

FLOOD RISK ASSESSMENT IN ACCORDANCE WITH PPS25

FOR

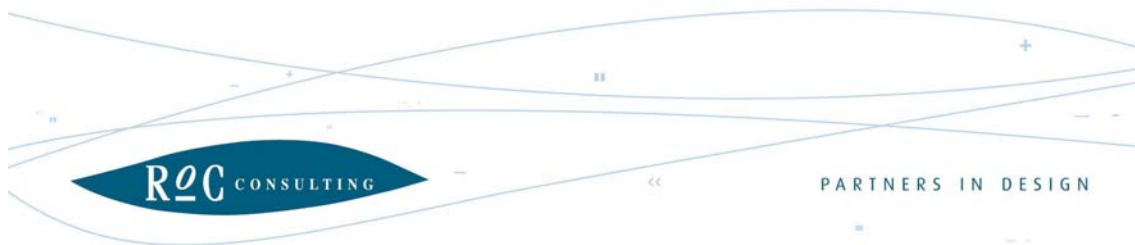
DEVELOPMENT

AT

EDGE LANE CENTRAL, LIVERPOOL

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Project Ref: 2050
Date: 29th December 2010
Ref: SD/ROC/NA/2050



FLOOD RISK ASSESSMENT IN ACCORDANCE WITH PPS25

ON

EDGE LANE CENTRAL, LIVERPOOL
SITES

FOR

DERWENT HOLDINGS LTD

Report Prepared By

A handwritten signature in purple ink, appearing to read 'SD', is written over a horizontal line.

04.12.09

Steve Douglas

Signature

Date

Report Checked By

A handwritten signature in black ink, appearing to read 'R O'Connor', is written over a horizontal line.

04.12.09

Rory O'Connor

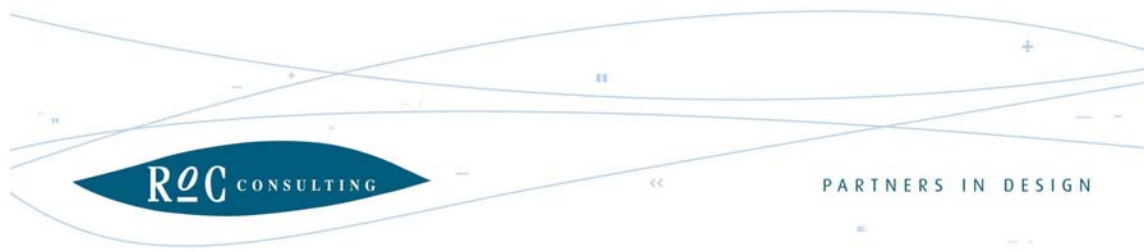
Signature

Date

Date of Issue:

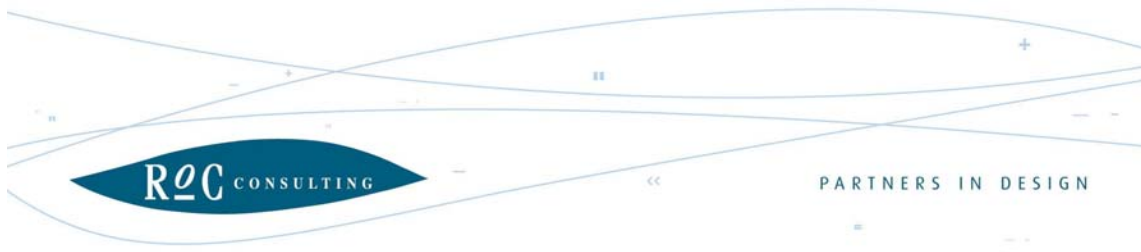
4th December 2009

Record of Issues / Amendments	Page No	Date Issued	Revision	Initial
Amendments to suite revised Masterplan	Various	29.09.10	B	ROC



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Edge Lane Central, Liverpool

Flood Risk Assessment in accordance with Planning Policy Statement 25 (PPS25)

This Flood Risk Assessment has been prepared in accordance with the pro-forma guide contained in the Planning Policy Statement 25 Practice Guide, June 2008 and Annex E of Planning Policy Statement 25 paragraph E3.

1.0 EXISTING SITE DESCRIPTION AND LOCATION

1.1 The subject sites are located in close proximity to the A5047 Edge Lane, Liverpool:-

1.1.1 The site is currently occupied by a mix of working and derelict industrial development and associated parking and landscaped open ground.

1.1.2 The site is split into West and East Zones for our reference purposes only. The areas referred to below in this Flood Risk Assessment are genuine development areas and are entirely consistent with the area of 21.5 Hectares within the application boundary which include substantial of Highway land

