Report on Surface Water Drainage Strategy to Accompany Planning Application 19/00519/FUL

Nomvula Park, Off Waterpark Drive, Knowsley

by

Barratt Manchester

Revision	Date	Prepared By	Revision Notes
1	20/11/18	SPG	
2	08/01/20	SPG	Operation and Maintenance details added/amended in accordance with Knowsley MBC request.

Contents

1. **Introduction**
2. **Site Details**
3. Existing Site Run-Off Rates & Volumes
4. Soakaway Testing
5. Design Parameters
6. Summary of Drainage Design
7. Design for Exceedance
8. Operation & Maintenance Plan
9. Defect Reporting
10. Response Times
11. Phasing Arrangements
12. Compliance with DEFRA's Non-statutory technical standards for sustainable drainage systems

Drawings

1. Topographical Survey Drg No 14F069/001
2. Engineering Layout Drg No 463-ED-02 Rev 27
3. Proposed Impermeable Areas Plan 463-ED-03 Rev C
4. Longsections Drg No 463-ED-13 Rev E
5. Longsections Drg No 463-ED-14 Rev D
6. Flow Control Details 463-ED-08 Rev D
7. 1:20 Manhole Schedules
8. External levels 463-ED-11 Rev K
9. Detailed Manhole Schedules 463-ED-15 Rev E
10. Exceedance Flood Routing Drg No 463-ED-19 Rev B
11. Plot Drainage 463-ED-18 Rev L
12. Pipe Codes
13. SUDS Operation & Maintenance Plan 463-ED-32
14. Polystorm Crate Details 463-ED-29
15. Polystorm Modular Cell Datasheet
16. Section 38 Layout 463-ED-38 Rev F

Appendices

A. FRA
B. Hydraulic_Assessment HYD104
C. Site Investigation inc Soakaway Test Results
D. Microdrainage Simulations 15mins to 10080mins
    a. Network 1
        i. Online Controls & Storage Structures
        ii. Summary of Critical Results by Maximum Level
            1. 1 in 1 Year
            2. 1 in 2 Year
            3. 1 in 30 Year
            4. 1 in 100 Year + 40% Climate Change
    b. Network 2
        i. Online Controls & Storage Structures
        ii. Summary of Critical Results by Maximum Level
            1. 1 in 1 Year
            2. 1 in 2 Year
            3. 1 in 30 Year
            4. 1 in 100 Year + 40% Climate Change
E. FRA Addendum dated 15/11/2018
F. Sustainable Drainage: Operation and Maintenance Plan and Details

Introduction

The following document provides a description of the surface water drainage design to accompany the planning application. It summarises the requirements of the FRA, and compares to the final surface water design, as well as giving relevant details on the design, construction and maintenance.

Site Details

Development Name	Nomvula Park
Site Address	Waterpark Drive, Knowsley
Longitude, Latitude (or OS Grid Ref)	X = 342782.0934 Y = 393074.1986
Site Description	Former school Building with associated playing fields. An existing culverted main river runs through the site.
Topographical Survey Drg No	14F069/001
Site Area (Ha)	2.906Ha
Existing Permeable Area (Ha)	2.85ha
Existing Impermeable Area (Ha)	0.05ha
FRA Report Reference	HYD104 Waterpark.Drive, Knowsley FRA & DMS
Is the Site Steeply Sloping (Y/N), If "Yes" Typical Gradient.	No

Table 1

Existing Site Run-off Rates and Volumes

Refer to the site specific FRA produced by Betts Hydro dated January 2017

Return Period	**Existing Discharge Rate**
Qbar Total Site Area (l/s)	13.2
1 in 1 Year (l/s)	11.5
1 in 30 Year (l/s)	22.3
1 in 100 Year (l/s)	27.4

Table 2

Return Period	**Existing Volume**
Qbar Total Site Area (m^3)	-
1 in 1 Year (m^3)	199.3
1 in 30 Year (m^3)	-
1 in 100 Year (m^3)	669.3

Table 3

Soakaway Testing

A site specific site investigation was carried out by ALM dated 24/04/2017. A copy of the site investigation is presented in Appendix B

Ground conditions are typically bands of sand and Clay.

2No soakaway tests were carried out as part of the site investigation.

Infiltration rates in the order of $2.74x10^{-6}$ were experienced; therefore the soakaway test results indicate that infiltration drainage is NOT a feasible option.

Design Parameters

Engineering Layout Drg No & Revision	463-ED-02 Rev X Engineering Layout
Proposed Impermeable Areas Drg No	463-ED-03_Rev C Proposed Impermeable Areas
Lowest FFL	24.300
Maximum TWL for Design	23.931
M5-60	19.60
Ratio R	0.382
MADD Factor	2
Climate Change Allowance	40%
Point of Connection	River Alt

Table 4

Summary of Drainage Design

The drainage has been designed in accordance with the site specific FRA produced by Betts Hydro dated January 2017

The drainage has also been designed to comply with DEFRA's Non-statutory technical standards for sustainable drainage systems dated March 2015. Compliance to such is demonstrated in Section 10.

Surface water is to drain to the adjacent River Alt, which is designated Main River. Proposed Discharge rates have been designed to mimic discharge rates for the pre-development site.

Attenuation storage is provided in the form of oversized pipes under highways and public open spaces. Attenuation storage is sized to provide attenuation for all flows up to and including 1 in 30 year storm event.

For storm events exceeding 1in 30 year events, long term storage is provided in below ground cellular storage tanks under communal driveways to ensure no flooding to properties occurs for all storm events up to and including 1 in 100 year 6 hour storm event plus a 40% allowance for climate change.

Microdrainage simulations are available in Appendix C.

Estimates for the proposed SW discharge volume show that there is a slight reduction in the discharge volume for the 1 in 1 year storm event.

Estimates for the proposed SW discharge volume show that there is a slight increase in the discharge volume for the 1 in 100 year storm event, 669m3 to 1036m3.

The proposal requires 2No outfall connections to the Existing main River Alt. EA consent will be required for the works to the existing culvert. It is envisaged these works can be consented under and exemption since the pipe size is less than 300mm. The consent can only be applied for once the planning application for the scheme has been approved.

Return Period	Existing Discharge Rate	Proposed Discharge Rate – Network 1	Proposed Discharge Rate – Network 2	Proposed Discharge Rate – Total
Qbar Total Site Area (l/s)	13.2	6.0	6.1	12.1
1 in 1 Year (l/s)	11.5	5.5	5.7	11.2
1 in 30 Year (l/s)	22.3	9.5	9.5	19
1 in 100 Year (l/s)	27.4	-	-	-
1 in 100 Year + 40% (l/s)	-	10.5	11.1	21.6

Table 5

Return Period	Existing Discharge Volume	Proposed Discharge Volume
Qbar Total Site Area (m^3)	-	-
1 in 1 Year (m^3)	224.6	164.0
1 in 100 Year (m^3)	699.1	1024.3

Table 6

Design for Exceedance

All surface water drainage models have been modelled for storm events greater than the 1 in 100 Year event to determine the impact of flooding. The flood locations are shown on the attached Flood Routing drawing. Any exceedance flooding has been demonstrated to be managed within the site.

This demonstrates that properties are unlikely to flood during extreme flood events.

Operation & Maintenance Plan

All Surface Water (coloured Blue) on the attached plan 463/ED/02, will be put forward for adoption under a S104 agreement with United Utilities. Prior to issue of the Vesting Declaration by United Utilities, the drainage shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

All areas of public open space will be transferred to the management company for adoption and maintenance. This includes the Overflow Attenuation Crates (coloured Blue) on the attached plan 463/ED/32. The management and maintenance will be funded by the purchasers/owners of the properties by way of an annual fee levied on the owner. In order to ensure the long term operation of the swales, the maintenance contract will stipulate regular maintenance of the SUDS network, in accordance with this management plan.

All highway gullies and highway drains on the attached plan will be put forward for adoption under a 38 agreement with Knowsley MBC. After issue of the highway final certificate, the highway (coloured pink) and Highway Drains, Gullies, and gully pipes (coloured blue) on the attached plan 463/ED/38, will be maintainable by the Local Highway Authority at public expense. Prior to issue of the final Certificate by Knowsley MBC, the highway drains shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

All Foul drainage (coloured Brown) on the attached plan 463/ED/02 will be put forward for adoption under a S104 agreement with United Utilities. Prior to issue of the Vesting Declaration by United Utilities, the drainage shown on the included plan will be maintainable by Barratt Manchester and at the expense of Barratt Manchester.

An Operation & Maintenance schedule for elements of the SUDS/Drainage infrastructure is shown in Appendix F

DEFECT REPORTING

Prior to adoption of the highway drains, foul drains, Surface water drains or SUDS, defects may be reported to Barratt Manchester by the local authority, local residents or members of the public.

All defects are can be reported to Barratt Manchester Customer Care Line using the following details:

Email: manchester@newhomecare.co.uk
Phone number during office hours: 0161 872 0161 option 3
Phone number out-of-hours: 0345 6016084

The customer care line normal working hours are Monday to Friday 9am to 5.30pm, excluding bank holidays. For reports of defects outside normal working hours, a 24 hours out of hours call centre is in operation.

After adoption, the following numbers may be useful.

Management Company:
TrustGreen

Unit 7, Portal Business Park, Eaton Lane, Tarporley, CW6 9DL.

0845 544 2924
enquiries@trustmgt.co.uk

Knowsley Council Flood Risk Team
0151 443 2704 or LLFA@knowsley.gov.uk

United Utilities
Tel: 0345 672 3723

Environment Agency
Tel: 0800 80 70 60 (24 Hours)

Knowsley Council Highways (footways and street lighting)
0151 443 2800

RESPONSE TIMES

All non-urgent defects will be repaired within 10 weeks of being reported.

All urgent defects will be made safe within 48 hours, or sooner if practicable. Any works to “Make Safe” may be of a temporary nature in order to protect the public, and allow sufficient time to procure the permanent remedial works. This may include temporary “fencing off” of the hazard until permanent remedials can be completed.

United Utilities, LA, EA and The Management Company may operate to alternative response times.

Phasing Arrangements

The site will be completed in a single phase. All surface water attenuation features and flow controls will be installed prior to first occupation of any properties. It is anticipated that the POS and SUDS system is expected to be handed over in 2021.

