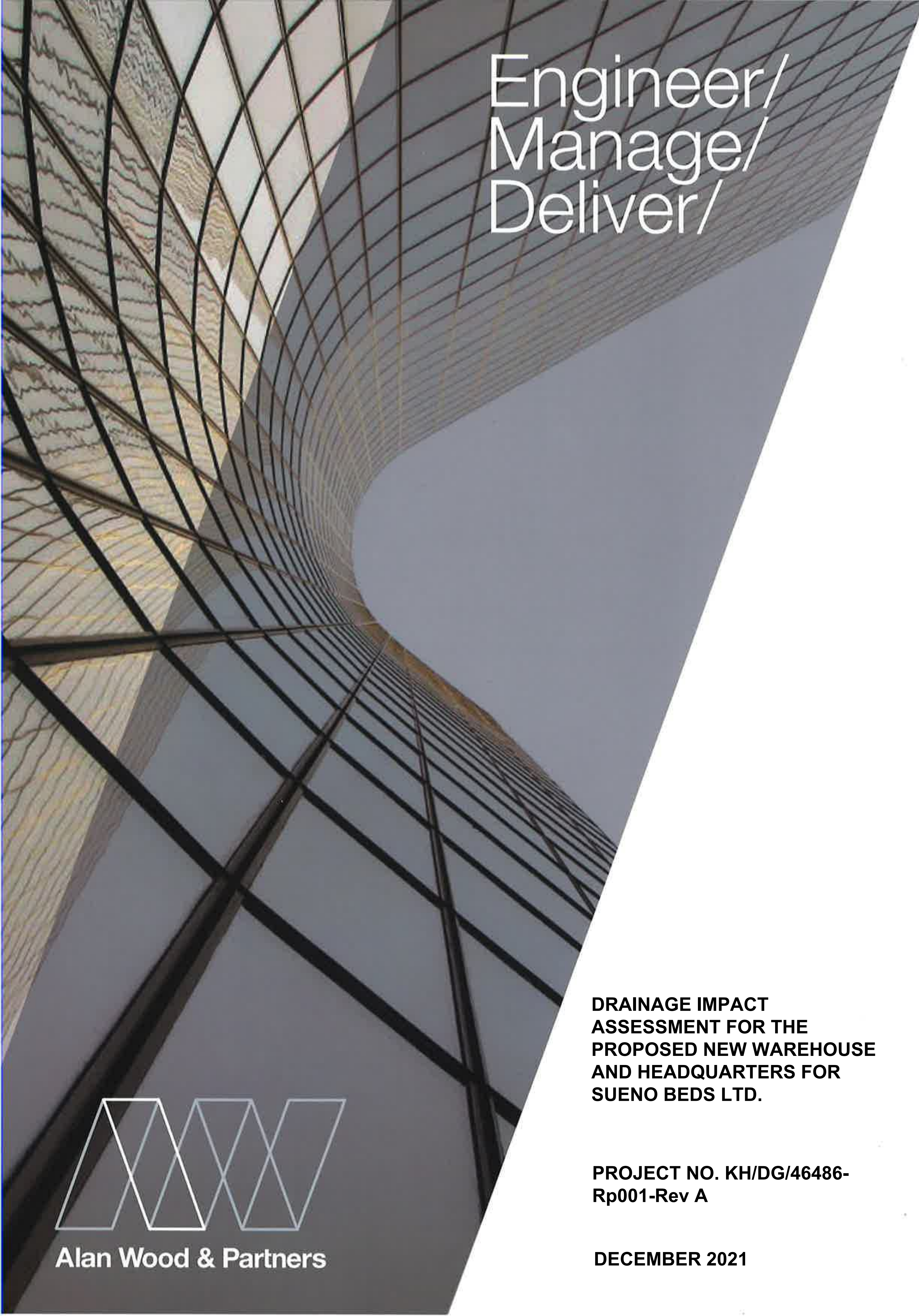

DRAINAGE IMPACT ASSESSMENT FOR THE PROPOSED NEW WAREHOUSE AND HEADQUARTERS FOR SUENO BEDS LTD.

PROJECT NO. KH/DG/46486-Rp001-Rev A

DECEMBER 2021

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DRAINAGE IMPACT ASSESSMENT FOR THE PROPOSED NEW WAREHOUSE AND HEADQUARTERS FOR SUENO BEDS LTD.

Prepared by: Devon Gardner, BEng (Hons), MSc

Date: 9th December 2021

Approved by: Kim Han, BEng (Hons) CEng MICE MIStructE

Date: 9th December 2021

Issue	Revision	Revised by	Approved by	Revised Date

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APPENDICES

1.0 INTRODUCTION

1.1 Background

1.1.1 Alan Wood & Partners were commissioned by Sueno Beds Ltd to prepare a Drainage Strategy for a proposed new Warehouse and office space in Bretton Parkway, Dewsbury.

1.1.2 A Drainage Impact Assessment (DS) for the proposed development considers the drainage proposal and implications.

1.1.3 The proposed development is within flood zone 1 (low risk of flooding) and is less than 1 hectare and therefore does not require a flood risk assessment.

2.0 EXISTING SITE DESCRIPTION

2.1 Location

2.1.1 The development is located off Bretton Street, just to the south of Savile Town, approximately 1.6km south of Dewsbury town centre, West Yorkshire.

2.1.2 The site is located to the South of the A644.

2.1.3 An aerial photograph and location plan are included in Figures 1 below, which identify the location of the site.

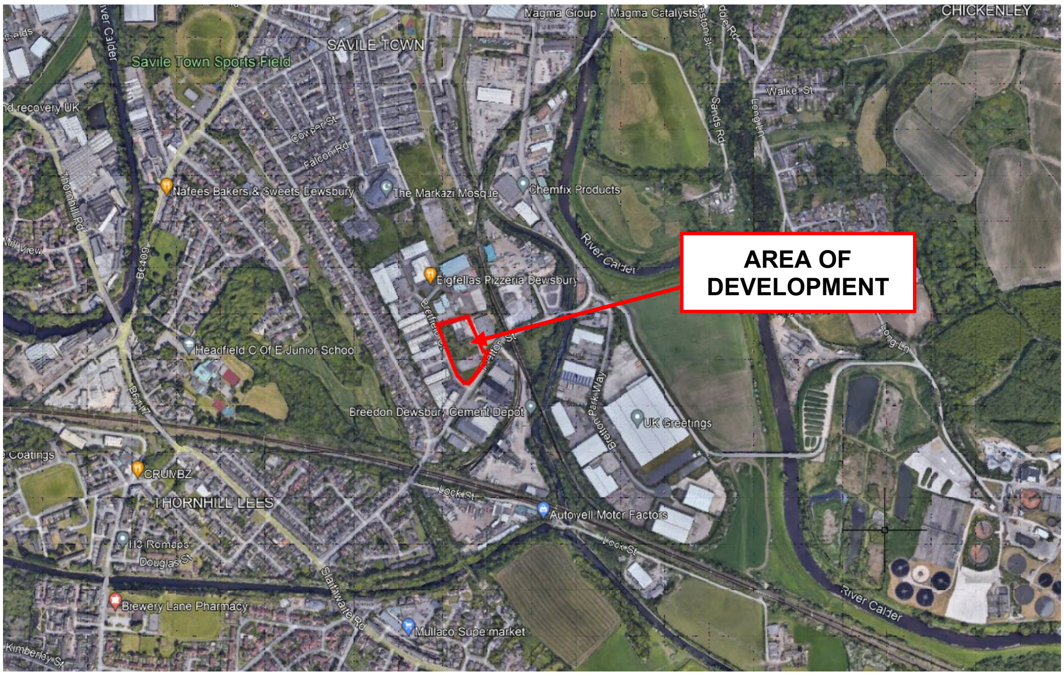

Figure 1: Aerial photograph

2.1.4 The Ordnance Survey grid reference for the center of the site development is approximately 424858 (mE), 420250 (mN).

2.2.1 Site Description

2.2.1 Currently the site is occupied by a single-story industrial building used primarily for mattress storage, with some hard standing and grassed areas, as can be seen in the aerial view in Figure 2.

Figure 2: Existing Site

2.2.2 The area of the proposed development site is approximately 0.906 hectares with a proposed, of approximately 0.793 hectares of impermeable area.

2.3 Surrounding Features

2.3.1 Industrial developments surround the site, with some residential developments further to the North and West.

2.3.2 There’s in a Railway bordering the east of the side.

2.3.3 There an existing retaining wall bordering the site to Bretton Street to the east of the site

2.3.4 The River Calder is approximately 350m to the east separated from the site by adjacent developments and the existing railway.

2.3.5 Access can be gained from Bretton Street, with Bretfield Court along the east boundary.

2.4 Topography

2.4.1 A topographic survey of the development site has been undertaken by MET Geo Environmental in November 2021. The survey shows that the existing ground levels vary around 42.8m AOD at the south of the site to 30.23m AOD to the north and around 44.0m AOD to the east boundary.

2.4.1 The topography survey is shown in Appendix A.

2.5 Ground Conditions

2.5.1 Arc Environmental undertook a phase 1 site investigation in October 2021, involving a Desk Top Study and Coal Mining Risk Assessment.

2.5.2 ARC Environmental conducted a study of the British Geological Survey map and BGS borehole records, show made ground is likely for to a depth of 2.65m, with superficial deposits of sand and gravel and firm to stiff clay to 5.2m below ground with dense clay, gravel and sand up 8m depth. The whole site is also underlain by the Pennine lower coal measure formation, with the site in a complex geological setting and several recorded faults within the site’s proximity.

2.5.3 They showed local groundwater maps reveals that the site overlays a Secondary A Aquifer, within a Groundwater Vulnerability Zone classification ‘medium’. There is no Source Protection zone within 500m of the site.

2.5.4 A Copy of the Ground investigation report will be included with the planning application.

3.0 PROPOSED DEVELOPMENT

3.1 The proposed development will involve demolition of existing units and construction of a new warehouse and office space.

3.2 The proposed development involves the construction of an industrial unit complex to include the following: -

- Demolition of existing single-story building.
- Construction of new warehouse with 4-story offices facility and showroom.
- Construction of a new car park and access.
- Pedestrian paved areas.
- Fencing and security gates.
- Landscaping.

3.3 Indicative layout drawings of the proposed development are included in Appendix B.

4.0 FOUL WATER DRAINAGE

4.1 The development will hold a commercial unit with office facilities.

4.2 Based on British Code of Practice ‘Flows and Loads – 4’ and an assumed maximum occupancy of approximately 100 the average foul flow is calculated to be approximately 0.116 l/s.

4.3 The peak discharge has been calculated to be 3.75l/s based on BS EN 12056-2.

4.4 It is envisaged, at this stage of the development, that the foul water from the development is discharge to the public combined sewer in Bretfield court to the east of the site. An extract of the existing public sewer network is included in Appendix c.

4.5 It is not known at this stage of the design whether the connection to the existing public combined sewer can be achieved by means of a gravity outfall. If a gravity outfall is found to be unachievable, then a pump station would be required, which would consist of a private package pump station within the proposed sit

4.6 Pipe sizes are likely to range from 100mm to 150mm in diameter, with gradients ranging from 1:40 to 1:150 to comply with current Building Regulation requirements.