1.1.3 The Areas

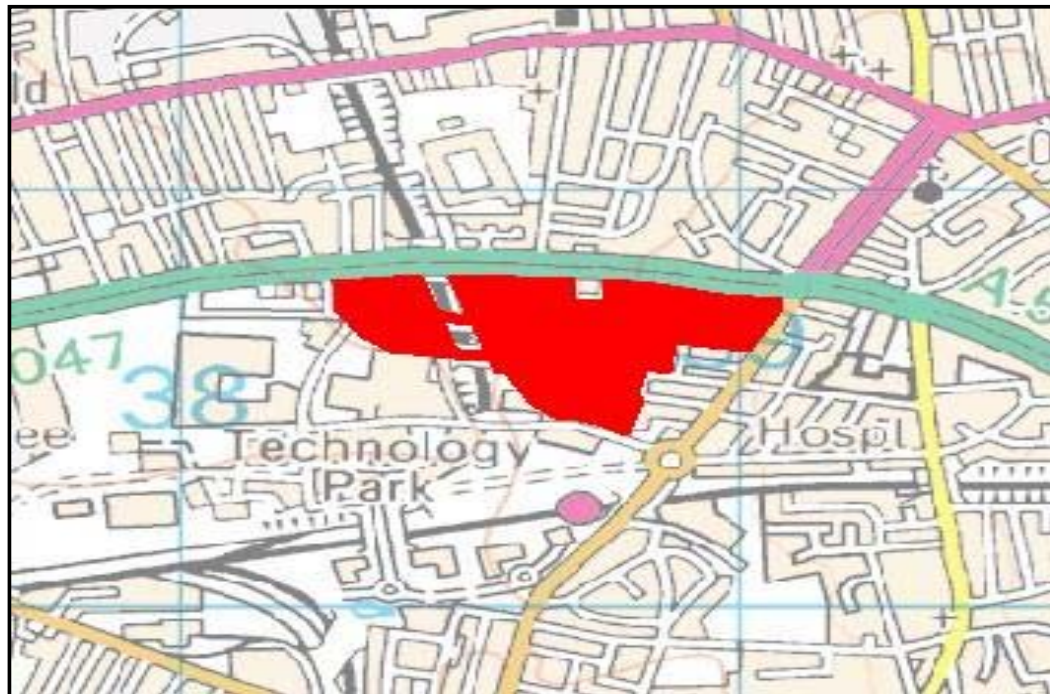
West Zone – A site area of approximately 2.7 hectares located south of Edge Lane, which forms the northern boundary. A railway cutting lies immediately to the east of the site. Binns Road currently runs through the middle of the West Zone. Ultimately Binns Rd and the proposed realigned Milton Road to the west will become the southern and western boundaries respectively. The West Zone of the site is currently occupied by some derelict industrial buildings, working office accommodation with landscaping and associated car parking.

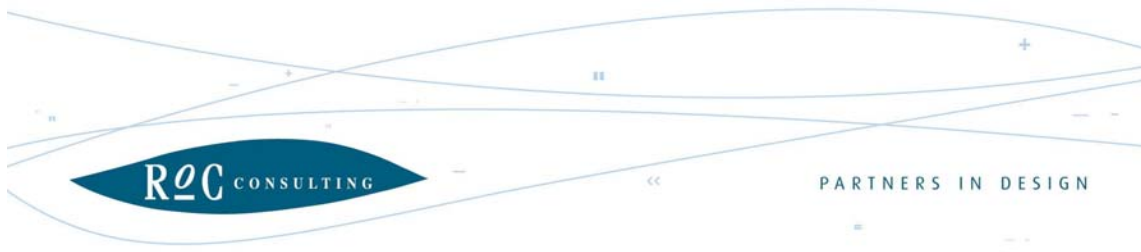
East Zone – A site area of approximately 15.2 hectares again located south of Edge Lane which forms the northern boundary. The railway cutting lies to the west and Pighue Lane is on the southern boundary. The South Eastern boundary is formed by terraced residential on Oceanic Road, Runic Street and Garnet Street. The far eastern boundary to the site is formed by Rathbone Road.

Existing development on site comprises industrial buildings on Henry Street and Tapley Place and the existing Edge Lane Retail Park on Montrose Way and Binns Road.

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- 1.2 Appendix A shows the extent and location of the Eastern and Western Zones forming the site.
- 1.3 The site is highlighted below in red and this reference to The Environment Agency Flood Risk map confirms that the site is situated within areas classified at Flood Zone 1 – Low Probability. Table D1 of PPS25 confirms that this is representative of land assessed as having less than a 1 in 1000 (0.1%) annual probability of flooding from rivers and coastal inundation in any one year.





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2.0 GENERAL DEVELOPMENT PROPOSALS

2.1 Drawings showing the type of development on the subject sites are attached at Appendix A, and are described:-

2.1.1 Whilst the site under consideration is a single site we have split it into West and East Zones for our reference purposes only.

West – Demolition of existing commercial and industrial buildings and redevelopment for retail units including parking and service areas.

East – Demolition of existing commercial and industrial buildings and redevelopment for retail and leisure units including parking and service areas.

2.2 All of the above building development types are classified in Table D2 of PPS25 below as within “Less Vulnerable” categories in consideration of flood risk.

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Table D.2: Flood Risk Vulnerability Classification

Essential Infrastructure	<ul style="list-style-type: none"> • Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk, and strategic utility infrastructure, including electricity generating power stations and grid and primary substations.
Highly Vulnerable	<ul style="list-style-type: none"> • Police stations, Ambulance stations and Fire stations and Command Centres and telecommunications installations required to be operational during flooding. • Emergency dispersal points. • Basement dwellings. • Caravans, mobile homes and park homes intended for permanent residential use. • Installations requiring hazardous substances consent.¹⁹
More Vulnerable	<ul style="list-style-type: none"> • Hospitals. • Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. • Buildings used for: dwelling houses; student halls of residence; drinking establishments; nightclubs; and hotels. • Non-residential uses for health services, nurseries and educational establishments. • Landfill and sites used for waste management facilities for hazardous waste.²⁰ • Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	<ul style="list-style-type: none"> • Buildings used for: shops; financial, professional and other services; restaurants and cafes; hot food takeaways; offices; general industry; storage and distribution; non-residential institutions not included in 'more vulnerable'; and assembly and leisure. • Land and buildings used for agriculture and forestry. • Waste treatment (except landfill and hazardous waste facilities). • Minerals working and processing (except for sand and gravel working). • Water treatment plants. • Sewage treatment plants (if adequate pollution control measures are in place).
Water-compatible Development	<ul style="list-style-type: none"> • Flood control infrastructure. • Water transmission infrastructure and pumping stations. • Sewage transmission infrastructure and pumping stations. • Sand and gravel workings. • Docks, marinas and wharves. • Navigation facilities. • MOD defence installations. • Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location. • Water-based recreation (excluding sleeping accommodation). • Lifeguard and coastguard stations. • Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms. • Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

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2.3 Table D3 of PPS25 below confirms all types of proposed development on these sites are compatible with a location within Flood Zone 1.