Compliance with DEFRA's Non-Statutory Technical Standards for Sustainable Drainage Systems dated March 2015

Flood risk outside the development

Criteria	Designers Comments
S1 Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (**S2** and **S3** below) and volume control technical standards (**S4** and **S6** below) need not apply.	The surface water discharges to existing watercourse/sewer, therefore this criteria does not apply.

Peak flow control

Criteria	Designers Comments
S2 For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.	The site is Brownfield therefore not applicable.
S3 For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event.	All proposed discharge rates are less than or equal to the equivalent greenfield discharge rate. See Table 5 For the 1:100 year event, a 21% reduction is discharge rate is provided, which also includes climate change. Therefore, this criteria is deemed to comply.

Volume control

Criteria	Designers Comments
S4 Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.	The site is Brownfield therefore not applicable.
S5 Where reasonably practicable, for developments which have been previously	As the infiltration test results do not allow infiltration drainage, it is not possible to reduce

developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to redevelopment for that event.	the run-off volume to the greenfield volume, therefore Criteria S6 will apply.
S6 Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with **S4** or **S5** above, the runoff volume must be discharged at a rate that does not adversely affect flood risk.	As the infiltration test results do not allow infiltration drainage, it is not possible to reduce the run-off volume to the greenfield volume, therefore the discharge rate has been reduced to less than the equivalent greenfield discharge rate for all rainfall events up to and including 1 in 100 year 6 hour event. For the 1:100 year event, a 21% reduction is discharge rate is provided, which also includes climate change. The reduction in discharge rate provides betterment and will NOT adversely affect flood risk. In addition, the hydraulic assessment provided by Betts Hydro, demonstrated that the River Alt is not adversely impacted by the development.

Flood risk within the development

Criteria	**Designers Comments**
S7 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event.	The drainage system has been designed to ensure no flooding occurs for any part of the site for a 1 in 30 year event. Micro drainage simulation for a 1 in 30 year event are attached in Appendix C
S8 The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development.	The drainage system has been designed to ensure no flooding to properties occurs for any part of the site for a 1 in 100 year 6 Hour event. For flows in excess of the 1 in 30 year event, flows are allowed to overflow into underground cellular storage tanks under the communal driveways. Micro drainage simulation for a 1 in 100 year event are attached in Appendix C
S9 The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed	All surface water drainage models have been modelled for storm events greater than the 1 in 100 Year event to determine the impact of flooding. The Flood locations are shown on the attached Flood Routing and over land flow drawing. Any exceedance flooding has been demonstrated to be managed within the site where reasonably practicable.

Structural integrity

Criteria	Designers Comments
S10 Components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance.	All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. A 12 month maintenance period is standard with all S104 sewers
S11 The materials, including products, components, fittings or naturally occurring materials, which are specified by the designer must be of a suitable nature and quality for their intended use.	All main sewers to be constructed to adoptable standards.

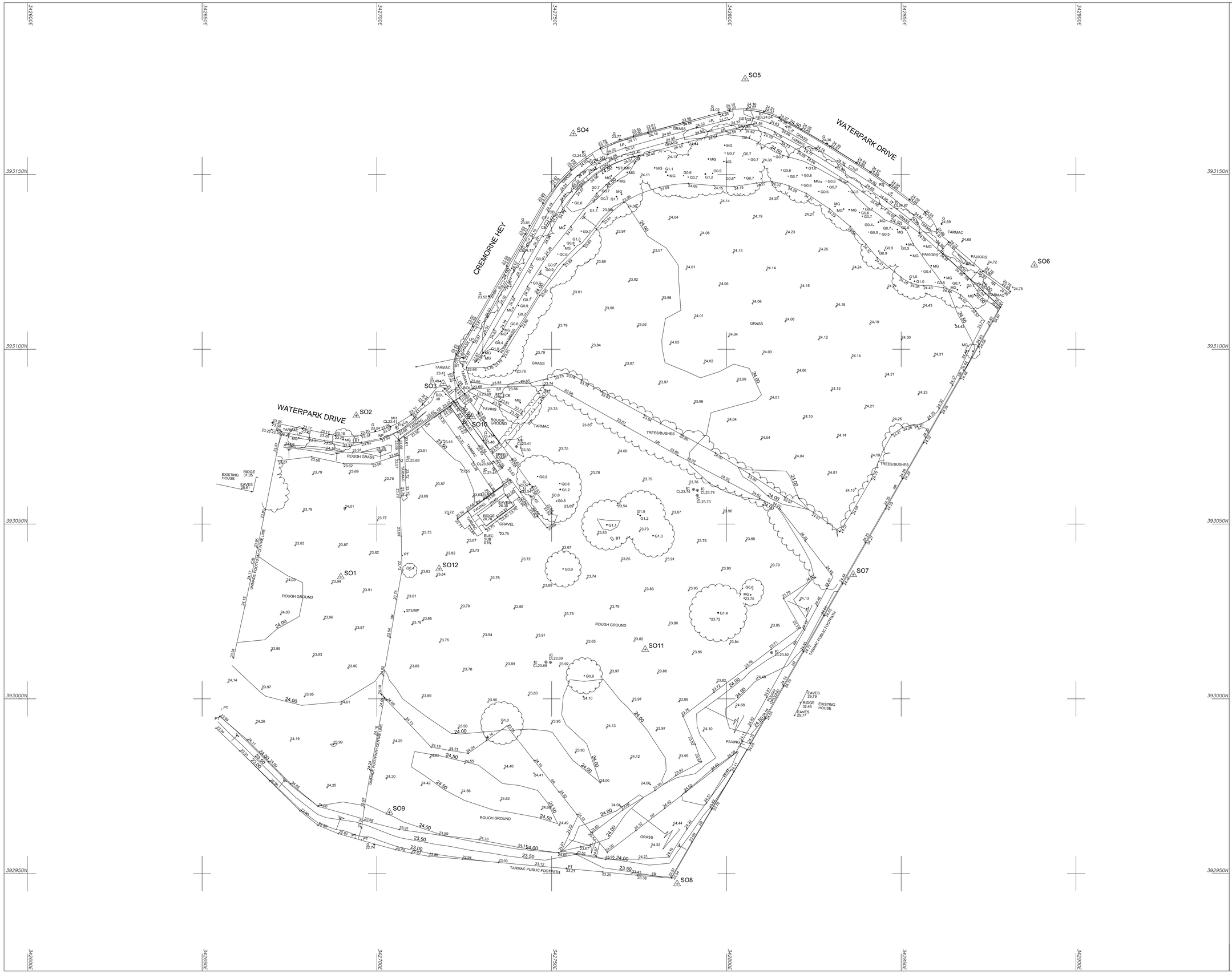
Designing for maintenance considerations

Criteria	Designers Comments
S12 Pumping should only be used to facilitate drainage for those parts of the site where it is not reasonably practicable to drain water by gravity.	Surface Water Pump Stations are not proposed on this development. A Foul Pump Station is NOT proposed on this development.

Construction

Criteria	Designers Comments
S13 The mode of construction of any communication with an existing sewer or drainage system must be such that the making of the communication would not be prejudicial to the structural integrity and functionality of the sewerage or drainage system.	Connection to the watercourse will require EA permit for works affecting a watercourse or an Exemption. Details of the works will be submitted to the EA for subsequent approval. No works to within 8m of a main river will be permitted without EA approval.
S14 Damage to the drainage system resulting from associated construction activities must be minimised and must be rectified before the drainage system is considered to be completed.	All Sewers are to be covered under a S104 agreement with United Utilities for future adoption. All sewers to be built to UU adoptable standards. A 12 month maintenance period is standard with all S104 sewers.

Drawings



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Note:

The survey is plotted on a plane local Grid. Orientation to National Grid. All levels relate to Ordnance Datum, achieved using the OS National GPS Network.

Survey Control Markers established for Mapping purposes only and should not be used for Construction without the written approval of Survey Operations Ltd.

SURVEY STATIONS

Name	Easting	Northing	Height
SO1	342689.69	393034.87	24.07
SO2	342694.11	393080.96	23.27
SO3	342718.97	393090.22	23.44
SO4	342756.19	393161.64	24.13
SO5	342805.35	393177.33	24.49
SO6	342888.07	393124.09	24.83
SO7	342836.25	393035.55	24.37
SO8	342785.89	392947.07	23.58
SO9	342703.57	392967.56	24.27
SO2A	342784.46	393107.45	24.02
SO10	342727.24	393080.71	23.56
SO12	342717.83	393037.18	23.94
SO11	342776.75	393014.12	23.89

Survey Operations

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ISO 9001 ISO 14001 OHSAS 18001 BUREAU VERITAS Certification

UKAS MANAGEMENT SYSTEMS 008

Client
Knowsley Metropolitan Borough Council

Drawing Title
Topographical Survey of Land at:
Brookside Community College Waterpark
Huyton, Knowsley

Scale(s)	1:500	Surveyor	CW
Date	JULY 14	Drawn	PM
Job Number	14F069	Checked	MH

Sheet Size & Drg Number & Revision
A1 14F069/001

KEY

- 19 — PROPOSED 6 METRE NOMINAL HEIGHT TUBULAR LIGHTING COLUMN PAINTED AIRCRAFT GREY (BS381693), COMPLETE POST TOP MOUNTED LANTERN (AIRCRAFT GREY). [WRTL PHILIPS 5S CHIP, MICRO LUMA 4.2KL 20 NW LEDS WITH DW50 REFLECTOR AT 0 DEGREE TILT (26W)]. - ORDER CODE - MC15S20/4.2DW50NW/DC/PT/MFN/6M1.5
- 7 — INSTALL SMARTSCAPE NEW ROOT MOUNTED ZETA LED SOLAR BOLLARD IN EXTRUDED ALUMINIUM FINISH, ORIENTATE OPTICS TOWARDS SHARED DRIVEWAY
- 1 — 8 METRE NOMINAL HEIGHT TUBULAR GALVANISED STEEL LIGHTING COLUMNS INSTALLED DURING PFI WORKS. MOVE UNIT 3M TO LOCATION SHOWN BY SYMBOL DUE TO NEW DRIVEWAY. RETAIN EXISTING LANTERN AND OPTIC SETTING. TRANSFER EXISITNG DNO SUPPLY
- 3 — EXISTING DEEMED TO COMPLY COLUMN (FOR INFORMATION ONLY)
- 3R & L — PROPOSED 6 METRE NOMINAL HEIGHT TUBULAR LIGHTING COLUMN PAINTED AIRCRAFT GREY (BS381693), COMPLETE POST TOP MOUNTED LANTERN (AIRCRAFT GREY). [WRTL PHILIPS 5S CHIP, MICRO LUMA 2.2KL 12 NW LEDS WITH DM10 REFLECTOR AT 0 DEGREE TILT (14W)]. - ORDER CODE - MC15S12/2.2DM10NW/DC/PT/MFN/6M1.5
- 5 — EXISTING COLUMN TO BE REMOVED