4.7 A drainage layout drawing detailing the proposed drainage strategy is included in Appendix E.

5.0 SURFACE WATER DRAINAGE

5.1 General

5.1.1 The surface water drainage has been designed in accordance with current CIRIA C753 SuDS Manual guidelines.

5.2 Existing Site

5.2.1 The drainage survey undertaken by Alternative Drainage shows the existing site to drain through the neighboring site and discharge via a 225mm diameter private pipe to the northeast of the site, through the adjacent area. A map of the survey is included within Appendix D.

5.2.2 From the aerial photograph in Figure 2, the developments consist of a building and hard standing with some landscaping.

5.2.3 The peak unrestricted surface water run-off from the existing site area is calculated to be 51.15 litres per second, based upon the BSEN752 50mm storm event calculations for the existing impermeable area of 0.368hectares

5.3 Run-off Destination

5.3.1 Requirement H3 of the Building Regulations establishes a preferred hierarchy for disposal of surface water disposal. Consideration should firstly be given to soakaway infiltration, watercourse and sewer in that priority order.

5.3.2 Ground investigation shown in section 2.5 indicate that the underlying strata is not suitable for soakaways/infiltration trenches to be used due to the low permeability clay deposits that underlay the site.

5.3.3 The second preferred option would be to discharge the surface water run-off from the development to a watercourse.

5.3.4 The River Calder is approximately 350m east of the site, with a ‘Calder and Hebble Navigation’ canal between the river and the site. However, these are separated from the site by private land and a rail line.

5.3.5 It is therefore proposed that the surface water run-off from the new development is discharged into the Yorkshire water drainage network.

5.3.6 A pre-planning enquiry has been submitted to Yorkshire Water, who are yet to respond.

5.3.7 The proposals at this stage are for the surface water to utilise the 600 diameter Yorkshire water public sewer running through the site. Restricting the discharge to existing brownfield rates with a 30% betterment of existing hard standing, in line with local guidelines for the area, a giving a rate of 35.8l/s. As well as greenfield rate for the new impermeable areas on the proposed site, at 5litres per second per hectare giving 2.13l/s in line with local guidelines. This gives a proposed discharge of 37.9l/s. A pre-planning enquiry has been submitted to Yorkshire Water. They are yet to respond.

5.4 Flood Risk

5.4.1 For new developments the current design criteria required for the surface water drainage will need to be based upon the critical 1 in 100 year storm event, with an additional allowance to account for climate change resulting from global warming. There should be no above ground flooding for the 1 in 30 year return period and with no flooding to the development or off-site flooding affecting other parties from the critical 1 in 100 year storm event, with an additional allowance to account for climate change.

5.5 Climate Change

5.5.1 An additional allowance of 30% to account for climate change has been included in the design of the surface water drainage network in accordance with Local SuDS Standards Documents.

5.6 Peak Flow Control

5.6.1 The developments proposed impermeable area will be made up from the existing and new impermeable areas. As per section 5.3.7, it is proposed to use the existing brownfield rate, with a 30% betterment to provide a degree of improvement to the public sewer. Along with some greenfield rates for any new impermeable areas.

5.6.2 It is therefore proposed the development discharge at the rate of 55.4l/s as per section 5.6.1 using the reduced greenfield rates calculated and 30% betterment of existing brownfield rate.

5.6.3 The drainage design is to be based on the 1 in 100-year storm event plus the required additional allowance for climate change, which for this development is 30% in compliance with National and Local authority requirements and guidelines

5.6.4 In order to ensure the discharge of surface water from the development will not increase the risk of flooding to other properties, it will be necessary to attenuate the drainage by restricting the discharge to the flow rate providing storage as required.

5.6.5 The surface water run-off from the development will be discharged via a vortex control into the public sewer to ensure the desired flow rates are achieved.

5.6.6 Based upon the above design criteria storage, a hydraulic model study has been undertaken to assess the pipe sizes and gradients and the likely storage volumes required.

5.6.7 A summary of the storage volumes required is set out in Table 1 below

Table 1: Volumes of estimated surface water storage required

Storm Event	**1 in 1 Year Storm**	**1 in 30 Year Storm**	**1 in 100 Year Storm +30%**
Storage Volume Required	16-60 m^3	119-226 m^3	342 m^3

5.6.8 A copy of the hydraulic model calculations is included in Appendix E.

5.6.9 The calculated storage volumes set out above will be subject to detailed design and approval.

5.6.10 The drainage system must contain the storage volume for the 30 year storm event below ground within the drainage system.

5.6.11 The additional volume over and above the 30 year storm event to accommodate a 100 year storm event plus climate change can be stored above ground provided it remains within the confines of the site without posing a risk to persons or property.

5.6.12 For this development, it is proposed that cellular underground storage tanks will be provided to accommodate the storage volume required.

5.6.13 A drainage layout drawing detailing the proposed drainage strategy is included in Appendix E.

5.7 Volume Control

5.7.1 The run-off volumes post development will be a reduction from pre-development condition sure to the reduction in surface water discharge.

5.7.2 SuDS guidelines advise that the run-off volume from the development site for the 1 in 100 year 6-hour rainfall event should not exceed the brownfield run-off volumes for the same event.

5.7.3 The overall development discharge rate will not exceed the existing brownfield rates of 55.4l/s, with a maximum proposed discharge of 37.9l/s.

5.7.4 We consider the impact on the receiving sewer to minimise as far as reasonably practicable.

5.8 Pollution Control

5.8.1 It is a requirement to ensure that the quality of any receiving body is not adversely affected by the development.

5.8.2 In order to minimise the risk of pollution to the final sewer, clean roof water drainage should discharge directly into the sealed drainage network (i.e. not via gullies) and will then be stored below ground prior to discharge to the sewer.

5.8.3 Silt traps should be provided on the outlets from any gullies or drainage channels, which should be maintained in accordance with Section 5.12 of this report.

5.8.4 Due to the risk of pollution within the car park and service yard, a bypass separator is to be utilised in-line with best practice guidance.

5.8.5 On this basis it is considered that the risk of pollution to the final receiving sewer/watercourse has been adequately addressed.

5.9 Designing for Exceedance

5.9.1 Overland flood risk from exceedance flows and from off-site sources will be mitigated to a large extent by the creation of the new surface water sewerage system as described above. Where possible proposed ground levels will be set to channel flows away from the proposed building. Furthermore, the ground floor construction level for the building will be raised by a minimum of 150mm above the finished ground level to provide additional clearance above any likely flooding.

5.9.2 The existing overland flow routes should generally be maintained within the final layout of the development site without increasing the flood risk to off-site parties.

5.9.3 Any existing flood risk may reduce by the creation of a formal surface water drainage system but cannot be entirely removed.

5.9.4 Drawings showing the existing and proposed overland surface water flood routing are included in Appendix G.

5.10 Highways Drainage

5.10.1 The development does not incorporate any formal highway drainage.

5.11 Urban Creep

5.11.1 The project is a commercial development and under the control of a single developer. Consequently, it is considered that there is no requirement to allow an additional 10% to the calculated impermeable areas for urban creep.

5.12 Operation and Maintenance

5.12.1 All pipework within the new drainage system is designed with self-cleansing gradients and consequently there should be little, or no maintenance required.

5.12.2 All items of maintenance work will remain the sole responsibility of developer or any subsequent owner of the site and should form part of the regular maintenance regime for the full development.

5.12.3 All road gullies or drainage channel systems serving areas of hardstanding will need to be regularly inspected to ensure the system remains operable see Table 2 below.

5.12.4 All inspection chambers should be regularly inspected to ensure the system is free-flowing. See operation and maintenance requirements in Table 2 below.

Table 2: Operation and Maintenance Requirements for Silt Traps/Trapped Gullies (Based on CIRIA C753 Table 14.2)

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	6 monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	6 monthly
	Inspect filter media and establish appropriate replacement frequencies	6 monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every 6 months
*During the first year of operation, inspections should be carried out at least monthly (and after significant storm events) to ensure that the system is functioning as designed and that no damage is evident.		

5.12.5 Operation and maintenance requirements for the petrol interceptor are set out in Table 3 below. The interceptor manufacturer may have additional maintenance requirements/recommendations.

Table 3: Operation and Maintenance Requirements for Oil Separators/Interceptors (Based on CIRIA C753 Section 14.12.2 and Environment Agency Document PPG3. To be read in conjunction with BS EN 858-2:2003).

Note: it is also usually required that separators are filled with clean water before being put into operation and each time after emptying for maintenance. Failure to do so will cause the separator to malfunction until surface water builds up the required permanent water level in the facility. It is possible to fit an alarm to separators that will indicate when the collected oil volume is at a maximum, and this may be a regulatory requirement. The alarms should be placed in a location that is clearly visible to those responsible for maintenance of the system.

Maintenance schedule	**Required action**	**Typical frequency**
Routine maintenance	Assess the depth of accumulated silt and oil/sludge; empty the separator if required*	6 monthly
	Check thickness of light liquid	6 monthly
	Check function of automatic closure device	6 monthly
	Check the coalescing material, and clean or change if necessary	6 monthly
	Check the function of the warning device (if fitted)	6 monthly
Remedial actions	When major fuel spill occurs, empty the separator*	As required
Monitoring	Check water-tightness of system	Monthly during first half year of operation, then 5 yearly
	Check structural condition	Monthly during first half year of operation, then 5 yearly
	Check internal coatings	Monthly during first half year of operation, then 5 yearly
	Check in-built parts	Monthly during first half year of operation, then 5 yearly
	Check electrical devices and installations	Monthly during first half year of operation, then 5 yearly
	Check if adjustment of automatic closure devices is required	Monthly during first half year of operation, then 5 yearly
*If oil or silt levels exceed 90% of the storage volume, the separator should be emptied straight away. If an alarm if fitted, this is usually set to trigger just prior to this level. When the oil or silt reaches this level, or after a spillage, employ a registered waste removal company with experience in emptying separators to empty the separator. Ensure the company does not allow any of the contents to escape from the outlet during emptying.		

5.12.6 Operation and maintenance requirements for the Hydro-Brake® vortex flow control are set out in Table 4 below.

Table 4: Operation and Maintenance Requirements for Hydro-Brake® Vortex Flow Control Device (Based on Manufacturer's recommendations)

Maintenance schedule	**Required action**	**Typical frequency**
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	6 monthly
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Monthly during the first three months, then every 6 months
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every 6 months

5.12.7 Operation and maintenance requirements for the storage tanks are set out in Table 5 below.

Table 5: Operation and Maintenance Requirements for Storage Tanks (Based on CIRIA C753 Table 21.3)

Maintenance schedule	**Required action**	**Typical frequency**
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually*
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required*
*During the first year of operation, inspections should be carried out at least monthly (and after significant storm events) to ensure that the system is functioning as designed and that no damage is evident.		

5.12.8 Operation and maintenance requirements of the drainage components, as listed above, should be undertaken in accordance with Chapter 32 of the CIRIA SuDS Manual and any relevant manufacturer's recommendations. See also BS 8582:2013 Code of Practice for Surface Water Management for Development Sites Section 11 and Susdrain Fact Sheet on SuDS Maintenance and Adoption Options (England) dated September 2015.

