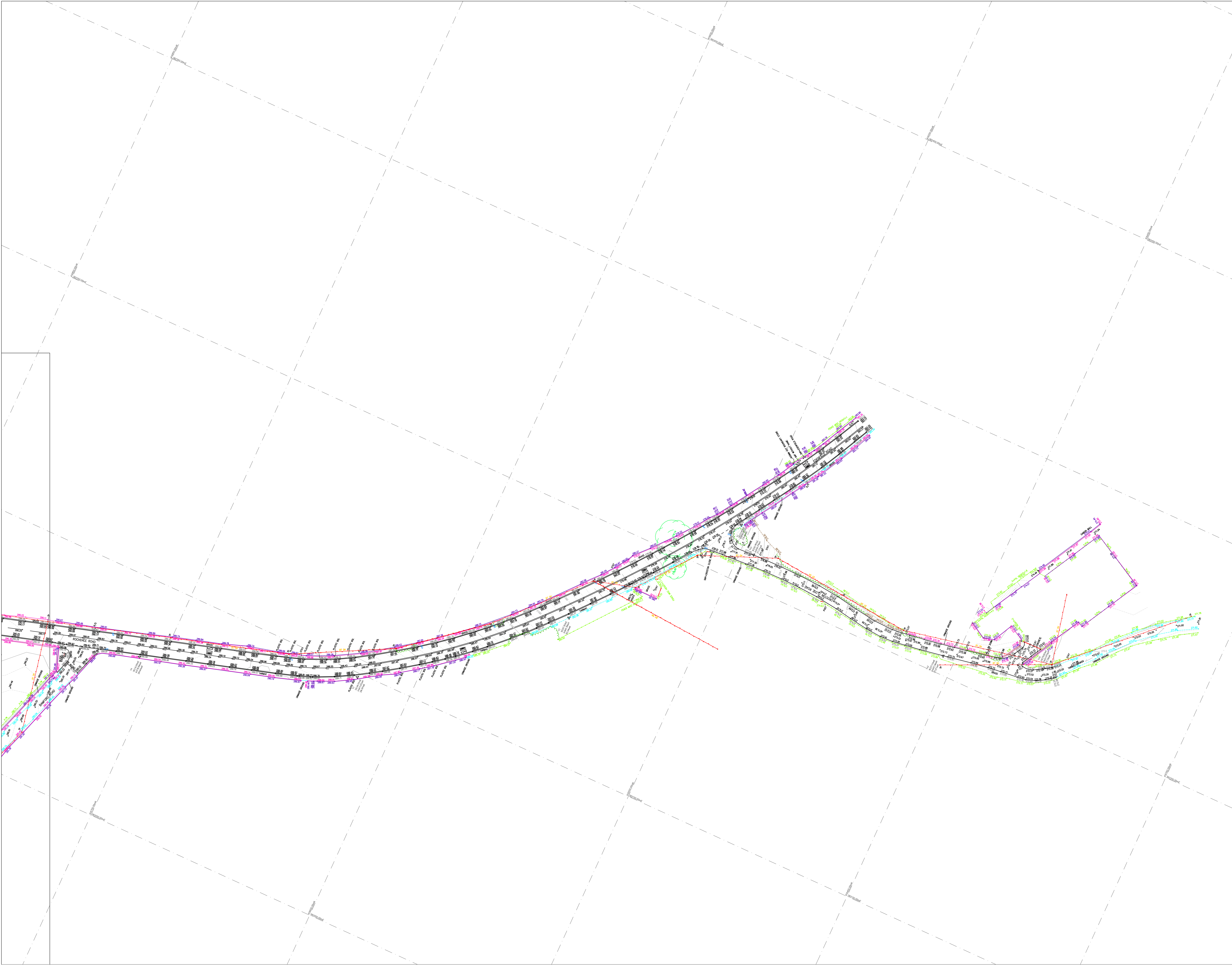
PM

Dwg

PMS24131-01

Issued

18/07/24



Site Grid North

Symbols/Abbreviations (Where Applicable):

+AV: AIR VALVE

+BB: BELISHA BEACON

●BH: BOREHOLE

+BM: BENCHMARK

○BOL: BOLLARD

+CAM: CAMERA

+CS: CABLE STAY

○CATV: C.A.T.V INSPECTION CHAMBER

+CBOX: ELECTRICITY BOX, CABLE BOX, ETC.

+CCTV: C.C.T.V CAMERA

+C.PIT: CATCH PIT

□EC: ELECTRICITY COVER

○EP: ELECTRICITY POLE

+ER: EARTH ROD

+FH: FIRE HYDRANT

○FP: FLAG POLE

□G: GULLY

○G: GULLY (ROUND)

+GV: GAS VALVE

□IC: INSPECTION COVER (SQUARE)

○IC: INSPECTION COVER (ROUND)

+IL: INVERT LEVEL

+KO: KERB OUTLET

○LC: LETTER BOX

○LP: LAMP POST

○LP/BS: LAMP POST/BUS STOP

□MH: MANHOLE (SQUARE)

○MH: MANHOLE (ROUND)

+MKR: MARKER

○P: POST

+RE: RUDDING EYE

+R/S: ROAD SIGN

+S/P: SIGN POST

+SNP: STREET NAME PLATE

+ST: STOP TAP

+SV: STOP VALVE

+TCB: TELEPHONE CALL BOX

+TL: TRAFFIC LIGHT

○TP: TELEGRAPH POLE

○TP/EP: TELEGRAPH POLE/ELECTRIC POLE

+T/C: TELECOM INSPECTION COVER

+WO: WATER OUTLET

+WM: WATER METER

✕: GATE

✕: DEFINED POINT

△: CONTROL POINT

△: TREE (CONIFEROUS)

△: TREE (DECIDUOUS)

