

FLOOD RISK ASSESSMENT AND DRAINAGE MANAGEMENT STRATEGY – LAND to SOUTH of ORIEL STREET PHASE 1

for

Proposed Retail / Residential Development

at



Naylor Street
Vauxhall Road
Liverpool
Merseyside
L3 6DR



Contract No: LV540

Dated: June 2019



Prepared by	Signature	Date
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Issue	Description	Date	Originator	Approved
Issue 1	First Issue	24/06/2019	I Akram	T Magee

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Smith Young Architecture Ltd – Naylor Street, Liverpool

LV540

Flood Risk Assessment & Drainage Management Strategy – Land to South of Oriel Street Phase 1

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EXECUTIVE SUMMARY

Flood Risk

Thomasons have been commissioned to produce a Flood Risk Assessment (FRA) and Drainage Management Strategy (DMS) in support of a planning application on behalf of our client – Smith Young Architecture Ltd (Liverpool) for a mixed use residential and commercial development and associated infrastructure. The land to the south of Oriel Street – Phase 1, known as the site, for the purpose of this report, is located between Oriel Street to the north, Paul Street to the south, St Bartholomew Road to the east and Vauxhall Road to the west. The approximate postcode for the site is L3 6DR. Refer to location plan in **Appendix B**. The existing site is predominantly impermeable with some permeable stoned areas which are currently occupied by informal car parking; however, a number of buildings, factories and workshops have previously occupied this site.

Following initial consultation with the Lead Local Flood Authority (LLFA), refer to **Appendix F** for correspondence, the site will be considered part 'brownfield' and part 'Greenfield' for the purposes of this report, however surface water discharge rates have been confirmed with both United Utilities and the Lead Local Flood Authority as informed in section 3.0 of this report.

The current regime for the surface water run-off is unrestricted run-off from a predominantly impermeable site to the surrounding sewer network. The proposals for the site have the potential to provide significant betterment to the surrounding catchment area in reducing the impermeable area footprint. Flood risk will be further reduced by the reduction of hardstanding and re-introduction of permeable, vegetated areas in the form of landscaping, public open space (POS) and verges. Refer to the Landscape Drawing within **Appendix A** for reference.

In addition to the above SuDS features it is proposed that the roof will be considered at detail design to incorporate possible green / brown rooves which would further decrease surface water run off to the public sewer system. However, for the purpose of this report, only permeable paving is to be considered and sized accordingly and the rooves are assumed as impermeable for calculation purposes to give a worse case scenario, refer to **Appendix E** for hydraulic calculations.

The site is approximately 0.3187 ha and will comprise of 5 blocks of residential apartments, access roads, events areas, underground parking and associated infrastructure. Refer to **Appendix A** for the proposed layout plan.

The site is located entirely within Flood Zone 1 with low risk of flooding. For this reason, the threshold levels into the buildings will be approximately the same as the existing ground levels across the site.

Whilst the site and surrounding area are not subjected to flood events the scheme proposed will seek, where possible to reduce the possibility of flood risk in the wider area by implementing methods such as restriction of surface water run-off, removal of areas of hardstanding and provision of retention. The site is not at risk from tidal, pluvial, groundwater, sewer related and artificial sources.

For further details regarding the proposed drainage system, refer to section 3.0 for the Drainage Management Strategy for the site.

Drainage Management Strategy

Following discussions with the LLFA, it was formally confirmed that the site would be limited to a discharge rate of 13.2 l/s (refer to LLFA correspondence in **Appendix F**).

The surface water drainage strategy is to outfall at the restricted rates of 13.2 l/s to the existing combined sewer system within Oriel Road shown on the sewer maps provided for in **Appendix C**. The restriction of run-off rates will generate storm-water storage volumes which will be retained on-site for all events up to and including the extreme 1 in 100-year event plus a 30% allowance for climate change*. (The upper tolerance of 40% climate change will be assessed at detailed design. Exceedance flows may arise from storm events that exceed the 1% AEP which will be directed away from on-site buildings). Storm-water storage will be provided for in the form of permeable paving within the unadopted private footways.

The foul water drainage strategy is to outfall to the existing public combined sewer located within the existing combined sewer at an unrestricted rate, this has been confirmed with United Utilities (See **Appendix F**).

**30% climate change has been requested by Liverpool City Council (04/02/2019) in preference to the latest EA guideline of 20% (2016) for developments of this type.*

**A rainfall intensity of 40mm/hr has been requested by Liverpool City Council (04/02/2019) in preference to the standard 50mm/hr used in the rational method for the rates calculated in Section 2.1, however as the proposed final rates derived from correspondence with Liverpool City Council (LLFA) (03/05/2018) are lower than those calculated in Section 2.1, this amendment in rainfall intensity does not impact upon the proposed drainage strategy.*

1.0 Introduction

1.1 Site Context

1.1.1 The site is approximately 0.3187 ha of predominantly hardstanding.

1.2 Legislative Context

1.2.1 A site-specific FRA has been carried out in accordance with NPPG as well as standard EA and LLFA guidance. Where adoptable sewers are to be proposed, sewers for adoption (SfA) standards apply, otherwise the latest building regulations apply. SuDS will be implemented with the guidance of Ciria C753 (2015).

1.3 Site Description and Location

1.3.1 The site is located on to the north east of Liverpool City Centre, L3 6DR (approximate postcode). OS Grid reference: 334450E, 391301N. An approximate red line boundary is shown in Figure 1.

1.3.2 The site is approximately 0.3187 hectares of predominantly impermeable hardstanding and is bordered by factories, workshops, vacant land and other industrial properties to the north, south and west. To the east is a development of multi storey student accommodation.



Figure 1: Aerial imagery showing Site Location.

1.4 Development Proposals

- 1.4.1 The proposed mixed use and residential development will be contained within the footprint identified on the plan shown in figure 2 below and within **Appendix A**. The development will consist of 5 number interconnecting blocks of between 6 and 11 storeys containing 240 residential apartments, 13 mixed commercial units and associated underground parking and infrastructure. The existing surrounding roads at Naylor Street, Paul Street and Bartholomew Street will remain relatively unaffected by the proposals. New access points will be created on both Naylor and Oriel Street to accommodate the proposed underground parking areas. Oriel Street runs to the North of the development and the intention is to incorporate this section of highway within the overall plans for the public realm and landscaping works. The road will remain adopted by the Local Highway Authority, however raised pedestrian tables and formalised on street parking will be introduced as part of a later Phase 2.
- 1.4.2 See Figure 2 for an extract of the proposed planning layout. As shown, there is significant potential to remove the existing hardstanding and provide areas of vegetated public open space and sustainable drainage systems.

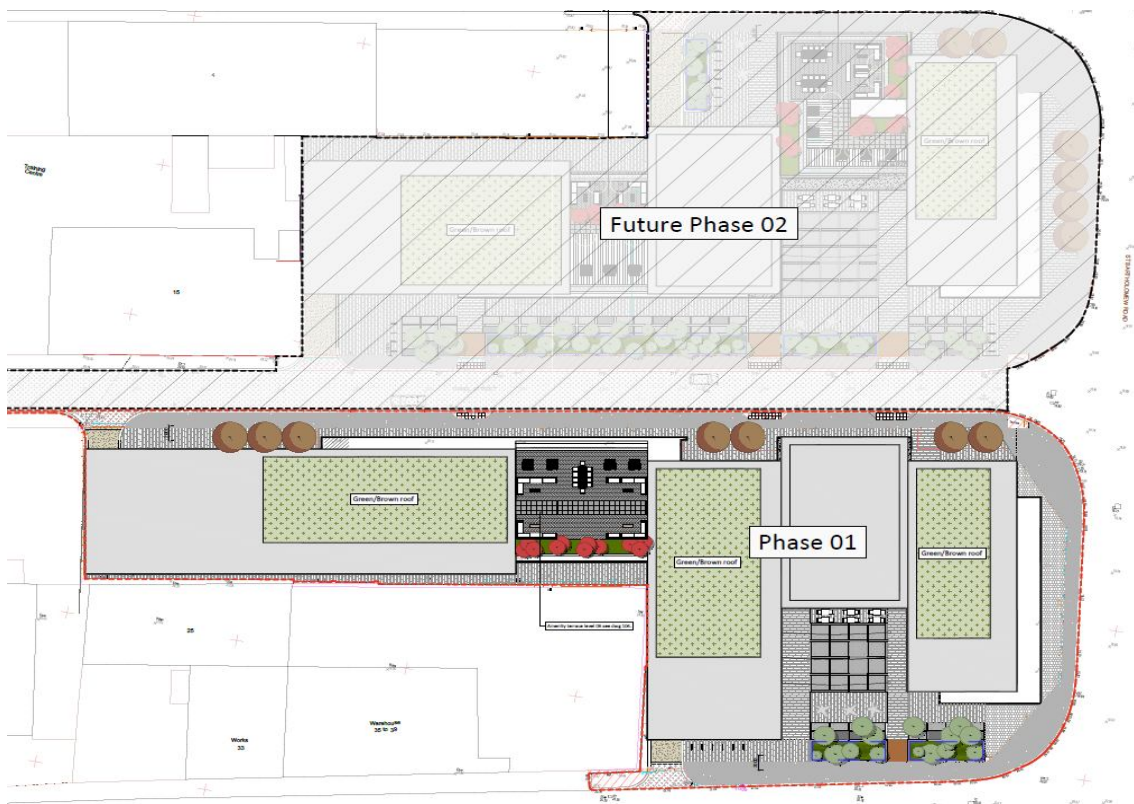


Figure 2: Extract of Proposed Planning Layout for Land to South of Oriel Street – Phase 1.

2.0 Flood Risk Appraisal

2.1 Summary of Potential Sources

2.1.1 The site is at 'low' risk from fluvial sources and at 'low' risk from all other sources including tidal, pluvial, groundwater related, sewer related and from artificial sources. There is no indication of flood risk from surface water and reservoirs and is also considered to be predominantly 'low'.

2.1.2 Flood risk will not increase as a result of the development and there is potential for significant betterment due to the restriction of proposed run-off rates as advised by the Lead Local Flood Authority.

2.2 Fluvial and Tidal Flooding

2.2.1 The site is in proximity to a coastline or tidally influenced watercourse, however Flood Risk from Tidal sources is still considered to be **"low"**.

2.2.2 The site is within Flood Zones 1, only (See Figure 2 below). Therefore, flood risk to the site is **"low risk"**. The development is considered 'appropriate' in accordance with NPPG and no sequential or exception testing is required at this time.

