

11th May 2018

Our reference: 890233-L01-EEBC-AS

Your Ref: 17/00001/FUL

Borough Planning Officer
Epsom and Ewell Borough Council
Town Hall
The Parade
Epsom
Surrey KT 5BY

Dear Sir

RE: 17/00001/FUL – Development Site at, High Street, Epsom, Surrey.

This letter has been produced to provide the necessary information for the Local Planning Authority, Epsom and Ewell Borough Council, to discharge planning condition 18 respective to the planning consent granted under planning application reference no. 17/00001/FUL, for a proposed mixed used development comprising food retail store and 30 residential apartments.

The Planning Authority's comments (shown in italics), together with our response are as follows:

Planning Authority's Comments (Condition 18)

The development hereby permitted shall not commence until the detailed design of the surface water drainage scheme have been submitted to and approved in writing by the planning authority. Those details shall include:

- a) A design that satisfies the SuDS Hierarchy and follows the principles set out in the approved drainage strategy 'Surface Water Strategy, Management and Maintenance Report'***
- b) Detailed drawings showing drainage layout, long or cross sections of each drainage element, pipe sizes and invert and cover levels.***
- c) Appropriate calculations to the elements above showing how the national SuDS standards have been met (if different from approved strategy).***
- d) Details of outline construction phasing and how surface water and any associated pollution risk will be dealt with during the construction of the development, and how any on site drainage systems will be protected and maintained.***
- e) Details of who will maintain the drainage elements and their associated maintenance regimes.***
- f) Details of where any exceedance flows (i.e. rainfall greater than design or flows following blockages) would run to, avoiding risks to people and property.***

Reason: To prevent an increased risk of flooding and to prevent pollution of the water environment in accordance with Policy CS6 of the Epsom and Ewell Core Strategy (2007) and Policy DM19 of the Development Management Policies 2015.

Consultant's Response

- a) The planning guidance, Part H of the Building Regulations provide a hierarchical approach for the disposal of storm water, with the preferred option being to drain it to an adequate soakaway or other infiltration system.

As stated in the FRA produced for this development there are some potential obstacles to the use of infiltration techniques such as:

- BGS records available online stated that groundwater is relatively shallow approximately 2.5mbgl, which means that infiltration design would be very tight with a minimum 1m unsaturated zone above the water table.
- This site is located within a Groundwater Source Protection Zone 1 and therefore it is unlikely that the Environment Agency would allow infiltration based SUDS within this area.

Infiltration not being possible, the next favoured option should be to discharge to a watercourse, which again is not viable since there are no suitable watercourses within the immediate vicinity of the site.

Given the absence of the above preferred options, it is proposed to discharge the surface water runoff into the public sewer located in the vicinity of the site.

- b) The proposed surface water drainage layout in **Appendix A** shows a combination of carrier pipes, permeable paving and a cellular storage unit. The proposed cellular storage feature is designed to provide 280m³ of storage to attenuate flows limited to a restricted discharge of 2.1l/s (Qbar) within a 1 in 100 year event of 30% climate change factor. It is also proposed to retain, within the tank, the flows up to the 1 in 100 year plus 40%, with the remaining exceedance flows attenuated within kerbs in the external car park access, allowing continued drainage once the event has subsided.

The type C permeable pavement system will also provide extra storage to deal with exceedance runoff. This runoff will infiltrate through the surface pavement into the sub-base where it will be treated and temporarily stored during worst storm events and then conveyed to the proposed main surface water drainage system.

Appendix A1 contains a long section drawing showing the main drainage run crossing the proposed development.

- c) The drainage calculations contained in **Appendix B** demonstrate that the surface water drainage system has been designed to contain up to and including the 1 in 100 year event including the effects of climate change.

- d) Based on the existing topography of the site, any excess water runoff will be concentrated in the southern part of the proposed external car park, therefore the risk for overland discharge is low.

It is intended to build the geocellular tank with the associated piped system to better manage the runoff during the construction, however if it is not possible, the following methods should be implemented to control the pollution runoff off site:

- Surface water runoff for the site should be discharged into the Thames Water public combined sewer subject to section 106 approval, as shown per the layout in **Appendix A**.
 - Temporary drainage ditch to be built along the eastern boundary of the site, to contain any runoff and sediments arising from the haul road route.
 - Silt removal should be provided prior to controlled discharge, with the use of temporary sedimentation tanks and catchpit manholes, these will be inspected regularly with silt/debris removed after each storm event.
 - Bunding should be provided along the southern boundary to prevent any excess surface water runoff discharging overland and offsite.
 - All stockpiles are to be protected with secured sheeting to minimise the spread and washing of sediments.
- e) Where the surface water's drainage is within the owner's plot the long-term maintenance and repair of the drainage system will be the responsibility of the plot owner. Where the surface water drainage is outside the responsibility of the plot owner, a Management Company will be put in place and an annual maintenance charge will apply to the residents to ensure that the maintenance and repair is carried out together with other aspects of the site, such as the private roads. Refer to the **Appendix C** for the detailing of the SUDS management plan for this site.
- f) In the event where the surface water system fails due to blockage or during an exceedance storm event greater than that designed for, consideration has been giving to routing the surface water away from vulnerable areas towards the drainage features in the external car park. Where possible, the external landscape and paving levels will fall away from the buildings, and the access road levels near the buildings will be set lower than the finished floor levels of the buildings. Refer to **Appendix D** for the exceedance flow routes layout for this site.



Yours faithfully,

For RSK Company Limited

A handwritten signature in black ink that reads 'Amir M. Selim'.