■: FOLIAGE

■: HEDGE

DPC 99.99m: DAMP PROOF COURSE LEVEL

EL 99.99m: EAVES LEVEL

FL 99.99m: FLOOR LEVEL

RL 99.99m: RIDGE LEVEL

SL 99.99m: SOFFIT LEVEL

TL 99.99m: THRESHOLD LEVEL

FENCE DESCRIPTIONS:

B/W: BARBED WIRE FENCE

C/B: CLOSE BOARDED FENCE

C/L: CHAIN LINK FENCE

C/P: CHESTNUT PALING FENCE

CONC/P: CONCRETE PANEL FENCE

I/R: IRON RAILING FENCE

P/R: POST AND RAIL FENCE

P/W: POST AND WIRE FENCE

P/C: POST AND CHAIN FENCE

S/PAL: STEEL PALISADE FENCE

S/B: SAFETY BARRIER

T/PAL: TIMBER PALISADE FENCE

SITE LAYOUT:

Revision Information

Rev	Date	Description

INFORMATION

1) Ordnance Survey co-ordinates and level are derived from OSTN15 and OSGM15, transformed from WGS84.

2) Only services located during the site survey are shown on this plan. Further investigation may be required to ascertain the full extent of the site services.

3) Copyright of this drawing remains the property of PM Surveys UK Ltd. Do not scale from this drawing. In the event of any discrepancy, refer query to PM Surveys UK Ltd.

NOTES

PM SURVEYS UK

PM Surveys UK Ltd

Unit 3, Queensferry Industrial Estate

Pentre

Flintshire, CH5 2DJ

Tel: 01244 952477

Email: info@pmsurveys.co.uk

Client Info

Cubico

Arrive, Blue Building

Media City UK

Salford

Tel:

Email: Joe.Chambers@cubicoinvest.com

Project

A680 Rossendale Road

Cheesden

Project No

PMS24131

Sheet: A0

Scale: 1:500

Surveyed By: TW KR

Drawn By: JW

Approved By: PM

Dwg

PMS24131-02

Issued: 18/07/24

APPENDIX C

Calculated by: Jay Kara

Site name: Higher Moss

Site location: BL0 0RT Ramsbottom

Site Details

Latitude: 53.64799° N

Longitude: 2.27326° W

Reference: 2974538593

Date: Nov 20 2024 16:09

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Runoff estimation approach

IH124

Site characteristics

Total site area (ha): 1.45

Methodology

Q_{BAR} estimation method: Calculate from SPR and SAAR

SPR estimation method: Calculate from SOIL type

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

Soil characteristics

	Default	Edited
SOIL type:	5	5
HOST class:	N/A	N/A
SPR/SPRHOST:	0.53	0.53

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

Hydrological characteristics

	Default	Edited
SAAR (mm):	1317	1317
Hydrological region:	10	10
Growth curve factor 1 year:	0.87	0.87
Growth curve factor 30 years:	1.7	1.7
Growth curve factor 100 years:	2.08	2.08
Growth curve factor 200 years:	2.37	2.37

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

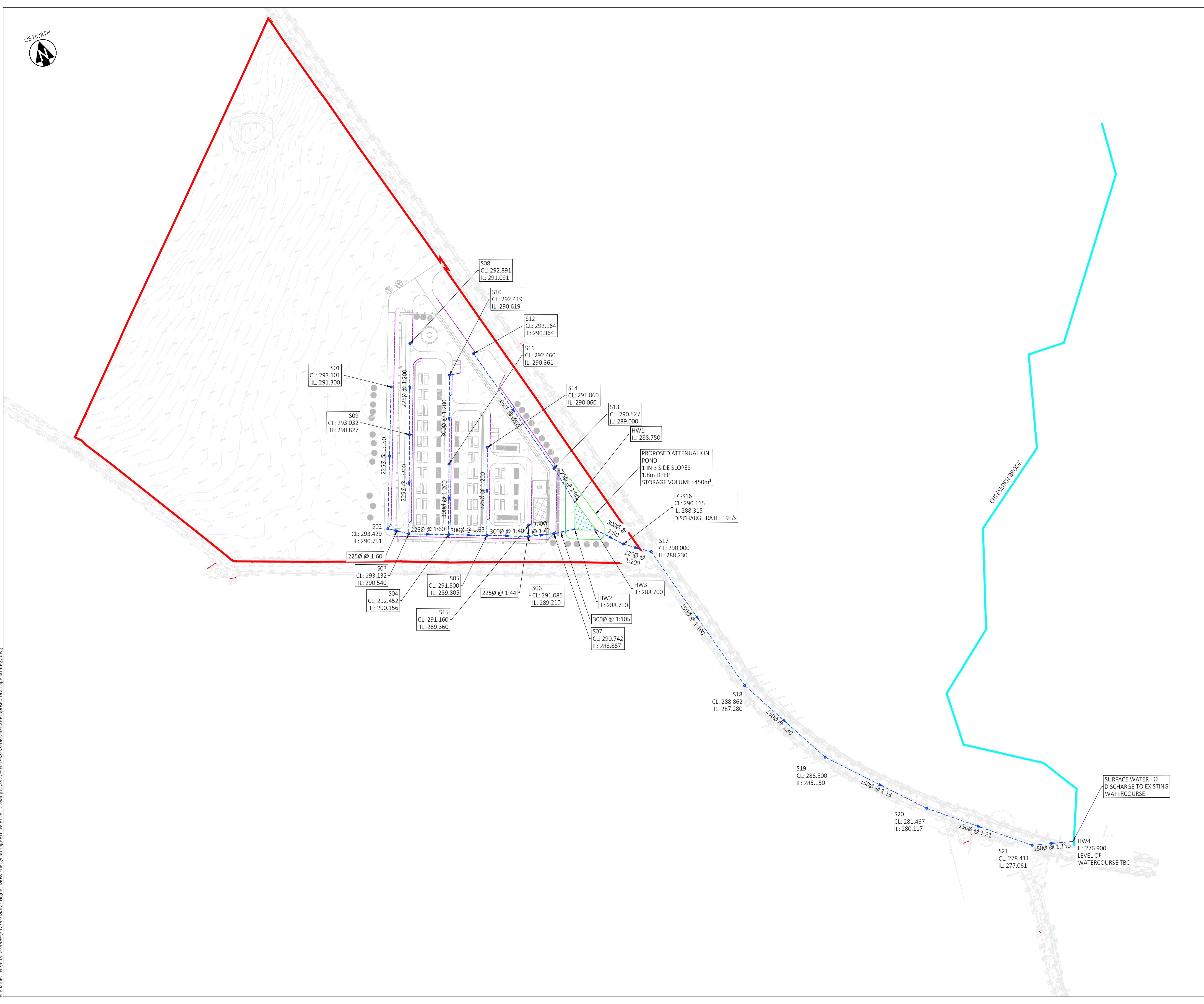
Greenfield runoff rates	Default	Edited
-------------------------	---------	--------