- ALL COLUMNS TO BE TUBULAR GALVANISED STEEL PAINTED AIRCRAFT GREY (BS381693) INSTALLED AT BACK EDGE OF PATH UNLESS STATED OTHERWISE
- ALL LANTERNS TO BE PAINTED AIRCRAFT GREY (BS381693)
- ALL NON-ILLUMINATED SIGNS TO BE MOUNTED ON NEW 76MM ROUND POST UNLESS STATED OTHERWISE (SIGN TO BE INSTALLED TO GIVE 2.1M HEIGHT CLEARANCE)
- ALL NEW ILLUMINATED SIGNS TO BE INSTALLED ON NEW 3M WIDE BASED POLE (SIGN TO BE INSTALLED TO GIVE 2.1M HEIGHT CLEARANCE)
- ALL ILLUMINATED EQUIPMENT TO BE FED VIA DNO LOW VOLTAGE MAINS NETWORK (UNLESS OTHERWISE STATED)
- ALL PRIVATE CABLE TO BE INSTALLED IN 100MM ORANGE DUCTING
- ALL PRIVATE CABLE ROUTES TO BE SHOWN ON AS-BUILT DRAWING
- ALL PRIVATE BOLLARDS TO BE FED FROM PLOTS AND TO BE THE RESPONSIBILITY OF THE DEVELOPER
- LIGHTING COLUMNS TO BE INSTALLED AS PER STANDARD DETAILS SSE/L/SD/01, SSE/L/SD/02, SSE/L/SD/016 & SSE/L/SD/017 AND IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS

- ALL COLUMNS & LANTERNS (IN ADOPTED AREA) TO BE TUBULAR GALVANISED STEEL PAINTED AIRCRAFT GREY (BS381693) INSTALLED AT BACK EDGE OF PATH UNLESS STATED OTHERWISE
- ALL COLUMNS TO BE INSTALLED MINIMUM 800MM FROM CARRIAGEWAY UNLESS STATED OTHERWISE
- ALL COLUMNS TO BE NEW SCOTTISH POWER DNO CONNECTION UNLESS STATED OTHERWISE
- ALL PRIVATE CABLE TO BE INSTALLED IN 100MM ORANGE DUCTING
- ALL PRIVATE CABLE ROUTES TO BE SHOWN ON AS-BUILT DRAWING
- LIGHTING COLUMNS TO BE INSTALLED AS PER STANDARD DETAILS SSE/L/SD/01, SSE/L/SD/02, SSE/L/SD/016 & SSE/L/SD/017 AND IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS

ENGINEERING KEY

- S1 — Adoptable S.W. Sewer & Manhole
- F1 — Adoptable F.W. Sewer & Manhole
- (10.25) — S. Water Drag-Out and Invert
- 10.25 — Foul Drag-Out and Invert
- Adoptable Road Gully
- Street Name Plate

ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewers for Adoption, 6th Edition', and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidelines shall take presidence.

United Utilities Standard details to be used are:

STND/19/001A	Manhole Type 1
STND/19/002A	Manhole Type 2 and Invert Access Detail
STND/19/003A	Shallow Manhole Detail for Small Diameter Pipes (Type 4)
STND/19/004A	Shallow Surface Water Manhole Detail – Restricted Headroom (less than 2.0m) – For Pipe Sizes 450Dia and Above
STND/19/005A	Flow Control Manhole Detail
STND/19/007A	External Backdrop Detail
STND/19/008A	Pipe Bedding Detail
STND/19/010A	Variable Manhole – Guidance Notes
STND/19/011A	Headwall Type 1 and Typical Outlet Grille Detail
STND/19/012A	Typical Outfall Details Type 2 & Type 3

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911:Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244-2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150ø unless stated otherwise.

11. All private house drainage shall be 100ø and all drag-out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

12. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

13. Pram crossings shall be provided at the inner tangent points of all junctions.

14. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

16. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

17. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their Inspections telephone number. Tel 0845 602 0406.

18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

Buyers are warned that this is a working drawing and is not intended to be treated as descriptive material describing, in relation to any particular property or development, any of the Specified matters prescribed by any Order made under the above Act. The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially from those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

REV	DESCRIPTION	DATE	DRAWN
X	Polystorm crates amended to be outside 8m standoff to watercourse.	20.09.18	DK
W	Plot drainage routes changed on plots 7–8, 25–28, 53 & 56 to suit architect drawing.	28.08.18	LB
V	Overflow Area levels revised. Culvert 8m stand–off added. Lighting Bollards O/s plot 18–18 repositioned to avoid culvert Standoff.	27.07.18	SPG
U	Planning Layout updated to Rev Q	28.06.18	SPG
T	Dragout levels for F1,F2,F10,F12,F13 amended to avoid clashes with SW.	07.06.18	DK
S	Street lighting column (number 8) relocated. R&L column added to footpath access way to the north east of the site. Existing columns to be removed also shown – private street lighting key updated to suit.	17.04.18	FB
R	Dragout to plot 79 from F3 removed. Plot drainage amended to suit.	22.03.18	DK
Q	Overflow areas amended. Planning layout rev P used.	12.03.18	DK
P	Culvert Aversion removed. Overflow area added to POS. Drainage revised to suit.	16.02.18	SPG
N	Street lighting bollards added to the south of the site.	11.01.18	FB
M	Staggered Barriers added.	10.01.18	DK
L	Plot 24 FFL amended to 24.45.	02.01.18	FB
K	Road & drainage lifted 100mm to suit higher surveyed invert than originally designed.	13.11.17	DK
J	Driveway splays added & gully positions revised to suit LA Highways comments.	08.11.17	DK
H	Street lighting & street lighting key added.	05.10.17	FB
G	ACO drains added to driveways where they fall towards adoptable highway. Plot drainage for plots 44–46 corrected.	05.07.17	DK
F	Plot Garages 19, 30, 76 FFLs changed.	28.06.17	BM
E	Plot drainage amended for plots 01–05, 28 garage, 29–43 & 71–72.	27.06.17	FB
D	SW outfalls amended to tie in with Betts watercourse modelling.	21.06.17	DK
C	Road & Sewer design amended to suit latest planning layout.	09.05.17	DK
B	Plot 25–26 FFL raised 150mm to tie in with road contour level. Drainage levels amended to suit.	22.03.17	FB
A	Private drainage added for whole site.	24.02.17	FB

BARRATT HOMES

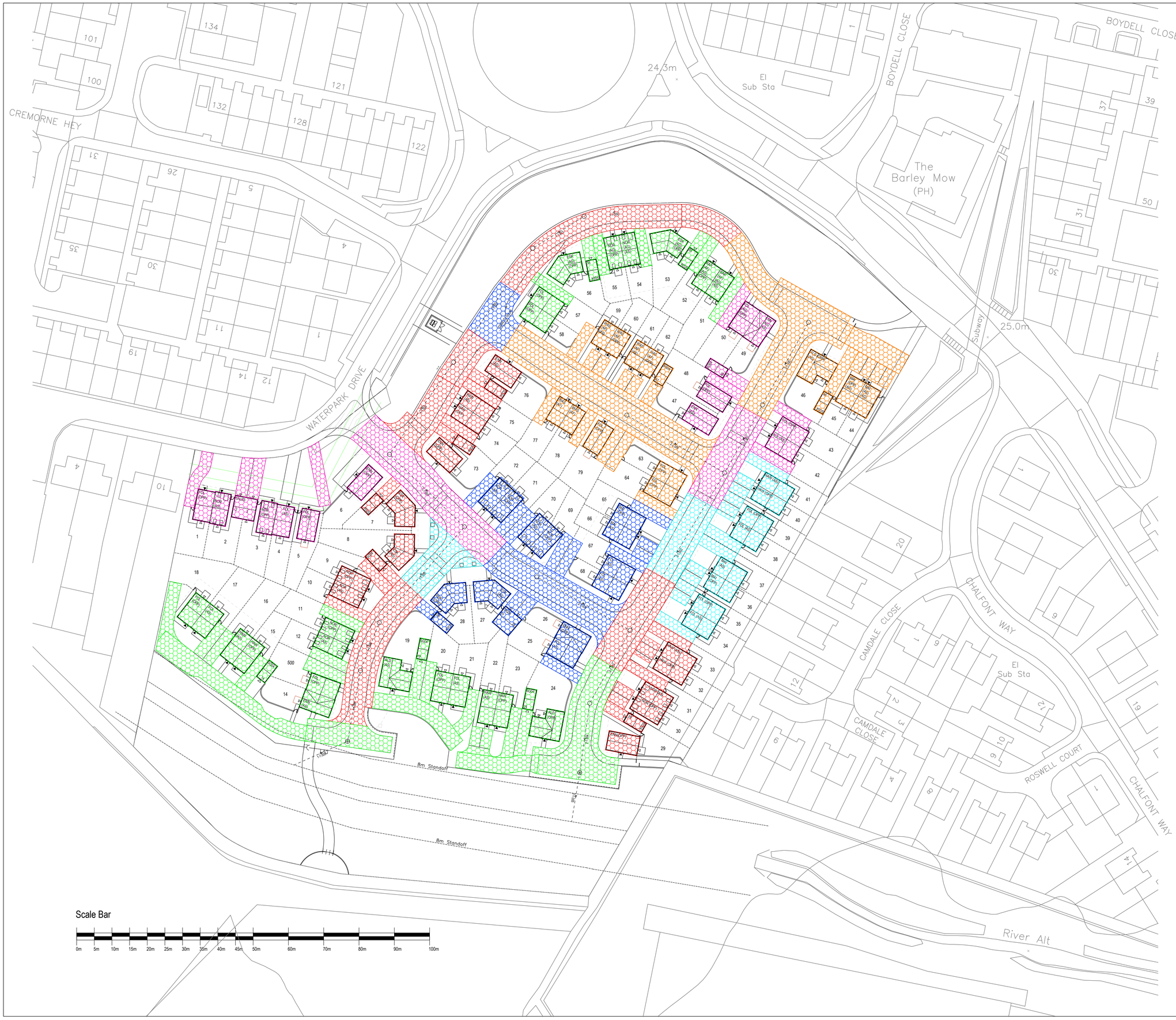
MANCHESTER

Barratt Homes Manchester
(A division of BDW Trading Ltd)
4 Brindley Road
City Park
Manchester
M16 9HQ
Tel: 0161 872 0161
Fax: 0161 855 2828