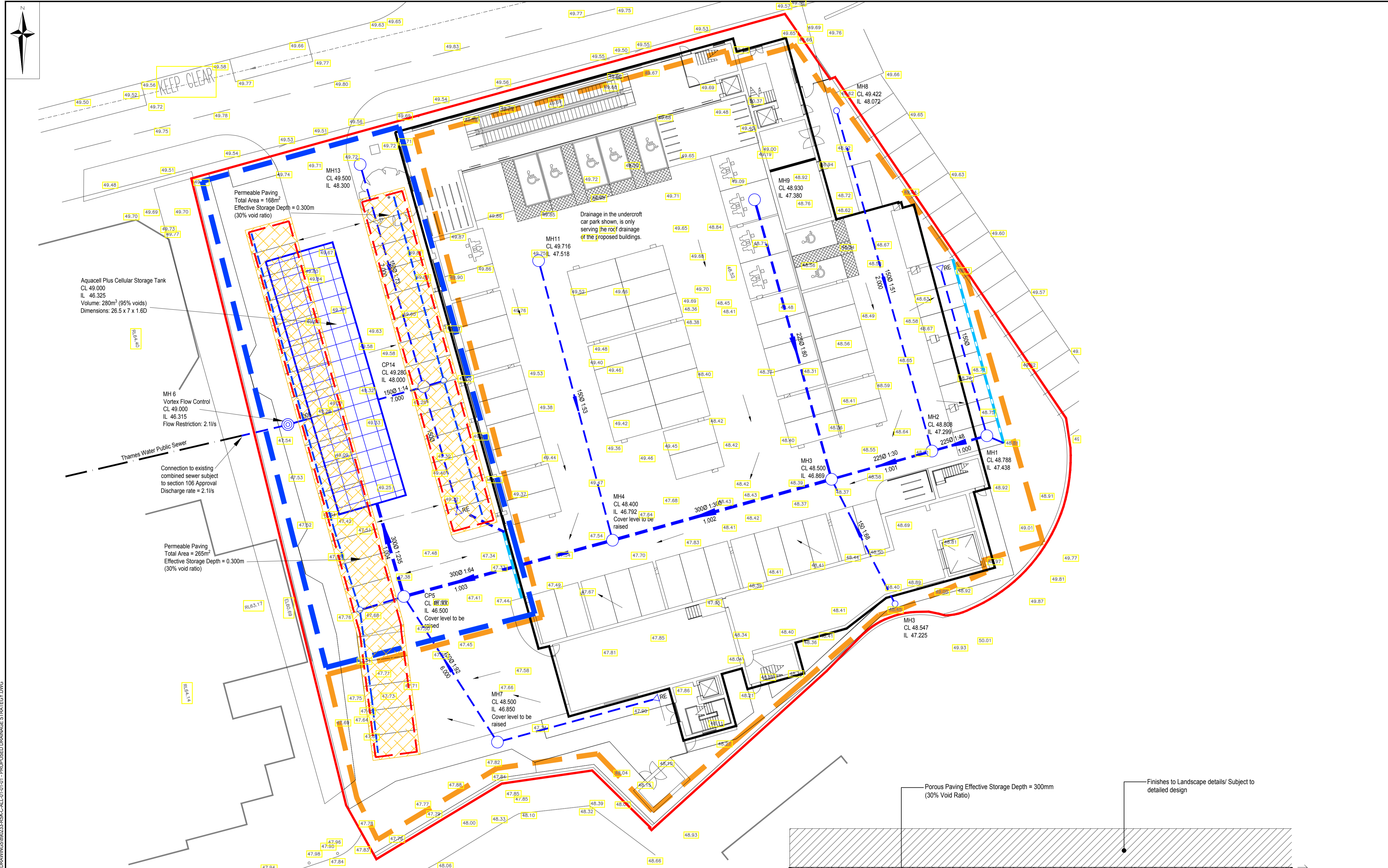
Infrastructure Engineer

Encs. Appendix A – Proposed drainage layout
Appendix A1 – Proposed Long Section
Appendix B – Surface water drainage calculations
Appendix C – SUDS Maintenance Management plan
Appendix D - Exceedance flow routes layout

APPENDICES



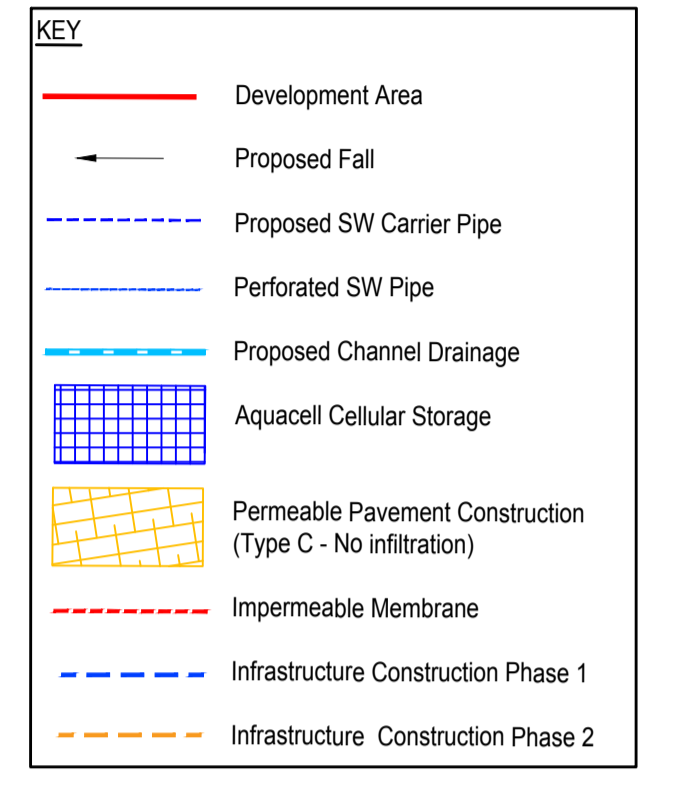
APPENDIX A
PROPOSED DRAINAGE LAYOUT



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.



- Notes:**
- This drawing has been produced to planning/viability purposes only.
 - This drawing is to be read in conjunction with all other relevant drawings.
 - Attenuation tank shown on the layout has the capacity to cater for a 1 in 100 year + CC storm surge events.
 - Surface water treatment to be provided by the use of Type C porous paving construction to accommodate up to and including 1:100yr + CC.
 - All dimensions are in metres U.N.O.
 - All levels in metres.