Table D.3²²: Flood Risk Vulnerability and Flood Zone 'Compatibility'

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	X	Exception Test required	✓
	Zone 3b 'Functional Floodplain'	Exception Test required	✓	X	X	X

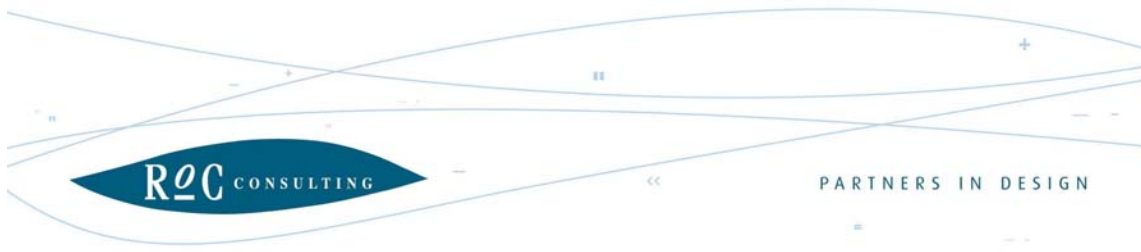
Key:

✓ Development is appropriate

X Development should not be permitted

2.4 Reference has been made to Liverpool City Council Strategic Flood Risk Assessment dated January 2008 (SFRA). The SFRA confirms that, "Less Vulnerable" development is appropriate in these locations subject to satisfactory passing of the Sequential Test.

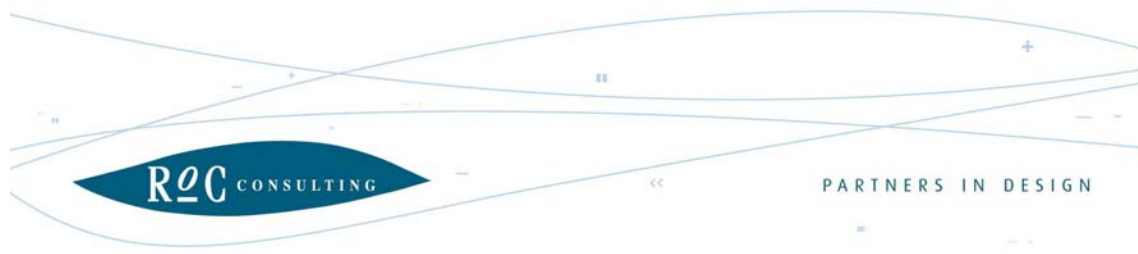
2.5 Sequential Test assessment has been carried out and the development is appropriate for these sites.



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3.0 DEFINITION OF FLOOD HAZARD

- 3.1 The existing sites are all serviced with combined or foul and surface water connections into existing sewers in Edge Lane, Montrose Way, Binns Road, Milton Road, Rathbone Road and Mill Lane. The possible history of flooding caused by blockage or lack of capacity in surrounding sewers has been considered. United Utilities have been consulted in this respect and reference made to the SFRA for record of flooding of properties as a result.
- 3.2 The SFRA identifies the general area as being at the watershed between the North (River Alt) and the South and West (Mersey Estuary) catchments. The nearest watercourse is the Upper Tue Brook system, which is identified as originating at the north of the site, flowing northward from Edge Lane, crossing Prescott Road to the north, making connection finally with Main River Fazakerley Brook. The upper section of this is recorded as a culverted watercourse.
- 3.3 There are no other bodies of open water local to the site likely to cause flooding.
- 3.4 At this time groundwater table across the sites is unknown. The SFRA identifies the risk of rising groundwater tables due to decreased water abstraction from local industries.
- 3.5 Any increase impermeable areas within the development site would increase the risk of overland flooding.

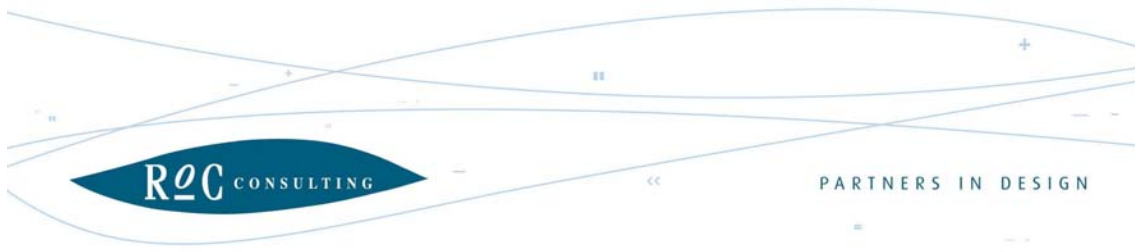


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4.0 PROBABILITY OF FLOODING

- 4.1 United Utilities have responded to our consultation with respect to properties on the flood risk register and their response is attached to this FRA at Appendix B.
- 4.2 The SFRA has also identified record of flooding of properties in Prescott Road to the north of the subject sites and to properties south of Pighue Road to the south of the site.
- 4.3 Both of these locations are “down-slope” of the subject sites and, in consequence, are unlikely to present any flood risk to the sites.
- 4.4 According to the SFRA there is no known occurrence of local flooding as a result of groundwater levels reaching or increasing above existing ground level.
- 4.5 According to the SFRA there is no known occurrence of flooding on the sites as a result of any of the local open or culverted watercourses flooding.
- 4.6 In consequence, other than as a result of any hitherto unrecorded inability of existing sewers to pass flows generated from rainfall on surrounding areas, there is no significant likelihood of flooding from surrounding land.
- 4.7 Reviewing the existing site characteristics, the 2 subject sites have the following total and drained impermeable areas:

Site Reference	Total Area (hectares)	Impermeable Area (hectares)	Permeable Area (hectares)
West Zone	2.7	2.2	0.5
East Zone	15.2	13.1	2.1
Both Sites	17.9	15.3	2.6



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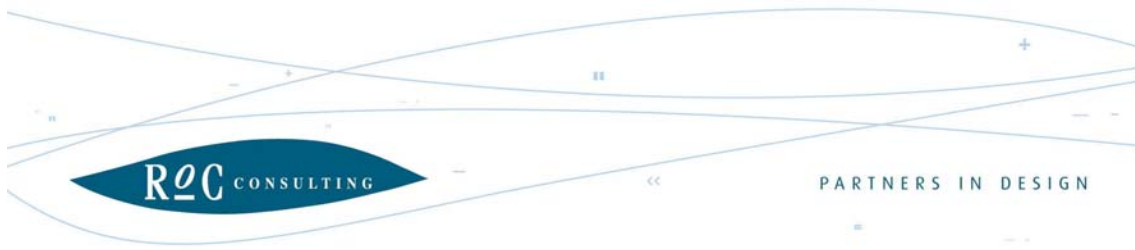
- 4.8 Making use of WinDes software by Microdrainage, peak short storm rainfall intensities have been generated for a range of storm returns. See Appendix C.