5.12.9 The personnel undertaking the maintenance should have appropriate experience of SuDS and drainage maintenance and should be capable of keeping sufficiently detailed records of any inspections. An example of a checklist for SuDS maintenance can be found within Appendix B of the CIRIA C753 SuDS Manual v2. If personnel do not have appropriate experience, then specific inspection visits may be necessary. During the first year of operations of SuDS, inspections should usually be carried out a monthly interval (and after significant storm events).

6.0 SUMMARY

6.1 This report has been prepared to assess the drainage implications for a proposed new Warehouse and Headquarters for Sueno Beds Ltd.

6.2 The proposed development is within a Flood Zone 1 (low risk of flooding) area and is less than 1 hectare in area and therefore does not require a formal Flood Risk Assessment.

6.3 Foul water is proposed to discharge to the existing 225mm diameter combined public sewer network within Bretfield court of the site.

6.4 Surface water is proposed to discharge to the existing 600mm diameter public sewer within the site at a restricted rate of 37.9l/s. The sewers will be designed and constructed to meet the requirements of the Building Regulations.

6.5 The report's supporting calculations and sketches provide a robust case for justifying the means of foul and surface water drainage and that the site can be suitably, safely and sustainably drained.

6.6 Overall, this report demonstrates that the foul and surface water drainage systems for the new development can be designed and constructed to meet local and national planning and drainage policies. Suitably worded Conditions can be applied to the grant of planning permission to control the delivery of the development in the usual manner.

APPENDIX A

Topographic Survey Drawing

Notes
This drawing and the information contained therein is Issue
confidence and is the copyright of Met Geo Environmental L
Disclosure of this information to Third Parties and unauthori
copying or replication of this data without approval is forbidd

N

Grid : OS National Grid.
Using the OS GPS Network and applyin
OSTN15 transformation and then remov
the scale factor for true distances with a
one-step transformation centred on S2

Datum : OS Level Datum.
Using the OS GPS Network and applyin
OSGM15 National Geoid Model to obtai
local area corrections.

Station Listing

Station	Easting	Northing	L
A1	424778.746	420283.956	43.
A2	424829.792	420295.453	42.
A3	424884.523	420219.471	42.
S1	424798.003	420209.639	43.
S2	424855.353	420129.467	43.
S3	424916.383	420247.929	43.

KEY

AIR VALVE	AV ☐	KERB OUTLET
BENCH MARK	BM ^	LAMP POST
BIN	BIN ○	MANHOLE (CIRCULAR)
BOLLARD	BOL ∘	MANHOLE (RECTANGULAR)
BORE HOLE	BH ⌖	MANHOLE (TRIANGULAR)
BRITISH TELECOM COVER	BT ☐	MARKER POST
BUS STOP	BUS	GULLY
CABLE TV COVER	CATV ☐	RODDING EYE
CABLE TV SUPPLY	CA ▿	SIGN POST
COLUMN	COL ▫	TELECOM COVER
DROPPED KERB	DK	TELEGRAPH POLE
EARTHING POINT	ER ∘	THRESHOLD LEVEL
ELECTRICITY COVER	ELEC ☐	TRAFFIC LIGHT
ELECTRICITY POLE	EP ∘	TRIAL PIT
FIRE HYDRANT	FH ☐	WASH OUT
GAS VALVE	GAS ◇	WATER METER
GATE		WATER STOP COCK
INSPECTION COVER (CIRCULAR)	IC ○	WATER STOP VALVE
INSPECTION COVER (RECTANGULAR)	IC ☐	
COVER LEVEL	CL	CHAMBER BASE LEVEL
INVERT LEVEL	IL	WATER SURFACE LEVEL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE

Rev	Date	Drawn	Description
-	--/--/----	--	--

GEO ENVIRONMENTA

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LS10 1SW

Client
PARK DESIGNED LIMITED

Site
BRETFIELD COURT,
BRETTON INDUSTRIAL ESTATE

Title
TOPOGRAPHICAL
SURVEY

Surveyed	JS / JEM	Drawn	JS
Check	DA	Date	04/11/202

Scale	Job No	Sheet Size	Rev
1:250	P21-01381	A0	

APPENDIX B

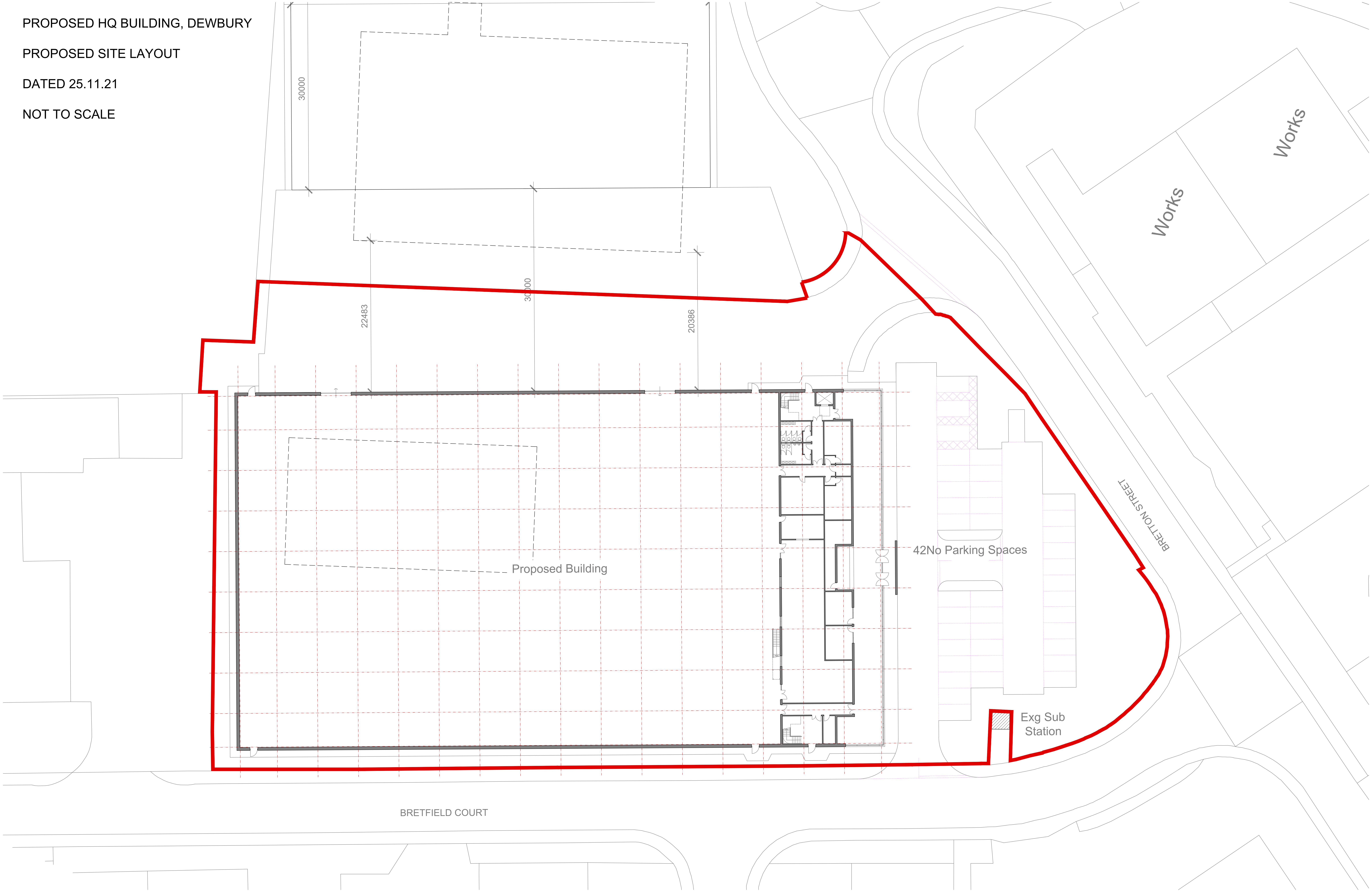
Indicative Layout Drawings

PROPOSED HQ BUILDING, DEWBURY

PROPOSED SITE LAYOUT

DATED 25.11.21

NOT TO SCALE



APPENDIX C

Extract of Public Sewer Records

YORKSHIRE WATER
PROTECTION OF MAINS AND SERVICES

1. The position of Yorkshire Water Services Ltd (YWS) apparatus shown on the existing mains record drawing(s) indicates the ***general*** position and nature of our apparatus and the accuracy of this information cannot be guaranteed. Any damage to YWS apparatus as a result of your works may have serious consequences and you will be held responsible for all costs incurred. Prior to commencing major works, the exact location of apparatus must be determined on site, if necessary by excavating trial holes. The actual position of such apparatus and that of service pipes which have not been indicated must be established on site by contacting the Customer Helpline on 0845 124 24 24 for both water and sewerage.

2. The public sewer and water network is lawfully retained in its existing position and the sewerage and water undertaker is entitled to have it remain so without any disturbance. The provisions of section 159 of the Water Industry Act 1991 provides that the undertaker may "inspect, maintain, adjust, repair or alter" the network. Those rights are given to enable the undertaker to perform its statutory duties. Any development of the land or any other action that unacceptably hindered the exercise of those rights would be unlawful. The provisions contained in Section 185 of the Water Industry Act 1991 state that where it is reasonable to do so, a person may require the water supply undertaker to alter or remove a pipe where it is necessary to enable that person to carry out a proposed change of use of the land. The provisions contained in Section 185 also require the person making the request to pay the full cost of carrying out the necessary works.

3. Ground levels over existing YWS apparatus are to be maintained. Sewers in highways will ***generally*** be laid to give 1200mm of cover from finished ground level working to kerb races, other permanent identification of the limits of the road or to an agreed line and level. Substantial increases or decreases to this 1200mm depth of cover will result in the sewer being re-laid at your expense. Water mains and services will ***generally*** be laid with a minimum of 750mm depth of cover however some mains and services usually those installed over 50 years ago may have less ground cover.

4. If surface levels are to be decreased / increased significantly the effects on existing water supply apparatus will be carefully considered and if any alterations are necessary, the costs of the alterations will be recharged to you in full. Outlets on fire hydrants must be no more than 300mm below the new levels and all surface boxes must be adjusted as part of the scheme.

5. To enable future repair works to be carried out without hindrance; any pipe, cable, duct, etc. installed parallel to a water main or service pipe should not be installed directly over or within 300mm of a water main or service pipe or 1000mm of a waste water asset. Where a pipe, cable, duct, etc. crosses a main or service it should preferably cross perpendicular or at an angle of no less than 45o and with a minimum clearance of 150mm. These requirements apply to activities within an existing highway and are relevant to the installation of pipes, cables, ducts, etc. up to and including 250mm in diameter *(see illustration below).* Necessary protection measures for installations greater than 250mm in diameter and/or in private land will need to be agreed on an individual basis. Installations within a new development site must comply with the National Joint Utilities Group publication Volume 2: NJUG Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites.

6. All excavation works near to YW apparatus should be by hand digging only.

7. Backfilling with a suitable material to a minimum 300mm above YW apparatus is required.

8. Adequate support must be provided where any works pass under YW apparatus.

9. Jointing chambers, lighting columns and other structures must be installed in such a way that future repair or maintenance works to YW apparatus will not be hindered.