P01	08.05.18	Preliminary Issue.	AS	AT	
Rev.	Date	Amendment	Drawn	Chkd.	Appd.

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Client: **LIDL UK gmbH**

Project Title: **LIDL UPPER HIGH STREET**

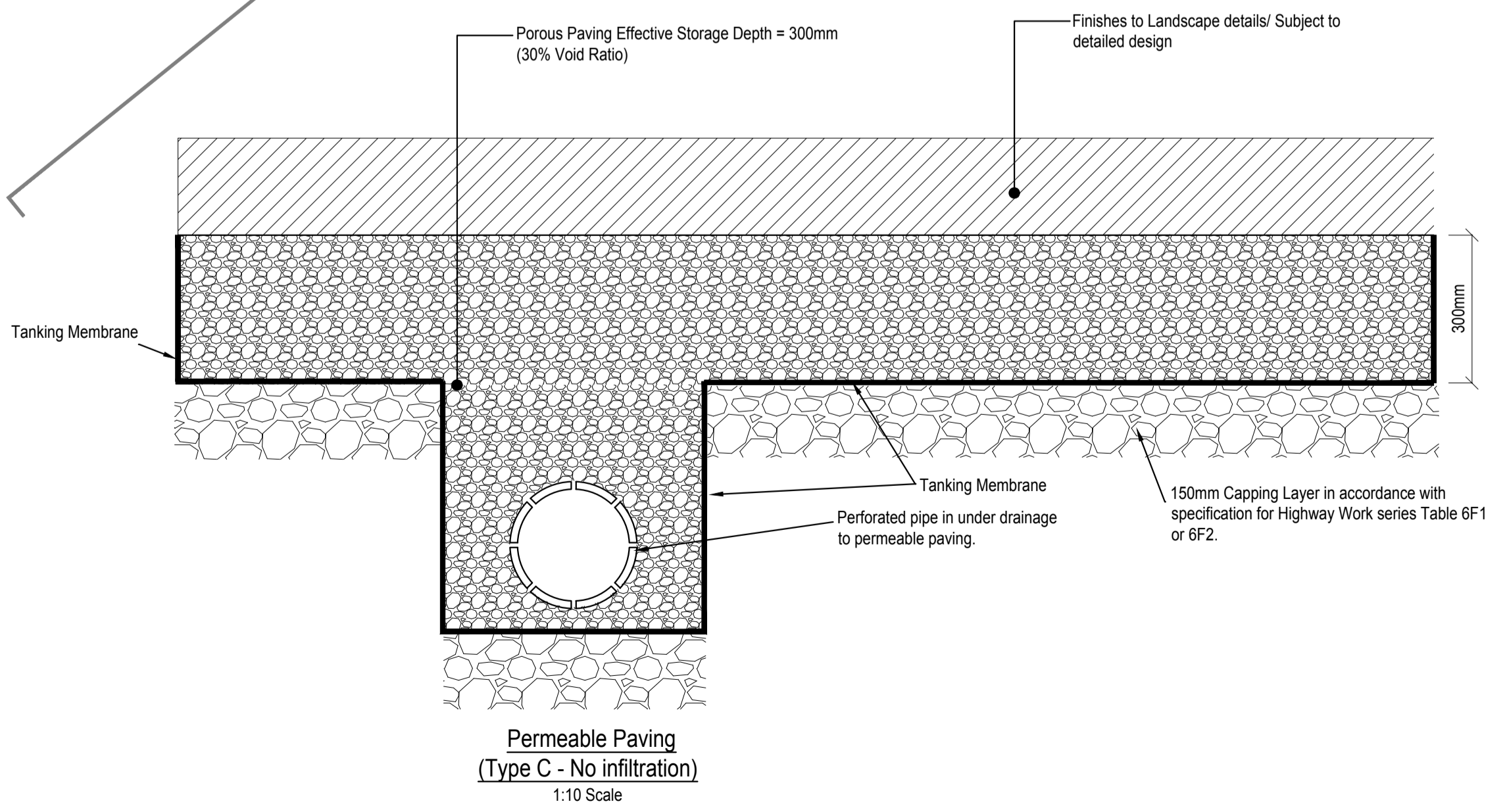
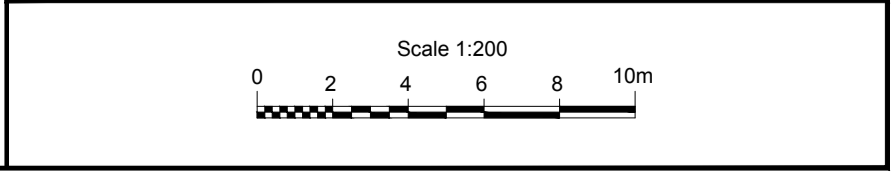
Status: **INFORMATION**

Drawing Title: **DRAINAGE STRATEGY**

Drawn	Date	Checked	Date	Approved	Date
AS	04/18	AT	04/18	AT	04/18
Scale	Orig Size	Dimensions	Revision		
1:200	A1	m	P01		

Drawing File: 890233-RSK-C-ALL-01-01-01 - PROPOSED DRAINAGE STRATEGY DWG

Project No.	Originator	Unit	Site Area	Series	Number	Sheet
890233	RSK	C	ALL	01	01	01