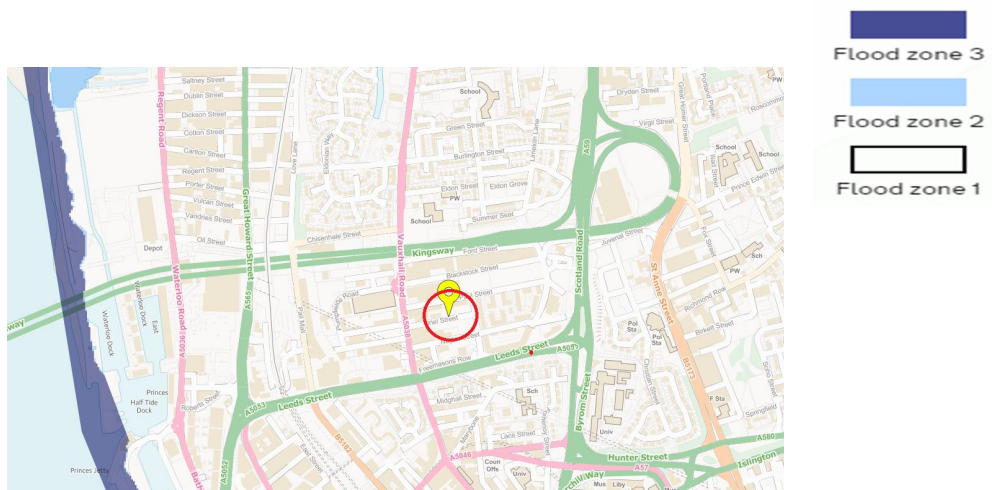


Figure 3: Environment Agency Flood Map for Planning

2.2.3 EA Product data shows flood extents and levels for flood zones associated with the River Mersey. However, as the river is approximately 500m west of the site and the flood extents of the data locations do not cover the site.

2.2.4 The EA fluvial flood risk map indicates that the site and surrounding area is entirely at ‘low’ risk, with areas of ‘high’ risk only shown to the west and adjacent to the River Mersey

2.3 Groundwater Flooding

2.3.1 A review of the NSRI Online Soilsmap map indicates that the ground conditions are classified as ‘Loamy and clayey’ and the area has impeded drainage which would prohibit the use of SuDS on the site.

2.3.2 Groundwater flood risk is therefore considered to be ‘low’.

2.4 Surface Water Flooding

2.4.1 The EA’s Surface Water Flood Mapping (Figure 3), shows that the site is predominantly at ‘Low to Medium’ risk of pluvial flooding.

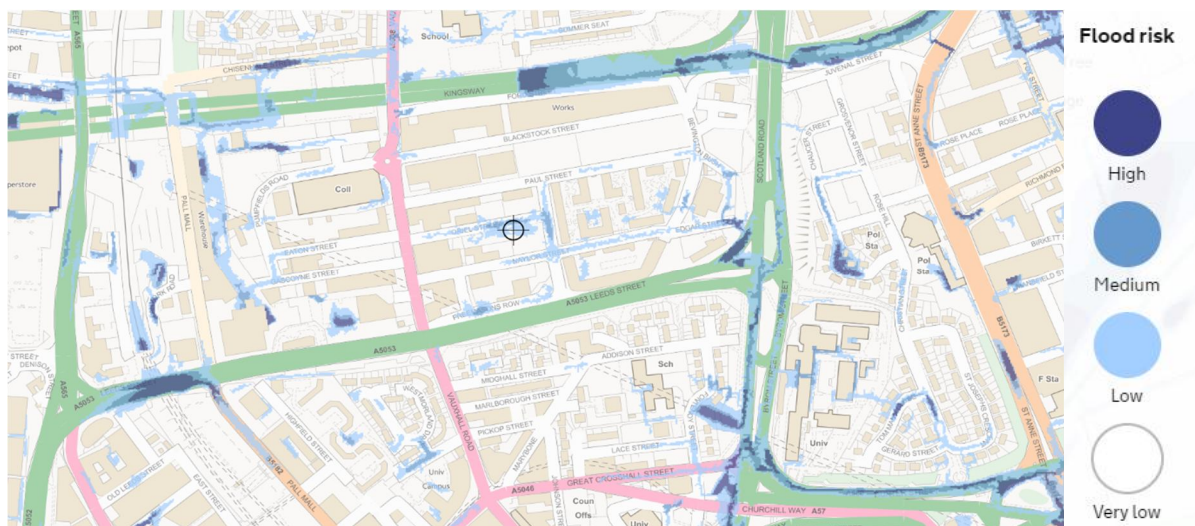


Figure 4: Environment Agency Surface Water Flood Map Extract

2.4.2 Overall the pluvial flood risk is considered to be ‘low’, the areas shown to be at medium risk will be mitigated by the proposed development which will restrict run-off rates flowing off the site and increase the permeable area. Runoff will be directed away from buildings to new and existing drainage infrastructure in accordance with building regulations part H.

2.5 Flooding from Public Sewers

2.5.1 The United Utilities records and topographical survey indicates the presence of several manholes located around the site. A CCTV survey was conducted which showed the drains to be of an egg shape brick sewer construction and in reasonable condition.

2.5.2 United Utilities sewer records also confirm that there are no public assets located within the site. Refer to **Appendix C** for details of sewer records.

2.5.3 All proposed sewers will be designed and installed in accordance with Sewers for Adoption and best practice building regulations.

2.5.4 Therefore, the risk of flooding from public sewers is '**low**'.

2.6 Flooding from Artificial Sources

2.6.1 The online EA flood map for reservoirs indicates that there is no risk of flooding from reservoirs and artificial sources so the risk from artificial sources is "**low**".

3.0 Drainage Strategy

3.1 Surface Water

3.1.1 Rainfall run-off from the proposed development will be controlled and directed to on-site surface water drainage infrastructure.

3.1.2 Hydraulic Assessment

The Site is partly concreted and partly stoned. Assuming the stoned area to be 100% permeable and the concrete area to be 100% impermeable

Area of Concrete = 0.1922ha, Area of Stone = 0.1260ha

Area of Concrete to be considered as positive drainage to existing drainage system.

$Q = 2.78 \times 40\text{mm/hr} \times 0.1922\text{ha} = 21.37 \text{ l/s}$

Applying 30% betterment = 14.96 l/s.

Total limited discharge for Site A = $14.96 + 5 = 20 \text{ l/s}$ (2sf).

However, following formal discussions with both UU and the LLFA, Refer to **Appendix F**, a limit of discharge of **13.2 l/s** will be imposed.

**40mm/hr rainfall intensity has been requested by Liverpool City Council in preference to the standard 50mm/hr normally used in the rational method. However as the proposed final rates derived from correspondence with Liverpool City Council (LLFA) (03/05/2018) are lower than those calculated above, this amendment in rainfall intensity does not impact upon the proposed drainage strategy or the proposed rates.*

- 3.1.3 Using the limit on discharge for the surface water an assessment has been undertaken to confirm the area of permeable pave required to achieve the storage generated from the limit on discharge of the agreed **13.2 l/s** for the site. Refer to **Appendix E** for the storage calculations.
- 3.1.4 The proposed permeable pave system is shown on the drainage strategy layout in combination with the landscape SuDS features. Refer to **Appendix D** for the Drainage Strategy Layout and typical construction details.

3.2 Foul Water

- 3.2.1 Foul flows will outfall unrestricted to the existing combined sewer. A pre-development enquiry has been submitted to United Utilities and confirmation that this approach is acceptable is included in **Appendix F**. Further correspondence with United Utilities will be required for possible S106 and S104 applications at the detailed design stage.

4.0 Conclusion

4.1 Residual Risk and Mitigation Measures

- 4.1.1 This report has illustrated that the site has significant potential to reduce flooding within the local catchment by reducing impermeable area and restricting run-off rates.
- 4.1.2 This report has also illustrated that the site is at low to medium risk from all sources of flooding including tidal, fluvial, pluvial, groundwater, sewer related and from artificial flooding.
- 4.1.3 The use of SuDS will further slowdown and reduce run-off, improve water quality and enhance the biodiversity and amenity of the site.
- 4.1.4 Any sewers will be designed in accordance with best practice guidelines and Sewers for Adoption (if applicable). SuDs guidance shall be taken from the SuDS Manual (C753, 2015). Private drainage will be designed in accordance to best practice guidelines/building regs.
- 4.1.5 Flood Risk can be assessed but never fully mitigated. Extreme flood events may happen that are beyond the scope of assessment at this stage, if this should happen, some out of chamber flooding may occur.
- 4.1.6 Flood risk will not increase, as a result of the development, due to the restriction of proposed run-off rates to mimic the existing greenfield/brownfield scenario in accordance with NPPG.



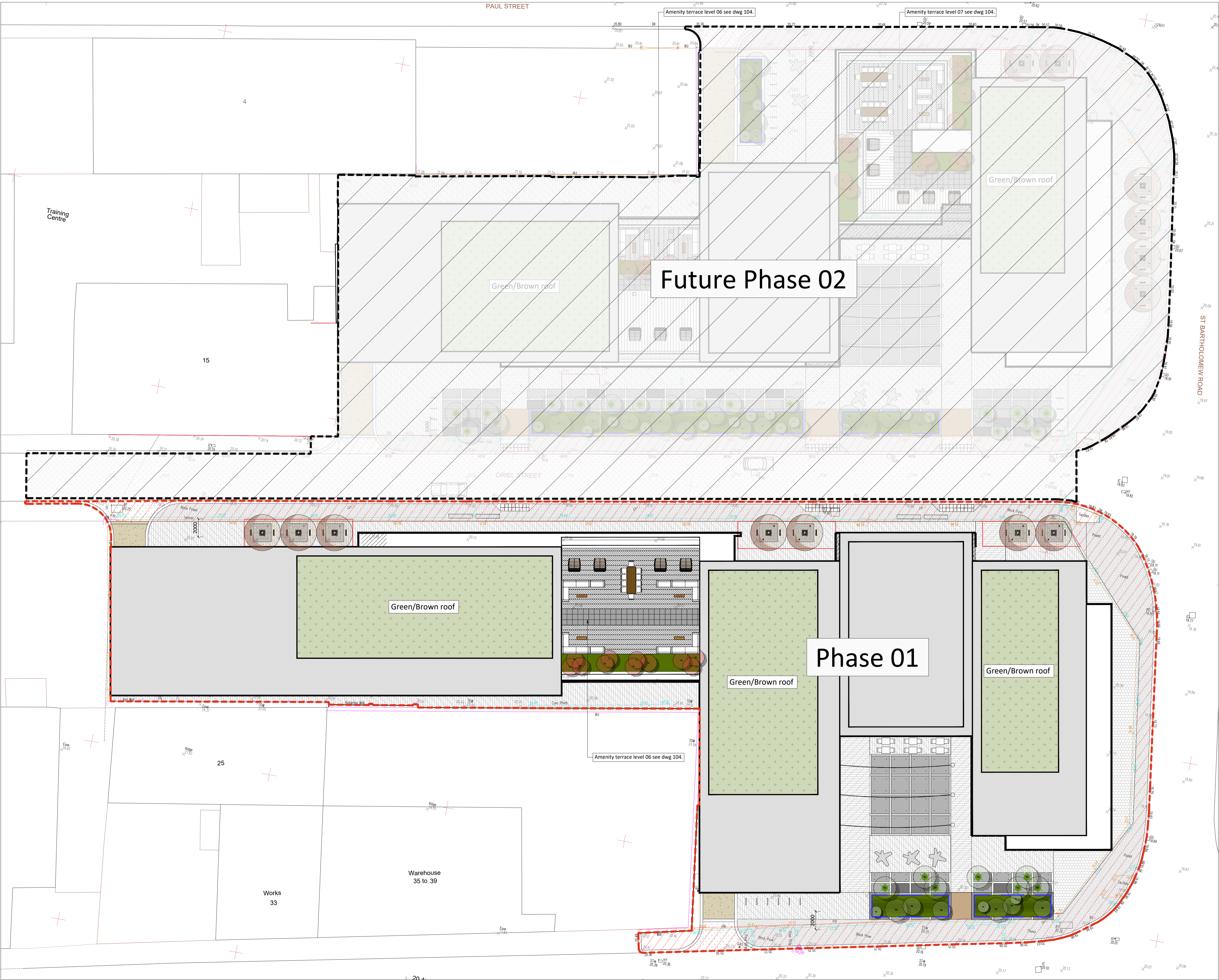
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Flood Risk Assessment & Drainage Management Strategy – Land to South of Oriel Street Phase 1