10. Apparatus such as; railings, sign posts, etc. must not be placed in such a way that they prevent access to or full operation of controlling valves, hydrants or similar apparatus. YWS surface boxes must not be covered or buried. Any adjustment, alteration or replacement of manhole covers must be agreed on site prior to the commencement of the works with a YWS Inspector who may be contacted via our Call Centre on 0845 124 24 24.

11. Explosives shall not be used within 100 metres of any Yorkshire Water Services apparatus or installations.

12. Vibrating plant should not be used directly over any apparatus. Movement or operation by vehicles or heavy plant is not to be permitted in the immediate vicinity of YWS plant or apparatus unless there has been prior consultation and, if necessary, adequate protection provided without cost to YWS.

13. ***Under no circumstances*** should thrust boring or similar trenchless techniques commence until the actual position of the Company's mains/services along the proposed route have been confirmed by trial holes.

14. Any alterations to the highway should be notified following the procedures outlined in the New Road and Street Works Act 1991 Code of Practice; Measures Necessary Where Apparatus Is Affected By Major Works (Diversionary Works).

15. You will be held responsible for any damage or loss to YWS apparatus during and after completion of work, caused by yourselves, your servant or agent. Any damage caused or observed to YWS plant or apparatus should be immediately reported to YWS. Should YW incur any costs as a result of non-compliance with the above, all costs will be rechargeable in full.

16. You should ensure that nothing is done on the site to prejudice the safety or operation of YWS employees, plant or apparatus.

17. In accordance with the New Roads and Street Works Act 1991, Chapter 22, Part 3, Section 80. The location of any identified YW asset "*which is not marked, or is wrongly marked, on the records made available*" should be communicated back to Yorkshire Water. The location of the apparatus should be identified on copies of the supplied plans which should be returned to Yorkshire Water (Asset Records Team) with photographic supporting evidence where possible.

18. The Government has decided that responsibility for private sewers serving two or more properties and lateral drains (the section of pipe beyond the boundary of a single property, connecting it to the public sewer) will be transferred to the water companies on Oct 1 2011.

Private pumping stations will also transfer during the period 1 October 2011 – 1 Oct 2016. Records of these assets may not yet be shown on the existing mains record drawing(s). If you encounter any of these assets you must inform Yorkshire Water Services Ltd (YWS).

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20. This information is for guidance only and the position and depth of any YW apparatus is approximate only. Likewise, the nature and condition of any YW apparatus cannot be guaranteed. YW has no responsibility for recording the locations of privately owned apparatus. As of 1 October 2011, there may be some lateral drains and/or public sewers which are not documented on YW records but may still be present. For the avoidance of doubt, this information is not a substitute for appropriate professional and/or legal advice. YW accepts no responsibility for any inaccuracy or omissions in this information. The actual position of YW apparatus must be determined on site by excavating trail holes by hand. YW requires a minimum of two working days' written notice of the intention to excavate any trial holes before any excavation can be undertaken. If there are any queries in this respect please contact Yorkshire Water on 0845 124 24 24.

Property Identfier

□ or +

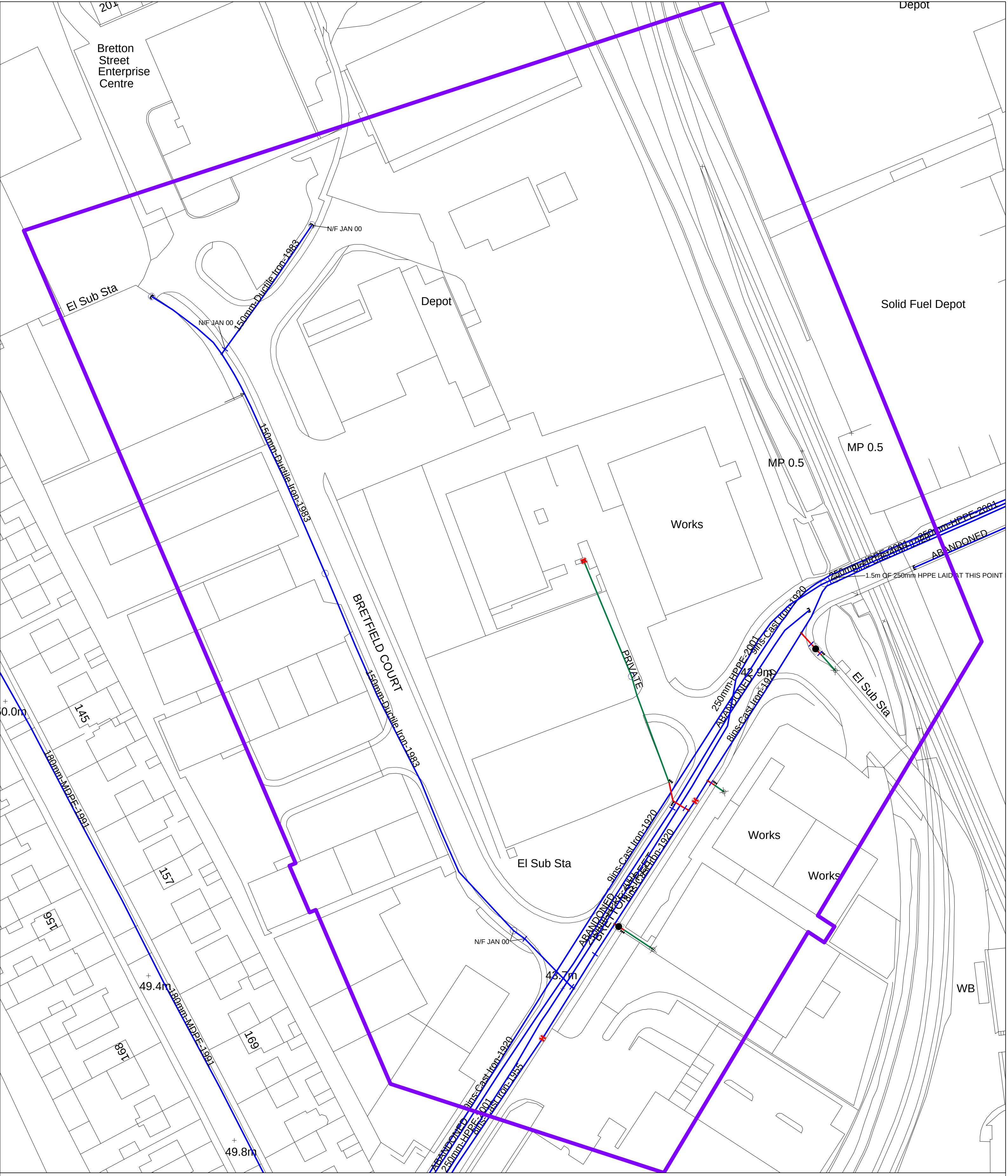
Sewer Legend

—▶—	Combined Sewer	—▷—	S24 Combined Sewer
- -▶- -	Surface Water Sewer	—▷—	S24 Surface Water Sewer
- -▶- -	Foul Sewer	—▷—	S24 Foul Sewer
- -▶- -	Section 104 Sewer	—\—	Rising Main
—▷—	Overflow Sewer	- ->- -	Abandoned Sewer
—▶—	Syphone Sewer & Vacuum Sewer		

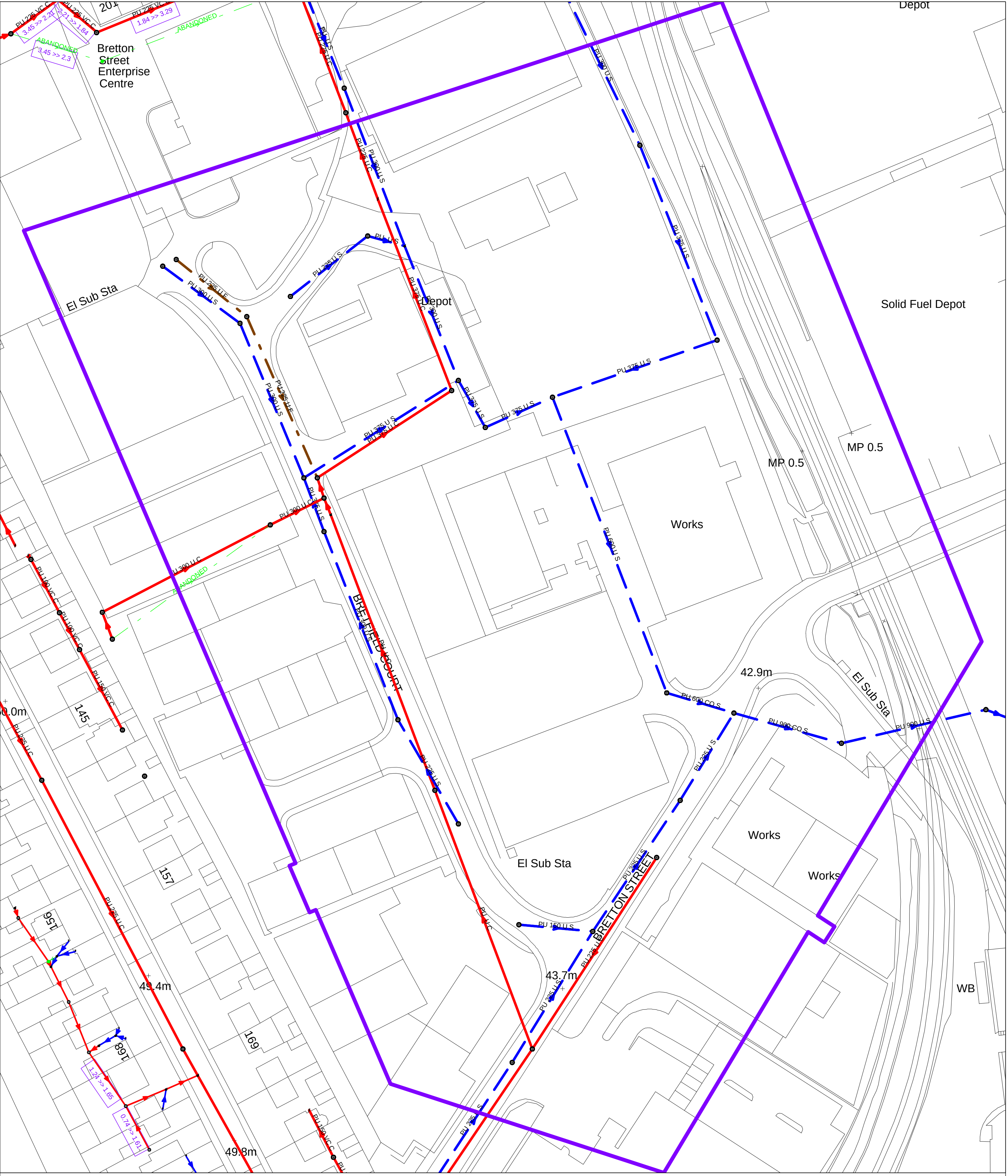
▲	Pumping Station	STW	Public Sewer Tretment Works

Water Legend

—	Water Main 4" and below
—	Water Main 4" and above
—	Raw Water Main
—	Private Water Main
Ⓗ	Fire Hydrant
▲	Pumping Station



Public Clean Water Network 23/11/2021 15:46:19 OS Grid Coordinates: 424682 : 420076 Map Name : SE2420SE svcGISSafeMovePD



Public Waste Water Network 23/11/2021 15:46:21 OS Grid Coordinates: 424682 : 420076 Map Name : SE2420SE svcGISSafeMovePD

APPENDIX D

Alternative Drainage Survey

MH - MANHOLE
G - GULLY
SVP - SOIL VENT PIPE
RWP - RAIN WATER PIPE
INT - INTERCEPTOR

FOUL 🟥
SURFACE WATER 🟦
COMBINED 🟩

SURVEYED LINE ━ ━ ━
UNSURVEYED LINE - - -

PLEASE NOTE THIS PLAN IS NOT TO SCALE

Notes

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N

Grid : OS National Grid.
Using the OS GPS Network and applyin
OSTN15 transformation and then remov
the scale factor for true distances with a
one-step transformation centred on S2

Datum : OS Level Datum.
Using the OS GPS Network and applyin
OSGM15 National Geoid Model to obtai
local area corrections.