Job
Waterpark Drive
Knowsley

Title
Engineering Layout

Design By	Date	Drawing Number	Rev
DK	17.01.17	463/ED/02	X
C.A.D By DK	Scale @ A1 1:500		



Scale Bar

0m 5m 10m 15m 20m 25m 30m 35m 40m 45m 50m 60m 70m 80m 90m 100m

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

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1-1.000 = 0.047 Ha	Net 1 Area= 0.525 Ha	
1-1.001 = 0.063 Ha		
1-1.002 = 0.016 Ha		
1-1.003 = 0.063 Ha		
1-1.004 = 0.100 Ha		
1-1.005 = 0.020 Ha		
1-1.006 = 0.071 Ha		
1-1.007 = 0.145 Ha		
1-1.008 = 0 Ha		
2-1.000 = 0.102 Ha	Net 2 Area= 0.682 Ha	
2-1.001 = 0.074 Ha		
2-1.002 = 0.088 Ha		
2-1.003 = 0.069 Ha		
2-1.004 = 0.085 Ha		
2-1.005 = 0 Ha		
2-2.000 = 0.128 Ha		
2-3.000 = 0.136 Ha		
	Total Area= 1.207 Ha	

REV	DESCRIPTION	DATE	DRAWN
C	Amended to latest planning layout rev S.	20.09.18	DK
B	Amended to latest planning layout rev J.	20.06.17	DK
A	Amended to latest planning layout.	05.05.17	DK

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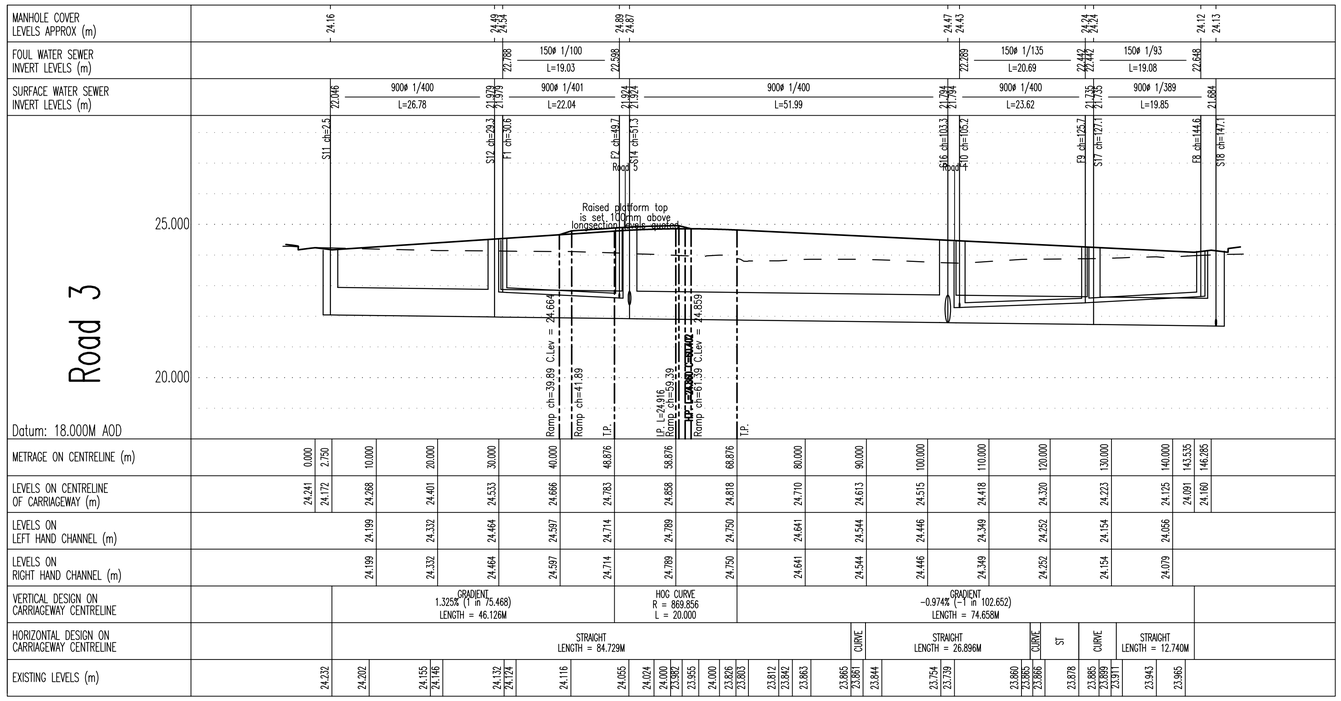
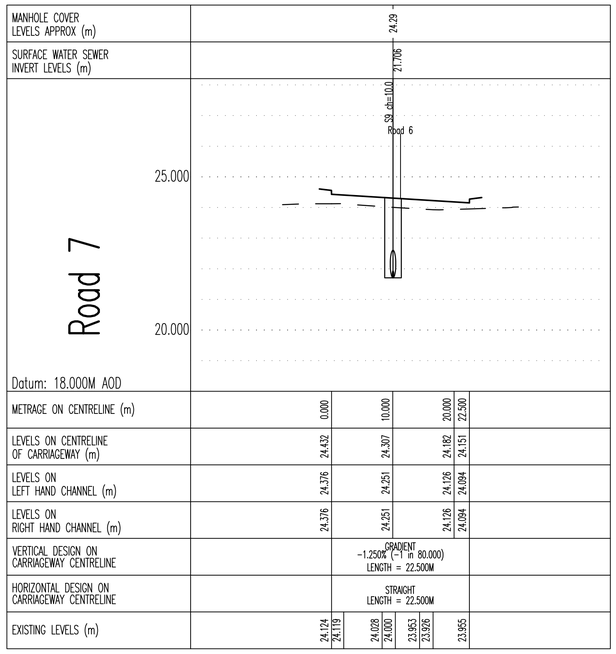
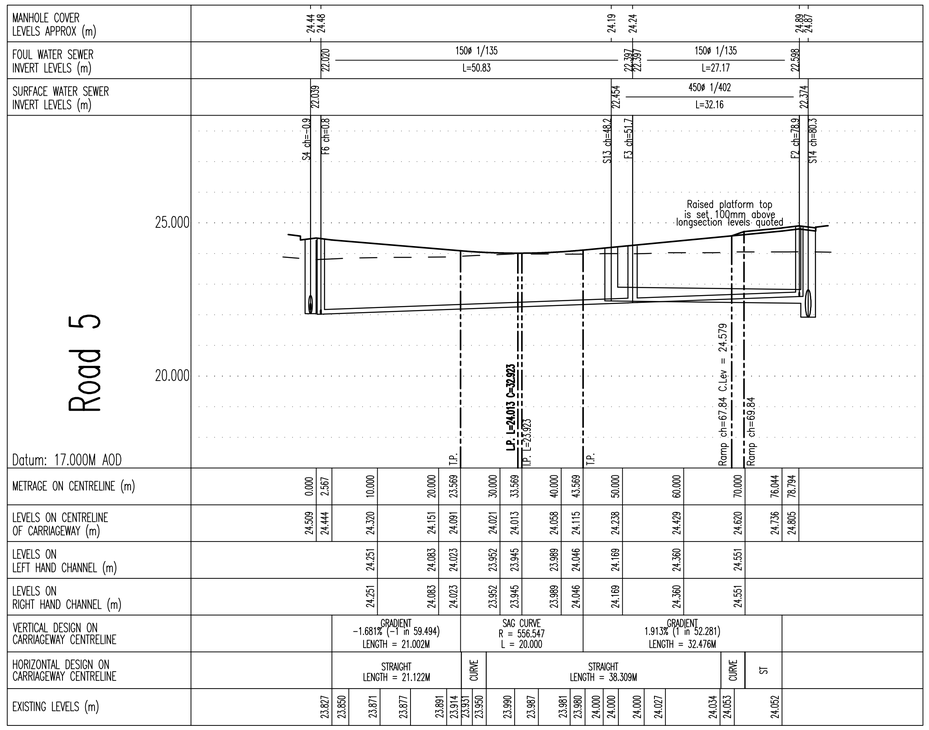
Job
Waterpark Drive
Knowsley

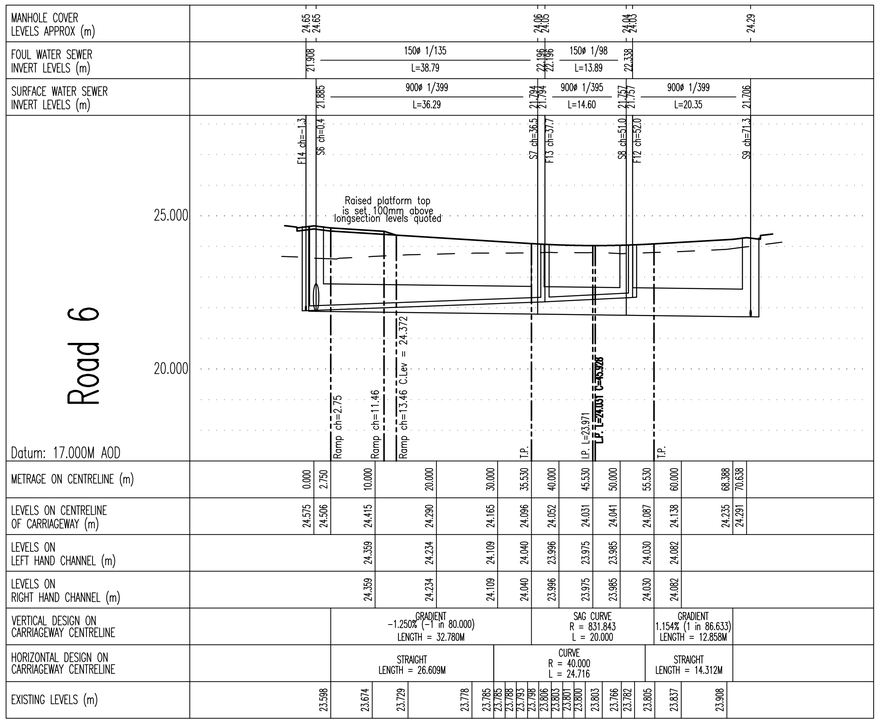
Title
Impermeable Drainage Areas

Design By	Date	Drawing Number	Rev
DK	18..01.17	436/ED/03	C
C.A.D By Dk	Scale @ A1 1:500		









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ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with 'Sewers for Adoption, 6th Edition, and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidlines shall take presidence.