Q_{BAR} (l/s):	19.03	19.03
1 in 1 year (l/s):	16.56	16.56
1 in 30 years (l/s):	32.36	32.36
1 in 100 year (l/s):	39.59	39.59
1 in 200 years (l/s):	45.11	45.11

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

APPENDIX D

Filename: H:\34000-34990\34779-SMAN - Higher Moss Energy Storage\01_WIP\DR_Drawing\34779-HYD-XX-XX-DR-C-0500-Proposed Drainage Strategy.dwg



DO NOT SCALE

KEY

PLANNING BOUNDARY

PROPOSED SURFACE WATER DRAINAGE

HEADWALL

PROPOSED FLOW CONTROL

KERB DRAIN

ATTENUATION POND

EXISTING WATERCOURSE

NOTES:

1. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT PROJECT DRAWINGS AND WITH THE HEALTH AND SAFETY INFORMATION PROVIDED AND/OR WITHIN THE PRE-CONSTRUCTION INFORMATION.

2. USE OF THIS DRAWING DOES NOT ABSOLVE THE CLIENT FROM HIS RESPONSIBILITIES UNDER THE HEALTH AND SAFETY: THE CONSTRUCTION DESIGN AND MANAGEMENT REGULATIONS 2015. THE PRINCIPAL DESIGNER IS REQUIRED TO CONTACT HYDROCK CONSULTANTS PRIOR TO PERMITTING THIS DRAWING TO BE USED IN CONNECTION WITH ANY CONSTRUCTION WORKS.

3. BEFORE COMMENCEMENT OF ANY WORKS ASSOCIATED WITH THE DRAWING REFER TO ALL RELEVANT HEALTH AND SAFETY INFORMATION FOR THE WORKS INCLUDING RESIDUAL RISK INFORMATION.

4. THE CONTRACTOR SHOULD COMPLY WITH HS(G) 47 "AVOIDING DANGER FROM UNDERGROUND SERVICES" WHEN PLANNING, LOCATING AND EXCAVATING AROUND EXISTING SERVICES. IT IS KNOWN THAT EXISTING UTILITY COMPANY UNDERGROUND SERVICES AND APPARATUS ARE PRESENT WITHIN THE PROPOSED WORKS AREA AND IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE EXISTING SERVICES ON SITE ACCURATELY.

5. INFORMATION REGARDING THE LOCATION AND DEPTH OF EXISTING SERVICES CANNOT BE GUARANTEED BY THE STATUTORY UNDERTAKER.

6. THE CONTRACTOR SHALL CONDUCT THE WORKS WITH DUE REGARD FOR THE ECOLOGICAL AND ENVIRONMENTAL REQUIREMENTS OF THE SCHEME.

7. THE DRAWING SHALL BE USED FOR THE INTENDED PURPOSE ONLY AND THIS DRAWING HAS BEEN BASED ON INFORMATION PROVIDED BY OTHER PARTIES AND HYDROCK DO NOT WARRANT THE ACCURACY OF THIS INFORMATION. DIMENSIONS SHALL NOT BE SCALED FROM THE DRAWING AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL DIMENSIONS AND LEVELS ON SITE FOR THE ACTUAL SETTING OUT OF THE WORKS. DIMENSIONS MARKED 'DIMENSIONS TO BE SITE CHECKED' ARE SUBJECT TO CONFIRMATION BY THE CONTRACTOR BEFORE THE WORKS COMMENCE.

8. HYDROCK IS NOT RESPONSIBLE FOR CHECKING DIMENSIONS ON SITE.

9. HYDROCK IS NOT RESPONSIBLE FOR SETTING OUT GRID LINES, BUILDING LINE ETC.

10. HYDROCK IS NOT RESPONSIBLE FOR DIMENSIONS USED IN THE ORDERING AND MANUFACTURING OF EQUIPMENT AND THIS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

11. ALL FIGURED LEVELS ARE IN METRES AND RELATED TO EXISTING SURVEY GRID & DATUM UNLESS NOTED OTHERWISE

12. ALL FIGURED DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

13. TEMPORARY WORKS DESIGN ASSOCIATED WITH THE CONSTRUCTION OF THE WORKS SHALL BE RESPONSIBILITY OF THE CONTRACTOR.

14. THE CONTRACTOR SHALL MAINTAIN FREE AND OPEN ACCESS TO PUBLIC HIGHWAY AND ADJACENT LANDS AT ALL TIMES DURING THE COURSE OF THE WORKS UNLESS OTHERWISE AGREED IN WRITING WITH THE INTERESTED PARTIES.

15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF ALL TRAFFIC MANAGEMENT PROPOSALS & PHASING. SUCH DETAILS SHALL BE SUBMITTED TO THE LOCAL HIGHWAY AUTHORITY FOR APPROVAL PRIOR TO THE START OF THE WORKS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASSOCIATED COSTS AND ORDERS.

16. CONFLICTING INFORMATION SHOWN ON THE ENGINEER'S DRAWINGS OR DISCREPANCIES BETWEEN THE INFORMATION GIVEN BY THE ENGINEER AND THAT PROVIDED BY OTHERS MUST BE REFERRED TO THE ENGINEER BEFORE THE WORKS COMMENCE.