Appendix A – Proposed Site Plan



KEY - Hard Landscape

- Adoptable zone (no tree pits)
- Overhead canopy/building
- Clay brick paver 200mm x 65mm x (D85)mm Staggered stretcher bond (pedestrian) BS EN 1344:2013
- Clay brick paver 200mm x 65mm x (D85)mm 90 degree herringbone (vehicular) BS EN 1344:2013
- Clay brick paver 200mm x 65mm x (D85)mm Stack Bond/running course BS EN 1344:2013
- Light coloured in situ concrete
- Large pre cast concrete slab 2000mm x 2000mm x (D140mm) Double-excel slab by Hardscape OEA
- Medium pre cast concrete slab 2000mm x 1000mm x (D140mm) Double-excel slab by Hardscape OEA
- 2 piece pre cast concrete slab with circular tree opening 2000mm x 1000mm x (D140mm) Double-excel slab by Hardscape OEA
- 300mm x 2000mm x (D varying) grey concrete in situ edging/kerb
- 225mm wide battered PCC kerb (LCC highways agreed adoptable standard)
- Corten steel bridge/plate
- New tarmac - to LCC highway adoptable standard
- Coloured tarmac
- AC6 Dense Surface to BS EN 13108-1 (LCC highways agreed adoptable standard)
- Cycle stands

KEY - Soft Landscape

- Betula nigra 'River Birch'
 - Ulmus lutece 'Nanguen'
 - Lower rain garden planting
- *see dwg 200 for lighting

PLANNING

Client	Smith Young Architecture Ltd.	Scale	1:200 @ A1	Created by	CM	Last edited by	MITCHELL.C	Date	March 2018
Job title	Naylor Street	Project number	17.543	Drawing number	100	Issue	P 5	Checked	AT
Drawing title	General Arrangement - Phase 01								

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Revision	Description	By	On
P 5	Planning	CM	08/05/2019
P 4	Revised LCC adoptable Materials	KG	07/11/2018
P 3	Revised to cohere with multiple building edits	KG	23/10/2018
P 2	Updates to include LCC adoptable feedback	CM	06/07/2018
P 1	Planning issue	CM	05/04/2018
D 3	Updated following building revision	CM	29/03/2018
D 2	Following highway engineer comments	CM	26/03/2018
D 1	Initial issue	CM	22/03/2018



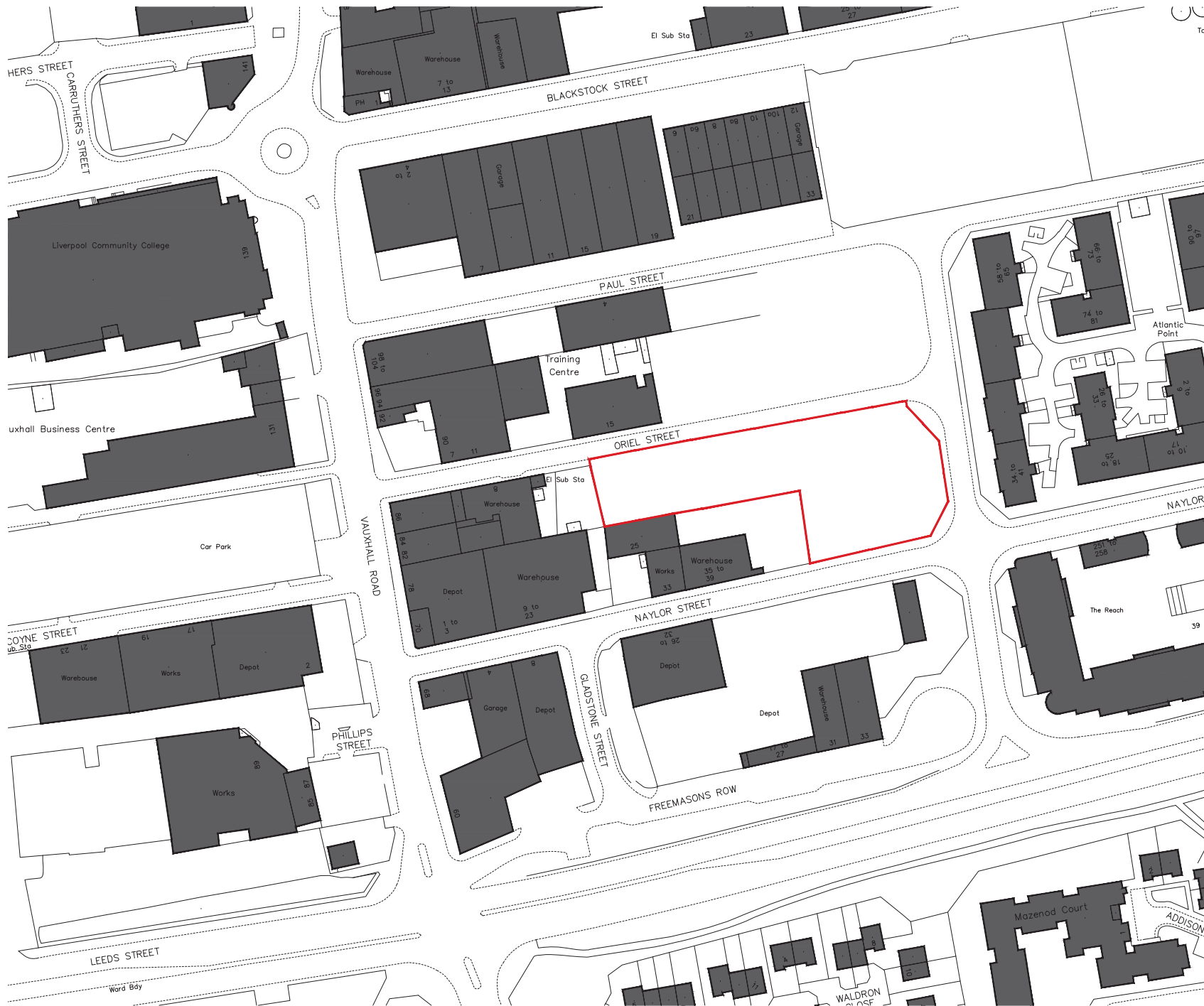
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Flood Risk Assessment & Drainage Management Strategy – Land to South of Oriel Street Phase 1

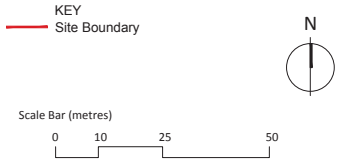
Appendix B – Existing Site Plans and Topo



LOCATION PLAN AS EXISTING @ 1:1250

All dimensions to be checked on site.
Figured dimensions to be read in preference to scaled.
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Revisions / Notes:



Job Title:	NAYLOR STREET PHASE 1		
Purpose:	PLANNING		
Client:	SMITH YOUNG ARCHITECTURE LTD		
Date:	24/01/2018		
Drawing Title:	LOCATION PLAN AS EXISTING		
Drawn By:	MIS	Checked By:	MJY
Scale:	1:1250	Paper Size:	A3
Job Number:	19.021	Drwg No:	001
		Rev:	

Appendix C – Sewer Records



**Thomason Partnership
Deva Centre
17 Brewery Yard, Trinity Way
Manchester
Greater Manchester
M3 7BB**

FAO: Ijaz Akram

Dear Sirs

Location: 13-23 NAYLOR STREET LIVERPOOL L3 6DR

I acknowledge with thanks your request dated 26/01/18 for information on the location of our services.

Please find enclosed plans showing the approximate position of our apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read our access statement before you start work to check how it will affect our network.
<http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please telephone us on 0370 751 0101.

Yours Faithfully,

Karen McCormack
Property Searches Manager

United Utilities Water Limited

Property Searches
Ground Floor Grasmere House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP

Telephone 0370 751 0101

Property.searches@uuplc.co.uk

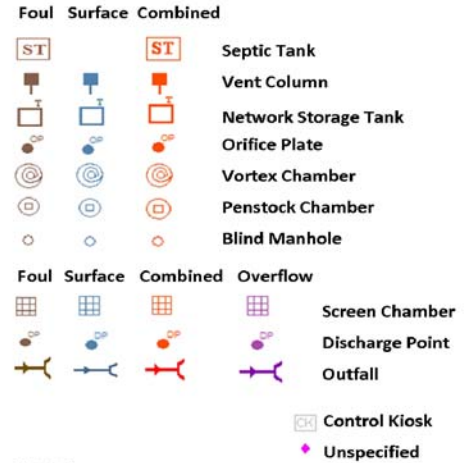
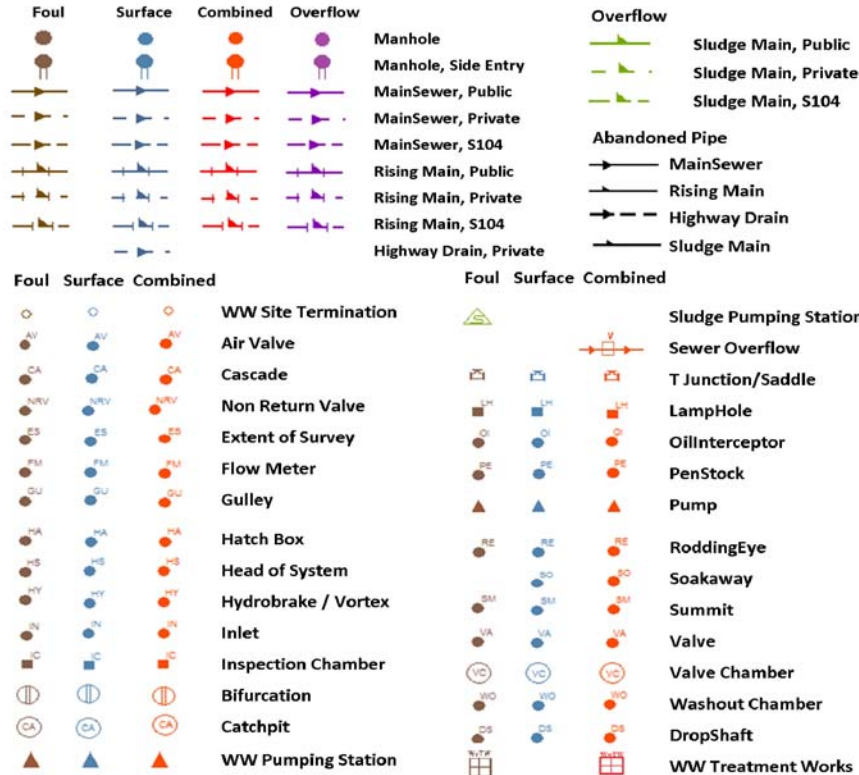
Your Ref: LV540
Our Ref: 1356460
Date: 29/1/2018

United Utilities Water Limited 2014
The plan is based upon the Ordnance Survey Map with the
sanction of the Controller of H.M. Stationery Office.Crown and
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DO NOT SCALE
Approximate Scale: 1:1250