United Utilities Standard details to be used are:

STND/00/006B	Typical Outfall Details D, E and F
STND/00/007C	Typical Details G & H Outlet Grille and safety grille to materials access shaft
STND/01/001B	Standard Detail No 4 (Type 1 Manhole) Standard Detail No 5 (Type 2 Manhole) Standard Detail No 6 (Manhole Accesses)
STND/01/002C	Standard Details 7, 8, 9 and 10 Ladders, Safety Chains and Handrailing.
STND/01/003B	Typical Details A, B, and C External and Internal Backdrops and Connection Details
STND/01/004B	Manhole and French Drain Details MH3, MH4, MH5 and PS6
STND/01/005B	Manhole Details and Brick Invert Renovation MH6, MH7, MH8, and BS1
STND/01/006B	Typical Details I and J – Segmental Shafts
STND/05/001B	Pipe Embedment Details

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911:Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN 13244-2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150ø unless stated otherwise.

11. All private house drainage shall be 100ø and all drag-out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

12. Runoff from private surfaces shall not discharge across the highway. Gullies or channels shall be provided as appropriate to prevent this.

13. Pram crossings shall be provided at the inner tangent points of all junctions.

14. Pipes shall be protected from concentrated loading by construction traffic during the construction period when insufficient cover to the pipe may make them vulnerable to damage.

15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

16. Groundworker to ensure that plot drainage be within the curtilage of the plot they serve where possible and inspection covers kept within hardstandings where possible.

17. Contractor to provide United Utilities with sufficient notice prior to commencement of Sewer works on their Inspections telephone number. Tel 0845 602 0406.

18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

REV	DESCRIPTION	DATE	DRAWN
D	Road 7 Drainage lifted 100mm to suit higher surveyed FWS outfall level.	13.11.17	DK
C	Longsections amended to suit latest planning layout.	10.05.17	DK
B	Longsections represented on AO with bigger text heights etc.	22.03.17	DK
A	Manhole Diameters removed from this drawing to avoid discrepancies.	16.02.17	DK

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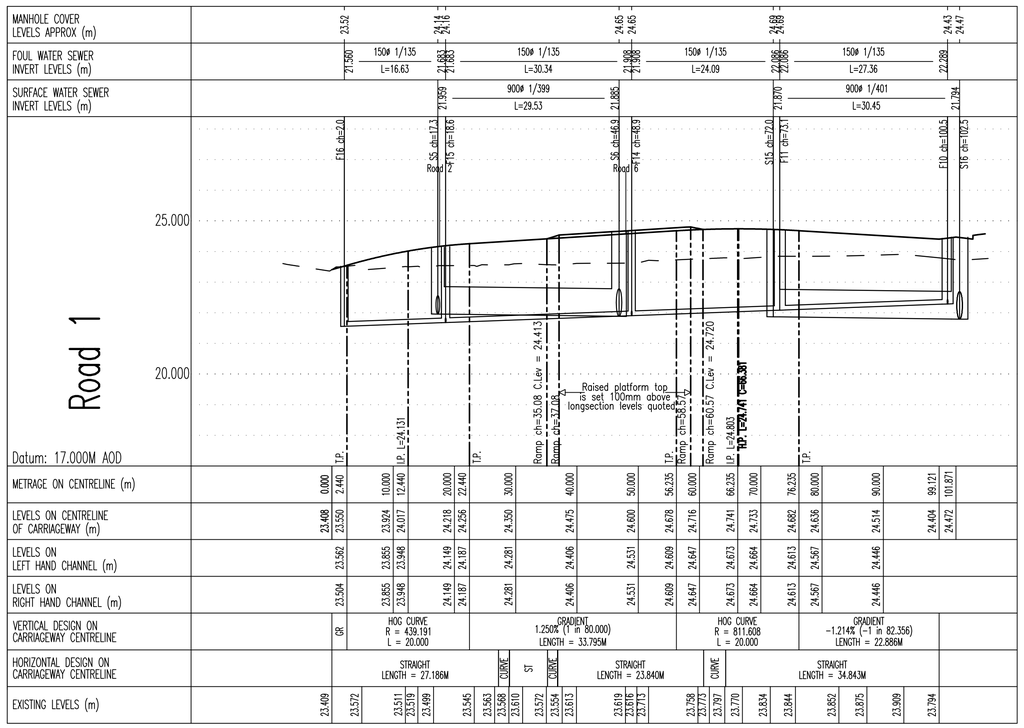
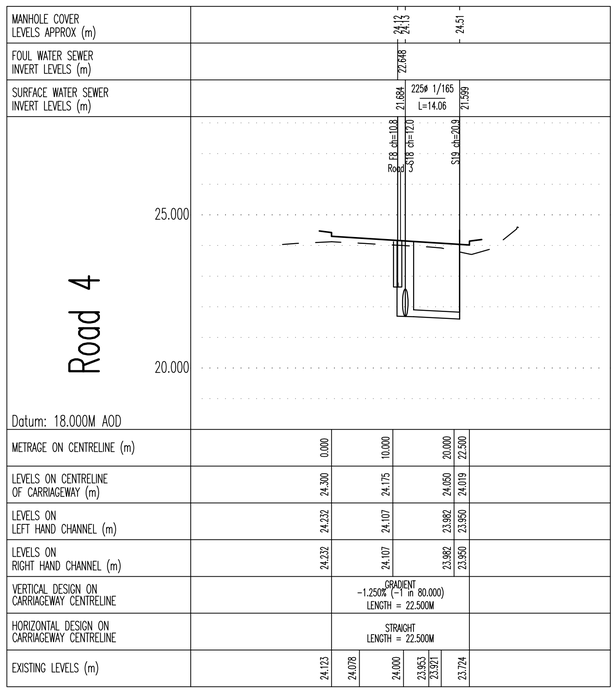
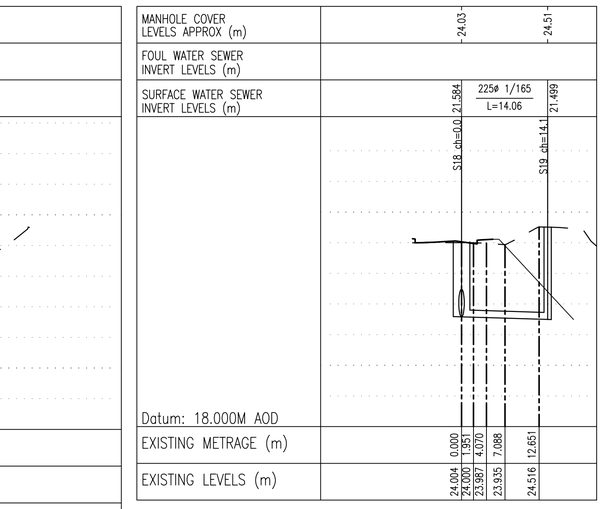
Job
Waterpark Drive
Knowsley