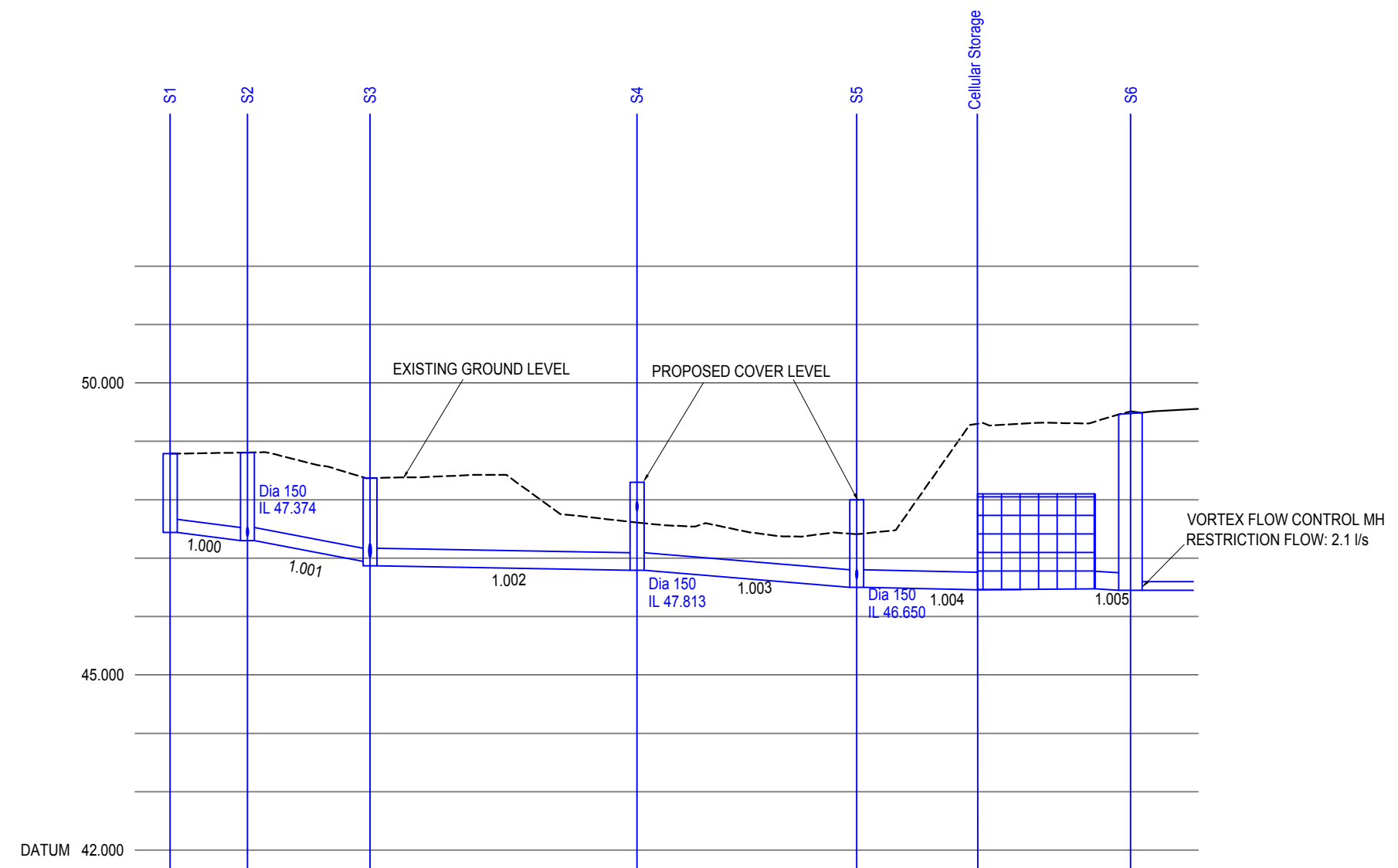


File Location: C:\P\DE\PROJECTS\890233 - LIDL EPSON\GRAPH\INFRASTRUCTURE\DRAWINGS\01 - PRE DESIGN\DRAWINGS\890233-RSK-C-ALL-01-01-01 - PROPOSED DRAINAGE STRATEGY DWG



APPENDIX A1
PROPOSED LONG SECTION

File Location: Q:\P-LDE (PROJECTS)\890233 - LIDL EPSOM\GRAPHINFRASTRUCTURE\DRAWINGS\01 - PRE-DESIGN DRAWINGS\890233-RSK-C-ALL-01-02-01 - PROPOSED LONG SECTION.DWG



GROUND LEVEL	48.788	48.725	48.384	48.248	47.610	47.606	47.410	49.250	49.380	49.515
STORMWATER COVER LEVEL	48.788	48.808	48.369		48.300		48.000	47.925	47.925	47.515
STORMWATER INVERT	47.438	47.299	46.944	46.869	46.792	46.792	46.500	46.500	46.325	46.315
STORMWATER DETAILS	Pipe 1.000 Dia 225 1 in 48	Pipe 1.001 Dia 225 1 in 30	Pipe 1.002 Dia 300 1 in 297		Pipe 1.003 Dia 300 1 in 64		Pipe 1.004 Dia 300 1 in 235	Cellular Storage Tank	Pipe 1.005 Dia 300 Circular CLAY 1 in 242	
STORMWATER LENGTHS	6.621	10.498	22.865		18.813		9.741	10.100	2.000	

Rev.	Date	Amendment	Drawn	Chkd.	Appd.
P01	08.05.18	Preliminary Issue.	AS	AT	



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Client
LIDL UK gmbH

Project Title
LIDL UPPER HIGHER STREET

Status
INFORMATION

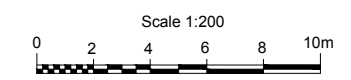
Drawing Title
PROPOSED LONG SECTION

Drawn	Date	Checked	Date	Approved	Date
AS	04/18		04/1	AT	04/18

Scale	Orig Size	Dimensions	Revision
H 1:500 V 1:100	A3		P01


Drawing File
890233-RSK-C-ALL-01-02-01 - PROPOSED LONG SECTION.DWG

Project No.	Originator	Unit	Site Area	Series	Number	Sheet
890233	RSK	C	ALL	01	01	02





APPENDIX B
SURFACE WATER DRAINAGE CALCULATIONS

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18 Frogmore Road Hemel Hempstead Herts, HP3 9RT	Lidl Epsom Drainage Calculations	
Date 01/05/2018 15:30 File Proposed Network wi...	Designed By ASalim Checked By	
Micro Drainage	Network W.12.5	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for PROPOSED NETWORK.SWS