REVISIONS

P02

Layout and Boundary Updated

20/03/25

JK

CF | NB

P01

First Issue

06/12/24

JK

CF | NB

Rev.

Revision Notes

Date

Drawn By

Checked | Approved

Hydrock

now

Stantec

Northern Assurance Buildings

9-21 Princess St, Albert Square

Manchester

M2 4DN

t: +44(0)1618 045550

e: manchestercentral@hydrock.com

CLIENT

CUBICO UK DEVELOPMENTS LTD

PROJECT

ROSSENDALE BESS

TITLE

PROPOSED DRAINAGE STRATEGY

HYDROCK PROJECT NO.

C-34779

SCALE @ A1

1:1000

STATUS DESCRIPTION

SUITABLE FOR INFORMATION

STATUS

S2

DRAWING NO.

34779-HYD-XX-XX-DR-C-0500

REVISION

P02

APPENDIX E

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Stormwater Controls Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		



Pond

Type : Pond

Dimensions

Exceedance Level (m)	290.400
Depth (m)	1.800
Base Level (m)	288.600
Freeboard (mm)	150
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	3.038
Total Volume (m³)	425.086

Depth (m)	Area (m²)	Volume (m³)
0.000	130.00	0.000
1.800	445.00	489.312

Inlets

Inlet

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (5)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (1)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (7)
Bypass Destination	(None)
Capacity Type	No Restriction

Outlets

Outlet

Outgoing Connection	Pipe (15)
Outlet Type	Free Discharge

Advanced

Perimeter	Circular
Length (m)	56.597
Friction Scheme	Manning's n
n	0.04

Project: Rossendale BESS for Cubico UK Developments Ltd		Date: 26/03/2025	
		Designed by: JK	Checked by: CF
		Approved By: NB	
Report Details: Type: Connections Storm Phase: Phase		Company Address: 100 Barbirolli Square Manchester M2 3PW	



Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
Pipe	12.481	Pipe	59.153		0.6	225	293.429	290.751
Pipe (1)	23.118	Pipe	60.204		0.6	225	293.132	290.540
Pipe (2)	22.149	Pipe	63.101		0.6	300	292.452	290.156
Pipe (3)	24.301	Pipe	40.841		0.6	300	291.800	289.805
Pipe (4)	14.670	Pipe	42.769		0.6	300	291.085	289.210
Pipe (5)	9.369	Pipe	35.091		0.6	300	290.742	288.867
Pipe (6)	6.610	Pipe	44.063		0.6	225	291.160	289.360
Pipe (8)	51.135	Pipe	200.528		0.6	225	291.860	290.060
Pipe (9)	40.947	Pipe	199.743		0.6	300	292.460	290.361
Pipe (10)	57.475	Pipe	200.260		0.6	225	293.032	290.827
Pipe (11)	82.288	Pipe	149.886		0.6	225	293.101	291.300
Pipe (12)	52.891	Pipe	200.346		0.6	225	292.891	291.091
Pipe (13)	81.395	Pipe	49.722		0.6	225	292.164	290.364
Pipe (14)	51.554	Pipe	199.821		0.6	300	292.419	290.619
Pipe (7)	33.021	Pipe	260.008		0.6	225	290.527	288.727
Pipe (15)	27.607	Pipe	96.866		0.6	300	290.400	288.600
Pipe (16)	16.722	Pipe	196.732		0.6	300	290.115	288.315
Pipe (17)	94.648	Pipe	99.630		0.6	225	290.000	288.230
Pipe (18)	62.499	Pipe	29.342		0.6	150	288.862	287.280
Pipe (19)	66.018	Pipe	13.117		0.6	150	286.500	285.150
Pipe (20)	64.726	Pipe	21.180		0.6	150	281.467	280.117

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
Pipe	293.132	290.540	None		(None)	(None)
Pipe (1)	292.452	290.156	None		(None)	(None)
Pipe (2)	291.800	289.805	None		(None)	(None)
Pipe (3)	291.085	289.210	None		(None)	(None)
Pipe (4)	290.742	288.867	None		(None)	(None)
Pipe (5)	290.400	288.600	None		(None)	(None)
Pipe (6)	291.085	289.210	None		(None)	(None)
Pipe (8)	291.800	289.805	None		(None)	(None)
Pipe (9)	292.452	290.156	None		(None)	(None)
Pipe (10)	293.132	290.540	None		(None)	(None)
Pipe (11)	293.429	290.751	None		(None)	(None)
Pipe (12)	293.032	290.827	None		(None)	(None)
Pipe (13)	290.527	288.727	None		(None)	(None)
Pipe (14)	292.460	290.361	None		(None)	(None)
Pipe (7)	290.400	288.600	None		(None)	(None)
Pipe (15)	290.115	288.315	None		(None)	(None)
Pipe (16)	290.000	288.230	None	19.0	(None)	(None)
Pipe (17)	288.862	287.280	None		(None)	(None)
Pipe (18)	286.500	285.150	None		(None)	(None)
Pipe (19)	281.467	280.117	None		(None)	(None)
Pipe (20)	278.411	277.061	None		(None)	(None)

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Inflow Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		



Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analysed (ha)
Catchment Area	S12		Time of Concentration	0.035	100	0	100	0.035
Catchment Area (1)	S08		Time of Concentration	0.021	100	0	100	0.021
Catchment Area (2)	S13		Time of Concentration	0.016	100	0	100	0.016
Catchment Area (3)	S01		Time of Concentration	0.032	100	0	100	0.032
Catchment Area (4)	S04		Time of Concentration	0.022	100	0	100	0.022
Catchment Area (5)	S05		Time of Concentration	0.034	100	0	100	0.034
Catchment Area (6)	S03		Time of Concentration	0.022	100	0	100	0.022
Catchment Area (7)	S10		Time of Concentration	0.019	100	0	100	0.019
Catchment Area (8)	S11		Time of Concentration	0.014	100	0	100	0.014
Catchment Area (9)	S14		Time of Concentration	0.015	100	0	100	0.015
Catchment Area (10)	S14		Time of Concentration	0.021	100	0	100	0.021
Catchment Area (11)	S15		Time of Concentration	0.022	100	0	100	0.022
Catchment Area (12)	S10		Time of Concentration	0.074	100	0	100	0.074
Catchment Area (13)	S04		Time of Concentration	0.071	100	0	100	0.071
Catchment Area (14)	S14		Time of Concentration	0.037	100	0	100	0.037
Catchment Area (15)	S05		Time of Concentration	0.084	100	0	100	0.084
Catchment Area (16)	S04		Time of Concentration	0.008	100	0	100	0.008
Catchment Area (17)	S15		Time of Concentration	0.070	100	0	100	0.070
Catchment Area (18)	S07		Time of Concentration	0.009	100	0	100	0.009
Catchment Area (19)	S07		Time of Concentration	0.030	100	0	100	0.030
Catchment Area (20)	S10		Time of Concentration	0.019	100	0	100	0.019
Catchment Area (21)	S08		Time of Concentration	0.027	100	0	100	0.027
Catchment Area (23)	S10		Time of Concentration	0.037	100	0	100	0.037
Catchment Area (25)	S01		Time of Concentration	0.023	100	0	100	0.023
Catchment Area (26)	S12		Time of Concentration	0.047	100	0	100	0.047
TOTAL		0.0		0.808				0.808

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Network Design Criteria Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		



Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	1.200
Min. Slope (1:X)	500.00
Max. Slope (1:X)	40.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐
--------------	--------------------------

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025			
	Designed by: JK	Checked by: CF	Approved By: NB	
Report Details: Type: Outfall Details Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW			

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
S21	Free Discharge			

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Title: Rainfall Analysis Criteria	Company Address: 100 Barbirolli Square Manchester M2 3PW		



Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		





FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S01	FSR: 2 years: +0 %: 15 mins: Winter	293.101	291.300	291.367	0.067	8.1	0.075	0.000	7.2	3.760	OK
S02	FSR: 2 years: +0 %: 15 mins: Winter	293.429	290.751	290.798	0.047	7.2	0.053	0.000	6.4	3.724	OK
S03	FSR: 2 years: +0 %: 15 mins: Winter	293.132	290.540	290.608	0.068	14.9	0.077	0.000	13.4	8.467	OK
S04	FSR: 2 years: +0 %: 15 mins: Winter	292.452	290.156	290.281	0.125	48.5	0.142	0.000	45.3	26.400	OK
S05	FSR: 2 years: +0 %: 15 mins: Winter	291.800	289.805	289.944	0.139	72.6	0.157	0.000	68.7	39.329	OK
S06	FSR: 2 years: +0 %: 15 mins: Winter	291.085	289.210	289.373	0.163	82.2	0.184	0.000	79.5	45.589	OK
S15	FSR: 2 years: +0 %: 15 mins: Winter	291.160	289.360	289.422	0.062	13.6	0.070	0.000	13.5	6.308	OK
S07	FSR: 2 years: +0 %: 15 mins: Winter	290.742	288.867	289.033	0.166	85.2	0.187	0.000	83.5	48.235	OK
S08	FSR: 2 years: +0 %: 15 mins: Winter	292.891	291.091	291.158	0.067	7.2	0.076	0.000	6.6	3.343	OK
S09	FSR: 2 years: +0 %: 15 mins: Winter	293.032	290.827	290.885	0.058	6.6	0.065	0.000	5.3	3.289	OK
S10	FSR: 2 years: +0 %: 15 mins: Winter	292.419	290.619	290.728	0.109	22.1	0.124	0.000	20.8	10.266	OK
S11	FSR: 2 years: +0 %: 15 mins: Winter	292.460	290.361	290.467	0.106	22.8	0.120	0.000	20.3	11.125	OK
S14	FSR: 2 years: +0 %: 15 mins: Winter	291.860	290.060	290.139	0.079	10.7	0.090	0.000	9.9	4.959	OK
S12	FSR: 2 years: +0 %: 15 mins: Winter	292.164	290.364	290.423	0.059	12.0	0.067	0.000	11.3	5.639	OK
S13	FSR: 2 years: +0 %: 60 mins: Winter	290.527	288.727	288.964	0.237	8.2	0.268	0.000	7.2	12.560	Surcharged
FC-S16	FSR: 2 years: +0 %: 60 mins: Winter	290.115	288.315	288.953	0.638	21.2	0.722	0.000	19.0	99.494	Surcharged
S17	FSR: 2 years: +0 %: 15 mins: Summer	290.000	288.230	288.327	0.097	18.8	0.109	0.000	18.9	20.062	OK
S18	FSR: 2 years: +0 %: 60 mins: Winter	288.862	287.280	287.367	0.087	19.0	0.099	0.000	19.0	98.839	OK
S19	FSR: 2 years: +0 %: 120 mins: Winter	286.500	285.150	285.215	0.065	19.0	0.073	0.000	19.0	137.244	OK
S20	FSR: 2 years: +0 %: 120 mins: Winter	281.467	280.117	280.192	0.075	19.0	0.085	0.000	19.0	137.201	OK
S21	FSR: 2 years: +0 %: 120 mins: Winter	278.411	277.061	277.135	0.074	19.0	0.000	0.000	19.0	137.201	OK