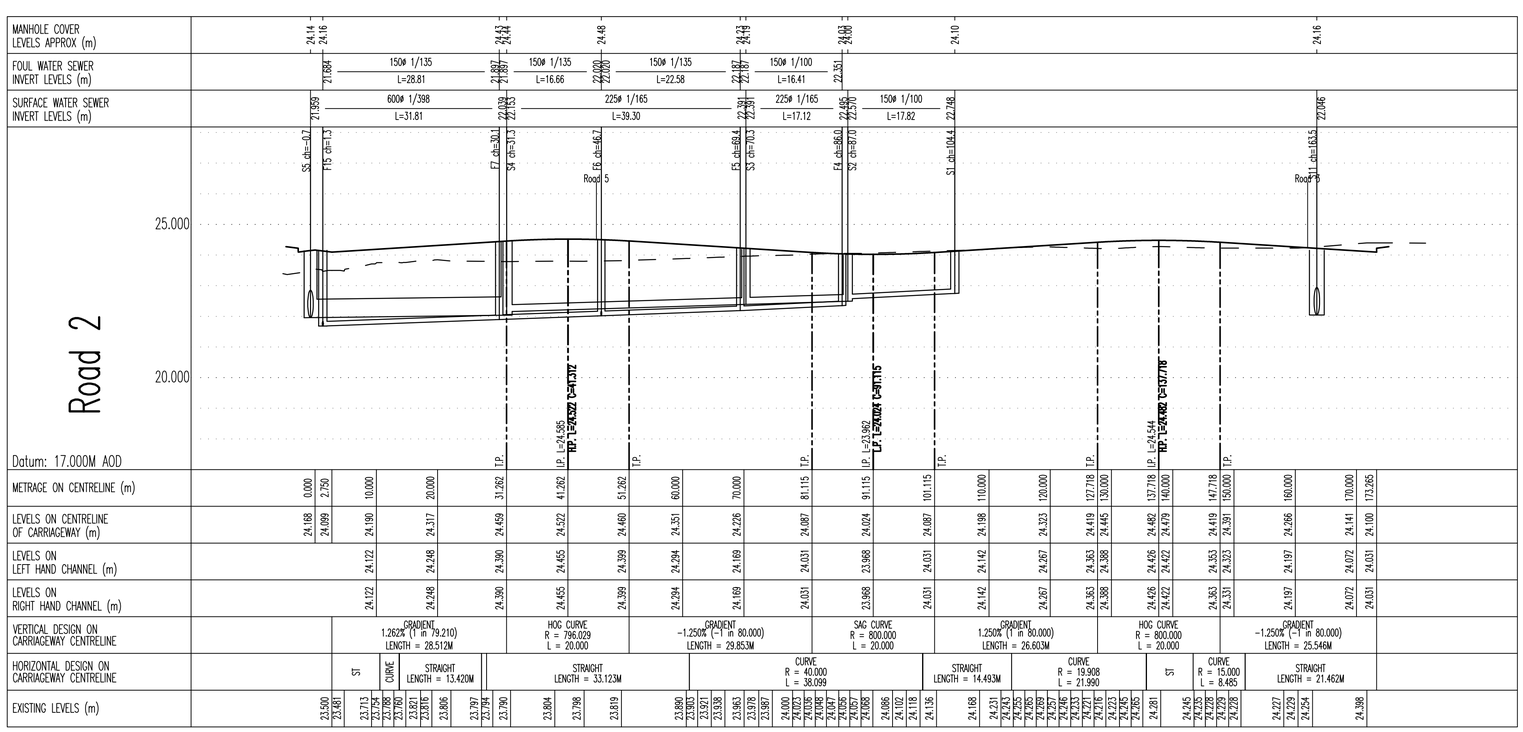
Title
Engineering Longsections
Sheet 2

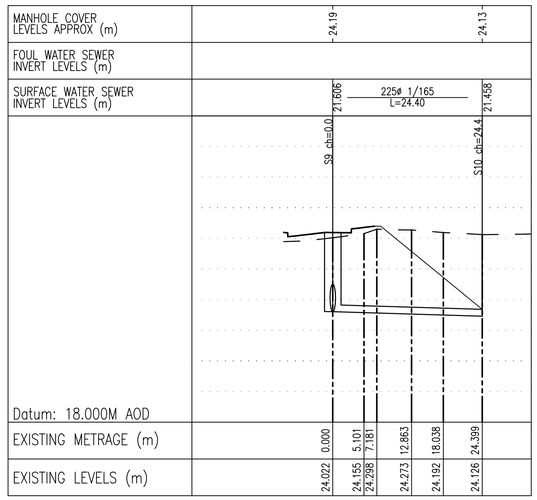
Design By	Date	Drawing Number	Rev
DK	09.02.17	463/ED/14	D
C.A.D By: DK	Scale @ A1: 1:500H,1:100V		











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ENGINEERING LAYOUT NOTES

1. All adoptable drainage works have been designed and are to be constructed in accordance with "Sewers for Adoption, 6th Edition, and United Utilities 'Guidelines for Sewer for adoption 6th Edition'. Where specification conflicts, UU guidlines shall take presidence.

United Utilities Standard details to be used are:

STND/00/006B Typical Outfall Details D, E and F
STND/00/007C Typical Details G & H
Outlet Grille and safety grille to materials access shaft
STND/01/001B Standard Detail No 4 (Type 1 Manhole)
Standard Detail No 5 (Type 2 Manhole)
Standard Detail No 6 (Manhole Accesses)
STND/01/002C Standard Details 7, 8, 9 and 10
Ladders, Safety Chains and Handrailing.
STND/01/003B Typical Details A, B, and C
External and Internal Backdrops and Connection Details
STND/01/004B Manhole and French Drain Details
MH3, MH4, MH5 and PS6
STND/01/005B Manhole Details and Brick Invert Renovation
MH6, MH7, MH8, and BS1
STND/01/006B Typical Details I and J – Segmental Shafts
STND/05/001B Pipe Embedment Details

2. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

3. All precast concrete pipework shall be to Class 120 in accordance with BS5911 Part 1, BS EN 1916 and bear the BS kitemark.

4. All adoptable drainage to be bedded in Class S granular surround unless otherwise stated.

5. All Concrete manholes and Soakaways rings, Concrete cover slabs and Con to be manufactured to BS EN 1917 and BS 5911:Part 3.

6. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244–2. Polyethylene fittings, including fusion joints, and electro–fusion fittings shall comply with BS EN 13244–2.

7. All levels relate to Ordnance Datum. Contractor to ensure that this drawing is read in conjuction with the site specific Topographical Survey provided by Barratt Manchester and the Benchmark information provided.

8. This drawing is to be read in accordance with all other relevant drawings.

9. The contractor shall be responsible for ensuring that any existing invert levels indicated on the drawings are correct before work commences.

10. All proposed connections to the sewer shall be 150ø unless stated otherwise.

11. All private house drainage shall be 100ø and all drag–out connections shall be 150ø at a minimum gradient of 1:80 unless otherwise stated and laid in accordance with Part H of the the Building Regulations.

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15. Insitu CBR tests of the road formation level are to be carried out to determine the depth of pavement construction required. This is to be approved by the adopting authority prior to construction of the road pavements.

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18. Contractor to obtain all necessary Highway opening notices from the relevant Local Authority, obtain approval to work on United Utilities Sewerage System, obtain approval to method statement from the Environment Agency for any works affecting a watercourse.

REV	DESCRIPTION	DATE	DRAWN
E	Road 7 Drainage lifted 100mm to suit higher surveyed FWS outfall level.	13.11.17	DK
D	Longsections added for outfall pipes to deculverted watercourse.	23.06.17	DK
C	Longsections amended to suit latest planning layout.	10.05.17	DK
B	Longsections represented on A0 with bigger text heights etc.	22.03.17	DK
A	Manhole Diameters removed from this drawing to avoid discrepancies.	16.02.17	DK

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Job
Waterpark Drive
Knowsley

Title
Engineering Longsections
Sheet 1

Design By	Date	Drawing Number	Rev
DK	09.02.17	463/ED/13	E
C.A.D By DK	Scale @ A1 1:500,1:100V		

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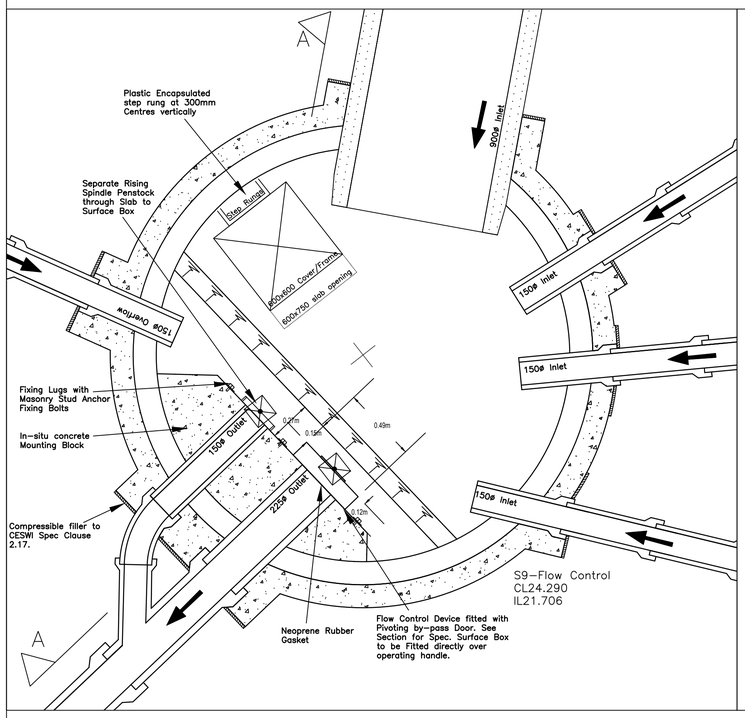
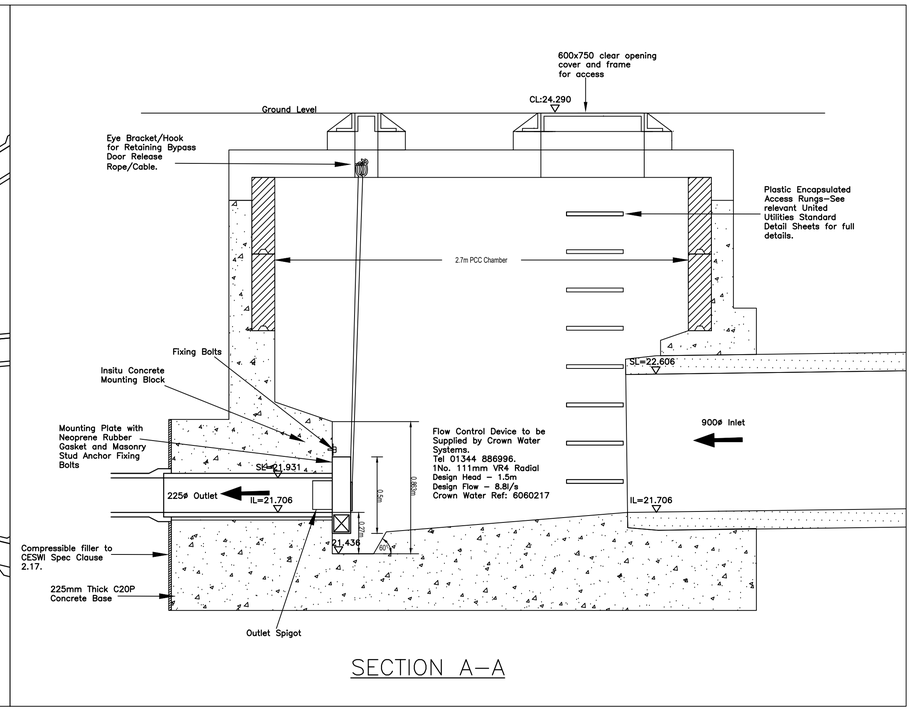
NOTES

This drawing is to be read in accordance with all other relevant engineering drawings, detailed manhole schedules, United Utilities Standard Drawings and Sewers For Adoption 6th Edition.

