GWK STRUCTURAL SOLUTIONS LTD
CONSULTING ENGINEERS

Proposed Drainage Strategy to Discharge Planning Condition 6 of Application No. APP/B4215/W/20/3249266

PROJECT REFERENCE:

- **Project No:** GK2315
- **Project Location:** Julia Street, Manchester
- **Project Title:** Proposed Car Park, Julia Street
- **Client:** Millennium Car Parks Ltd

				APPROVALS	
Issue	**Date**	**Pages**	**Issue Description**	**By**	**Check**
A	15.01.21		Issued to discharge planning condition	PG	GWK

☑	Entire Report Issued this Revision	Report Issued for:			
		☐	In-house Review	☐	Purchase
☐	Revised Pages Only Issued this Revision	☐	Client Approval	☐	Construction
		☐	Inquiry	☑	Planning

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1.0 Introduction

In October 2019 a planning application was submitted to Manchester City Council for the construction of a temporary car park within unmade land off Julia Street, Manchester. No Flood Risk Assessment or Drainage Strategy Report was submitted with the application.

Planning approval, via Appeal, ref APP/B4215/W/20/32499266 was granted in August 2020 subject to one planning condition relating to the drainage of the development.

This report has been prepared to remove this condition; number 6.

2.0 Drainage Strategy

2.1 Existing Drainage

The United Utilities sewer records have been reviewed and confirm that there are a number of combined public sewers bounding the site. Figure 1 below defines the extent of these sewers.

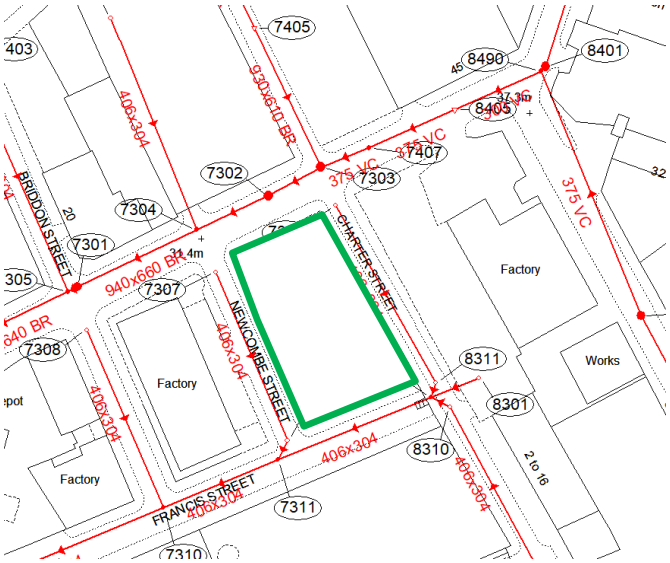

Figure 1: United Utilities Sewer Records

There are no identified drainage runs within the site. Though based on the historic nature of the site, there is expected to be numerous buried stub connections to the sewers.

The site is currently greenfield and therefore greenfield runoff rates would apply.

2.2 Existing Geology

A review of the local BGS borehole information would indicate the local ground conditions to incorporate cohesive clay. This would therefore negate the option of infiltration as a viable option for draining the site. The historic nature of the site within anticipated buried basements and foundations would also support this.

2.3 Existing Watercourse

A review of the local maps would indicate the closest watercourse to be the River Irwell, some 300m to the south of the site.

2.4 SuDS Hierarchal Approach

Based on the existing drainage configuration, plus an assessment of the local site conditions, the SuDS hierarchal approach for discharge of surface water at the development site is considered in detail below:

Method	Suitability	Suitability for Development
Infiltration to Ground	No	A review of local BGS ground conditions and would indicate the underlying ground to be clay, thus unsuitable for infiltration.
Connection to Watercourse	No	There are no watercourses in close proximity to the development site.
Connection to Surface Water Sewer	No	There are no surface water sewers in close proximity to the development site.
Connection to Combined Water Sewer	Yes	The combined sewer within Newcombe Street to the south west is to be used.

Figure 2: SuDS Hierarchal Approach

2.5 Surface Water Drainage Strategy

The build up of the car park will be compacted type 1 material. As such this will be classed as impermeable. The general principal of the surface water drainage strategy is for the runoff from the car park surface to fall to the natural grades to the south west. A raised kerb will prevent runoff to the existing highway and new gullies will pick up the surface water. A drainage network will pass the flows to a control chamber, limiting the peak flow to 5l/s to prevent blockage. As the car park is only temporary for 5 years, the microdrainage calculations have only been simulated for the 1 and 5 year return period events. No attenuation measures are required. A new connection will be made to the combined sewer in Newcombe Street via a S106 connection application, should an existing stub not be located.

2.6 Maintenance

The long-term maintenance of the new drainage infrastructure will be with the owner of the car park in line with best practice guidance.

3.0 Drainage Related Planning Condition and Responses

3.1 Planning Conditions

Condition 6.