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		





FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S01	FSR: 30 years: +0 %: 15 mins: Winter	293.101	291.300	291.394	0.094	15.3	0.107	0.000	13.9	7.107	OK
S02	FSR: 30 years: +0 %: 15 mins: Winter	293.429	290.751	290.819	0.068	13.9	0.077	0.000	12.5	7.062	OK
S03	FSR: 30 years: +0 %: 15 mins: Winter	293.132	290.540	290.639	0.099	29.2	0.112	0.000	27.0	16.089	OK
S04	FSR: 30 years: +0 %: 15 mins: Winter	292.452	290.156	290.352	0.196	94.3	0.222	0.000	88.4	50.089	OK
S05	FSR: 30 years: +0 %: 15 mins: Winter	291.800	289.805	290.031	0.226	140.2	0.255	0.000	133.2	74.519	OK
S06	FSR: 30 years: +0 %: 15 mins: Winter	291.085	289.210	289.501	0.291	155.8	0.329	0.000	148.9	86.468	OK
S15	FSR: 30 years: +0 %: 15 mins: Winter	291.160	289.360	289.509	0.149	25.7	0.168	0.000	22.6	11.942	OK
S07	FSR: 30 years: +0 %: 120 mins: Winter	290.742	288.867	289.399	0.532	78.8	0.602	0.000	78.2	228.848	Surcharged
S08	FSR: 30 years: +0 %: 15 mins: Winter	292.891	291.091	291.186	0.095	13.5	0.107	0.000	12.6	6.300	OK
S09	FSR: 30 years: +0 %: 15 mins: Winter	293.032	290.827	290.910	0.083	12.6	0.094	0.000	10.6	6.238	OK
S10	FSR: 30 years: +0 %: 15 mins: Winter	292.419	290.619	290.778	0.159	41.8	0.180	0.000	39.6	19.404	OK
S11	FSR: 30 years: +0 %: 15 mins: Winter	292.460	290.361	290.516	0.155	43.3	0.175	0.000	39.4	21.075	OK
S14	FSR: 30 years: +0 %: 15 mins: Winter	291.860	290.060	290.174	0.114	20.2	0.129	0.000	19.0	9.350	OK
S12	FSR: 30 years: +0 %: 15 mins: Winter	292.164	290.364	290.447	0.083	22.7	0.094	0.000	21.5	10.537	OK
S13	FSR: 30 years: +0 %: 120 mins: Winter	290.527	288.727	289.396	0.669	10.7	0.757	0.000	9.8	31.217	Surcharged
FC-S16	FSR: 30 years: +0 %: 120 mins: Winter	290.115	288.315	289.387	1.072	19.4	1.213	0.000	19.0	237.316	Surcharged
S17	FSR: 30 years: +0 %: 30 mins: Winter	290.000	288.230	288.327	0.097	18.9	0.109	0.000	19.0	52.521	OK
S18	FSR: 30 years: +0 %: 15 mins: Summer	288.862	287.280	287.367	0.087	19.0	0.099	0.000	19.1	21.087	OK
S19	FSR: 30 years: +0 %: 15 mins: Summer	286.500	285.150	285.215	0.065	19.1	0.073	0.000	19.0	20.551	OK
S20	FSR: 30 years: +0 %: 15 mins: Winter	281.467	280.117	280.192	0.075	19.0	0.085	0.000	19.0	20.368	OK
S21	FSR: 30 years: +0 %: 15 mins: Winter	278.411	277.061	277.135	0.074	19.0	0.000	0.000	19.0	20.368	OK

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		





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

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Junctions Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		



Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
S01	FSR: 100 years: +40 %: 15 mins: Winter	293.101	291.300	291.510	0.210	27.3	0.238	0.000	27.2	12.664	OK
S02	FSR: 100 years: +40 %: 30 mins: Winter	293.429	290.751	291.466	0.715	18.0	0.808	0.000	22.1	18.612	Surcharged
S03	FSR: 100 years: +40 %: 30 mins: Winter	293.132	290.540	291.463	0.923	43.5	1.044	0.000	49.5	42.433	Surcharged
S04	FSR: 100 years: +40 %: 30 mins: Winter	292.452	290.156	291.400	1.244	114.9	1.407	0.000	109.5	129.440	Surcharged
S05	FSR: 100 years: +40 %: 30 mins: Winter	291.800	289.805	291.142	1.337	175.0	1.512	0.000	171.8	192.421	Surcharged
S06	FSR: 100 years: +40 %: 30 mins: Winter	291.085	289.210	290.466	1.256	202.7	1.420	0.000	200.4	220.661	Surcharged
S15	FSR: 100 years: +40 %: 30 mins: Winter	291.160	289.360	290.501	1.141	33.1	1.290	0.000	30.9	30.195	Surcharged
S07	FSR: 100 years: +40 %: 240 mins: Winter	290.742	288.867	290.079	1.212	91.0	1.371	0.000	90.6	526.540	Surcharged
S08	FSR: 100 years: +40 %: 30 mins: Winter	292.891	291.091	291.578	0.487	17.5	0.551	0.000	16.2	16.174	Surcharged
S09	FSR: 100 years: +40 %: 30 mins: Winter	293.032	290.827	291.493	0.666	16.2	0.754	0.000	18.6	16.613	Surcharged
S10	FSR: 100 years: +40 %: 30 mins: Winter	292.419	290.619	291.611	0.992	53.8	1.122	0.000	50.8	49.692	Surcharged
S11	FSR: 100 years: +40 %: 30 mins: Winter	292.460	290.361	291.498	1.137	55.7	1.286	0.000	52.2	54.378	Surcharged
S14	FSR: 100 years: +40 %: 30 mins: Winter	291.860	290.060	291.242	1.182	26.0	1.337	0.000	23.3	24.090	Surcharged
S12	FSR: 100 years: +40 %: 15 mins: Winter	292.164	290.364	290.482	0.118	40.6	0.134	0.000	39.5	18.651	OK
S13	FSR: 100 years: +40 %: 240 mins: Winter	290.527	288.727	290.076	1.349	12.6	1.526	0.000	12.3	68.777	Surcharged
FC-S16	FSR: 100 years: +40 %: 240 mins: Winter	290.115	288.315	290.066	1.751	19.3	1.980	0.000	19.0	472.291	Flood Risk
S17	FSR: 100 years: +40 %: 15 mins: Winter	290.000	288.230	288.329	0.099	19.0	0.113	0.000	19.0	22.626	OK
S18	FSR: 100 years: +40 %: 360 mins: Summer	288.862	287.280	287.367	0.087	19.0	0.099	0.000	19.0	607.597	OK
S19	FSR: 100 years: +40 %: 1440 mins: Summer	286.500	285.150	285.215	0.065	19.0	0.073	0.000	19.0	914.839	OK
S20	FSR: 100 years: +40 %: 960 mins: Winter	281.467	280.117	280.192	0.075	19.0	0.085	0.000	19.0	913.735	OK
S21	FSR: 100 years: +40 %: 1440 mins: Winter	278.411	277.061	277.135	0.074	19.0	0.000	0.000	19.0	1024.989	OK