Storm frequency	Average rainfall intensity I (mm/hr) for 15-minute duration summer storm
YR1	29.22
YR30	71.61
YR30 + 20%	85.93
YR100	92.75
YR100 + 20%	111.30

- 4.9 WinDes software has estimated Standard Average Annual Rainfall (SAAR) for the area as 845mm. The total volume of rainfall to fall on all of the subject sites will be 151255 cubic metres, with 86% of that (130079 cubic metres) draining to public sewer.

- 4.10 Estimated existing peak run-off rates from both sites based upon the above information are as follows:

Site Reference	Total Drained Area (hectares)	YR1 peak flow (litres/sec)	YR30 peak flow (litres/sec)	YR100 peak flow (litres/sec)
West Zone	2.2	179	438	567
East Zone	13.1	1063	2606	3375



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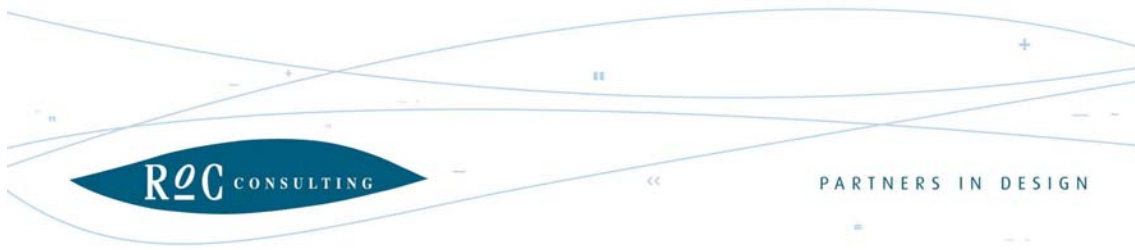
5.0 CLIMATE CHANGE

- 5.1 According to Annex B of PPS25, it is anticipated that Climate Change will bring about an increase in rainfall intensities in the future.
- 5.2 From PPS25 Table B.2 below, adopt the anticipated increase of 20% up to the year 2085 and 30% up to the year 2115.

Table B.2 Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights.

Parameter	1990 to 2025	2025 to 2055	2055 to 2085	2085 to 2115
Peak rainfall intensity	+5%	+10%	+20%	+30%
Peak river flow	+10%	+20%		
Offshore wind speed	+5%		+10%	
Extreme wave height	+5%		+10%	

- 5.3 With an estimated design life of 50 years for retail and leisure developments, any necessary on-site designs for drainage, soakaways or other sustainable disposal methods limiting surface water disposal flows will incorporate rainfall intensities that have been increased by 20% as appropriate to take account of the effects of climate change up until the year 2085.



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6.0 DETAILED DEVELOPMENT PROPOSALS

6.1 Development will comprise the sites as described below and as illustrated on the Environment Agency Flood Risk Plan included at section 1.3 of this FRA and the proposed master plan for the whole site M3458 F2003 J.

6.1.1 The Site is a single site and we have split it into West Zone and East Zone) for our reference purposes only.

West Zone – Demolition of existing commercial and industrial buildings and redevelopment for retail including parking and service areas.

East Zone – Demolition of existing commercial and industrial buildings and redevelopment for leisure and retail units including parking and service areas

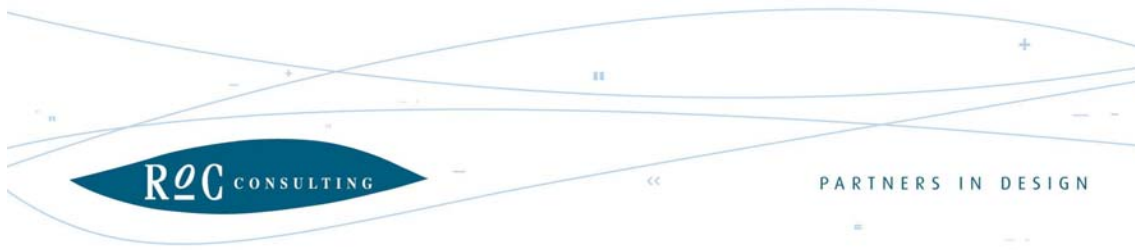
6.1.2 Both sites will have incorporated within them areas of underground car parking and other below ground accommodation.