WASTE WATER SYMBOLOGY



Legend	
MANHOLE FUNCTION	SEWER SHAPE
FO Foul	CI Circular
SW Surface Water	EG Egg
CO Combined	OV Oval
OV Overflow	FT Flat Top
	RE Rectangular
	SQ Square
	TR Trapezoidal
	AR Arch
	BA Barrel
	HO HorseShoe
	UN Unspecified
SEWER MATERIAL	
AC Asbestos Cement	DI Ductile Iron
BR Brick	VC Vitrified Clay
CO Concrete	PP Polypropylene
CSB Concrete Segment	PF Pitched Fibre
CSU Concrete Segment	MA Masonry, Coursed
CC Concrete Box Culverted	MA Masonry, Random
PSC Plastic / Steel	RP Reinforced Plastic
GR Glass Reinforced	CI Cast Iron
GRP Glass Reinforced	SI Spun Iron
PVC Polyvinyl Chloride	ST Steel
PE Polyethylene	U Unspecified

CLEAN WATER SYMBOLOGY

PIPE WORK



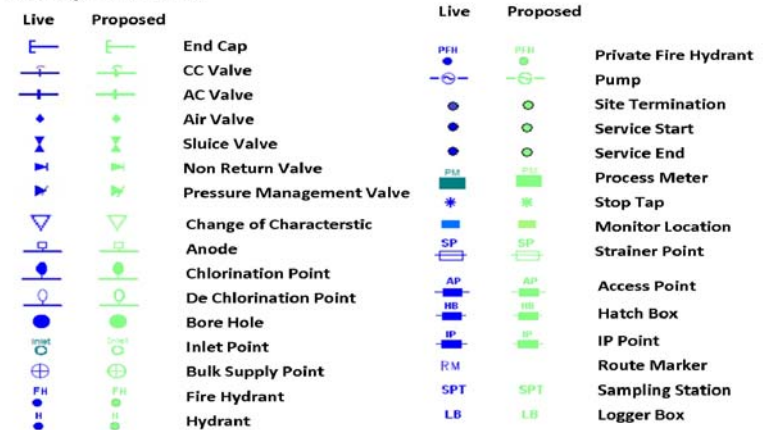
ABANDONED PIPE



PROPERTY TYPES



NODES/FURNITURES



Legend	
MATERIAL TYPES	LINING TYPES
AC ASBESTOS CEMENT	CL CEMENT LINING
CI CAST IRON	TB TAR OR BITUMEN
CU COPPER	ERL EPOXY RESIN
CO CONCRETE	
DI DUCTILE IRON	INSERTION TYPES
GI GALVANISED IRON	DD DIE DRAWN
GR GREY IRON	DR DIRECTIONAL DRILLING
OT OTHERS	MO MOLING
PB LEAD	PI PIPELINE
PV UPVC	SL SLIP LINED
SI SPUN IRON	
ST STEEL	
UN UNKNOWN	
PE POLYETHYLENE	

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These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self-construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

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4. The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
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8. If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
9. This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.



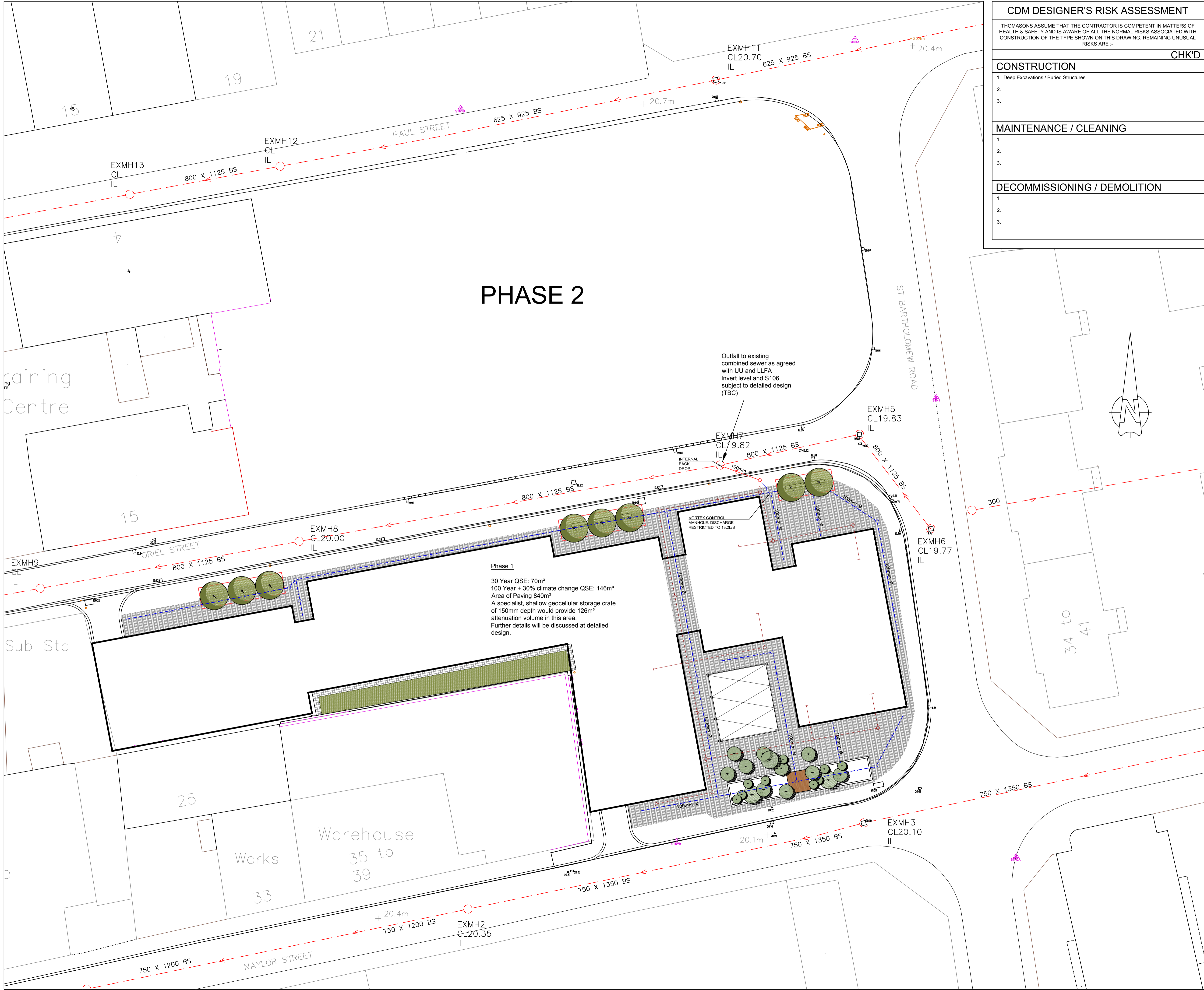
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Smith Young Architecture Ltd – Naylor Street, Liverpool

Flood Risk Assessment & Drainage Management Strategy – Land to South of Oriel Street Phase 1

Appendix D – Drainage Strategy Plan



PHASE 2

CDM DESIGNER'S RISK ASSESSMENT	
THOMASONS ASSUME THAT THE CONTRACTOR IS COMPETENT IN MATTERS OF HEALTH & SAFETY AND IS AWARE OF ALL THE NORMAL RISKS ASSOCIATED WITH CONSTRUCTION OF THE TYPE SHOWN ON THIS DRAWING. REMAINING UNUSUAL RISKS ARE :-	
CONSTRUCTION	CHK'D
1. Deep Excavations / Buried Structures	
2.	
3.	
MAINTENANCE / CLEANING	
1.	
2.	
3.	
DECOMMISSIONING / DEMOLITION	
1.	
2.	
3.	

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2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

3. DO NOT SCALE FROM THE DRAWINGS OR THE COMPUTER DIGITAL DATA, ONLY FIGURED DIMENSIONS ARE TO BE USED.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, FABRICATION, ERECTION AND REMOVAL OF ALL TEMPORARY WORKS AND SHALL PROVIDE ALL TEMPORARY BRACING AS NECESSARY TO MAINTAIN STRUCTURAL STABILITY DURING CONSTRUCTION.

5. IF THE CONTRACTOR CONSIDERS THAT HE DOES NOT HAVE SUFFICIENT INFORMATION TO SAFELY COMPLETE THE WORKS DETAILED ON THIS DRAWING, HE SHOULD CONTACT THE ENGINEER.

6. ~~THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND FABRICATION OF ALL TEMPORARY BRACING AND SHALL PROVIDE ALL TEMPORARY BRACING AS NECESSARY TO MAINTAIN STRUCTURAL STABILITY DURING CONSTRUCTION.~~
- DRAINAGE NOTES

1. ALL PRIVATE DRAINAGE WITHIN THE SITE IS TO COMPLY WITH THE REQUIREMENTS OF BS EN 752 AND BUILDING REGULATIONS PART H.

2. DETAILS OF EXISTING SEWERS SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHOULD CHECK THE LEVELS OF ALL NEW OUT FALLS IN RELATION TO EXISTING SEWERS PRIOR TO ANY CONSTRUCTION TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED.

3. THE CONTRACTOR SHALL ASCERTAIN THE DEPTHS, SIZES AND LOCATIONS OF ALL SERVICES TO BE CROSSED BEFORE EXCAVATION COMMENCES. ANY CONFLICT IN LEVELS BETWEEN NEW AND EXISTING SEWERS TO BE NOTIFIED TO THE ENGINEER.

4. ALL PIPES, CONNECTIONS, GULLIES, ACCESS FITTINGS, INSPECTION CHAMBERS, AND MANHOLES ARE TO COMPLY WITH THE BUILDING REGULATIONS. WHERE DRAINAGE IS TO BE ADOPTED THE FOREGOING ARE ALSO TO COMPLY WITH THE LATEST EDITION OF SEWERS FOR ADOPTION AND ANY ADDITIONAL REQUIREMENTS SPECIFIED BY THE UNDERTAKER.

5. REFER TO ARCHITECTS DRAWINGS FOR POSITIONS OF SOIL VENT PIPES, STUB STACKS AND RAINWATER PIPES.

6. UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE EXISTING DRAINAGE SYSTEM.

7. ALL WPC, IG, BG AND RWP CONNECTIONS TO BE 100mm DIAMETER U.N.O. LAID TO A FALL NO FLATTER THAN 1:40.

8. FOR EXTERNAL LEVEL INFORMATION REFER TO ARCHITECTS DRAWINGS
- KEY

PROPOSED SURFACE WATER

PROPOSED FOUL DRAINAGE

EXISTING COMBINED DRAINAGE

PERFORATED DRAIN

PROPOSED PERMEABLE PAVE ATTENUATION STORAGE SYSTEM. TYPE AND SPECIFICATION SUBJECT TO PLANNING CONDITIONS AND REVIEW AT DETAIL DESIGN STAGE.