Project: Rossendale BESS for Cubico UK Developments Ltd		Date: 26/03/2025			
		Designed by: JK	Checked by: CF	Approved By: NB	
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: 100 Barbirolli Square Manchester M2 3PW			



FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FSR: 2 years: +0 %: 60 mins: Winter	288.963	288.963	0.363	0.363	63.9	55.818	0.000	0.000	21.2	99.906	86.869	OK

Project: Rossendale BESS for Cubico UK Developments Ltd		Date: 26/03/2025			
		Designed by: JK	Checked by: CF		Approved By: NB
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: 100 Barbirolli Square Manchester M2 3PW			



FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Avg. Depth

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FSR: 30 years: +0 %: 120 mins: Winter	289.396	289.396	0.796	0.796	88.0	147.225	0.000	0.000	19.4	239.101	65.366	OK

Project: Rossendale BESS for Cubico UK Developments Ltd		Date: 26/03/2025		
		Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Stormwater Controls Summary Storm Phase: Phase		Company Address: 100 Barbirolli Square Manchester M2 3PW		





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

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Residant Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FSR: 100 years: +40 %: 240 mins: Winter	290.076	290.075	1.476	1.475	102.6	356.483	0.000	0.000	19.3	475.174	16.138	OK

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		





FSR: 2 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S02	S03	293.429	290.798	0.058	3.724	0.8	0.09	6.4	OK
Pipe (1)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S03	S04	293.132	290.608	0.097	8.467	0.8	0.2	13.4	OK
Pipe (2)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S04	S05	292.452	290.281	0.132	26.400	1.5	0.32	45.3	OK
Pipe (3)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S05	S06	291.800	289.944	0.151	39.329	1.9	0.39	68.7	OK
Pipe (4)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S06	S07	291.085	289.373	0.164	45.589	2.0	0.47	79.5	OK
Pipe (5)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S07	Pond	290.742	289.033	0.183	48.235	2.1	0.44	83.5	OK
Pipe (6)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S15	S06	291.160	289.422	0.113	6.308	0.7	0.17	13.5	OK
Pipe (8)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S14	S05	291.860	290.139	0.109	4.959	0.5	0.27	9.9	OK
Pipe (9)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S11	S04	292.460	290.467	0.116	11.125	0.8	0.26	20.3	OK
Pipe (10)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S09	S03	293.032	290.885	0.063	3.289	0.6	0.14	5.3	OK
Pipe (11)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S01	S02	293.101	291.367	0.057	3.760	0.9	0.17	7.2	OK
Pipe (12)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S08	S09	292.891	291.158	0.062	3.343	0.7	0.18	6.6	OK
Pipe (13)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S12	S13	292.164	290.423	0.077	5.639	1.0	0.15	11.3	OK
Pipe (14)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S10	S11	292.419	290.728	0.108	10.266	0.9	0.27	20.8	OK
Pipe (7)	FSR: 2 years: +0 %: 15 mins: Winter	Pipe	S13	Pond	290.527	288.866	0.202	5.804	0.5	0.35	11.3	OK
Pipe (15)	FSR: 2 years: +0 %: 30 mins: Winter	Pipe	Pond	FC-S16	290.400	288.929	0.300	53.047	0.6	0.21	23.4	Surcharged
Pipe (16)	FSR: 2 years: +0 %: 60 mins: Winter	Pipe	FC-S16	S17	290.115	288.953	0.101	99.452	0.9	0.24	19.0	Surcharged
Pipe (17)	FSR: 2 years: +0 %: 60 mins: Winter	Pipe	S17	S18	290.000	288.326	0.092	99.180	1.2	0.36	19.0	OK
Pipe (18)	FSR: 2 years: +0 %: 60 mins: Winter	Pipe	S18	S19	288.862	287.367	0.076	98.839	2.1	0.58	19.0	OK

Project: Rossendale BESS for Cubico UK Developments Ltd				Date: 26/03/2025							
Designed by: JK				Checked by: CF		Approved By: NB					
Report Details: Type: Connections Summary Storm Phase: Phase				Company Address: 100 Barbirolli Square Manchester M2 3PW							

Pipe (19)	FSR: 2 years: +0 %: 120 mins: Winter	Pipe	S19	S20	286.500	285.215	0.070	137.244	2.4	0.38	19.0	OK
Pipe (20)	FSR: 2 years: +0 %: 120 mins: Winter	Pipe	S20	S21	281.467	280.192	0.075	137.201	2.2	0.49	19.0	OK