Prior to the first use of the car park surface water drainage layout for the site, based on sustainable drainage principles shall be submitted to and approved in writing by the local planning authority. Car park surfacing should be designed to maximise attenuation of surface water within the substructure. The development shall be constructed and completed in accordance with the approved details.

3.2 GWK Response to Discharge Planning Conditions

Condition 6.

Due to the steep sloping nature of the proposed car park, permeable surfacing would be suitable as the flows would end up just returning out of the surface at the low point. As the car park is only temporary a compacted stone surface is proposed. SuDs have been considered but due to the limited permeability of the underlying ground this is not suitable. The flows will however be controlled to a low rate of 5l/s to the public sewer.

The Outline drainage GA can be found in Appendix A with the calculations in Appendix B.

Appendix A - GWK Design Drawings

NOTES

NOTES:–

1. ALL LEVELS ARE IN METRES.
2. ALL DIMENSIONS ARE IN MILLIMETRES.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCURACY OF ALL DIMENSIONS AND LEVELS AND FOR THE CORRECT SETTING OUT OF THE WORK ON SITE UNLESS NOTED OTHERWISE.
4. THE CONTRACTOR SHALL ENSURE ALL NECESSARY PRECAUTIONS ARE TAKEN TO PROTECT EXISTING SERVICES DURING THE WORKS.

KEY

- EXISTING COMBINED WATER SEWER
- PROPOSED SURFACE WATER DRAINAGE
- PROPOSED HB2 KERB
- PROPOSED DROP KERB
- +33.60 PROPOSED DROP KERB
- +33.45 PROPOSED DROP KERB

No	DATE	DRAWN	REV'D ENG.	AMENDMENT
A	07.01.21	PG	GWK	ISSUED FOR INFORMATION

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CLIENT: MILLENNIUM CAR PARK LTD

PROJECT: JULIA STREET CAR PARK
MANCHESTER

DRAFTER	ENGINEER
PG	GWK

TITLE: DRAINAGE GA

SCALE	DRAWING No	DATE	AMDT
1:100	GK2315-C-001	07.01.21	A

Appendix B - GWK Drainage Calculations

	Julia Street SW Network	
Date 07/01/2021 21:53 File Julia Street calcs.MDX	Designed by SHD20 Checked by	
Micro Drainage	Network 2018.1	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes Pipe Manhole Sizes Manhole

FSR Rainfall Model - England and Wales

Return Period (years)	2	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.358	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.058	4-8	0.022

Total Area Contributing (ha) = 0.080

Total Pipe Volume (m³) = 0.459

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	18.000	0.150	120.0	0.054	6.00	0.0	0.600	o	150	Pipe/Conduit	
1.001	8.000	0.800	10.0	0.026	0.00	0.0	0.600	o	150	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	6.33	29.800	0.054	0.0	0.0	0.0	0.92	16.2	7.3
1.001	50.00	6.37	29.300	0.080	0.0	0.0	0.0	3.20	56.6	10.8

	Julia Street SW Network	
Date 07/01/2021 21:53 File Julia Street calcs.MDX	Designed by SHD20 Checked by	
Micro Drainage	Network 2018.1	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	150	SW01	31.500	29.800	1.550	Open Manhole	1200
1.001	o	150	SW02	31.250	29.300	1.800	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	18.000	120.0	SW02	31.250	29.650	1.450	Open Manhole	1200
1.001	8.000	10.0	sewer	29.900	28.500	1.250	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.001	sewer	29.900	28.500	27.000	0	0

Simulation Criteria for Storm

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	2	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	18.000	Storm Duration (mins)	30
Ratio R	0.358		

Online Controls for Storm

Orifice Manhole: SW02, DS/PN: 1.001, Volume (m³): 2.5

Diameter (m) 0.041 Discharge Coefficient 0.600 Invert Level (m) 29.300

	Julia Street SW Network	
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Micro Drainage	Network 2018.1	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.358	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 5
Climate Change (%)	0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	30 Winter	1	+0%	1/15 Summer				30.254	0.304	0.000
1.001	SW02	30 Winter	1	+0%	1/15 Summer				30.244	0.794	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.27		4.0	SURCHARGED	
1.001	SW02	0.07		3.4	SURCHARGED	

	Julia Street SW Network	
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Micro Drainage	Network 2018.1	

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

Simulation Criteria

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

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

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm) 18.000	Cv (Summer) 0.750
Region	England and Wales	Ratio R 0.358	Cv (Winter) 0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	OFF
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440
Return Period(s) (years)	1, 5
Climate Change (%)	0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)
1.000	SW01	30 Winter	5	+0%	1/15 Summer				30.995	1.045	0.000
1.001	SW02	30 Winter	5	+0%	1/15 Summer				30.981	1.531	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
1.000	SW01	0.27		4.1	SURCHARGED	
1.001	SW02	0.09		4.5	FLOOD RISK	