PROPOSED SURFACE WATER RETENTION SWALES SUBJECT TO PLANNING CONDITIONS AND REVIEW AT DETAIL DESIGN STAGE
- FOR INFORMATION PURPOSES ONLY, NOT FOR CONSTRUCTION

P1	PRELIMINARY FIRST ISSUE	IA	25/06/19	TM
Rev	Description	By	Date	Chkd

THOMASONS
2nd Floor, St. Nicholas House, Old Churchyard,
Liverpool L2 8TX | Tel : 0151 294 3908

NAYLOR STREET
LIVERPOOL

DRAINAGE MANAGEMENT
STRATEGY - PHASE 1

Status
PRELIMINARY

Drawing No.
LV540-500-01

Revision
P1

Scale 1:250	Size A1	Drawn IA	Date JUN 19	Chkd IA	Passed TM
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GENERAL NOTES

- WHERE A METHOD OF CONSTRUCTION OR SEQUENCE IS NOTED ON A DRAWING, IT SHOULD BE ADHERED TO AND ANY VARIATION TO THIS MUST BE AGREED IN ADVANCE WITH THE ENGINEER.
- THE CONTRACTORS IS TO DETERMINE THE REQUIREMENT FOR, AND, WHERE REQUIRED, TO DESIGN, INSTALL, MAINTAIN AND REMOVE ALL TEMPORARY WORKS.
- LEVELS RELATE TO ASSUMED FINISHED FLOOR LEVELS AS MARKED.
- DETAILS OF EXISTING SEWERS SHALL BE CONFIRMED BY THE CONTRACTOR ON SITE PRIOR TO THE COMMENCEMENT OF WORKS. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY. THE CONTRACTOR SHOULD CHECK THE LEVELS OF ALL NEW OUTFALLS IN RELATION TO EXISTING SEWERS PRIOR TO ANY CONSTRUCTION TO ENSURE THE PROPOSED DESIGN CAN BE ACHIEVED.
- THE CONTRACTOR SHALL ASCERTAIN THE DEPTHS, SIZES AND LOCATIONS OF ALL SERVICES TO BE CROSSED BEFORE EXCAVATION COMMENCES. ANY CONFLICT IN LEVELS BETWEEN NEW AND EXISTING SEWERS TO BE NOTIFIED TO THE ENGINEER.
- ALL PIPES, CONNECTIONS, GULLIES, ACCESS FITTINGS, INSPECTION CHAMBERS, AND MANHOLES ARE TO COMPLY WITH THE BUILDING REGULATIONS.
- PIPE BEDDINGS ARE TO BE IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS, TAKING ACCOUNT OF THE DEPTH & LOADING IN RELATION TO THE PIPE STRENGTH, AND MODIFIED IF NECESSARY WHERE BELOW WATER LEVEL. BEDDING PROPOSALS ARE TO BE ISSUED TO 'THOMASONS' FOR CONSIDERATION.
- ALL BURIED CONCRETE IS TO HAVE SULPHATE RESISTANCE IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE SITE INVESTIGATION.
- PIPES CONNECTED TO CHAMBERS ARE TO HAVE SOFFITS LEVEL U.N.O. PIPES 150mm IN DIAMETER OR SMALLER MAY BE LOWERED TO CENTRE LINES LEVEL.
- REFER TO ARCHITECTS DRAWINGS FOR POSITIONS OF SOIL VENT PIPES, STUB STACKS AND RAINWATER PIPES.
- RAINWATER CONNECTIONS NOT PASSING DIRECTLY INTO AN ACCESS CHAMBER ARE TO BE FITTED WITH AN ACCESS GULLY.
- ALL FOUL DRAINS TO BE 100mm DIAMETER. U.N.O. LAID NO FLATTER THAN 1:80 WHEN SERVING A MINIMUM OF 1NO. W.C. CONNECTIONS WITH FLOWS LESS THAN 1NO. W.C. TO BE LAID NO FLATTER THAN 1:40 U.N.O.
- ALL ROAD GULLY CONNECTIONS TO BE 150mm DIAMETER. LAID NO FLATTER THAN 1:80 U.N.O. ALL ROOF DRAINAGE CONNECTIONS TO BE 100mm DIAMETER. LAID NO FLATTER THAN 1:40 U.N.O.
- ALL SOAKAWAYS TO BE LOCATED 5.0m MIN CLEAR DISTANCE FROM FACE OF SOAKAWAY TO FOUNDATION.
- PIPES PASSING OVER FOOTINGS ARE TO HAVE LINTELS OVER AND BE APPROPRIATELY REBATED OR SLEEVED IF RUNNING AT A LEVEL BELOW THE TOP OF THE FOOTING