6.2 As a consequence of development of the subject sites, the positively drained impermeable area will become:

Site Reference	Total Area (hectares)	Impermeable Area (hectares)	Permeable Area (hectares)
West Zone	2.7	2.6	0.1
East Zone	15.2	14.4	0.8
Both Sites	17.9	17 (95%)	0.9 (5%)

And estimated proposed peak run-off rates from all sites are as follows:

Site Reference	Total Drained Area (hectares)	YR1 peak flow (litres/sec)	YR30 peak flow + climate change % (litres/sec)	YR100 peak flow + climate change % (litres/sec)
West Zone	2.6	211	621	804
East Zone	14.4	1168	3437	4451

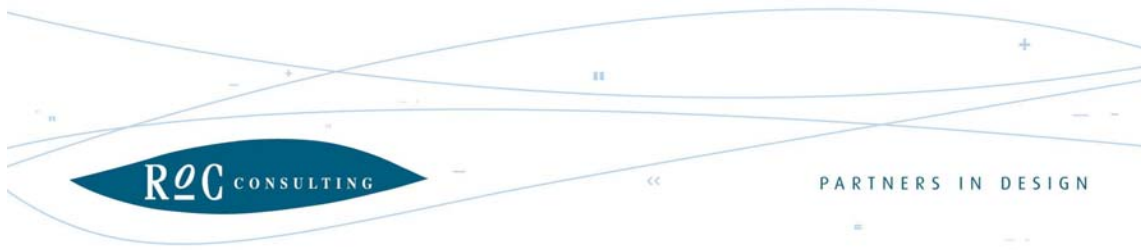


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- 6.3 Ground conditions on site will be investigated in order to establish if sustainable methods of surface water disposal such as soakaways are feasible on the subject sites.
- 6.4 In general the design of on-site surface water drains will be in accordance with good practice for no surface flooding during the critical YR30 storm.
- 6.5 Where surface water is disposed to sewer or watercourse, this will incorporate consideration and design of underground attenuation storage which will be designed such that surface water flows into local sewers and watercourses from the sites will not exceed existing run-off rates for all storms up to and including the critical YR30 storm.
- 6.6 In addition to provision of YR30 (+ climate change %) storage, PPS 25 requires that there is no risk of flooding to buildings or any overland flows offsite during a YR100 (+ climate change %) storm.
- 6.7 Whilst storage to protect the site against flooding during a YR30 event must be provided underground, attenuation storage up to the YR100 event may be provided on the surface of the site provided it does not present risk of flooding to buildings or other vulnerable areas or risk of overland flows from the site.
- 6.8 WinDes software has estimated the required storage volumes for each of the subject sites for both the YR30 + climate change % and YR100 + climate change % storms:-

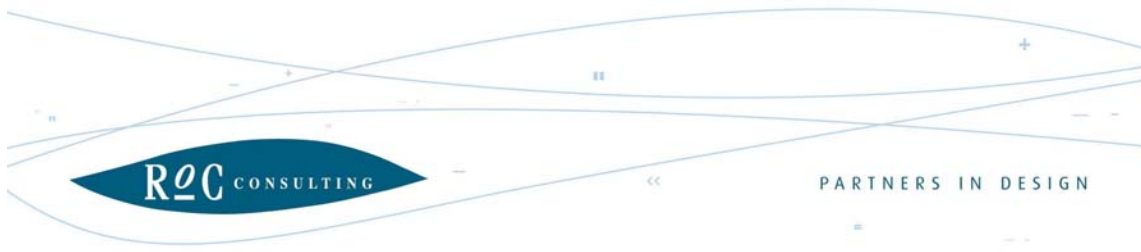
Site Reference	YR30 + climate change % storage estimate (cubic metres)	YR100 + climate change % storage estimate (cubic metres)
West Zone	71 - 364	194 - 564
East Zone	286 - 1948	921 - 2992

See Appendix D. Actual volumes will be determined at detailed design stage.



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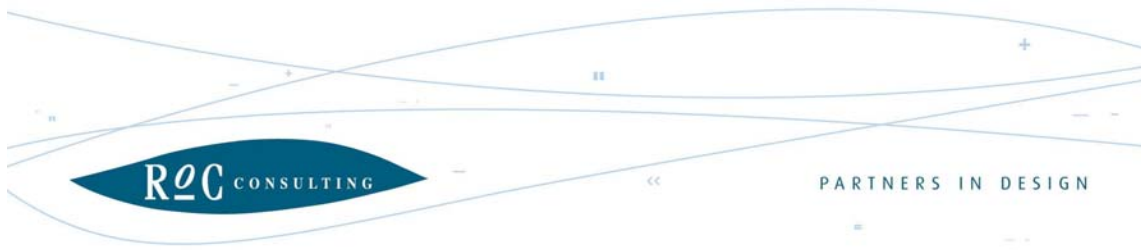
- 6.9 The difference in required volumes for the YR30 and the YR100 event may therefore be provided at ground level. Where site topography determines this cannot be achieved, it will be necessary for the YR100 storage volume to be provided below ground.
- 6.10 In all cases finished floor levels will be set at least 150mm above external ground levels to ensure reduced risk of damage as a result of overland flows.
- 6.11 Entrances and exits to underground car parks should be protected from ingress of flood flows by bunds to the openings 150mm above external ground levels.
- 6.12 Drainage from car parks, service areas and site roads will incorporate additional protection of deep trapped gullies and petrol separators where necessary.
- 6.13 Foul drainage system from each of the subject sites will connect with the existing foul and combined sewers local to the site via new sewer connections in accordance with S.106 of The Water Industry Act 1991 or via existing private drainage connections.



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7.0 FLOOD RISK MANAGEMENT MEASURES

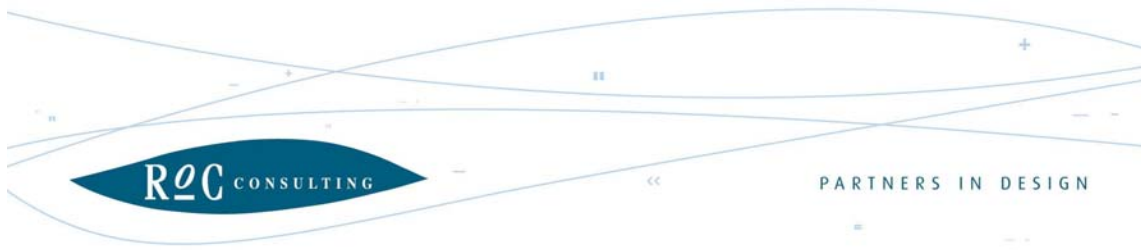
- 7.1 All of the development sites are within Flood Zone 1. In consequence, no special measures will be necessary to ensure that safe access and escape routes are available to high ground during the design flood event.
- 7.2 In the event of extreme emergency the local authority and other emergency services have contingency plans for dealing with the consequences of flooding.
- 7.3 There will be site management and health and safety documents prepared in respect of each site. These will include the required maintenance regime for private drains and sewers on site.
- 7.4 The design of surface water drainage will ensure that there are no uncontrolled off-site overland flood flows created by the proposed developments. Where possible, site surfaces will be modelled so that flood flows generated on site from events beyond the stipulated drainage design criteria will flow to, and be contained on site within, landscaped or paved areas such that there is no increased risk of flooding to buildings and other vulnerable areas. Such flood flows will not be allowed to flow from the sites onto adjoining property or highways.
- 7.5 The vehicular and pedestrian accesses to below ground car parks and other spaces will be protected by bunds and raised thresholds to prevent surface flood flows into these areas.
- 7.6 Flood flows onto the sites from adjoining property or highways will either pass across the site or will be contained on site within landscaped or paved areas such that there is no increased risk of flooding to buildings and other vulnerable areas.