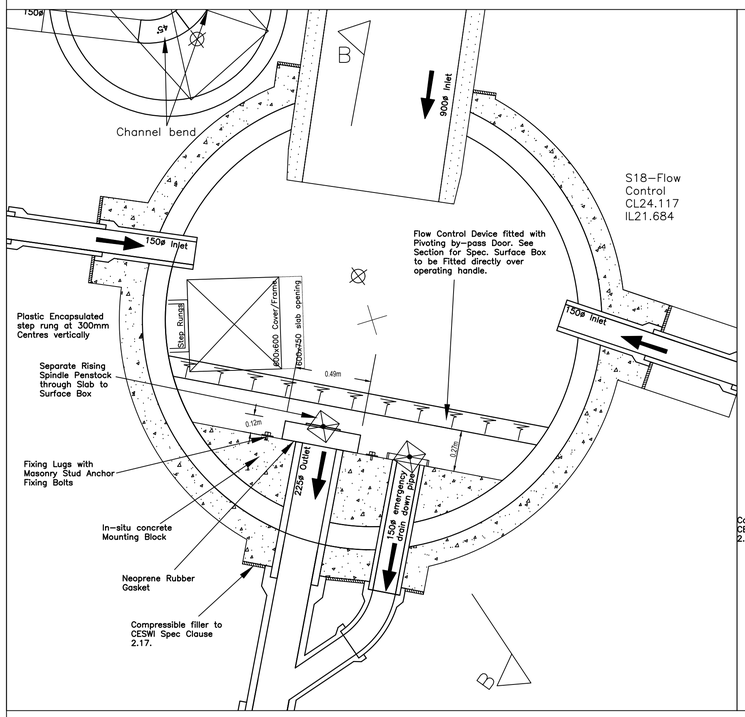
For co-ordinates to main pipe intersects denoted thus: ⊕ see detailed manhole schedule drawing. Chamber to be then centred over pipes as demonstrated by this drawing.

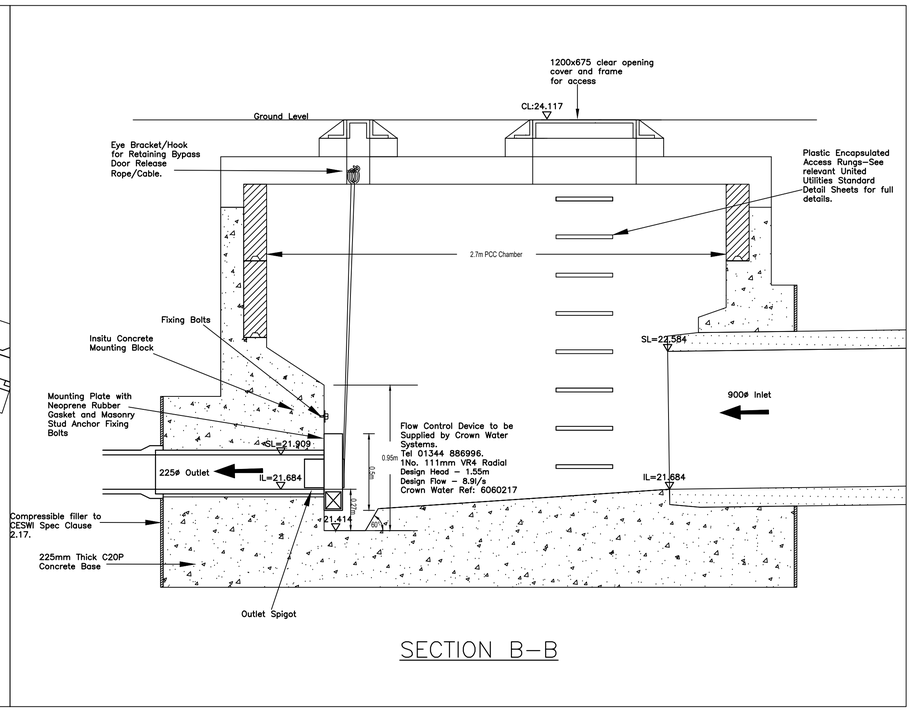
Invert levels stated on this drawing are the inverts to the outgoing pipe.





SECTION A-A





SECTION B-B

REV	DESCRIPTION	DATE	DRAWN
D	Orintation of Outfall changed in S18 to suit new outfall positions	13.07.18	DK
C	road & drainage lifted 100mm to suit higher FWS outfall level.	13.11.17	DK
B	Outfalls amended to suit latest engineering design.	23.06.17	DK
A	Amended to suit latest engineering layout.	12.05.17	DK

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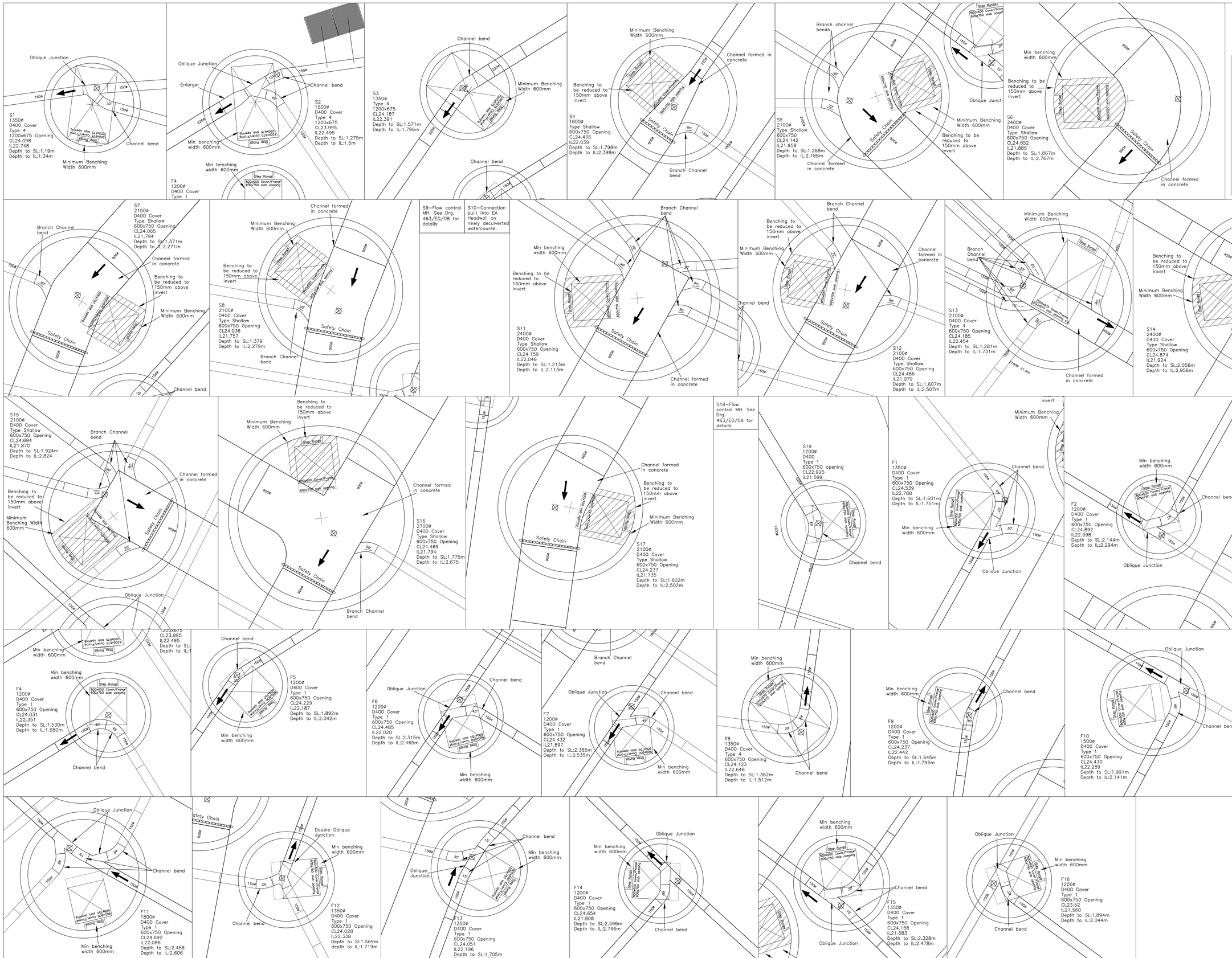
Job
Waterpark Drive
Knowsley

Title
Flow Control MH Details
S9 & S18

Design By	Date	Drawing Number	Rev
DK	10.02.17	463/ED/08	D
C.A.D By DK	Scale @ A1 1:20		



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NOTES

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For co–ordinates to main pipe intersects denoted thus: ⊕ see detailed manhole schedule drawing. Chamber to be then centred over pipes as demonstrated by this drawing.

Invert levels stated on this drawing are the inverts to the outgoing pipe.

'ROCKER PIPES WILL BE PROVIDED IN ACCORDANCE WITH UNITED UTILITIES STANDARD DETAILS'

MINIMUM BENCHING WIDTH
225ø–375ø= 600mm Width
450ø–525ø= 750mm Width
600ø+ = 1100mm Width

REV	DESCRIPTION	DATE	DRAWN
C	Road & drainage lifted 100mm to suit higher FWS Outfall level.	13.11.17	DK
B	Outfalls amended to suit latest engineering design.	23.06.17	DK
A	Amended to suit latest engineering layout.	12.05.17	DK

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Job
WaterPark Drive
Knowsley

Title
1:20 Manhole Schedules

Design By	Date	Drawing Number	Rev
BM	06.02.17	463/ED/07	C
C.A.D By BM	Scale @ A0 1:20		

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REV	DESCRIPTION	DATE	DRAWN
K	POS Contours revised	27.07.18	SPG
J	POS Contours added	29.06.18	SPG
H	Overflow areas amended to suit engineering layout.	12.03.18	DK
G	External levels amended to suit change in FFL	02.01.18	FB
F	Roads lifted 100mm to suit amended drainage design.	13.11.17	DK
E	Additional level information added to POS area.	04.07.17	DK
D	Full site external levels amended. Plot Garages 19, 30, 76 FFLs changed.	28.06.17	BM
C	FFLs amended to suit latest planning layout rev J.	20.06.17	DK
B	External Levels amended to coincide with latest planning layout.	12.05.17	FB
A	Plot 25-26 FFL raised 150mm to tie in with road contour level.	22.03.17	FB