FOR PRICING PURPOSES ONLY,
NOT FOR CONSTRUCTION



PILLARS CONSTRUCTION
THE MOUNT, ASHBOURNE

DRAINAGE CONSTRUCTION
DETAILS

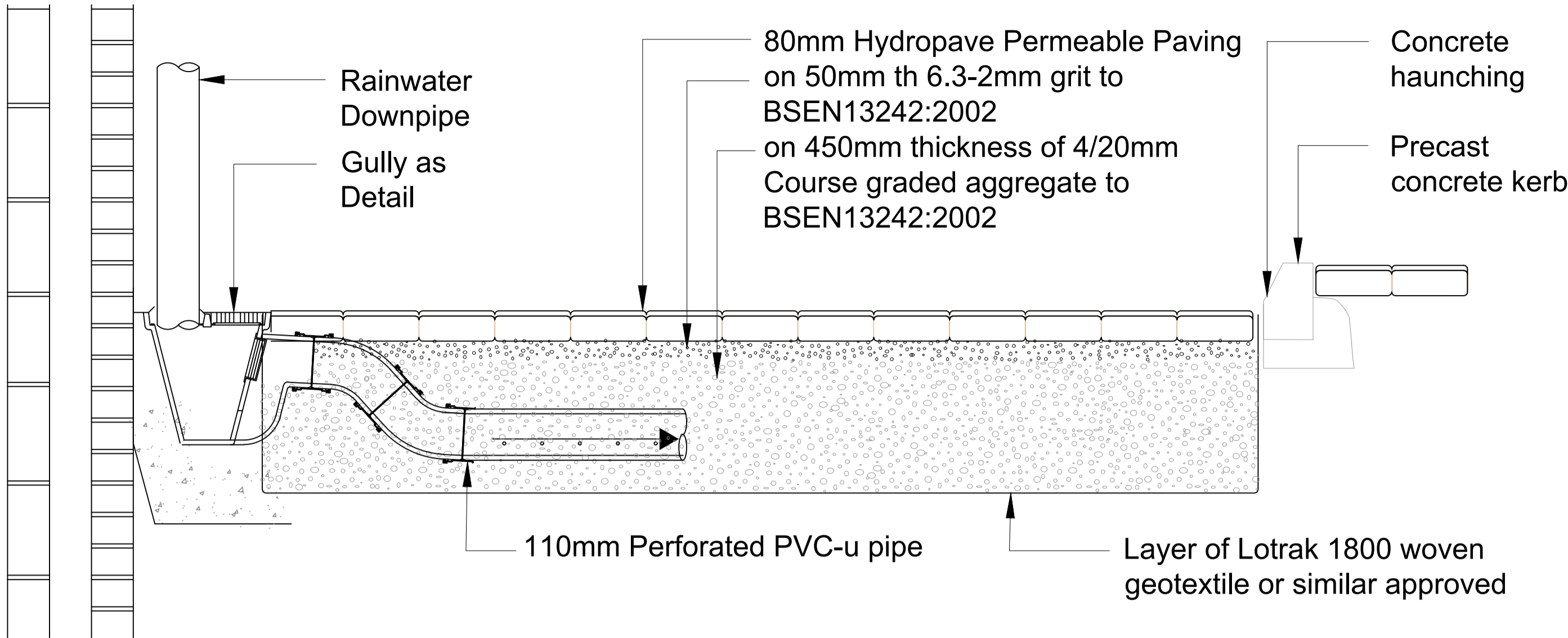
Status
TENDER

Drawing No.
LV483-CIV-501-01

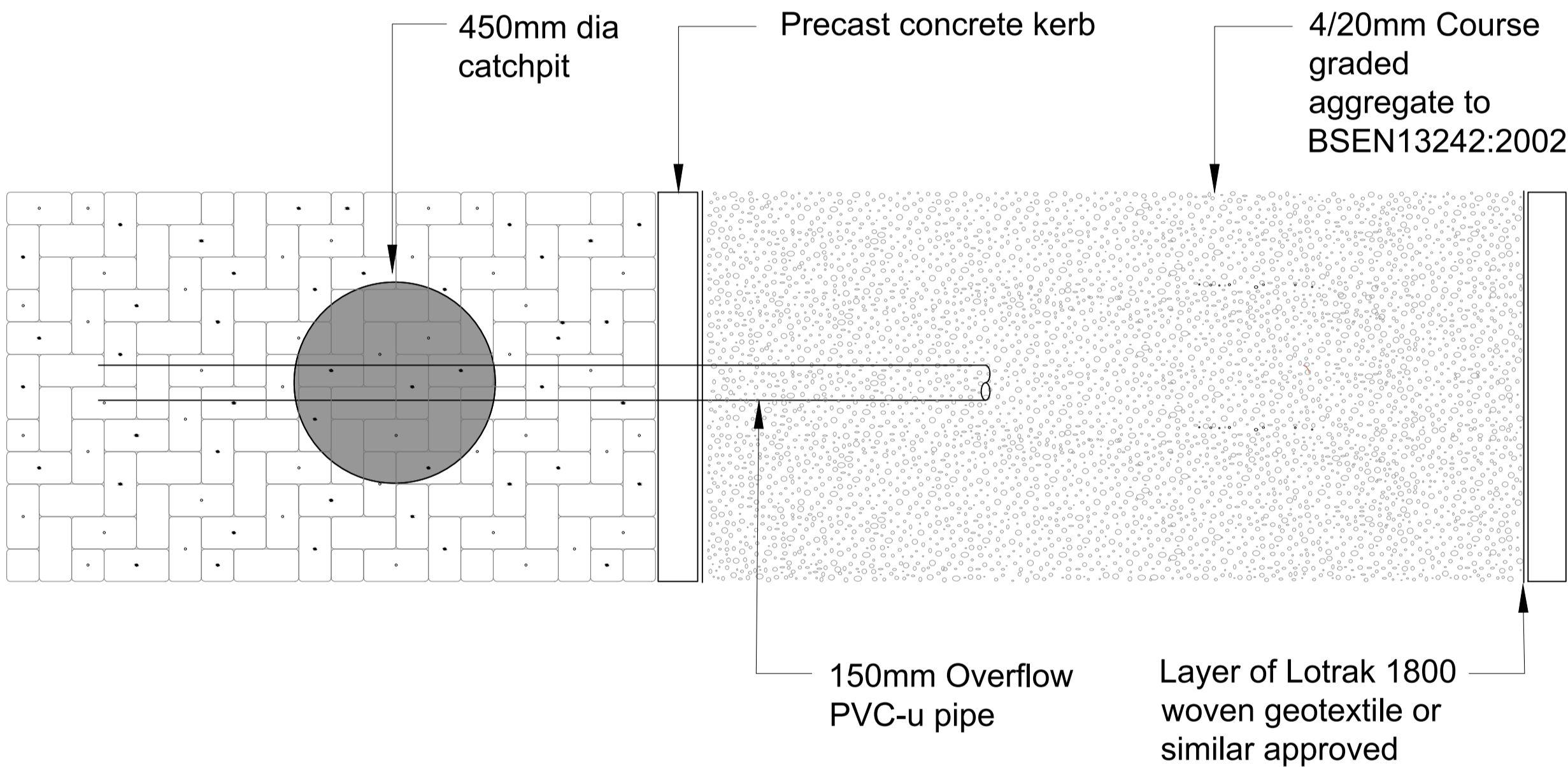
Revision

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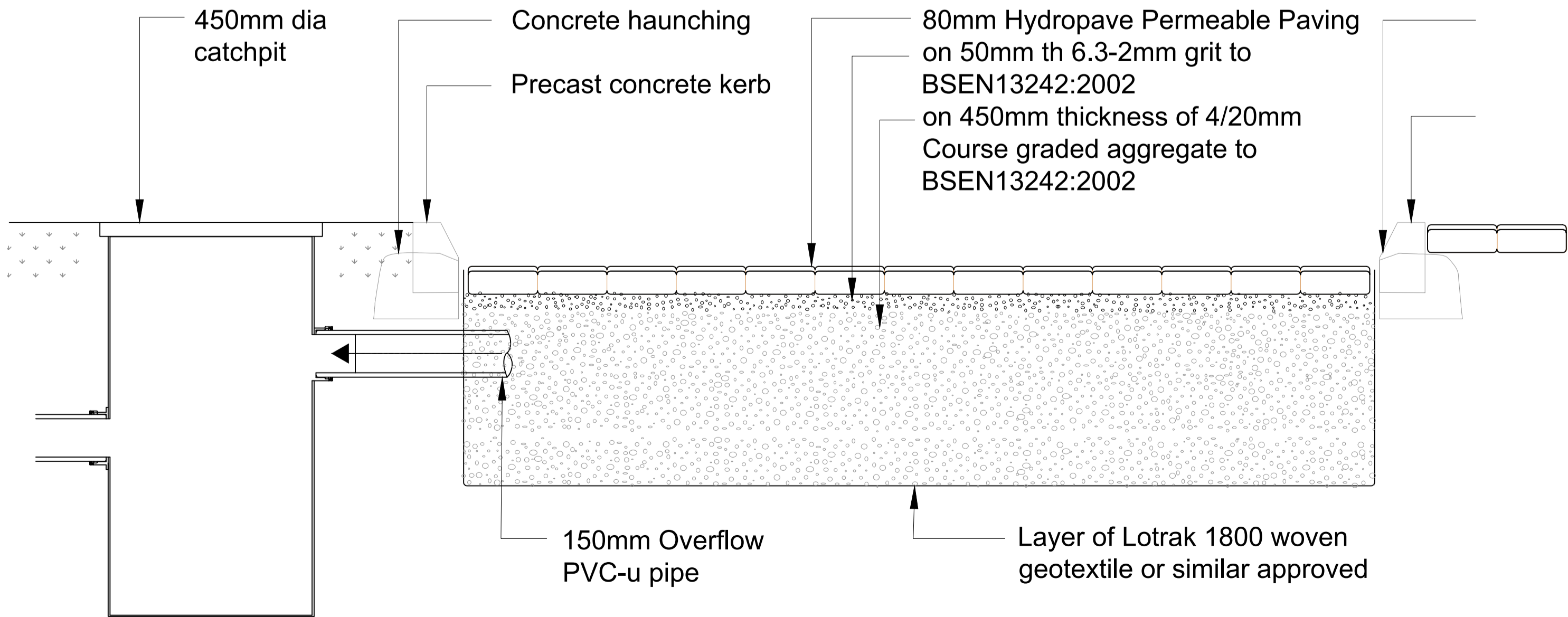
Scale AS SHOWN	Size A1	Drawn IA	Date DEC 17	Chkd IA	Passed TM
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DOWNPIPE DRAINAGE INTO FILTRATION SYSTEM - SECTION



DOWNPIPE DRAINAGE INTO FILTRATION SYSTEM - PLAN



MAIN DRAINAGE INTO FILTRATION SYSTEM - SECTION

Appendix E – Hydraulic Calculations



GEOMAN

44 Elmwood Avenue, Belfast BT9 6AZ | 02890 664 941 | www.geoman.co.uk

Preliminary Permeable Paving Design

Land South of Oriel Street, Liverpool (Phase 1)

Location Address:	Land South of Oriel Street, Liverpool
Designed:	Geoman Ltd.
Date:	25/06/2019
Design Reference Number/Version:	18-5286-1
Type of Design:	Attenuation Permeable Paving Design
 Tobermore Sales Executive Contact:	Ryan Haddick

Technical Support and Back Up

If you have any questions relating to this design, please contact the people listed below:

Contact:	Contact Number:	Email Address:
Jaques Wong (Geoman Ltd.)	+44(0)2890664941	geoman@geoman.co.uk
Ryan Haddick (Tobermore Ltd.)	+44(0)7974242945	R.Haddick@tobermore.co.uk



Geoman Ltd.	Project:	Ref:	Date:	Rev:
Preliminary Permeable Paving Design	Land South of Oriel Street, Liverpool	18-5286-1	25/06/2019	0

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Preliminary Permeable Paving Design	Land South of Oriel Street, Liverpool	18-5286-1	25/06/2019	0

1.0 Proposed Section

It is proposed to install Tobermore Hydropave as the surfacing to approximately **1400m²** of the development to create a permeable paving system on site. This includes the proposed access road at Land South of Oriel Street, Liverpool development.

We have assumed it is proposed to store water in the coarse graded aggregate (CGA) subbase and allow no infiltration into the subgrade below. For the access road, it is assumed they will need to accommodate loading as per Loading Category E (100 large Goods Vehicle per week only). Please advise if a more onerous loading is to be considered.

An impermeable membrane should be provided at sub-base formation level. Indicative proposed sections of the Hydropave attenuation system are shown on Geoman Ltd. drawing SK18-5286-1-01 for Category E.

For preliminary design purposes we have made the following assumptions:

1. The proposed formation level CBR will be at least 5.0%. This should be confirmed via in-situ testing prior to construction. If lower values are recorded this design will need to be reviewed.
2. The allowable discharge rate to the adjacent ditch is a minimum of 5.0l/s. If this rate is not permitted and must be lower, please advise us as this design will need to be reviewed.

1.1 Attenuation – Hydropave Summary

Category Type:	Category E (100 large Goods Vehicle per week only)
Paving Block:	Tobermore Hydropave (240x120x80mm deep)
Laying Course:	50mm thickness of 6.3-2mm grit to BS EN13242:2002
Dense Bitumen Macadam:	N/A
Coarse Graded Aggregate:	Category E- Minimum 450mm depth for storage.
Geotextiles:	Please contact us for further info
Impermeable Liner:	2000 gauge impermeable liner
Drawing Number:	SK18-5286-1-01

1.2 Tobermore Hydropave Product to be used on Scheme

Product Name:	Tobermore Hydropave 240
Size:	240x120x80mm deep
Color:	TBC
Finish:	Standard
Strength:	> 3.6MPa or 250 N/m
Manufactured to:	BS EN 1338:2003
Installed to:	BS EN 7533-3:2005
Laying pattern:	Herringbone



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2.0 Site Levels

If there is a fall in the subbase formation level, there will be a considerable loss in effective storage within the CGA when compared to a flat site. We would therefore recommend that the subbase formation level is kept virtually flat, with only a slight fall (1:200). If the formation level can not be provided baffles must be used.

The paved Hydropave surface should have no slopes steeper than 1:20 to ensure that water can infiltrate through the joints.

It is assumed that any fall greater than 1:20 will run off in to an area with a max 1:20 fall and infiltrate in to the permeable subbase.

Site levels should be confirmed prior to construction.

3.0 Hydraulic Design

The thickness of a permeable pavement's crushed rock base has to be calculated on the basis of the need to store water and also on structural requirements. In this section, the thickness calculation based on the storage of water is set out.

The thickness of the sub-base necessary for water storage depends upon the factor r , which is the ratio of the 60-minute storm rainfall depth to the 2-day maximum rainfall depth. This factor varies across the UK and implies a 5-year storm return period. For greater return periods a correction factor, Z_2 , given in Table 4 should be applied to the five-year return period rainfall value and the sub-base calculated in accordance with Table 2.

3.1 Table 01: Hydraulic Design Parameters

Town/ City	M560 (mm)	r Value	SAAR (mm)	WRAP	Soil Index	Return Period	Climate Change
Liverpool	18.90	0.40	825.00	4.00	0.45	100 years	Factor 1.30

The method undertaken to vary the storm return period for any duration is as follows:

It is assumed that the depth of rainfall occurring during a 60-minute storm recurring every 5 years is 18.90mm in the area. The depth of rainfall occurring every five years over storm durations other than 60-minutes is obtained as follows:

The design rainfall depth for any given return period and storm duration can be found by multiplying 18.90mm by a factor Z_1 , which requires knowledge of ' r ', the ratio of 60-minute to 2-day rainfalls for a 5-years return period.

The M₅60 storm for Liverpool may be taken as 18.90mm, with an ' r ' value of 0.40. The relevant Z_1 factors may be taken and multiplied by the rainfall to give a quantity for each storm duration, shown in Table 2.



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3.2 Table 02: Z1 Factored Storm Durations

	Storm Duration									
	Minutes					Hours				
	5	10	15	30	60	2	4	6	10	24
Z1	0.38	0.53	0.64	0.81	1.00	1.20	1.42	1.57	1.74	2.16
M5 – D rainfall	7.18	10.02	12.10	15.31	18.90	22.68	26.84	29.67	32.89	40.82

Z2 factors are then applied to vary storm return period. This preliminary design considers a 1 in 100-year storm, plus 30% to account for climate change. The rainfall multiplied by the Z2 factor is return dependent.

3.3 Table 03: Rainfalls for 1 in 100 Year Storm

Return Period: 100	Storm Duration									
	Minutes					Hours				
	5	10	15	30	60	2	4	6	10	24
Rainfall (mm)	12.86	19.14	23.51	30.50	38.20	45.80	53.55	58.53	64.03	76.89
x CC Factor	16.71	24.88	30.56	39.65	49.66	59.54	69.61	76.09	83.23	99.95

3.4 Site Analysis Parameters

Category E (100 large goods vehicle per week only)

- Total area of Tobermore Hydropave approximately **1400m²** (to include access road)
- Total Catchment Area approximately **3935m²** (this includes the Hydropave area + roof drainages from the adjacent buildings).
- It was assumed that a minimum depth of 450mm of coarse graded aggregate for storage will be included below the Category E.

For preliminary design purposes we have made the following assumptions:

1. The proposed formation level CBR will be at least 5.0%. This should be confirmed via in-situ testing prior to construction. If lower values are recorded this design will need to be reviewed.
2. The allowable discharge rate to the adjacent ditch is a minimum of 5.0l/s. If this rate is not permitted and must be lower, please advise us as this design will need to be reviewed.

**Please check these areas and which, if any, of the other surrounding areas are to be included.
Please also check that the assumed allowable discharge rate is appropriate and CBR can be achieved.**



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3.5 Critical Storm Duration Calculation

The following table indicates the Factors of Safety for the proposed Hydropave system for storm durations up to 24 hours. The void ratio of the coarse graded aggregate was assumed to be 0.32, with the minimum depth of the CGA for water storage to be 450mm under the Hydropave blocks. See the proposed sections on drawing SK18-5286-1-01 for Category E.