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8.0 OFF-SITE IMPACTS

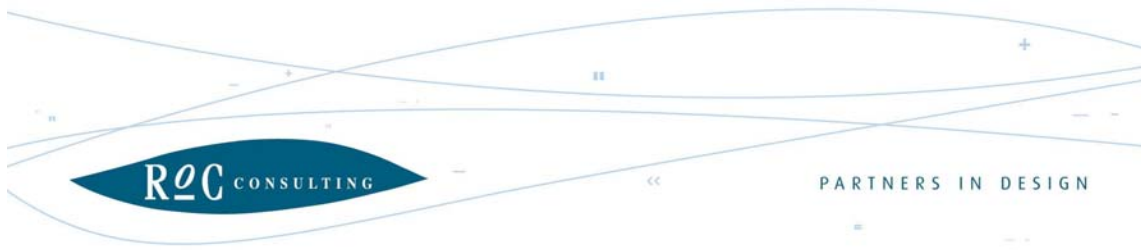
- 8.1 There will be no additional off-site impacts as a result of these developments.
- 8.2 Proposed on-site drainage will be designed and constructed in accordance with The Building Regulations.
- 8.3 This will also be designed so as not to compromise the existing United Utilities public sewerage system and the local land drainage system.
- 8.4 All on-site roofs and paved areas are to drain into the designed surface water drainage system, thereby ensuring there will be no off-site flood flows generated by the development.



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9.0 RESIDUAL RISKS

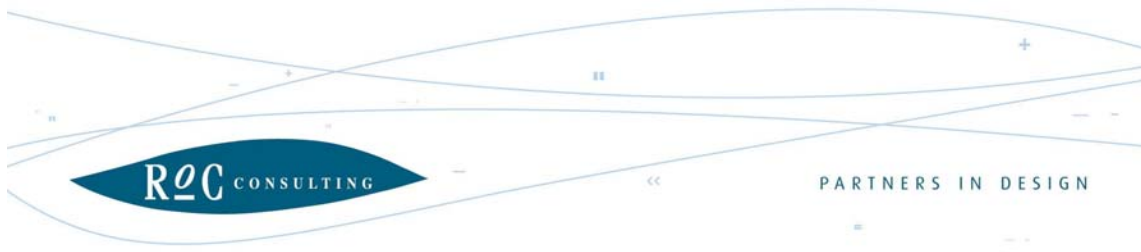
- 9.1 The risk of flood flows entering and leaving the development sites will remain after development. This risk will be reduced as far as possible because the design will be such that there will be no flooding during all rainfall events up to and including the critical YR30 storm and no overland flows from the sites up to the critical YR100 storm.
- 9.2 By implementation of the flood procedures and by careful design of the flood protection measures as described above, all residual flood-related risks will be minimized after the developments have been completed.



Edge Lane Central, Liverpool

APPENDIX A: DEVELOPMENT DRAWINGS

APPENDIX A DEVELOPMENT DRAWINGS



Edge Lane Central, Liverpool

**APPENDIX B: UNITED UTILITIES RESPONSE
TO FLOOD RISK ASSESSMENT CONSULTATION**

APPENDIX B

UNITED UTILITIES RESPONSE TO FLOOD RISK ASSESSMENT CONSULTATION

Direct Line 01925 537258
Direct Fax 01925 537516
David.Hardman@uuplc.co.uk

Your ref Rory O'Connor
Our ref DC/09/4061
Date 02-DEC-09

Dear Mr O'Connor

Location: Edge Lane, Liverpool
Proposal: Flood Risk Assessment

Thank you for your planning consultation of 23 November 2009.

Further to your enquiry, I can advise that we have no record of public sewer flooding of properties in this vicinity as a result of overloaded sewers. i.e. no properties on the 'at risk' register as compiled for our Regulator.

Please note that United Utilities Water plc (UW) can only record and check flooding events which are reported to us and we have to comply with our Regulators instructions on the qualification of flooding events to place on the 'at risk' register.

Also, this does not include any sewer flooding events caused by blockages or collapses which are the result of third party actions, natural events or other actions over which UW has no control and not a facet of sewer capacity.

United Utilities offers a fully supported mapping service at a modest cost for our water mains and sewerage assets. This is a quality service, which is constantly updated by our Property Searches Department (0870 7510101) and you should contact them for more details of our utility assets. It is, however, the applicant's responsibility to demonstrate the exact relationship on site between any assets that may cross the site and any proposed development

If possible, the site should be drained on a separate system, with foul drainage only connected into the foul sewer. Surface water should discharge to the watercourse/soakaway/ surface water sewer and may require the consent of the Environment Agency. If surface water is allowed to be discharged to the public surface water sewerage system we may require the flow to be attenuated to a maximum discharge rate determined by UW.

When you have planning permission and wish to arrange for a connection point to public sewer you should contact our Wastewater Connections telephone number 0845 602 0406.

They will send you a Connections pack for your completion. When returned this will be considered by our local Wastewater Network Engineer and a suitable connection point determined.