Pipe Sizes Pipes Manhole Sizes Manholes

FSR Rainfall Model - England and Wales

Return Period (years)	2	Add Flow / Climate Change (%)	0
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.000
Ratio R	0.400	Maximum Backdrop Height (m)	0.000
Maximum Rainfall (mm/hr)	50	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for PROPOSED NETWORK.SWS

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.269	4-8	0.166

Total Area Contributing (ha) = 0.435


Total Pipe Volume (m³) = 10.254

Network Design Table for PROPOSED NETWORK.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
1.000	6.621	0.139	47.6	0.041	5.00	0.0	0.600	o	225
2.000	35.583	0.698	51.0	0.021	5.00	0.0	0.600	o	150
1.001	10.498	0.355	29.6	0.026	0.00	0.0	0.600	o	225
3.000	29.185	0.361	80.8	0.065	5.00	0.0	0.600	o	225

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	50.00	5.06	47.438	0.041	0.0	0.0	0.0	1.90	75.5	5.6
2.000	50.00	5.42	48.072	0.021	0.0	0.0	0.0	1.41	25.0	2.8
1.001	50.00	5.49	47.299	0.088	0.0	0.0	0.0	2.41	96.0	11.9
3.000	50.00	5.33	47.380	0.065	0.0	0.0	0.0	1.46	57.9	8.8

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18 Frogmore Road Hemel Hempstead Herts, HP3 9RT	Lidl Epsom Drainage Calculations	
Date 01/05/2018 15:30 File Proposed Network wi...	Designed By ASalim Checked By	
Micro Drainage	Network W.12.5	

Network Design Table for PROPOSED NETWORK.SWS

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	T.E. (mins)	DWF (l/s)	k (mm)	HYD SECT	DIA (mm)
4.000	14.070	0.206	68.3	0.022	5.00	0.0	0.600	o	150
1.002	22.865	0.077	296.9	0.022	0.00	0.0	0.600	o	300
5.000	29.104	0.576	50.5	0.053	5.00	0.0	0.600	o	150
1.003	18.813	0.292	64.4	0.000	0.00	0.0	0.600	o	300
6.000	18.396	0.200	92.0	0.051	5.00	0.0	0.600	o	150
1.004	23.491	0.100	234.9	0.000	0.00	0.0	0.600	o	300
7.000	21.980	0.300	73.3	0.039	5.00	0.0	0.600	o	150
7.001	5.610	0.400	14.0	0.000	0.00	0.0	0.600	o	150
8.000	24.711	0.300	82.4	0.064	5.00	0.0	0.600	o	150
9.000	18.144	0.300	60.5	0.031	5.00	0.0	0.600	o	150
1.005	7.651	0.015	510.1	0.000	0.00	0.0	0.600	o	375

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ Area (ha)	Σ DWF (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
4.000	50.00	5.19	47.225	0.022	0.0	0.0	0.0	1.22	21.5	3.0
1.002	50.00	5.91	46.869	0.197	0.0	0.0	0.0	0.91	64.1	26.7
5.000	50.00	5.34	47.518	0.053	0.0	0.0	0.0	1.42	25.1	7.2
1.003	50.00	6.07	46.792	0.250	0.0	0.0	0.0	1.96	138.7	33.9
6.000	50.00	5.29	46.850	0.051	0.0	0.0	0.0	1.05	18.5	6.9
1.004	50.00	6.46	46.500	0.301	0.0	0.0	0.0	1.02	72.2	40.8
7.000	50.00	5.31	48.299	0.039	0.0	0.0	0.0	1.18	20.8	5.3
7.001	50.00	5.35	47.999	0.039	0.0	0.0	0.0	2.70	47.8	5.3
8.000	50.00	5.37	47.620	0.064	0.0	0.0	0.0	1.11	19.6	8.7
9.000	50.00	5.23	48.270	0.031	0.0	0.0	0.0	1.30	22.9	4.2
1.005	50.00	6.62	46.325	0.435	0.0	0.0	0.0	0.80	87.9	58.9

18 Frogmore Road
Hemel Hempstead
Herts, HP3 9RT

Lidl Epsom
Drainage Calculations



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Micro Drainage

Network W.12.5

Simulation Criteria for PROPOSED NETWORK.SWS

Volumetric Runoff Coeff	0.750	Foul Sewage per hectare (l/s)	0.000
PIMP (% impervious)	100	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Run Time (mins)	60
Manhole Headloss Coeff (Global)	0.500	Output Interval (mins)	1
Number of Input Hydrographs	0	Number of Storage Structures	3
Number of Online Controls	1	Number of Time/Area Diagrams	0
Number of Offline 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)	20.000	Storm Duration (mins)	30
Ratio R	0.400		

18 Frogmore Road
Hemel Hempstead
Herts, HP3 9RT

Lidl Epsom
Drainage Calculations



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Micro Drainage

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Online Controls for PROPOSED NETWORK.SWS

Hydro-Brake® Manhole: 6, DS/PN: 1.005, Volume (m³): 7.1

Design Head (m) 1.600 Hydro-Brake® Type Md4 Invert Level (m) 46.370
Design Flow (l/s) 2.1 Diameter (mm) 47

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.0	1.200	1.9	3.000	3.0	7.000	4.6
0.200	0.8	1.400	2.0	3.500	3.2	7.500	4.7
0.300	0.9	1.600	2.2	4.000	3.4	8.000	4.9
0.400	1.1	1.800	2.3	4.500	3.7	8.500	5.0
0.500	1.2	2.000	2.4	5.000	3.8	9.000	5.2
0.600	1.3	2.200	2.6	5.500	4.0	9.500	5.3
0.800	1.5	2.400	2.7	6.000	4.2		
1.000	1.7	2.600	2.8	6.500	4.4		

18 Frogmore Road
Hemel Hempstead
Herts, HP3 9RT

Lidl Epsom
Drainage Calculations



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Storage Structures for PROPOSED NETWORK.SWS