Station Listing

Station	Easting	Northing	L
A1	424778.746	420283.956	43.
A2	424829.792	420295.453	42.
A3	424884.523	420219.471	42.
S1	424798.003	420209.639	43.
S2	424855.353	420129.467	43.
S3	424916.383	420247.929	43.

KEY

AIR VALVE	AV	KERB OUTLET
BENCH MARK	BM	LAMP POST
BIN	BIN	MANHOLE (CIRCULAR)
BOLLARD	BOL	MANHOLE (RECTANGULAR)
BORE HOLE	BH	MANHOLE (TRIANGULAR)
BRITISH TELECOM COVER	BT	MARKER POST
BUS STOP	BUS	GULLY
CABLE TV COVER	CATV	RODDING EYE
CABLE TV SUPPLY	CA	SIGN POST
COLUMN	COL	TELECOM COVER
DROPPED KERB	DK	TELEGRAPH POLE
EARTHING POINT	ER	THRESHOLD LEVEL
ELECTRICITY COVER	ELEC	TRAFFIC LIGHT
ELECTRICITY POLE	EP	TRIAL PIT
FIRE HYDRANT	FH	WASH OUT
GAS VALVE	GAS	WATER METER
GATE		WATER STOP COCK
INSPECTION COVER (CIRCULAR)	IC	WATER STOP VALVE
INSPECTION COVER (RECTANGULAR)	IC	
COVER LEVEL	CL	CHAMBER BASE LEVEL
INVERT LEVEL	IL	WATER SURFACE LEVEL
UNABLE TO RAISE	UTR	UNABLE TO MEASURE
GIRTH OF TREE TRUNK	G	DIAMETER OF TREE TRUNK
HEIGHT TO TOP OF TREE CANOPY	H	MULTI BOLE TREE

Rev	Date	Drawn	Description
-	--/--/----	--	--

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Leeds E: admin@metgeoenvironmental.
West Yorkshire W: www.metgeoenvironmental.co
LS10 1SW

Client
PARK DESIGNED LIMITED

Site
BRETFIELD COURT,
BRETTON INDUSTRIAL ESTATE

Title
TOPOGRAPHICAL
SURVEY

Surveyed	JS / JEM	Drawn	JS
Check	DA	Date	04/11/202

Scale	Job No	Sheet Size	Rev
1:250	P21-01381	A0	

APPENDIX E

Indicative Drainage Layout Drawing

RWP'S, GULLIES, CHANNEL DRAIN AND FOUL WATER SOURCES ARE INDICATIVE AND SUBJECT TO DETAILED DESIGN, SETTING OUT, LEVELS, FOUNDATIONS AND EXTERNAL WORKS.

CHANNEL DRAINAGE SIZES TO BE SUITABLY SIZED TO SUIT DRAINED AREAS. ALL CHANNEL DRAINS TO HAVE SUMP UNIT/SILT BUCKET ON ALL OUTLETS

RWP AND FOUL POP UPS ARE INDICATIVE ONLY AWAITING CONFIRMATION FROM THE ARCHITECT

EXISTING DRAINAGE INFORMATION FROM ALTERNATIVE DRAINAGE DATED NOVEMBER 2021.

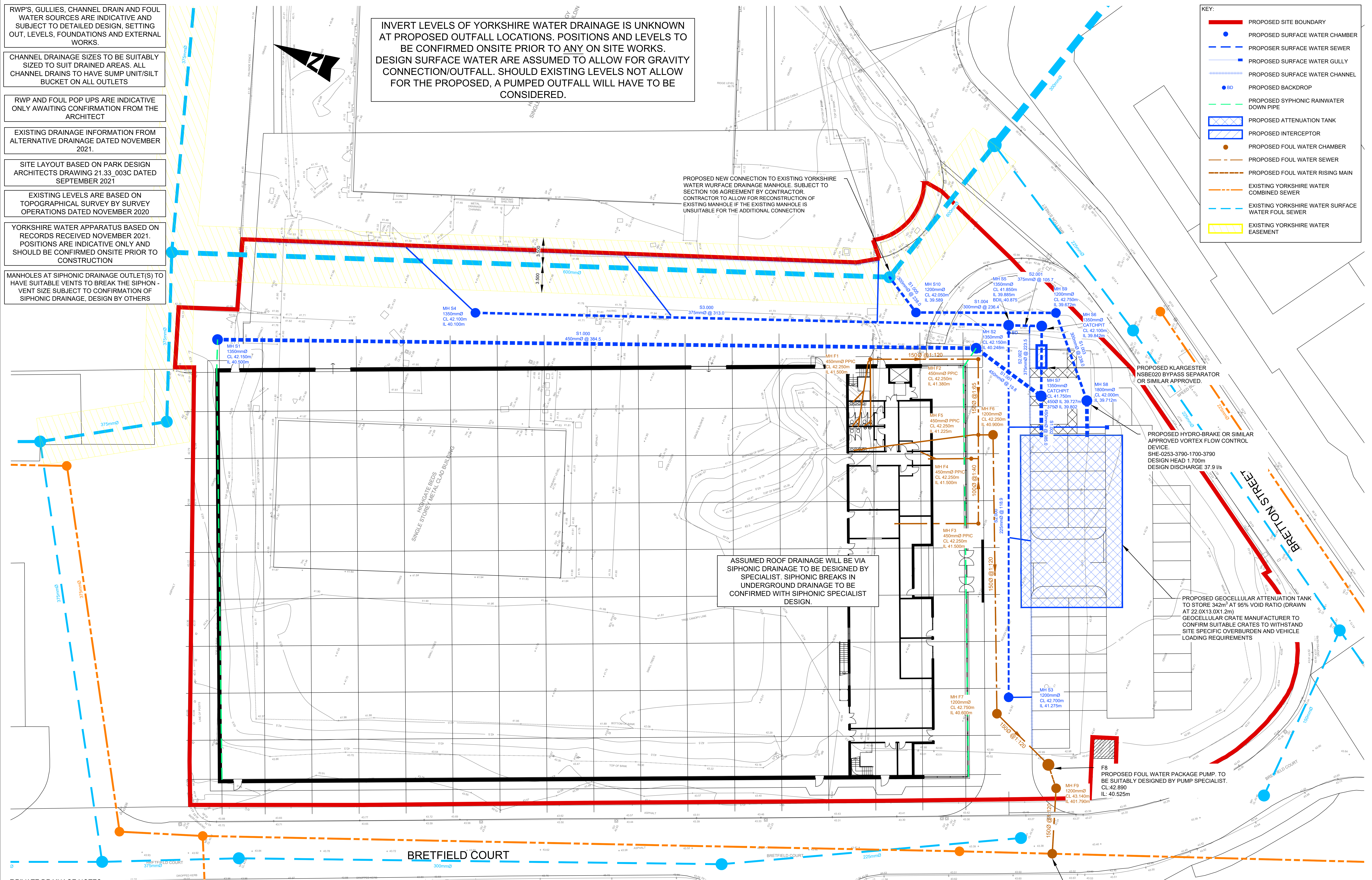
SITE LAYOUT BASED ON PARK DESIGN ARCHITECTS DRAWING 21.33_003C DATED SEPTEMBER 2021

EXISTING LEVELS ARE BASED ON TOPOGRAPHICAL SURVEY BY SURVEY OPERATIONS DATED NOVEMBER 2020

YORKSHIRE WATER APPARATUS BASED ON RECORDS RECEIVED NOVEMBER 2021. POSITIONS ARE INDICATIVE ONLY AND SHOULD BE CONFIRMED ONSITE PRIOR TO CONSTRUCTION

MANHOLES AT SIPHONIC DRAINAGE OUTLET(S) TO HAVE SUITABLE VENTS TO BREAK THE SIPHON - VENT SIZE SUBJECT TO CONFIRMATION OF SIPHONIC DRAINAGE, DESIGN BY OTHERS

INVERT LEVELS OF YORKSHIRE WATER DRAINAGE IS UNKNOWN AT PROPOSED OUTFALL LOCATIONS. POSITIONS AND LEVELS TO BE CONFIRMED ONSITE PRIOR TO ANY ON SITE WORKS. DESIGN SURFACE WATER ARE ASSUMED TO ALLOW FOR GRAVITY CONNECTION/OUTFALL. SHOULD EXISTING LEVELS NOT ALLOW FOR THE PROPOSED, A PUMPED OUTFALL WILL HAVE TO BE CONSIDERED.



PROPOSED NEW CONNECTION TO EXISTING YORKSHIRE WATER WURFACE DRAINAGE MANHOLE. SUBJECT TO SECTION 106 AGREEMENT BY CONTRACTOR. CONTRACTOR TO ALLOW FOR RECONSTRUCTION OF EXISTING MANHOLE IF THE EXISTING MANHOLE IS UNSUITABLE FOR THE ADDITIONAL CONNECTION

PROPOSED KLARGESTER NSBE020 BYPASS SEPARATOR OR SIMILAR APPROVED.

PROPOSED HYDRO-BRAKE OR SIMILAR APPROVED VORTEX FLOW CONTROL DEVICE.
SHE-0253-3790-1700-3790
DESIGN HEAD 1.700m
DESIGN DISCHARGE 37.9 l/s

ASSUMED ROOF DRAINAGE WILL BE VIA SIPHONIC DRAINAGE TO BE DESIGNED BY SPECIALIST. SIPHONIC BREAKS IN UNDERGROUND DRAINAGE TO BE CONFIRMED WITH SIPHONIC SPECIALIST DESIGN.

PROPOSED GEOCELLULAR ATTENUATION TANK TO STORE 342m^3 AT 95% VOID RATIO (DRAWN AT 22.0X13.0X1.2m)
GEOCELLULAR CRATE MANUFACTURER TO CONFIRM SUITABLE CRATES TO WITHSTAND SITE SPECIFIC OVERBURDEN AND VEHICLE LOADING REQUIREMENTS

F8
PROPOSED FOUL WATER PACKAGE PUMP. TO BE SUITABLY DESIGNED BY PUMP SPECIALIST.
CL:42.890
IL: 40.525m

PROFERED FOUL WATER OUTFALL BY GRAVITY TO PROPOSED NEW 1200Ø MANHOLE TO EXISTING YORKSHIRE WATER COMBINED SEWER. SUBJECT TO SECTION 106 AGREEMENT BY CONTRACTOR.