Category E (100 large goods vehicle per week only)

Storm Duration	Depth of rainfall (mm) 100 year storm	Volume entering Hydropave (m ³)	Outflow to Storm Sewer (m ³)	Storage Required (m ³)	Storage Capacity (m ³)	Factor of Safety
5 minutes	16.71	65.76	1.50	64.26	201.60	3.14
10 minutes	24.88	97.89	3.00	94.89	201.60	2.12
15 minutes	30.56	120.26	4.50	115.76	201.60	1.74
30 minutes	39.65	156.04	9.00	147.04	201.60	1.37
1 hour	49.66	195.42	18.00	177.42	201.60	1.14
2 hours	59.54	234.28	36.00	198.28	201.60	1.02
4 hours	69.61	273.93	72.00	201.93	201.60	1.00
6 hours	76.09	299.43	108.00	191.43	201.60	1.05
10 hours	83.23	327.53	180.00	147.53	201.60	1.37
24 hours	99.95	393.32	432.00	-38.68	201.60	N/A

The critical storm duration therefore 4 hours.



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4.0 Structural Design & Summary

It is proposed to install Tobermore Hydropave as the surfacing to approximately **1400m²** of the development to create a permeable paving system on site. This includes the proposed access road at Land South of Oriel Street, Liverpool development.

We have assumed it is proposed to store water in the coarse graded aggregate (CGA) subbase and allow no infiltration into the subgrade below. For the access road, it is assumed they will need to accommodate loading as per Loading Category E (100 large Goods Vehicle per week only). Please advise if a more onerous loading is to be considered.

An impermeable membrane should be provided at sub-base formation level. Indicative proposed sections of the Hydropave attenuation system are shown on Geoman Ltd. drawing SK18-5286-1-01 for Category E.

For preliminary design purposes we have made the following assumptions:

1. The proposed formation level CBR will be at least 5.0%. This should be confirmed via in-situ testing prior to construction. If lower values are recorded this design will need to be reviewed.
2. The allowable discharge rate to the adjacent ditch is a minimum of 5.0l/s. If this rate is not permitted and must be lower, please advise us as this design will need to be reviewed.

Please inform Geoman if this is incorrect as we will need to revise the preliminary design.

We normally highlight that all our proposals for permeable paving are marked 'Feasibility only – not for construction'. Clients should review the proposals and issue comments where appropriate. Proposals are based on information received from a salesperson or site team and may not have been checked by the parties to the construction contract. Geoman Ltd has not checked these proposals.

Instructions to proceed and issue drawings 'for construction' can only come from the Client, Scheme Architect or Scheme Engineer. This can only happen once they have checked the proposal and the assumptions and only if all their requirements have been taken into account will they instruct the contractor to proceed.

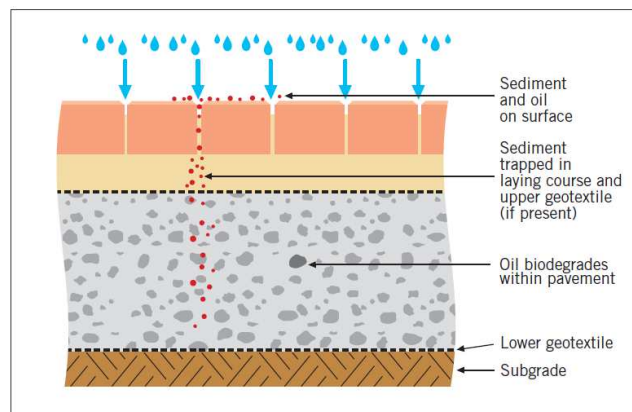


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4.1 Petrol Interceptor requirements

Permeable pavements are effective at removing pollution from runoff and as a consequence oil separators are not required. The following is an extract from the Interpave Guidelines which demonstrates this:

“Concrete block pavements are very effective at removing pollution from runoff, unlike attenuation tanks. The pollutants may either remain on the surface (particularly with zero gradients) or may be flushed into the underlying pavement layers where many of the pollutants are filtered and trapped or degrade over time.



Hydrocarbons may degrade but other contaminants, such as heavy metals, do not break down and remain within the pavement structure for a long period of time, making permeable pavements ideal for areas where vehicles are stored or maintained. Further information on pollution removal is provided in CIRIA Reports C 697, C 609 and C 582 (CIRIA 2007, 2004 and 2001). The research that has been undertaken demonstrates the effectiveness of permeable pavements in reducing pollution. They can for example remove between 60% and 95% of total suspended solids (i.e. silt) and 70% to 90% of hydrocarbons. When subjected to low level oil drips, such as in car parks, the pavements can continue to biodegrade the hydrocarbons indefinitely.

‘Pollution Prevention Guideline’ PPG 3 (Environment Agency, 2006) identifies the beneficial performance of permeable pavements in removing pollution from runoff. It states that: “Techniques that control pollution close to the source, such as permeable surfaces or infiltration trenches, can offer a suitable means of treatment for runoff from low risk areas such as roofs, car parks, and nonoperational areas.”

Oil separators are not required when permeable pavements are used. Indeed permeable pavements are more effective at removing a wider range of pollutants from runoff than oil separators (CIRIA, 2004). If additional treatment is required for higher risk areas it is normally more effective to use green SUDS methods such as swales or wetlands, as these also treat a wider range of pollutants.”



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4.2 Construction Considerations

Sub-base material (coarse graded aggregate) should be placed in layers not exceeding 150mm in thickness or twice the nominal maximum aggregate size. Unlike traditional pavement construction, the open-graded materials should not be fully compacted to eliminate any voids, as this will compromise the performance of the system.

It is likely that excessive compaction will result in the displacement of the open graded aggregate by the compaction equipment. The open-graded material should be compacted such that its maximum density is achieved for the particular aggregate type and grading without compromising the final void percentage offered by the material.

Each layer should be suitably compacted before the next layer is placed to prevent any potential settlement of the pavement after completion.

Due to the nature of both the sub-layers and the block paving, care should be taken during the construction process to prevent dirt or detritus contaminating the sub-base and compromising the permeability of the system. For example, the trafficking of the sub-base as a site access route should not be undertaken. Should other construction or maintenance work take place close to the pavement which may affect the infiltration of the pavement, suitable protective measures should be implemented.

Edge restraints should be sufficiently robust to resist the lateral displacement from imposed loadings placed upon the pavement. The edge restraint may take the form of associated fittings, walls or buildings or be formed from precast concrete, clay or natural stone kerb systems, either existing or newly constructed features. The restraint must provide a consistent vertical face to a level below the laying course material.



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Appendix A – Aggregates

Please Refer to BS7533-13 2009 Guide for the design of permeable pavements constructed with concrete paving blocks and flags, natural stone slabs and setts and clay pavers.

Laying Course and jointing material

- Laying course requires 6.3-2mm sized grit to BSEN 13242:2002. In particular, the material should be categorised as LA20 according to Table 9, SZ18 according to Table 10 and MDE15 according to Table 11 within this standard. The grit should be insoluble in dilute hydrochloric acid and should be naturally occurring material. In our experience, incorrect use of aggregates is one of the most common reasons for failure of a permeable paving design.

Course Graded Aggregate (CGA)

- Requires 32% of voids spacing for the storage of water. CGA should comply with the requirements of BSEN 13242:2002. The material should be designated Type 4/20 (4mm minimum and 20mm maximum particle size). In our experience, incorrect use of aggregates is one of the most common reasons for failure of a permeable paving design.

Dense Bitumen Macadam (DBM)

- Normally used for temporary Road Surface. Should be installed in accordance with BS 4987-1:2005, 0/32mm size dense base. DBM should be punched prior to commencing construction of the Tobermore Hydropave paving block; typical holes should be 75mm diameter on an orthogonal grid of 750mm. All debris shall be removed and the holes in the DBM shall be filled with CGA.

Capping

- Capping material is included in order to achieve a firm-working platform so that the overlying layers can be correctly installed. The permeable paving designs are normally designed for 5% CBR, If not then the appropriate increase in capping material should be used. All capping materials should meet the requirements of either 6F1 or 6F2 of Table 6.1 of Highways Agency's '*Specification for Highway Works-Series 600-Earthworks*'

Please note: If you obtain the appropriate technical information for the aggregates which you plan to use on a permeable paving scheme please send them to us so we can give feedback on if they meet BS 7533-13:2009 and BSEN 13242:2002 requirements. Depending on the project size we would strongly advise customers that aggregates used in the construction of a permeable paving system should be tested to ensure conformity during the construction of the project.

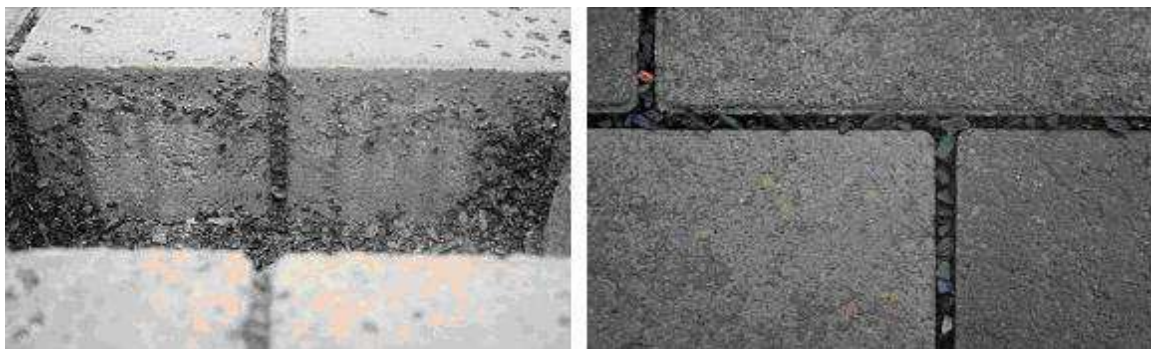


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Appendix B – Installation

Paving should be installed to BS7533-3:2005.

- i. A permeable paving design relies heavily on using the correct aggregates. Prior to installation, we would ask you to test both the 4/20mm coarse graded aggregate and also the 6.3-2mm bedding and jointing grit as per the relevant British Standard specification (BS EN 13242:2002). In particular, the material should be categorized as LA20 according to Table 9, SZ18 according to Table 10 and MDE15 according to Table 11 within this standard. The grit should be insoluble in dilute hydrochloric acid and should be naturally occurring material. In our experience, incorrect use of aggregates is one of the most common reasons for failure of a permeable paving design.
- ii. All joints must be filled to the top with 6.3-2mm grit. Joints which are not fully filled can lead to possible movement of the blocks after use. We recommend that after a few weeks use that any joints, which have settled and are not full, are topped up with grit. Joints should be kept filled at all times. You need approximately 1 ton of grit for every 100m² of 80mm paving.
- iii. Care should be taken that the permeable joints do not become contaminated as work on the scheme is completed. Special care needs to be taken when soft landscaping is carried out so that soil does not enter the joints.



All joints must be filled to the top with 6.3-2mm grit.



Geoman Ltd.	Project:	Ref:	Date:	Rev:
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Appendix C – Geoman Services

Geoman Ltd offers design services in relation to permeable paving products in general accordance with the Interpave design guide:

Where certain information is not provided assumptions will be made in order to produce an answer. The project team should check any assumptions in a site investigation or using tests at the construction stage.

Often the project team will update and make changes to our proposal based on their detailed knowledge of the scheme and its requirements.