Porous Car Park Manhole: 15, DS/PN: 8.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	54.0
Max Percolation (l/s)	72.0	Slope (1:X)	60.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	47.620	Cap Volume Depth (m)	0.300


Porous Car Park Manhole: 16, DS/PN: 9.000

Infiltration Coefficient Base (m/hr)	0.00000	Width (m)	4.8
Membrane Percolation (mm/hr)	1000	Length (m)	35.0
Max Percolation (l/s)	46.7	Slope (1:X)	60.0
Safety Factor	2.0	Depression Storage (mm)	5
Porosity	0.30	Evaporation (mm/day)	3
Invert Level (m)	48.270	Cap Volume Depth (m)	0.300

Cellular Storage Manhole: 6, DS/PN: 1.005

Invert Level (m)	46.325	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.00000	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.00000		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	185.0	0.0	1.601	0.0	0.0
1.600	185.0	0.0			

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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PROPOSED NETWORK.SWS

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	1	0%	100/15	Summer			
2.000	15 Winter	1	0%					
1.001	15 Winter	1	0%	100/15	Summer			
3.000	15 Winter	1	0%	100/15	Summer			
4.000	15 Winter	1	0%	100/15	Summer			
1.002	15 Winter	1	0%	30/15	Summer			
5.000	15 Winter	1	0%	100/15	Summer			
1.003	15 Winter	1	0%	30/240	Winter			
6.000	15 Winter	1	0%	30/15	Summer			
1.004	960 Winter	1	0%	30/15	Summer			
7.000	15 Winter	1	0%	100/15	Summer			
7.001	15 Winter	1	0%					
8.000	15 Winter	1	0%	100/15	Summer			
9.000	15 Winter	1	0%					
1.005	960 Winter	1	0%	1/600	Winter			

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	47.487	-0.176	0.000	0.11	0.0	5.7	OK
2.000	8	48.107	-0.115	0.000	0.12	0.0	2.9	OK
1.001	2	47.356	-0.168	0.000	0.14	0.0	11.6	OK
3.000	9	47.442	-0.163	0.000	0.16	0.0	8.9	OK
4.000	10	47.264	-0.111	0.000	0.15	0.0	3.0	OK
1.002	3	47.014	-0.155	0.000	0.46	0.0	26.2	OK
5.000	11	47.575	-0.093	0.000	0.30	0.0	7.3	OK
1.003	4	46.899	-0.193	0.000	0.28	0.0	33.5	OK
6.000	12	46.917	-0.083	0.000	0.40	0.0	7.0	OK
1.004	5	46.713	-0.087	0.000	0.05	0.0	3.1	OK
7.000	13	48.353	-0.096	0.000	0.27	0.0	5.3	OK
7.001	14	48.036	-0.113	0.000	0.14	0.0	5.4	OK
8.000	15	47.691	-0.079	0.000	0.45	0.0	8.4	OK
9.000	16	48.314	-0.106	0.000	0.18	0.0	4.0	OK
1.005	6	46.712	0.012	0.000	0.02	0.0	1.0	SURCHARGED

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PROPOSED NETWORK.SWS

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	15 Winter	30	0%	100/15	Summer			
2.000	15 Winter	30	0%					
1.001	15 Winter	30	0%	100/15	Summer			
3.000	15 Winter	30	0%	100/15	Summer			
4.000	15 Winter	30	0%	100/15	Summer			
1.002	720 Winter	30	0%	30/15	Summer			
5.000	15 Winter	30	0%	100/15	Summer			
1.003	720 Winter	30	0%	30/240	Winter			
6.000	720 Winter	30	0%	30/15	Summer			
1.004	720 Winter	30	0%	30/15	Summer			
7.000	15 Winter	30	0%	100/15	Summer			
7.001	15 Winter	30	0%					
8.000	15 Winter	30	0%	100/15	Summer			
9.000	15 Winter	30	0%					
1.005	720 Winter	30	0%	1/600	Winter			

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	47.517	-0.146	0.000	0.27	0.0	14.0	OK
2.000	8	48.128	-0.094	0.000	0.29	0.0	7.0	OK
1.001	2	47.395	-0.129	0.000	0.38	0.0	30.3	OK
3.000	9	47.481	-0.124	0.000	0.40	0.0	21.8	OK
4.000	10	47.289	-0.086	0.000	0.38	0.0	7.5	OK
1.002	3	47.201	0.032	0.000	0.10	0.0	5.4	SURCHARGED
5.000	11	47.617	-0.051	0.000	0.74	0.0	17.9	OK
1.003	4	47.200	0.108	0.000	0.06	0.0	6.8	SURCHARGED
6.000	12	47.200	0.200	0.000	0.08	0.0	1.4	SURCHARGED
1.004	5	47.199	0.399	0.000	0.12	0.0	7.8	SURCHARGED
7.000	13	48.390	-0.059	0.000	0.67	0.0	13.1	OK
7.001	14	48.059	-0.090	0.000	0.33	0.0	13.2	OK
8.000	15	47.766	-0.004	0.000	1.00	0.0	18.6	OK
9.000	16	48.345	-0.075	0.000	0.49	0.0	10.4	OK
1.005	6	47.198	0.498	0.000	0.03	0.0	1.6	SURCHARGED

RSK Ltd		Page 7
18 Frogmore Road Hemel Hempstead Herts, HP3 9RT	Lidl Epsom Drainage Calculations	
Date 01/05/2018 15:30 File Proposed Network wi...	Designed By ASalim Checked By	
Micro Drainage	Network W.12.5	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for PROPOSED NETWORK.SWS