100mm at A1

KEY:

🟥	PROPOSED SITE BOUNDARY
●	PROPOSED SURFACE WATER CHAMBER
— — —	PROPOSER SURFACE WATER SEWER
—■	PROPOSED SURFACE WATER GULLY
┼┼┼┼	PROPOSED SURFACE WATER CHANNEL
● BD	PROPOSED BACKDROP
— — —	PROPOSED SYPHONIC RAINWATER DOWN PIPE
▨	PROPOSED ATTENUATION TANK
▨	PROPOSED INTERCEPTOR
●	PROPOSED FOUL WATER CHAMBER
— - —	PROPOSED FOUL WATER SEWER
----	PROPOSED FOUL WATER RISING MAIN
— - —	EXISTING YORKSHIRE WATER COMBINED SEWER
— — —	EXISTING YORKSHIRE WATER SURFACE WATER FOUL SEWER
▨	EXISTING YORKSHIRE WATER EASEMENT

NOTES:

1. THESE NOTES ARE INTENDED TO AUGMENT DRAWINGS AND SPECIFICATIONS. WHERE CONFLICT OF REQUIREMENTS EXIST THE ORDER OF PRECEDENCE SHALL BE AS SHOWN IN THE SPECIFICATION. OTHERWISE THE STRICTEST PROVISION SHALL GOVERN.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS.
3. DRAWINGS NOT TO BE SCALED. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER AND FURTHER INSTRUCTIONS OBTAINED BEFORE WORK IS COMMENCED.
4. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO DETERMINE THE ERECTION PROCEDURE AND SEQUENCE AND ENSURE THAT THE BUILDING AND ITS COMPONENTS ARE SAFE DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE-DOWNS WHICH MAY BE NECESSARY, SUCH MATERIAL REMAINING THE THE PROPERTY OF THE CONTRACTOR ON COMPLETION, AND FOR ENSURING THAT THE WORKS AND ANY ADJACENT PROPERTIES
5. ARE SAFE IN THE TEMPORARY CONDITION.THE DRAINAGE STRATEGY IS DESIGNED TO CATER FOR THE 100 YEAR STORM + 30% CLIMATE CHANGE. NO FLOODING DURING THE PEAK 30 YEAR STORM, MINIMAL CONTROLLED FLOODING WITHIN THE EXTERNAL YARD DURING THE 100 YEAR STORM + 30% CC.
6. SURFACE WATER PACKAGE PUMP MAY BE REQUIRED IF THE EXISTING DRAINAGE AT THE POINT OF THE CONNECTION IS HIGHER THAN THE INVERT LEVEL SHOWN AND/OR THE PIPE CONDITION IS NOT SATISFACTORY.
6. LINE, LEVEL AND LOCATION OF EXISTING DRAINAGE IS TO BE VERIFIED PRIOR TO DETAILED DESIGN.
7. ALL PRIVATE DRAINAGE WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH BUILDING REGULATIONS PART H, BS EN 752, THE CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY.
8. ABOVE GROUND DRAINAGE DETAILS TO BE DESIGNED/CONFIRMED BY THE ARCHITECT/M&E CONTRACTOR
9. ALL SPECIALIST/PROPRIETARY PRODUCTS SUCH AS SEPARATORS, ATTENUATION TANKS, CHANNEL DRAINS, SOAKAWAYS, PACKAGE PUMPING STATION AND WATER TREATMENT UNITS TO BE INSTALLED AS PER THE MANUFACTURER'S INSTALLATION DETAILS AND SPECIFICATIONS.

INTERCEPTOR NOTES:

Y01. INTERCEPTORS TO BE BYPASS SEPARATOR TYPE.

Y02. INTERCEPTORS TO BE COMPLIANT WITH THE CURRENT BUILDING REGULATIONS, ENVIRONMENT AGENCY REQUIREMENTS AND WITH BS EN 858-2002 A1 2004 AND BS EN 858-2:2003.

Y03.INTERCEPTORS TO RESIST GROUNDWATER AND STRUCTURALLY APPROPRIATE FOR IT'S LOCATION RELATIVE TO TRAFFIC LOADING (TEMPORARY AND PERMANENT STATES).

Y04.INTERCEPTORS TO BE VENTED TO NEAREST LANDSCAPED AREA.

Y05. INTERCEPTORS TO BE PROVIDED WITH ALARM, POWER AND TELEMETRY LINKED TO A LOCATION TO BE AGREED.

PRIVATE DRAINAGE NOTES:

1. DRAINAGE SYSTEMS TO COMPLY WITH THE FOLLOWING STANDARDS:
- BS EN 752:2008
- BUILDING REGULATIONS APPROVED DOCUMENT PART H, 2015 EDITION
2. ALL COMPONENTS USED IN DRAINAGE SYSTEMS TO COMPLY WITH THE FOLLOWING: BS EN 476:2011
3. ALL DRAINAGE SYSTEMS AND COMPONENTS TO BE CONSTRUCTED AND TESTED TO THE FULL SATISFACTION OF THE BUILDING REGULATIONS INSPECTOR
4. ALL DRAINAGE TO BE CONSTRUCTED AND TESTED IN ACCORDANCE WITH BS EN 1610:2015.
5. EXACT POSITIONS OF SVP'S, STUB-STACKS, W.C. OUTLETS ETC. AND RAINWATER DOWNPIPES ARE TO BE ACCURATELY LOCATED FROM THE ARCHITECT'S DESIGN DRAWINGS.
6. PIPES UPTO 225Ø TO BE VITRIFIED CLAY, VITRIFIED CLAY PIPES AND FITTINGS TO COMPLY WITH THE RELEVANT PROVISIONS OF BS EN295-1:2013,-2:2013,-3:2012 AND BS 65 RESPECTIVELY AND BE KITEMARKED. ALL PIPES SHALL BE EXTRA STRENGTH TO BS 65 OR EQUIVALENT BS EN295 PIPE CRUSHING STRENGTH.
7. PIPES > 225Ø TO BE CONCRETE. CONCRETE PIPES TO BE CLASS 120 TO BS EN1916:2002 & BS5911-1:2002.
8. PRECAST CONCRETE MANHOLES TO BE IN ACCORDANCE WITH BS EN 1917:2002 AND BS 5911-3:2010,-4:2002 AND TO BE KITEMARKED. PRECAST CONCRETE RINGS AND COVER SLABS TO CONCRETE PIPES TO BE JOINTED WITH CEMENT MORTAR UNLESS NOTED OTHERWISE.
9. INSITU AND PRECAST CONCRETE UNITS SHALL HAVE SULPHATE RESISTING PORTLAND CEMENT TO BS EN 197-1:2011.
10. POLYPROPYLENE INSPECTION CHAMBERS TO COMPLY WITH BS EN 13598-1:2010,-2:2016 AND BS 7158:2001 AND TO BE KITEMARKED.
11. MANHOLE COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015. MANHOLE COVERS AND FRAMES TO BE OF A NON-ROCKING DESIGN WITH CUSHION INSERTS AND KITEMARKED. LOAD CLASS D400 COVERS TO BE USED IN ALL LOCATIONS. ALL COVERS TO BE BADGED "FW" OR "SW" AS APPROPRIATE. MANHOLE COVER SLABS AND ACCESS TO BE IN ACCORDANCE WITH CONCRETE PIPE ASSOCIATION TECHNICAL BULLETIN ISSUED SEPTEMBER 2001.
12. POLYPROPYLENE INSPECTION CHAMBER COVERS AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015. COVERS AND FRAMES TO BE OF A NON-ROCKING DESIGN WITH CUSHION INSERTS AND KITEMARKED. LOAD CLASS A15 COVERS TO BE USED IN AREAS INACCESSIBLE TO VEHICLES; LOAD CLASS D400 COVERS TO BE USED ELSEWHERE.
13. ROAD GULLY GRATES AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015 AND BE OF A NON-ROCKING DESIGN WITH LEFT HANDED CAPTIVE HINGE ACCESS AND BE KITEMARKED. LOAD CLASS D400 GRATES TO BE USED THROUGHOUT WITH 450mm SQ. GRATE AND FRAME. MINIMUM AREA OF WATERWAY TO BE 1010cm².
14. YARD GULLY GRATES AND FRAMES SHALL COMPLY WITH THE RELEVANT PROVISIONS OF BS EN 124-1 TO 6:2015 AND BE OF A NON-ROCKING DESIGN AND BE KITEMARKED. LOAD CLASS A15 GRATES TO BE USED IN AREAS INACCESSIBLE TO VEHICLES. GRATES TO BE 300mm SQ. MINIMUM AREA OF WATERWAY TO BE 900cm².
15. RAINWATER DOWNPIPES CONNECTED DIRECT TO DRAIN TO BE CONNECTED USING AN APPROPRIATE ADAPTOR AND REMOVABLE SECTION OF DOWNPIPE TO PERMIT RODDING ACCESS.
16. CLASS Z BEDDING DETAIL SHALL BE PROVIDED:
- WHERE COVER TO PIPE BARREL IS;
  i) <1.2m IN VEHICULAR TRAFFICKED AREAS
  ii) <0.9m IN AREAS INACCESSIBLE TO VEHICLES.
- AT ALL ROAD GULLY, YARD GULLY, RWP, SVP AND DRAINAGE CHANNEL BRANCHES.
- AREAS OF DEEP ROOTING VEGETATION.
- PIPE RUNS NEAR BUILDINGS IN ACCORDANCE WITH TYPICAL SECTIONS ON AWP DRAWINGS.
- WHERE TWO PIPES CROSS WITH A CLEAR GAP OF <300mm. CLASS Z SURROUND TO EXTEND A MINIMUM OF 1.0m FROM THE CENTRE OF THE CROSSING POINT & EXTENDED TO WITHIN 150mm OF THE NEAREST FLEXIBLE JOINT, WHERE REQUIRED.
17. CLASS Y BEDDING DETAIL TO BE PROVIDED WHERE COVER TO PIPE CROWN FROM THE UNDERSIDE OF THE SUB STRUCTURE IS LESS THAN 300mm.
18. PIPE BEDDING MATERIALS TO COMPLY GENERALLY WITH SHW - SERIES 500 - CLAUSE 503. GRANULAR BEDDING MATERIALS TO ALSO COMPLY WITH BS EN 13242 & THE GRANULAR BEDDING MATERIAL TABLE ON THIS DRAWING.
19. SELECTED BACKFILL MATERIAL TO BE PROVIDED ABOVE THE PIPE SURROUND TO A HEIGHT OF 300mm MINIMUM ABOVE THE TOP OF THE PIPE. SELECTED BACKFILL MATERIAL TO BE CLASS 8 - LOWER TRENCH FILL MATERIAL IN ACCORDANCE WITH SHW - SERIES 600 TABLE 6/1 & TO COMPRISE OF UNIFORM SOIL, FREE FROM STONES LARGER THAN 40mm, LUMPS OF CLAY OVER 100mm, TIMBER, FROZEN MATERIAL & VEGETABLE MATTER. SELECTED BACKFILL MATERIAL TO BE PLACED & COMPACTED IN LAYERS NOT EXCEEDING 150mm IN THICKNESS. SHOULD THE MATERIAL BE UNSUITABLE OR WEATHER CONDITIONS AFFECT THE MATERIALS STABILITY, THEN A SUITABLE HARD GRANULAR MATERIAL SHALL BE USED.
20. GENERAL BACKFILL TO DRAINAGE TRENCHES [OTHER THAN FILTER DRAINS] IN VEHICULAR TRAFFICKED AREAS ABOVE THE PIPE BEDDING & SELECTED BACKFILL SHALL BE CLASS 1, 2 OR 3 GENERAL FILL MATERIAL IN ACCORDANCE WITH SHW - SERIES 600.
21. GENERAL BACKFILL UNDER NON-VEHICULAR TRAFFICKED AREAS TO BE SUITABLE AS-DUG MATERIAL COMPACTED IN ACCORDANCE WITH SHW - SERIES 600 IN LAYERS NOT EXCEEDING 225mm, EACH LAYER COMPACTED TO FORM A STABLE TRENCH BACKFILL, SHOULD THE MATERIAL BE UNSUITABLE OR WEATHER CONDITIONS AFFECT THE MATERIALS STABILITY, THEN A HARD GRANULAR MATERIAL SHALL BE USED UP TO FORMATION LEVEL.
22. ALL CONCRETE TO BE DESIGNATED CONCRETE TO CONFORM TO BS 8500-2.
23. NO MECHANICAL COMPACTION OF FILL MATERIAL WITHIN 300mm OF THE CROWN OF ANY PIPE.