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		





FSR: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S02	S03	293.429	290.819	0.084	7.062	0.9	0.18	12.5	OK
Pipe (1)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S03	S04	293.132	290.639	0.148	16.089	1.0	0.4	27.0	OK
Pipe (2)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S04	S05	292.452	290.352	0.211	50.089	1.7	0.63	88.4	OK
Pipe (3)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S05	S06	291.800	290.031	0.258	74.519	2.1	0.76	133.2	OK
Pipe (4)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S06	S07	291.085	289.501	0.285	86.468	2.1	0.87	148.9	OK
Pipe (5)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S07	Pond	290.742	289.146	0.300	90.759	2.4	0.83	157.0	OK
Pipe (6)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S15	S06	291.160	289.509	0.220	11.942	0.7	0.29	22.6	OK
Pipe (8)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S14	S05	291.860	290.174	0.170	9.350	0.6	0.52	19.0	OK
Pipe (9)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S11	S04	292.460	290.516	0.175	21.075	0.9	0.5	39.4	OK
Pipe (10)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S09	S03	293.032	290.910	0.091	6.238	0.7	0.29	10.6	OK
Pipe (11)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S01	S02	293.101	291.394	0.081	7.107	1.1	0.33	13.9	OK
Pipe (12)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S08	S09	292.891	291.186	0.089	6.300	0.9	0.34	12.6	OK
Pipe (13)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S12	S13	292.164	290.447	0.197	10.537	1.1	0.29	21.5	OK
Pipe (14)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S10	S11	292.419	290.778	0.157	19.404	1.1	0.5	39.6	OK

Project: Rossendale BESS for Cubico UK Developments Ltd		Date: 26/03/2025					
		Designed by: JK	Checked by: CF	Approved By: NB			
Report Details: Type: Connections Summary Storm Phase: Phase		Company Address: 100 Barbirolli Square Manchester M2 3PW					

Pipe (7)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S13	Pond	290.527	289.105	0.225	9.422	0.5	0.6	19.1	Surcharged
Pipe (15)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	Pond	FC-S16	290.400	289.055	0.300	25.457	0.4	0.25	28.6	Surcharged
Pipe (16)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	FC-S16	S17	290.115	289.045	0.101	23.216	1.3	0.24	19.1	Surcharged
Pipe (17)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S17	S18	290.000	288.326	0.092	22.227	1.2	0.37	19.0	OK
Pipe (18)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S18	S19	288.862	287.367	0.076	21.087	2.1	0.58	19.1	OK
Pipe (19)	FSR: 30 years: +0 %: 15 mins: Summer	Pipe	S19	S20	286.500	285.215	0.070	20.551	2.4	0.39	19.0	OK
Pipe (20)	FSR: 30 years: +0 %: 15 mins: Winter	Pipe	S20	S21	281.467	280.192	0.075	20.368	2.2	0.49	19.0	OK

Project: Rossendale BESS for Cubico UK Developments Ltd	Date: 26/03/2025		
	Designed by: JK	Checked by: CF	Approved By: NB
Report Details: Type: Connections Summary Storm Phase: Phase	Company Address: 100 Barbirolli Square Manchester M2 3PW		





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

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S02	S03	293.429	291.115	0.225	11.708	0.7	0.37	25.0	Surcharged
Pipe (1)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S03	S04	293.132	291.078	0.225	26.793	1.4	0.81	54.4	Surcharged
Pipe (2)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S04	S05	292.452	291.084	0.300	91.769	1.6	0.83	116.5	Surcharged
Pipe (3)	FSR: 100 years: +40 %: 30 mins: Winter	Pipe	S05	S06	291.800	291.142	0.300	192.421	2.4	0.99	171.8	Surcharged
Pipe (4)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S06	S07	291.085	290.220	0.300	156.202	2.9	1.18	201.9	Surcharged
Pipe (5)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S07	Pond	290.742	289.710	0.300	163.715	3.1	1.15	217.1	Surcharged
Pipe (6)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S15	S06	291.160	290.265	0.225	21.389	1.0	0.5	39.1	Surcharged
Pipe (8)	FSR: 100 years: +40 %: 15 mins: Summer	Pipe	S14	S05	291.860	290.861	0.225	15.085	0.7	0.73	26.8	Surcharged
Pipe (9)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S11	S04	292.460	291.264	0.300	38.455	0.8	0.76	59.5	Surcharged
Pipe (10)	FSR: 100 years: +40 %: 30 mins: Summer	Pipe	S09	S03	293.032	291.236	0.225	14.546	0.7	0.61	22.4	Surcharged
Pipe (11)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S01	S02	293.101	291.510	0.225	12.664	0.9	0.64	27.2	OK
Pipe (12)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S08	S09	292.891	291.493	0.225	11.398	0.9	0.63	23.0	Surcharged
Pipe (13)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S12	S13	292.164	290.482	0.225	18.651	1.0	0.53	39.5	OK
Pipe (14)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S10	S11	292.419	291.457	0.300	34.992	0.9	0.8	62.7	Surcharged

Project: Rossendale BESS for Cubico UK Developments Ltd		Date: 26/03/2025					
		Designed by: JK	Checked by: CF	Approved By: NB			
Report Details: Type: Connections Summary Storm Phase: Phase		Company Address: 100 Barbirolli Square Manchester M2 3PW					

Pipe (7)	FSR: 100 years: +40 %: 15 mins: Winter	Pipe	S13	Pond	290.527	289.451	0.225	18.668	1.1	1.31	42.2	Surcharged
Pipe (15)	FSR: 100 years: +40 %: 30 mins: Winter	Pipe	Pond	FC-S16	290.400	289.693	0.300	52.975	0.7	0.32	35.7	Surcharged
Pipe (16)	FSR: 100 years: +40 %: 30 mins: Winter	Pipe	FC-S16	S17	290.115	289.685	0.101	49.990	1.2	0.24	19.0	Surcharged
Pipe (17)	FSR: 100 years: +40 %: 30 mins: Winter	Pipe	S17	S18	290.000	288.327	0.092	49.126	1.2	0.37	19.0	OK
Pipe (18)	FSR: 100 years: +40 %: 360 mins: Summer	Pipe	S18	S19	288.862	287.367	0.076	607.597	2.1	0.58	19.0	OK
Pipe (19)	FSR: 100 years: +40 %: 1440 mins: Summer	Pipe	S19	S20	286.500	285.215	0.070	914.839	2.4	0.38	19.0	OK
Pipe (20)	FSR: 100 years: +40 %: 1440 mins: Winter	Pipe	S20	S21	281.467	280.192	0.075	1024.989	2.2	0.49	19.0	OK