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

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

PN	Storm	Return Period	Climate Change	First X Surcharge	First Y Flood	First Z Overflow	O/F Act.	Lvl Exc.
1.000	960 Winter	100	+30%	100/15	Summer			
2.000	15 Winter	100	+30%					
1.001	960 Winter	100	+30%	100/15	Summer			
3.000	960 Winter	100	+30%	100/15	Summer			
4.000	960 Winter	100	+30%	100/15	Summer			
1.002	960 Winter	100	+30%	30/15	Summer			
5.000	15 Winter	100	+30%	100/15	Summer			
1.003	960 Winter	100	+30%	30/240	Winter			
6.000	960 Winter	100	+30%	30/15	Summer			
1.004	960 Winter	100	+30%	30/15	Summer			
7.000	15 Winter	100	+30%	100/15	Summer			
7.001	15 Winter	100	+30%					
8.000	15 Winter	100	+30%	100/15	Summer			
9.000	15 Winter	100	+30%					
1.005	960 Winter	100	+30%	1/600	Winter			

PN	US/MH Name	Water Level (m)	Surch'ed Depth (m)	Flooded Volume (m³)	Flow / Cap.	O'flow (l/s)	Pipe Flow (l/s)	Status
1.000	1	47.833	0.170	0.000	0.03	0.0	1.5	SURCHARGED
2.000	8	48.148	-0.074	0.000	0.49	0.0	11.9	OK
1.001	2	47.833	0.309	0.000	0.04	0.0	3.2	SURCHARGED
3.000	9	47.833	0.228	0.000	0.04	0.0	2.4	SURCHARGED
4.000	10	47.833	0.458	0.000	0.04	0.0	0.8	SURCHARGED
1.002	3	47.832	0.663	0.000	0.12	0.0	6.8	SURCHARGED
5.000	11	48.125	0.457	0.000	1.07	0.0	25.8	SURCHARGED
1.003	4	47.831	0.739	0.000	0.07	0.0	8.5	SURCHARGED
6.000	12	47.831	0.831	0.000	0.10	0.0	1.7	SURCHARGED
1.004	5	47.830	1.030	0.000	0.16	0.0	10.1	FLOOD RISK
7.000	13	48.511	0.062	0.000	1.10	0.0	21.7	SURCHARGED
7.001	14	48.078	-0.071	0.000	0.55	0.0	21.6	OK
8.000	15	47.918	0.148	0.000	1.23	0.0	22.9	SURCHARGED
9.000	16	48.375	-0.045	0.000	0.82	0.0	17.5	OK
1.005	6	47.828	1.128	0.000	0.03	0.0	2.1	SURCHARGED



APPENDIX C
SUDS MANAGEMENT PLAN



LIDL UK

Lidl Epsom

Sustainable Urban Drainage (SUDS) Management Strategy

Project No. 890233



APRIL 2018



RSK GENERAL NOTES

Project No.: 890233

Title: Lidl Epsom


Client: Lidl gmbH UK

Date: 08/05/18

Office: Coventry

Status: Final

Author	<u>Assif Salim</u>	Technical reviewer	<u>Andrew Taylor</u>
			
Date:	<u>08/05/18</u>	Date:	<u>08/05/18</u>

Project manager	<u>Andrew Taylor</u>
	
Date:	<u>08/05/18</u>

RSK LDE Ltd (RSK) has prepared this report for the sole use of the client, showing reasonable skill and care, for the intended purposes as stated in the agreement under which this work was completed. The report may not be relied upon by any other party without the express agreement of the client and RSK. No other warranty, expressed or implied, is made as to the professional advice included in this report.

Where any data supplied by the client or from other sources have been used, it has been assumed that the information is correct. No responsibility can be accepted by RSK for inaccuracies in the data supplied by any other party. The conclusions and recommendations in this report are based on the assumption that all relevant information has been supplied by those bodies from whom it was requested.

No part of this report may be copied or duplicated without the express permission of RSK and the party for whom it was prepared.

Where field investigations have been carried out, these have been restricted to a level of detail required to achieve the stated objectives of the work.

This work has been undertaken in accordance with the quality management system of RSK LDE Ltd.

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3	MAINTENANCE REGIME	3
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3.2	Permeable Paving	4
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1 INTRODUCTION

This management strategy has been prepared by RSK Land & Development Engineering Ltd on behalf of *Lidl gmbH* to discharge planning condition 18 related to planning application no. 17/00001/FUL.

The SUDS considered for the purposes of this statement, include drainage features that will be employed to reduce and manage surface water runoff from the development to a design return period of one hundred years plus climate change. This is required so that the development will not increase the risk of flooding to the site and its environs. All the surface water site runoff for this proposed site will be conveyed in pipes and attenuated within a permeable pavement underlying layer and a geocellular system before discharging into a combined public sewer. The drainage features for this site shown on the drainage strategy layout 890233-RSK-C-ALL-01-01-01 include the following:

- *Geocellular Attenuation Tank*
- *Permeable Paving*
- *Drainage Channels*
- *Inlet Structures (inspection chambers, manholes)*
- *Below ground drainage pipes*

This document outlines the long term maintenance of the proposed surface water system and will make reference to the following documents, some of which provide further detail on the maintenance operations required:

- CIRIA Report C753, '*The SuDS Manual*', 2015
- CIRIA Report C625, '*Model Agreements for Sustainable Water Management Systems*', 2004
- CIRIA Report C768, '*Guidance on the Construction of SuDS*', 2017; and
- Interpave, '*Permeable pavements: Guide to the Design, Construction and Maintenance of Concrete Block Permeable Pavements*', ed. 4, 2006.

2 MAINTENANCE RESPONSIBILITIES

Responsibility for drainage within England and Wales rests with various bodies. For the development, the drainage responsibilities will be divided between the following:

- A Management Company will be set up for the development to maintain all SUDs and drainage features including all permeable paving, geocellular soakaway tanks and drainage channels within property cartilages and communal areas.

3 MAINTENANCE REGIME

As the maintenance of the drainage and SUDs features will be carried out via a Management Company, the form of agreement should include the required maintenance listed below. Should the maintenance be transferred at a later date to a public body, then the model agreement SUDS MA1 should be used, details of which can be found in the CIRIA guidance C625.

The following section describes the required maintenance for each feature in turn. The SUDS maintenance requirements listed below should be reviewed after the first 5 years, with a view to agreeing a new regime for the ongoing maintenance.