Rev	Description	Date	By	Chk	App
P1	FIRST ISSUE	02.12.21	DG	JP	KH

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Project:
New Headquarters and Warehouse, Dewsbury

Client:
Sueno Beds Ltd.

Drawing:
Proposed Drainage Strategy

Role: Civil Engineer

Drawing Status: PRELIMINARY

Job. no. 46486 | Scale@ A1: 1:250 | Rev. P01

Project	Originator	Volume	Level	Type	Role	Number
SUEN	AWP	ZZ	XX	DR	C	3000

APPENDIX F

Hydraulic Model Study

Time Area Diagram for Storm

Time (mins)	**Area (ha)**	**Time (mins)**	**Area (ha)**
0-4	0.427	4-8	0.382

Total Area Contributing (ha) = 0.809

Total Pipe Volume (m^3) = 31.356

STORM SEWER DESIGN by the Modified Rational Method

Network Design Table for Storm

« - Indicates pipe capacity < flow

PN	**Length (m)**	**Fall (m)**	**Slope (1:X)**	**I.Area (ha)**	**T.E. (mins)**	**Base Flow (l/s)**	**k (mm)**	**HYD SECT**	**DIA (mm)**	**Section Type**	**Auto Design**
S1.000	96.892	0.252	384.5	0.263	5.00	0.0	0.600	o	450	Pipe/Conduit	🔒
S1.001	10.311	0.521	19.8	0.257	0.00	0.0	0.600	o	450	Pipe/Conduit	🔓
S2.000	47.544	0.400	118.9	0.128	5.00	0.0	0.600	o	225	Pipe/Conduit	🔒
S3.000	68.125	0.218	313.0	0.161	5.00	0.0	0.600	o	375	Pipe/Conduit	🔒
S2.001	4.229	0.040	105.7	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔓
S2.002	8.941	0.040	223.5	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	🔒
S1.002	5.871	0.015	385.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	🔓
S1.003	11.893	0.040	297.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
S1.004	17.878	0.083	215.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒
S1.005	5.636	0.017	331.5	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	🔒

Network Results Table

PN	**Rain (mm/hr)**	**T.C. (mins)**	**US/IL (m)**	**Σ I.Area (ha)**	**Σ Base Flow (l/s)**	**Foul (l/s)**	**Add Flow (l/s)**	**Vel (m/s)**	**Cap (l/s)**	**Flow (l/s)**
S1.000	50.00	6.57	40.500	0.263	0.0	0.0	0.0	1.03	163.9	35.7
S1.001	50.00	6.60	40.248	0.520	0.0	0.0	0.0	4.59	729.4	70.5
S2.000	50.00	5.66	41.275	0.128	0.0	0.0	0.0	1.20	47.6	17.3
S3.000	50.00	6.11	40.100	0.161	0.0	0.0	0.0	1.02	112.5	21.8
S2.001	50.00	6.15	39.882	0.289	0.0	0.0	0.0	1.76	194.6	39.1
S2.002	50.00	6.28	39.842	0.289	0.0	0.0	0.0	1.21	133.4	39.1
S1.002	50.00	6.70	39.727	0.809	0.0	0.0	0.0	1.03	163.8	109.6
S1.003	50.00	6.92	39.712	0.809	0.0	0.0	0.0	0.91	64.1«	109.6
S1.004	50.00	7.20	39.672	0.809	0.0	0.0	0.0	1.07	75.4«	109.6
S1.005	50.00	7.31	39.589	0.809	0.0	0.0	0.0	0.86	60.6«	109.6

Simulation Criteria for Storm

```
         Volumetric Runoff Coeff 0.750   Additional Flow - % of Total Flow 0.000
          Areal Reduction Factor 1.000       MADD Factor * 10m³/ha Storage 2.000
                Hot Start (mins)     0                  Inlet Coeffiecient 0.800
              Hot Start Level (mm)   0 Flow per Person per Day (l/per/day) 0.000
  Manhole Headloss Coeff (Global) 0.500                     Run Time (mins)    60
    Foul Sewage per hectare (l/s) 0.000              Output Interval (mins)     1

             Number of Input Hydrographs 0 Number of Storage Structures 1
               Number of Online Controls 1 Number of Time/Area Diagrams 0
              Number of Offline Controls 0 Number of Real Time Controls 0
```

Synthetic Rainfall Details

```
               Rainfall Model                FSR          Profile Type Summer
         Return Period (years)                30           Cv (Summer)  0.750
                       Region England and Wales           Cv (Winter)  0.840
                   M5-60 (mm)             19.000 Storm Duration (mins)     30
                      Ratio R              0.350
```

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S8, DS/PN: S1.003, Volume (m³): 7.2

Unit Reference	MD-SHE-0253-3790-1700-3790
Design Head (m)	1.700
Design Flow (l/s)	37.9
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	253
Invert Level (m)	39.712
Minimum Outlet Pipe Diameter (mm)	300
Suggested Manhole Diameter (mm)	1800

Control Points	**Head (m)**	**Flow (l/s)**
Design Point (Calculated)	1.700	37.9
Flush-Flo™	0.520	37.9
Kick-Flo®	1.141	31.3
Mean Flow over Head Range	-	32.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**	**Depth (m)**	**Flow (l/s)**
0.100	8.2	1.200	32.1	3.000	49.8	7.000	75.1
0.200	25.9	1.400	34.5	3.500	53.7	7.500	77.7
0.300	36.0	1.600	36.8	4.000	57.2	8.000	80.2
0.400	37.4	1.800	38.9	4.500	60.6	8.500	82.6
0.500	37.9	2.000	41.0	5.000	63.8	9.000	84.9
0.600	37.7	2.200	42.9	5.500	66.8	9.500	87.2
0.800	36.8	2.400	44.7	6.000	69.7		
1.000	34.8	2.600	46.5	6.500	72.5		

Storage Structures for Storm

Tank or Pond Manhole: S8, DS/PN: S1.003

Invert Level (m) 39.712

Depth (m)	**Area (m²)**	**Depth (m)**	**Area (m²)**	**Depth (m)**	**Area (m²)**
0.000	285.0	1.200	285.0	1.201	0.0

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	1	+0%					40.641
S1.001	S2	15 Winter	1	+0%					40.359
S2.000	S3	15 Winter	1	+0%	100/15 Summer				41.368
S3.000	S4	15 Winter	1	+0%	100/15 Summer				40.211
S2.001	S5	15 Winter	1	+0%	30/15 Summer				40.049
S2.002	S6	15 Winter	1	+0%	30/15 Summer				40.042
S1.002	S7	15 Winter	1	+0%	30/15 Summer				40.030
S1.003	S8	120 Winter	1	+0%	30/15 Summer				39.918
S1.004	S9	120 Winter	1	+0%					39.772
S1.005	S10	120 Winter	1	+0%					39.712

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.309	0.000	0.19			29.7	OK	
S1.001	S2	-0.339	0.000	0.14			55.8	OK	
S2.000	S3	-0.132	0.000	0.35			16.2	OK	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S4	-0.264	0.000	0.18			19.1	OK	
S2.001	S5	-0.208	0.000	0.31			33.5	OK	
S2.002	S6	-0.175	0.000	0.35			33.2	OK	
S1.002	S7	-0.147	0.000	0.79			88.2	OK	
S1.003	S8	-0.094	0.000	0.31			16.0	OK	
S1.004	S9	-0.200	0.000	0.25			16.0	OK	
S1.005	S10	-0.177	0.000	0.35			16.0	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	**US/MH Name**	**Storm**	**Return Period**	**Climate Change**	**First (X) Surcharge**	**First (Y) Flood**	**First (Z) Overflow**	**Overflow Act.**	**Water Level (m)**
S1.000	S1	15 Winter	30	+0%					40.733
S1.001	S2	15 Winter	30	+0%					40.439
S2.000	S3	15 Winter	30	+0%	100/15 Summer				41.438
S3.000	S4	15 Winter	30	+0%	100/15 Summer				40.396
S2.001	S5	15 Winter	30	+0%	30/15 Summer				40.350
S2.002	S6	15 Winter	30	+0%	30/15 Summer				40.329
S1.002	S7	15 Winter	30	+0%	30/15 Summer				40.300
S1.003	S8	60 Winter	30	+0%	30/15 Summer				40.162
S1.004	S9	60 Winter	30	+0%					39.840
S1.005	S10	60 Winter	30	+0%					39.791

PN	**US/MH Name**	**Surcharged Depth (m)**	**Flooded Volume (m³)**	**Flow / Cap.**	**Overflow (l/s)**	**Half Drain Time (mins)**	**Pipe Flow (l/s)**	**Status**	**Level Exceeded**
S1.000	S1	-0.217	0.000	0.47			72.5	OK	
S1.001	S2	-0.259	0.000	0.36			147.9	OK	
S2.000	S3	-0.062	0.000	0.87			39.6	OK	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S4	-0.079	0.000	0.42			44.3	OK	
S2.001	S5	0.093	0.000	0.79			84.2	SURCHARGED	
S2.002	S6	0.112	0.000	0.88			83.9	SURCHARGED	
S1.002	S7	0.123	0.000	1.98			221.3	SURCHARGED	
S1.003	S8	0.150	0.000	0.69			35.7	SURCHARGED	
S1.004	S9	-0.132	0.000	0.55			35.7	OK	
S1.005	S10	-0.098	0.000	0.79			35.7	OK	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 30

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S1	15 Winter	100	+30%					40.830
S1.001	S2	15 Winter	100	+30%					40.651
S2.000	S3	15 Winter	100	+30%	100/15 Summer				41.854
S3.000	S4	15 Winter	100	+30%	100/15 Summer				40.857
S2.001	S5	15 Winter	100	+30%	30/15 Summer				40.743
S2.002	S6	15 Winter	100	+30%	30/15 Summer				40.628
S1.002	S7	120 Winter	100	+30%	30/15 Summer				40.554
S1.003	S8	120 Winter	100	+30%	30/15 Summer				40.547
S1.004	S9	180 Summer	100	+30%					39.848
S1.005	S10	180 Summer	100	+30%					39.800