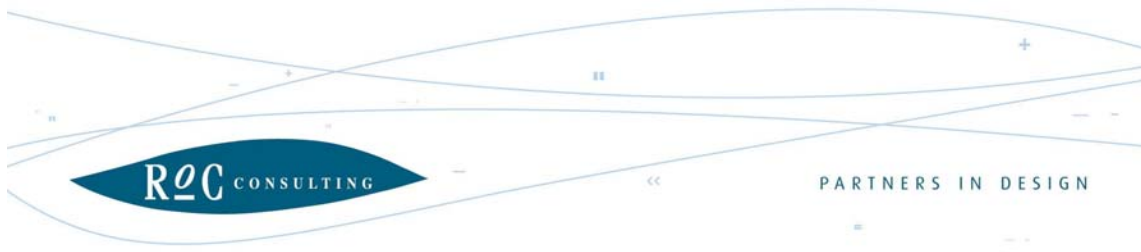
Land drainage or subsoil drainage water must not be connected into the public sewer system directly or by way of private drainage pipes. It is the developer's responsibility to provide adequate land drainage without recourse to the use of the public sewer system.

UUW is not obliged to receive highway drainage from the proposed development into the public wastewater network.

You should be aware of our recent change to charging non-household metered premises on the basis of surface and highway drainage connected to public sewer. This new charging scheme is a strong incentive to keep relatively clean surface water out of the public sewer, reducing foul flood risk, reducing pollution at storm sewer overflows and reducing the carbon footprint.

Yours sincerely

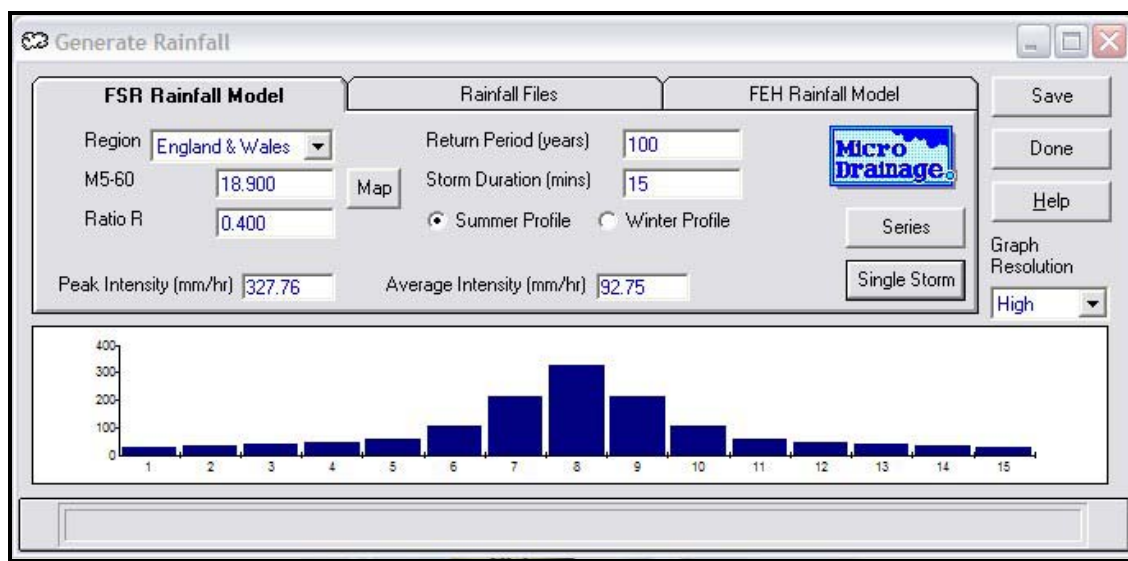
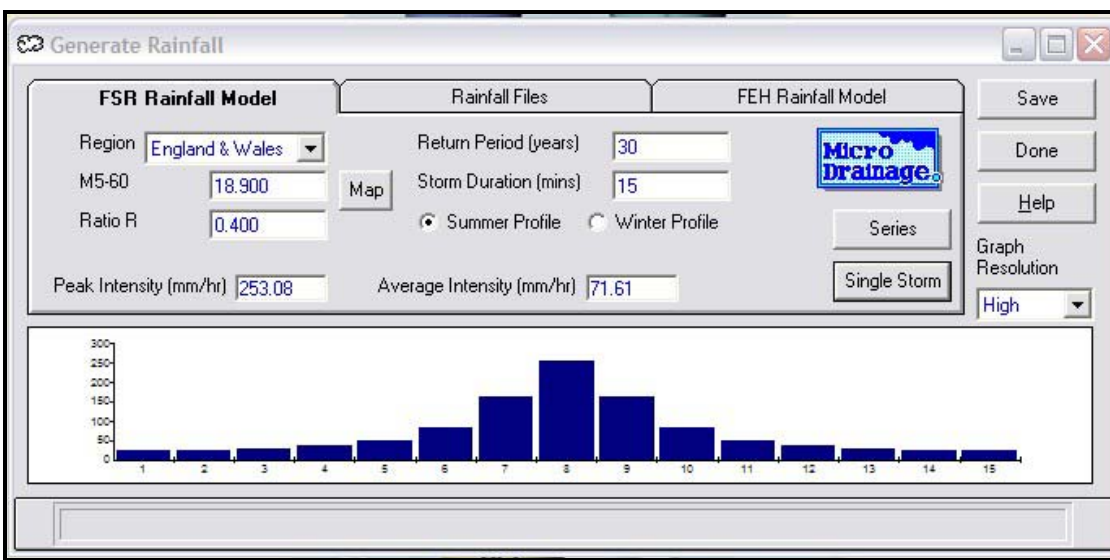
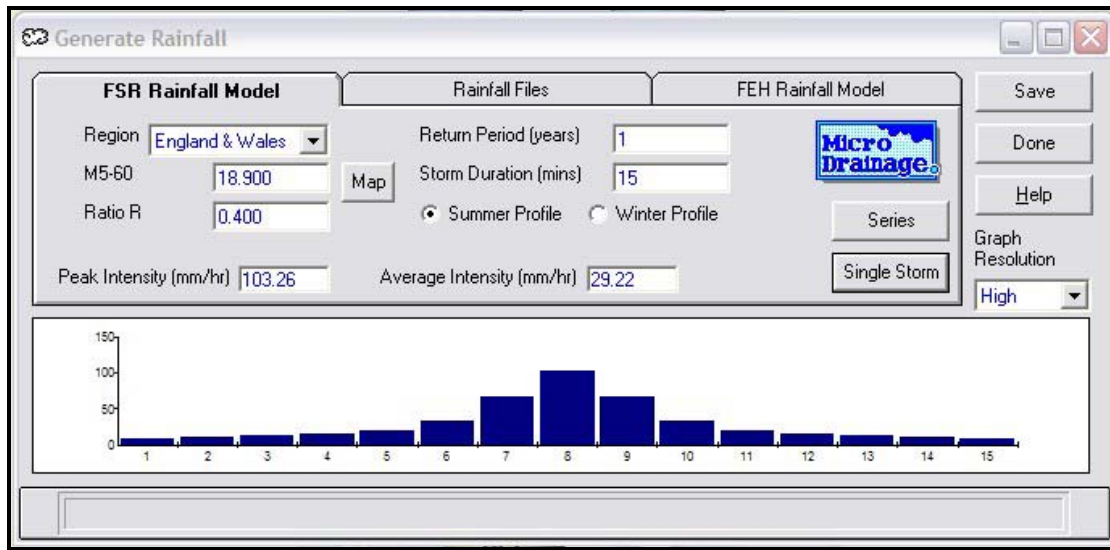
David Hardman
Asset Protection