Our deliverable documents include a design signed off by a chartered engineer recording all the information provided. The project team should check that all the information used is current. The Project Consulting Engineer still has a duty to check the design provided.

This service excludes supervision of the works. Responsibility for supervision of the works remains with the Resident Engineer, usually a representative of the Project Consulting Engineer. If this supervisory service is required, Geoman should be given a brief and asked to formally quote for it by the project team. Invoices will be made direct to the project team or client for this supervisory service.

Occasionally some projects have the specialized aspects of the works billed as contractor design or a form of warranty may be required. Geoman Ltd can offer an indemnified design as above and in addition will make visits as we see fit in order to check that the works are being undertaken correctly. Often this service will consist of one or two visits, occasionally we are requested to supervise full time. Good liaison is required with the Principal Contractor and if defects are not correct we reserve the right to report any concerns direct to the project team.

The Principal Contractor still has a duty to install the system correctly and make any changes advised.

Any site supervisory staff still has a duty to record and notify Geoman of any activities that give rise to concern in our absence. If this supervisory service is required, Geoman should be given a brief and asked to formally quote for it by the project team. Invoices will be made direct to the project team, Principal Contractor or client for this supervisory service.



DESIGN WARRANTY

This agreement is made the (DATE) between (Element Designer) Geoman Ltd whose address is 44 Elmwood Avenue, Belfast BT9 6AZ and (Client)... whose address is on behalf of (Principal Designer)..... whose address is

Copyright in Our Design

This design has been produced for the site stated in the design document only. All advise is specific to this development. The completed design, including all calculations, drawings, specifications and any advice produced on behalf of Geoman is subject to the law of copyright. Geoman will retain exclusive retain copyright and other intellectual property rights. This design and advise is not to be used for any other project with prior written consent from Geoman. For these purposes "Design" means the design attached to these conditions. This includes any design included in the specification and/ or any other design or technical advice provided by Geoman in connection with the Project, including any revisions, amendments and updates made by Geoman to these design and/or design advice. "Development" means the client's specified project location (where "client" include any contractor, architect, specifier or agent who is identified as the client) in connection with which the design is supplied.

Now it is hereby agreed in consideration of the payment of excluding VAT by to Geoman Ltd, receipt of which Geoman Ltd hereby acknowledges:

1. Geoman Ltd (The Element Designer) warrants that it has exercised reasonable care and diligence in the performance of its services to (The Client) under the appointment.
2. In the event of any breach of this agreement:
 - a. Subject to sub-clauses (b) and (c), The element designer shall be liable for the reasonable costs of repair, renewal and/or reinstatement of any part or parts of the development to the extent that the purchaser reasonably incurs such costs and the purchaser becomes liable or by way of financial contribution for such costs. The element designer shall not be liable for other losses incurred by the purchaser.
 - b. Without prejudice to any other exclusion or limitation of liability, damages, loss, expense or costs the element designer's liability for such costs of the repair, renewal or reinstatement in question shall be further limited to that proportion thereof as it would be just and equitable to require the element designer to pay having regard to the extent of the element designer's responsibility for the same and on the assumptions that:
 - i. all other element designers, consultants and advisors, contractors and subcontractors involved in the development have provided contractual undertakings on terms no less onerous than those set out in clause 1 to the purchaser in respect of the carrying out of their obligations in connection with the development and;
 - ii. that there are no exclusions of or limitations of liability nor joint insurance or co-insurance provisions between the purchaser and any other party referred to in this clause 2 and any such party who is responsible to any extent for such costs is contractually liable to the purchaser for the same and
 - iii. all the parties referred to in this clause 2 have paid to the purchaser such proportion of such costs that it would be just and equitable for them to pay having regard to their responsibilities for the same.
 - c. The element designer shall be entitled in any actions or proceedings by the purchaser to rely in any limitation or exclusion in the appointment and to raise the equivalent rights in defence of liability as it would have against the client under appointment.
 - d. The obligations of the element designer under or pursuant to this agreement shall not be released or diminished by the appointment of any person by the purchaser to carry out any independent enquiry into any relevant matter.
3. The element designer has exercised reasonable skill and care to see that, unless authorised by the client in writing, or where such authorisation is given orally, confirmed by the element Designer to the client in writing, materials specified by it for use in the development are in accordance with the guidelines contained in the edition of the publication 'Good Practice in Selection of Construction Materials' (Ove Arup & Partners) current at the date of its specification.
4. The purchaser shall have no authority to issue any direct or instruction to the element designer in relation to the appointment.
5. The element designer shall not be liable for any use by the purchaser, the client, the principal designer or its appointee of any of the documents for any purpose other than that for which the same were prepared by or on behalf of the element designer.
6. This design and advise provided to the principal engineer by the element designer is specific to the development stated in this design document. The client acknowledge that to complete this design, the element designer have relied upon the information, supplied by the client and any professional advisors working on this development. Geoman (the element designer) can take no responsibility for any failure or defect arising for incomplete, inaccurate or misleading information we have received for you or arising from any other third party engaged in this development. This design and advise have been provided on the basis that the element designer approved products will be used in construction. If any other products other than the element designers approved products are used for construction, the element designer can no accept responsibility for the preformance of those products. This design and/or advise will not be valid for the use of any other products other than the element designer's approved products.
7. The element designer shall maintain professional indemnity insurance in an amount each year of not less than (...) pounds in the aggregate for the period of insurance in respect of each and every occurrence or series of occurrences arising out of one event for a period of five years from the date of practical completion of the design under this agreement and provided that such insurance is available at commercially reasonable rates. The element designer shall inform the purchaser if such insurance ceases to be available at reasonable commercial rates in order that the element designer and purchaser can discuss the best means of protecting their respective positions. The element designer shall on reasonable request provide evidence that such insurance is being maintained.
8. The purchaser may assign by way of absolute legal assignment only the benefit of this agreement to a third party who also takes an assignment of the purchaser's interest in the premises (The 'first assignee'). The First Assignee may assign by way of absolute legal assignment only the benefit of this agreement to a third party who also takes an assignment of the First Assignee's interest in the premises. Any such assignment shall only be effective if written notice thereof is given to the element designer. No further or other assignment of this agreement shall be permitted.
9. Any notice to be given by the element designer shall be deemed to be duly given if it is delivered by hand or sent by recorded (signed for) or special delivery to the purchaser at the above mentioned address; and any notice given by the purchaser shall be deemed to be duly given if it is delivered by hand or sent by recorded (signed for) or special delivery to the element designer at the above address. Any such notices shall be deemed to have been received 48 hours after being posted (subject to proof to the contrary).
10. No action or proceedings for any breach of this agreement shall be commenced against the element designer after the expiry of five years from the date of practical completion of the relevant part of the premises or, in the event that practical completion is not achieved, the date that the element Designer finished its services under the appointment.
11. Nothing in this agreement confers or purports to confer on any third party any benefit or any right to enforce any term of this agreement pursuant to the Contracts (rights of third parties) Act 1999.
12. This agreement is subject to the law of England and Wales and the parties hereto subject to the jurisdiction of the courts of England and Wales.

As witness the hands of the parties hereto:

Signed by or on behalf of the Element Designer

For and on behalf of Geoman Ltd

Signed by or on behalf of the Client

For and on behalf of ... Ltd

Appendix F - Correspondence

Ijaz Akram

From: Jackson, Dave <Dave.Jackson@liverpool.gov.uk>
Sent: 03 April 2018 14:00
To: Ijaz Akram
Subject: RE: LV540 Naylor Street Development

Ijaz

Site A and Site B are currently being used as car parks on compacted ground and are not drained by a positive surface water drainage system connected to a public sewer or watercourse so this area cannot be considered as brownfield for the purposes of the drainage assessment. However the information provided demonstrates that some of the car park discharges over the footpaths and is drained by the gullies located in the streets adjacent to the sites therefore 50% of the car park area can be considered to be drained for the purposes of the hydraulic calculations to determine the maximum surface water discharge limits.

The maximum surface water discharges should be as follows –

Site A - 12.5 l/s
Site B - 13.2 l/s

I hope this is of assistance

Thanks

Dave Jackson | Engineer

Liverpool City Council | Cunard Building | Water Street | Liverpool | L13 1AH

T: 0151 233 0927 | E: dave.jackson@liverpool.gov.uk

Postal address:

Liverpool City Council | Cunard Building | Water Street | Liverpool | L3 1AH



From: Ijaz Akram [mailto:iakram@thomasons.co.uk]
Sent: 14 March 2018 10:34
To: Jackson, Dave <Dave.Jackson@liverpool.gov.uk>
Subject: LV540 Naylor Street Development

Hi Dave,

We are currently pulling together a drainage strategy for a development off Naylor Street. I have attached some pre planning drawings which show the proposals for the externals and existing drainage layout.

Although the development is under one application we are looking to split the development into two areas, Site A and Site B.

Could you please give your thoughts on discharge limits and what you would accept going forward in way of SUDS, positive drainage etc. A separate pre development enquiry is also being submitted for connections to the public sewer.

As the sites currently have sections of hardstanding with surface water run off directly onto the public highway we would consider both sites to be brownfield. As confirmation please see the topo survey with levels shown with flow arrows for hardstanding areas. With this in mind would you accept a 30% betterment for each site based on existing brownfield rates.

The development blocks have an underground car park so attenuation wise in the externals we are pretty limited for space.

Look forward to your response.

Regards

Ijaz Akram BEng
Civil Engineer



2nd Floor, St Nicholas House, Old Churchyard, Chapel Street, Liverpool L2 8TX
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Ijaz Akram

From: McDermott, Daniel <Daniel.McDermott@uuplc.co.uk>
Sent: 27 March 2018 15:35
To: Ijaz Akram
Cc: Wastewater Developer Services
Subject: RE: PDE 4200020197: LV540 Naylor Street

In reply, we have carried out an assessment of your application which is based on the information provided; this wastewater pre development advice will be valid for 12 months.

Foul

The foul water flows emanating from both the Norther parcel and Southern parcel will be allowed to freely drain in to the nearest available public foul water sewerage system located within the public highway and or crossing the site.

Surface Water

Northern Parcel - The surface water flows generated from the site must drain at a pass forward rate of 39 l/s and will be allowed to communicate with the public combined water sewer located within Oriol Street.

Southern Parcel - The surface water flows generated from the site must drain at a pass forward rate of 42 l/s and will be allowed to communicate with the public combined water sewer located within Oriol Street

Connection Applications

Although we may discuss and agree discharge points & rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below

<http://www.unitedutilities.com/connecting-public-sewer.aspx>

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Please also note, if you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to long term operability and give United Utilities a cost effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by United Utilities. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

If I can be of any further assistance please don't hesitate to contact me.

Regards

Daniel McDermott
Developer Services Engineer

Developer Services and Planning
Operational Services
United Utilities
T: 07795046445
Unitedutilities.com

From: Ijaz Akram [<mailto:iakram@thomasons.co.uk>]
Sent: 14 March 2018 15:04
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: LV540 Naylor Street

Hi

Please find attached the pre development enquiry for Naylor street with attached supporting documents.

Should you require anything further please contact me.

Regards

Ijaz Akram BEng
Civil Engineer



2nd Floor, St Nicholas House, Old Churchyard, Chapel Street, Liverpool L2 8TX
Tel: 0151 294 3908 | Mob: 07765 501 466

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