Notwithstanding the routine inspections and maintenance requirements, after severe storm events all features shall be inspected to clear debris and repair damaged structures or features. Records of the maintenance carried out shall be prepared by the Management Company.

3.1 Geocellular Attenuation Tank

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, the annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from pre-treatment structures such as catchpits and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year then annually

3.2 Permeable Paving

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three monthly 48h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

3.3 Drainage Channels

Maintenance schedule	Required action	Typical frequency
Regular maintenance	The buckets of sumps (or gullies) should be removed, emptied, cleaned and their drain holes cleared. Silt etc. should be removed from the bottom of the sump. Ensure that the bucket is replaced within the sump (or gully) with an easy fit	Monthly Annually (or as required)
Occasional maintenance	Access to the channel is provided via gratings or inspection covers at periodic intervals along the channel.	As required, based on inspections
Remedial actions	The channels should be cleaned out carefully ensuring the surface finish is not damaged. A shaped shovel (e.g. a trowel) may be used	As required

Maintenance schedule	Required action	Typical frequency
	within channels with removable grating. Replace channel if necessary	
Monitoring	Grating slots and exposed edges of channels should be examined for signs of any damage, which may have been caused by high stress concentrations, resulting from stones lodged in the channel or from local impact loads. Broken channels and / or gratings should be replaced.	Monthly in the first year then annually
	Particularly following storms, the efficiency of the sumps or gullies should be checked. The bucket should be removed periodically and checked for blockages. These inspections should be carried out in conjunction with an inspection of the underground drainage connection out of the channel system. Occasionally, water should be poured into the sump (or gully) to check that it disperses freely.	Quarterly

3.4 Inspection Chambers, Rodding Eyes and Manholes

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove cover and inspect, ensuring water is flowing freely and that the route for water is unobstructed. Remove debris and silt	Annually
Remedial actions	Repair physical damage if necessary.	As required

3.5 Below ground drainage pipes

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action	Monthly for 3 Months and then Annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	Maintain vegetation to designed limits within the vicinity of below ground drainage pipes to avoid damage to the system	Monthly or as required
	Remove sediment from inlet structures (channels, rainwater pipes and inspection chambers).	Annually or as required
Remedial actions	Repair physical damage if necessary.	As required
Monitoring	Inspect all inlets, outlets and vents to ensure that they are in good condition and operating as designed.	Annually
	Survey inside of pipe runs for sediment build up and remove if necessary	Every 5 years or as required.

APPENDIX A

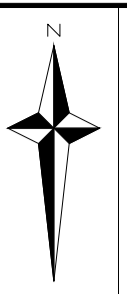
INSPECTION CHECKLIST

General information			
Site ID			
Site location and co-ordinates (GIS if appropriate)			
Elements forming the SuDS scheme		Approved drawing reference	
Inspection frequency		Approved specification reference	
Type of development		Specific purpose of any parts of the scheme (eg biodiversity, wildlife and visual aspects)	

Inspection Date	Details	Y/ N	Action required	Date completed	Details	Y/ N	Action required	Date completed
	accumulation in the system? If yes, is this a blockage risk?							
	Is there any evidence of any other clogging or blockage of outlets or drainage paths?							
	Is the vegetation condition satisfactory (density, weed growth, coverage etc)? (check against approved planting regime)							
	Does any part of the system require weeding, pruning or mowing? (check against maintenance frequency state in approved design).							
	Is there any evidence of invasive species becoming established? If yes, state action required							
	Are any check dams or weirs in good condition?							
	Is there any evidence of any accidental damage to the system (eg wheel ruts?)							
	Is there any evidence of cross connections or other unauthorised inflows?							
	Is there any evidence of tampering with the flow control?							
	Are there any other matters that could affect the performance of the system in relation to the design objectives for hydraulic, water quality, biodiversity and visual aspects?							
	Other observations							



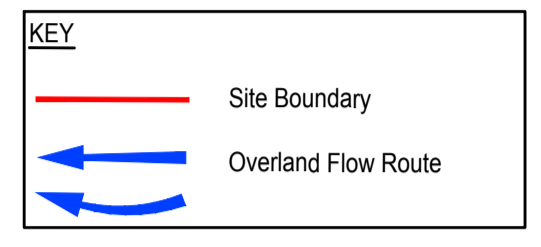
APPENDIX D
EXCEEDANCE FLOW ROUTES PLAN



CIVIL / STRUCTURAL DESIGN RISK MANAGEMENT

Abnormal or unusual residual risks associated with the design outcomes shown on this drawing are:-

RSK LDE LTD has followed its Design Risk Management process for Hazard Elimination and Risk reduction in developing the designs shown on this drawing. Abnormal or unusual residual risks may be shown above where it is considered that such risk may not normally be expected by competent persons engaged on work of this nature or type.



- Notes:**
- This drawing has been produced to planning/viability purposes only.
 - This drawing is to be read in conjunction with 890233-RSK-C-ALL-01-02-01 drainage strategy drawing.
 - All levels in metres.

P01	08.05.18	Preliminary Issue.	AS	AT
Rev.	Date	Amendment	Drawn	Chkd. Appd.



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Client
LIDL UK gmbH

Project Title
LIDL UPPER HIGH STREET

Status
INFORMATION

Drawing Title
EXCEEDANCE FLOW ROUTE PLAN

Drawn	Date	Checked	Date	Approved	Date
AS	04/18	AT	04/18	AT	04/18
Scale	Orig Size	Dimensions	Revision		
1:200	A1	m	P01		

Drawing File
 890233-RSK-C-ALL-01-03-01 - OVERLAND FLOW ROUTE PLAN.DWG

Project No.	Originator	Unit	Site Area	Series	Number	Sheet
890233	RSK	C	ALL	01	03	01



File Location: C:\P\DE\PROJECTS\890233 - LIDL_EPS\M\GRAPH\INFRASTRUCTURE\DRAWINGS\01 - PRE-DESIGN\DRAWINGS\890233-RSK-C-ALL-01-03-01 - OVERLAND FLOW ROUTE PLAN.DWG