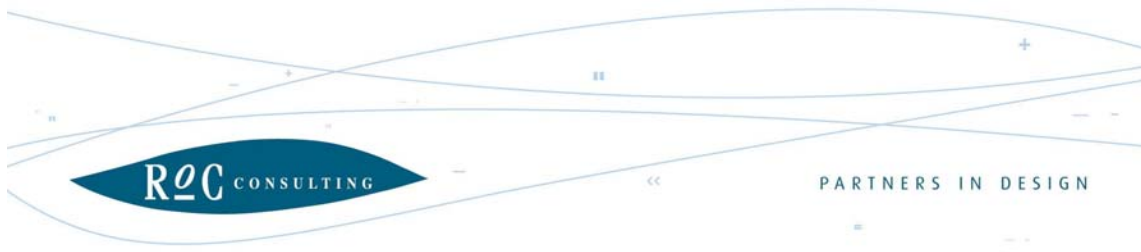


Edge Lane Central, Liverpool

APPENDIX C: WINDES RAINFALL INTENSITIES

APPENDIX C WINDES RAINFALL INTENSITIES





Edge Lane Central, Liverpool

APPENDIX D: STORAGE ESTIMATES

APPENDIX D STORAGE ESTIMATES

West Zone YR30

Quick Storage Estimate

Variables | Result | Design | Overview 2D | Overview 3D | Vt

Region	England & Wales	Cv (Summer)	0.750
Return Period (years)	30	Cv (Winter)	0.840
Map	M5-60 (mm)	Impermeable Area (ha)	2.6
Ratio R	0.4	Maximum Allowable Discharge (l/s)	438
		Infil Coefficient (m/hr)	
		Safety Factor	2
		Climate Change %	20

Apply

Done Help

Quick Storage Estimate

Variables | **Result** | Design | Overview 2D | Overview 3D | Vt

Global Variables require approximate storage of between 71 m³ and 364 m³.

These values are estimates only and should not be used for design purposes.

Done Help

West Zone YR100

Quick Storage Estimate

Variables | Result | Design | Overview 2D | Overview 3D | Vt

Region	England & Wales	Cv (Summer)	0.750
Return Period (years)	100	Cv (Winter)	0.840
Map	M5-60 (mm)	Impermeable Area (ha)	2.6
Ratio R	0.4	Maximum Allowable Discharge (l/s)	438
		Infil Coefficient (m/hr)	
		Safety Factor	2
		Climate Change %	20

Apply

Done Help

Quick Storage Estimate

Variables | **Result** | Design | Overview 2D | Overview 3D | Vt

Global Variables require approximate storage of between 194 m³ and 564 m³.

These values are estimates only and should not be used for design purposes.

Done Help

East Zone YR30

Quick Storage Estimate

Variables | Result | Design | Overview 2D | Overview 3D | Vt

Region	England & Wales	Cv (Summer)	0.750
Return Period (years)	30	Cv (Winter)	0.840
Map	M5-60 (mm)	Impermeable Area (ha)	14.4
Ratio R	0.4	Maximum Allowable Discharge (l/s)	2606
		Infil Coefficient (m/hr)	
		Safety Factor	2
		Climate Change %	20

Apply

Done Help

Quick Storage Estimate

Variables | **Result** | Design | Overview 2D | Overview 3D | Vt

Global Variables require approximate storage of between 286 m³ and 1948 m³.

These values are estimates only and should not be used for design purposes.

Done Help

East Zone YR100

Quick Storage Estimate

Variables | Result | Design | Overview 2D | Overview 3D | Vt

Region	England & Wales	Cv (Summer)	0.750
Return Period (years)	100	Cv (Winter)	0.840
Map	M5-60 (mm)	Impermeable Area (ha)	14.4
Ratio R	0.4	Maximum Allowable Discharge (l/s)	2606
		Infil Coefficient (m/hr)	
		Safety Factor	2
		Climate Change %	20

Apply

Done Help

Quick Storage Estimate

Variables | **Result** | Design | Overview 2D | Overview 3D | Vt

Global Variables require approximate storage of between 921 m³ and 2992 m³.

These values are estimates only and should not be used for design purposes.

Done Help