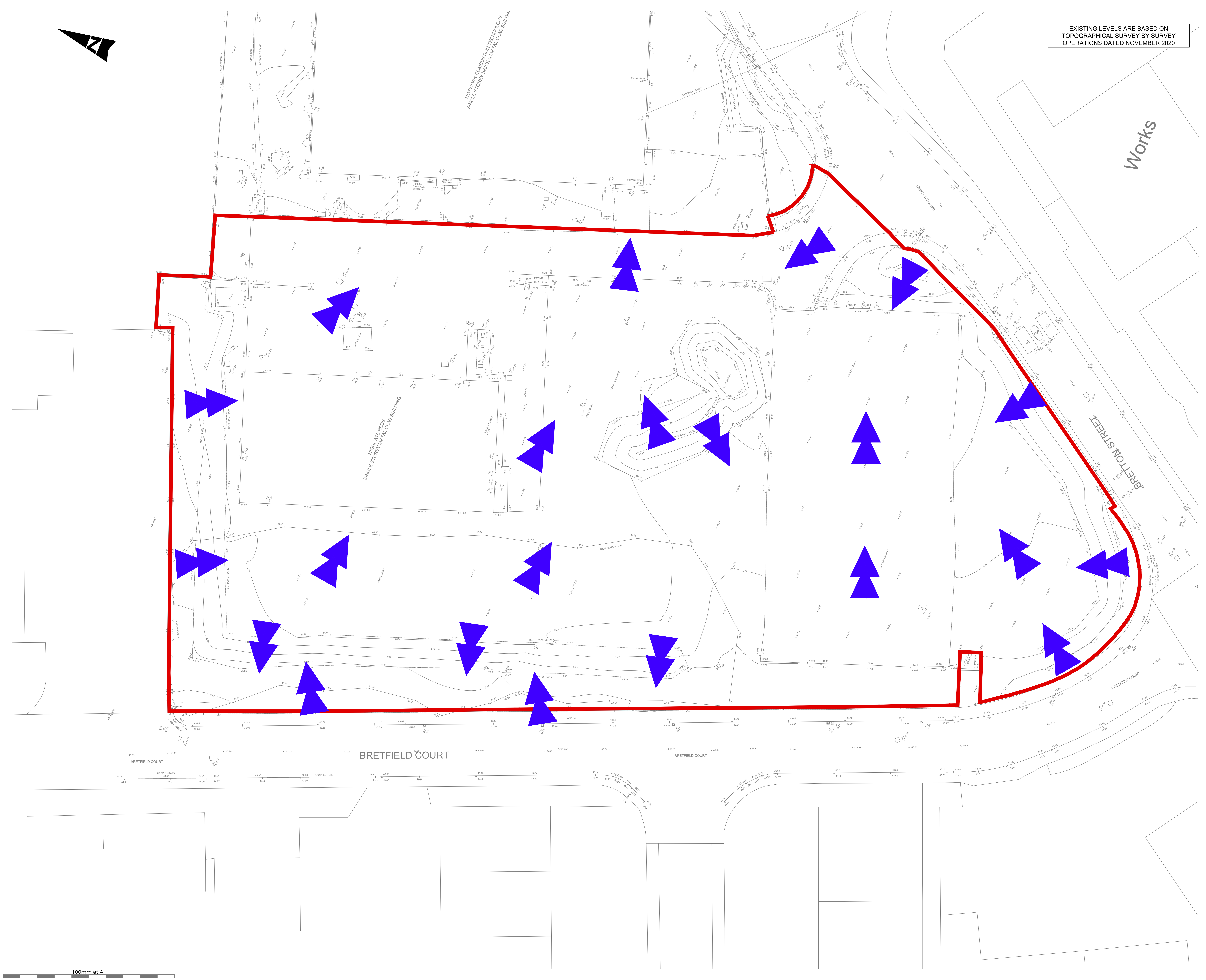
PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S1.000	S1	-0.120	0.000	0.78			121.9	OK	
S1.001	S2	-0.047	0.000	0.51			209.3	OK	
S2.000	S3	0.354	0.000	1.37			62.6	SURCHARGED	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Surcharged Depth (m)	Flooded Volume (m^3)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded
S3.000	S4	0.382	0.000	0.68			71.8	SURCHARGED	
S2.001	S5	0.486	0.000	1.26			134.8	SURCHARGED	
S2.002	S6	0.411	0.000	1.41			134.5	SURCHARGED	
S1.002	S7	0.377	0.000	1.20			134.3	SURCHARGED	
S1.003	S8	0.535	0.000	0.73			37.8	SURCHARGED	
S1.004	S9	-0.124	0.000	0.58			37.8	OK	
S1.005	S10	-0.089	0.000	0.84			37.8	OK	

APPENDIX G

Surface Water Exceedance Flood Routing Drawings



EXISTING LEVELS ARE BASED ON TOPOGRAPHICAL SURVEY BY SURVEY OPERATIONS DATED NOVEMBER 2020

NOTES:

1. THESE NOTES ARE INTENDED TO AUGMENT DRAWINGS AND SPECIFICATIONS. WHERE CONFLICT OF REQUIREMENTS EXIST THE ORDER OF PRECEDENCE SHALL BE AS SHOWN IN THE SPECIFICATION. OTHERWISE THE STRICTEST PROVISION SHALL GOVERN.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ENGINEERS AND ARCHITECTS DRAWINGS.
3. DRAWINGS NOT TO BE SCALED. ALL DIMENSIONS TO BE CHECKED ON SITE BY THE CONTRACTOR. ANY DISCREPANCIES TO BE NOTIFIED TO THE ENGINEER AND FURTHER INSTRUCTIONS OBTAINED BEFORE WORK IS COMMENCED.
4. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS FULLY COMPLETED. IT IS THE CONTRACTORS SOLE RESPONSIBILITY TO DETERMINE THE ERECTION PROCEDURE AND SEQUENCE AND ENSURE THAT THE BUILDING AND ITS COMPONENTS ARE SAFE DURING ERECTION. THIS INCLUDES THE ADDITION OF WHATEVER TEMPORARY BRACING, GUYS OR TIE-DOWNS WHICH MAY BE NECESSARY, SUCH MATERIAL REMAINING THE THE PROPERTY OF THE CONTRACTOR ON COMPLETION, AND FOR ENSURING THAT THE WORKS AND ANY ADJACENT PROPERTIES

KEY

🟥	SITE BOUNDARY
▶▶	EXISTING EXCEEDENCE ROUTE

Rev	Description	Date	By	Chk	App
P1	FIRST ISSUE	09.12.21	DG	KH	KH

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Sheffield	T. 01142 440077
York	T. 01904 611594

Project: New Headquarters and Warehouse, Dewsbury

Client: Sueno Beds Ltd.

Drawing: Existing Exceedence Plan

Role: Civil Engineer

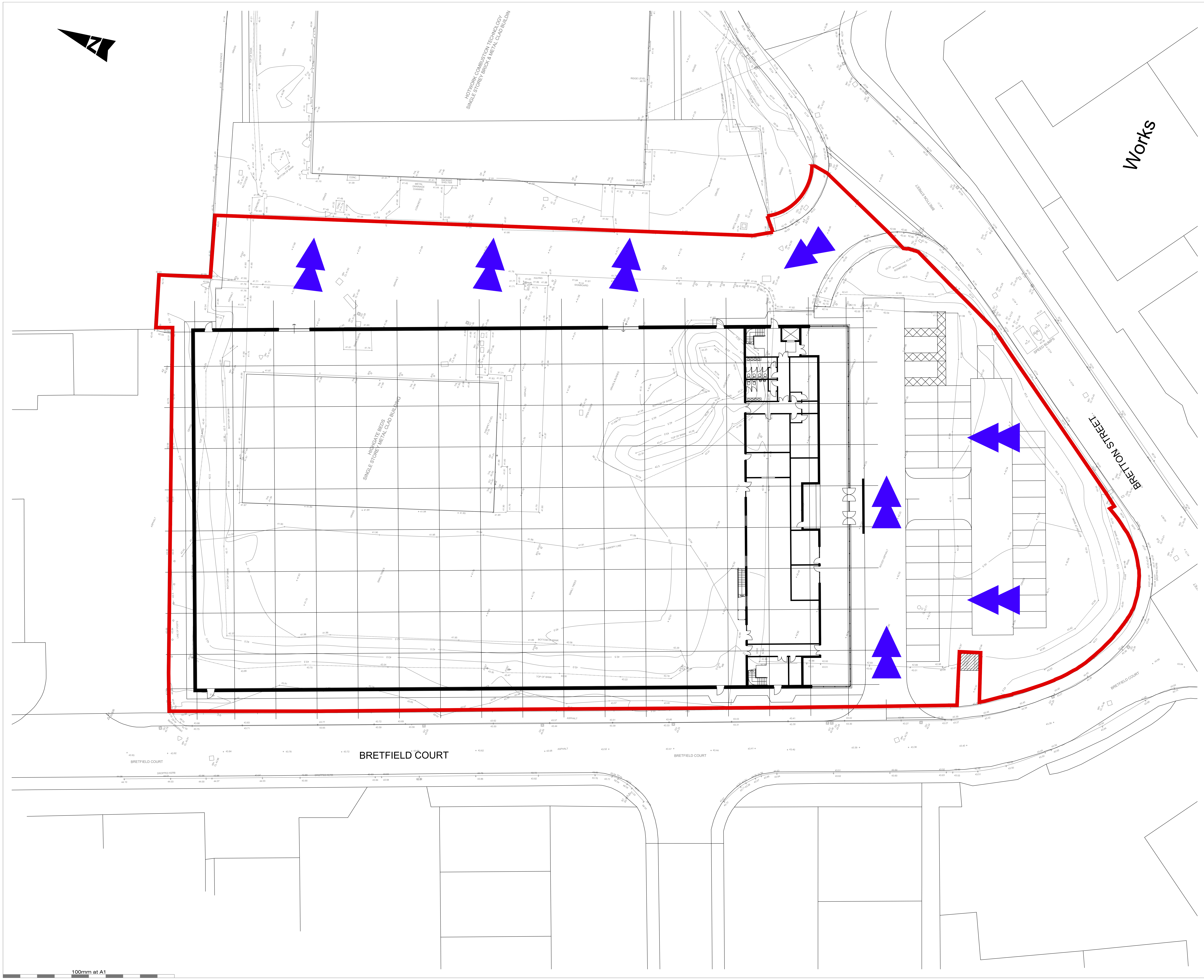
Drawing Status: FOR INFORMATION

Job. no. 46486

Scale@ A1: 1:250

Rev. P01

Project	Originator	Volume	Level	Type	Role	Number
SUEN	AWP	ZZ	XX	DR	C	3101



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KEY

🟥	SITE BOUNDARY
▶▶	PROPOSED EXCEEDENCE ROUTE

Rev	Description	Date	By	Chk	App
P1	FIRST ISSUE	09.12.21	DG	KH	KH

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Project:
New Headquarters and Warehouse, Dewsbury

Client:
Sueno Beds Ltd.

Drawing:
Proposed Exceedence Plan

Role: Civil Engineer

Drawing Status: FOR INFORMATION

Job. no. 46486 | Scale@ A1: 1:250 | Rev. P01

Project	Originator	Volume	Level	Type	Role	Number
SUEN	AWP	ZZ	XX	DR	C	3100

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