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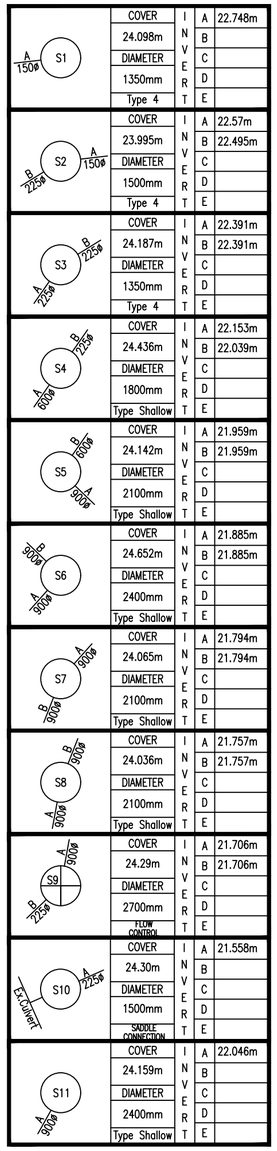
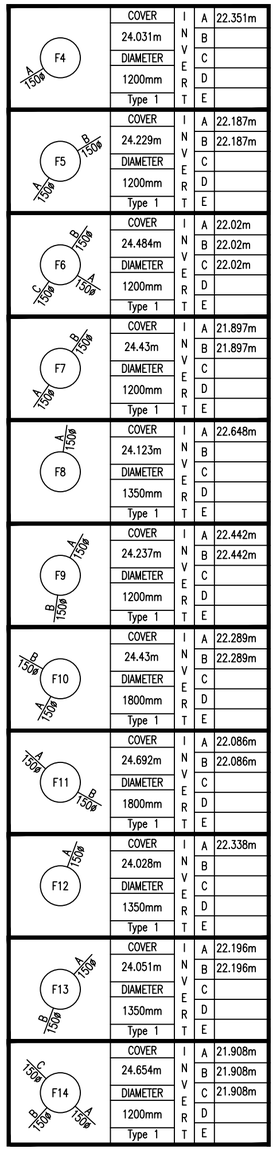
Job
Waterpark Drive
Knowsley

Title
External Levels

Design By	Date	Drawing Number	Rev
FB	13.02.17	463/ED/11	K
C.A.D By FB	Scale @ A0 1:250		

MH No.	MANHOLE DIAMETER (mm)	MANHOLE TYPE	COVER LEVEL (m)	INVERT LEVEL (m)	EASTING (m)	NORTHING (m)
S1	1350	Type 4	24.098	22.748	342800.560	393143.550
S2	1500	Type 4	23.995	22.495	342782.857	393141.519
S3	1350	Type 4	24.187	22.391	342768.297	393132.517
S4	1800	Type Shallow	24.436	22.039	342745.868	393100.250
S5	2100	Type Shallow	24.142	21.959	342727.712	393074.131
S6	2400	Type Shallow	24.652	21.885	342748.937	393053.603
S7	2100	Type Shallow	24.065	21.794	342724.808	393026.493
S8	2100	Type Shallow	24.036	21.757	342719.501	393012.890
S9	2700	Flow Control	24.29	21.706	342715.838	392992.873
S10	1500	Saddle Conn.	24.126	21.558	342702.901	392987.140
S11	2400	Type Shallow	24.159	22.046	342846.412	393111.521
S12	2100	Type Shallow	24.486	21.979	342833.359	393088.133
S13	2100	Type 4	24.185	22.454	342794.933	393085.245
S14	2400	Type Shallow	24.874	21.924	342822.620	393068.885
S15	2100	Type Shallow	24.694	21.87	342769.448	393039.419
S16	2700	Type Shallow	24.469	21.794	342795.880	393024.299
S17	2100	Type Shallow	24.237	21.735	342784.429	393003.638
S18	2700	Flow Control	24.13	21.684	342781.598	392983.993
S19	1500	Saddle Conn.	24.511	21.599	342779.510	392971.408
F1	1350	Type 1	24.539	22.788	342831.484	393087.636
F2	1200	Type 1	24.892	22.598	342822.171	393071.04
F3	1500	Type 1	24.238	22.397	342798.920	393085.095
F4	1200	Type 1	24.031	22.351	342782.64	393139.363
F5	1200	Type 1	24.229	22.187	342768.685	393130.734
F6	1200	Type 1	24.484	22.02	342755.876	393112.137
F7	1200	Type 1	24.43	21.897	342746.399	393098.437
F8	1350	Type 1	24.123	22.648	342780.546	392985.541
F9	1200	Type 1	24.237	22.442	342783.328	393005.52
F10	1800	Type 1	24.43	22.289	342793.201	393023.708
F11	1800	Type 1	24.692	22.086	342769.388	393037.173
F12	1350	Type 1	24.028	22.338	342720.713	393011.611
F13	1350	Type 1	24.051	22.196	342725.549	393024.633
F14	1200	Type 1	24.654	21.908	342751.575	393053.398
F15	1350	Type 1	24.158	21.683	342730.009	393074.744
F16	1200	Type 1	23.520	21.56	342716.647	393084.638





Manhole Schedule Notes

1. This drawing is to be read in conjunction with the 1:20 manhole schedule drawings and United Utilities standard details.

2. Co-ordinates shown relate to intersection of main pipe centrelines as displayed on the 1:20 schedules, not to centre of chamber. Chamber to be positioned over pipes as per 1:20 scale manhole schedules and in accordance with United Utilities benching requirements.

3. Manhole Ironwork cover sizes are to be as per the sizes denoted within these schedules.

4. PCC cover slabs to be manufactured to BS EN 1917 and BS 5911:Part 3 and to be kitemarked.

5. PCC cover slabs to have 600x750mm clear openings unless stated otherwise within this schedule and b be manufactured to BS EN 1917 and BS 5911:Part 3.

5. 'Corbel seating units' manufactured to BS EN 1917 and BS 5911:Part 3 to be used eccentric over slab opening to reduce from 600x600 opening in ironwork to 600x750 opening in cover slab where applicable.

6. PCC Manhole rings to be manufactured to BS EN 1917 and BS 5911:Part 3 and kitemarked.

7. All Concrete pipework to be manufactured to BS EN1916 and BS 5911:Part 1 and be Strength Class 120, kitemarked.

8. All clay pipe work shall be Extra Strength Clayware to BS 295 and BS 65 (SW pipes only).

9. Rising Mains to be Black Polyethylene Pipes complying to BS EN 13244-2. Polyethylene fittings, including fusion joints, and electro-fusion fittings shall comply with BS EN13244-2.

10. All existing levels stated on this drawing are approximate only and to be checked by Contractor prior to the commencement of works.

11. 1350ø Chambers relate to recently kitemarked units available from some suppliers. Contractor to source kitemarked units. Non-kitemarked are not acceptable for use.

12. Requirement for double cover for chambers with less than 1.5m headroom to soffit is a specific variation requested by UU on this development.

13. Requirement for recess and no handrailing on large diameter pipes is a specific variation requested by UU on this development.

14. For chambers where depth from cover down to soffit is 3.5m or greater, step rungs shall be replaced with a ladder.

15. See UU standard details for use of reducer and reducing slab requirement.

WARNING TO HOUSE-PURCHASERS
Property Misdescriptions Act 1991

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The contents of this drawing may be subject to change at any time and alterations and variations can occur during the progress of the works without revision of the drawing. Consequently the layout, form, content and dimensions of the finished construction may differ materially fron those shown. Nor do the contents of this drawing constitute a contract, part of any contract or warranty.

REV	DESCRIPTION	DATE	DRAWN
E	Surface water outfalls amended to suit latest engineering layout rev Q.	15.03.18	DK
D	Manhole cover & invert levels lifted by 100mm to suit higher FWS outfall level.	13.11.17	DK
C	SW Outfalls amended to latest engineering design.	23.06.17	DK
B	Manhole schedules amended to suit latest engineering layout.	11.05.17	DK
A	Manhole Diameters amended to suit 1:20 MH Schedules.	16.02.17	DK

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Job
Waterpark Drive
Knowsley

Title
Detailed MH Schedules

Design By	Date	Drawing Number	Rev
DK	09.02.17	463/ED/15	E
C.A.D By DK	Scale @ A2 NTS		

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REV	DESCRIPTION	DATE	DRAWN
B	Updated for current drainage layout.	20.09.18	DK
A	Updated for current drainage layout.	13.07.18	SPG

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Job
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Knowsley

Title
Exceedance Flood Routing
when ran against 1 in100yr+50%CC (past normal design criteria)

Design By	Date	Drawing Number	Rev
DK	22.06.17	463/ED/19	B
C.A.D By DK	Scale @ A0 1:250		

WARNING TO HOUSE-PURCHASERS
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LEGEND

ALL FOUL AND SURFACE WATER DRAINAGE TO BE 110mmø UNLESS OTHERWISE STATED

MINIMUM GRADIENTS:-
110mm FOUL WATER 1:80
110mm SURFACE WATER 1:100
160mm FOUL WATER 1:150
160mm SURFACE WATER 1:150

- FOUL DRAIN
- SURFACE WATER DRAIN
- SOIL PIPE / WC CONNECTION
- RAINWATER PIPE
- GULLY
- 110mm RODDING EYE
- ACO DRAIN

REV	DESCRIPTION	DATE	DRAWN
L	Plot drainage routes changed on plots 7–8, 25–28, 53 & 56 to suit architect drawing.	28.08.18	LB
K	Dragout levels for F1,F2,F10,F12,F13 amended to avoid clashes with SW.	07.06.18	DK
J	Dragout to plot 79 from F3 removed. Plot drainage amended to suit.	22.03.18	DK
H	Culvert diversion removed. Overflow area added to POS. Drainage revised to suit.	16.02.18	SPG
G	Plot 24 FFL amended. private drainage levels also amended to suit.	02.01.18	FB
F	ACO drains added to driveways where they fall towards adoptable highway. Plot drainage for plots 44–46 corrected.	05.07.17	DK
E	Plot drainage amended to coincide with the latest external levels. Plot Garages 19, 30, 76 FFLs changed.	28.06.17	BM
D	Plot drainage amended for plots 01–05, 28 garage, 29–43 & 71–72.	27.06.17	FB
C	Private drainage amended to suit latest planning layout.	06.06.17	FB
B	Private drainage amended to coincide with latest planning layout.	12.05.17	FB
A	Plot 25–26 FFL raised 150mm to tie in with road contour level. Drainage levels amended to suit.	22.03.17	FB

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Job
Waterpark Drive
Knowsley

Title
Plot Drainage

Design By	Date	Drawing Number	Rev
FB	24.02.17	463/ED/18	L
C.A.D By FB	Scale @ A0 1:250		