Project		
28 REDINGTON ROAD		Mott MacDonald

Calculations for	Dvn/dept	Job no/file no	
SURFACE WATER DRAINAGE	Calculated by AJ Jin	Date 22/4/16	Sheet no
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AIM

TO CALCULATE THE EXISTING AND PROPOSED RAINFALL INTENSITY, PEAK DISCHARGE RATES, SURFACE WATER VOLUME AND REQUIRED ATTENUATION VOLUME FOR A NUMBER OF RETURN PERIODS

REFERENCES

1. MICRODRAINAGE
2. MODIFIED RATIONAL METHOD

CALCULATIONS

RAINFALL INTENSITY

USING MICRODRAINAGE THE RAINFALL INTENSITY FOR A NUMBER OF RETURN PERIODS CAN BE OBTAINED.

FOR EACH RETURN PERIOD A 15 MIN WINTER STORM DURATION WAS MODELLED TO DETERMINE THE PEAK RAINFALL INTENSITY.

AN INCREASE OF 30% HAS BEEN ALLOWED FOR DURING THE 1:100 YEAR EVENT FOR CLIMATE CHANGE.

RETURN PERIOD	RAINFALL INTENSITY (mmh^{-1})
1	34
30	82
100	107
100+30%	139

PEAK DISCHARGE RATE

THE PEAK DISCHARGE RATE PER RETURN PERIOD CAN BE CALCULATED USING THE MODIFIED RATIONAL METHOD.

$Q = 2.78CiA$ WHERE

- Q = PEAK FLOW RATE (l_s^{-1})
- C = RUNOFF COEFFICIENT
- i = RAINFALL INTENSITY (mmh^{-1})
- A = IMPERMEABLE AREA (Ha)

C = 1 (WORST CASE)

i = AS CALCULATED ABOVE

A = 800m² = 0.08Ha (THIS IS THE SAME FOR EXISTING AND PROPOSED)

RETURN PERIOD	PEAK DISCHARGE RATE (l/s⁻¹)
1	7.55
30	18.20
100	23.75
100+30%	30.86

TOTAL VOLUME OF SURFACE WATER

AS THE EXISTING SITE IS POSITIVELY DRAINED AND THE PROPOSED SITE IS POSITIVELY DRAINED IT IS ASSUMED THAT 100% OF THE SURFACE WATER WHICH FALLS ON THE IMPERMEABLE AREAS OF THE SITE DISCHARGES VIA THE OUTFALL.

THE VOLUME OF WATER HAS BEEN CALCULATED FOR A 6 HOUR PERIOD BASED ON THE RAINFALL INTENSITY FOR A 6 HOUR EVENT (CALCULATED WITH MICRODRAINAGE) AND THE AREA OF 800m²

RETURN PERIOD	6 HOUR RAINFALL (mm·h)	DISCHARGE VOLUME (m³)
1	3.72	17.86
30	8.17	39.22
100	10.58	50.78
100+30%	13.75	66.00

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SURFACE WATER ATTENUATION

IT IS PROPOSED THAT THE PEAK FLOW RATE IS LIMITED TO THE EXISTING 1:100 YR RETURN PERIOD RATE OF 2.4 l/s.

THEREFORE ATTENUATION IS REQUIRED TO STORE SURFACE WATER FOR MORE EXTREME EVENTS AND THE EFFECTS OF CLIMATE CHANGE.

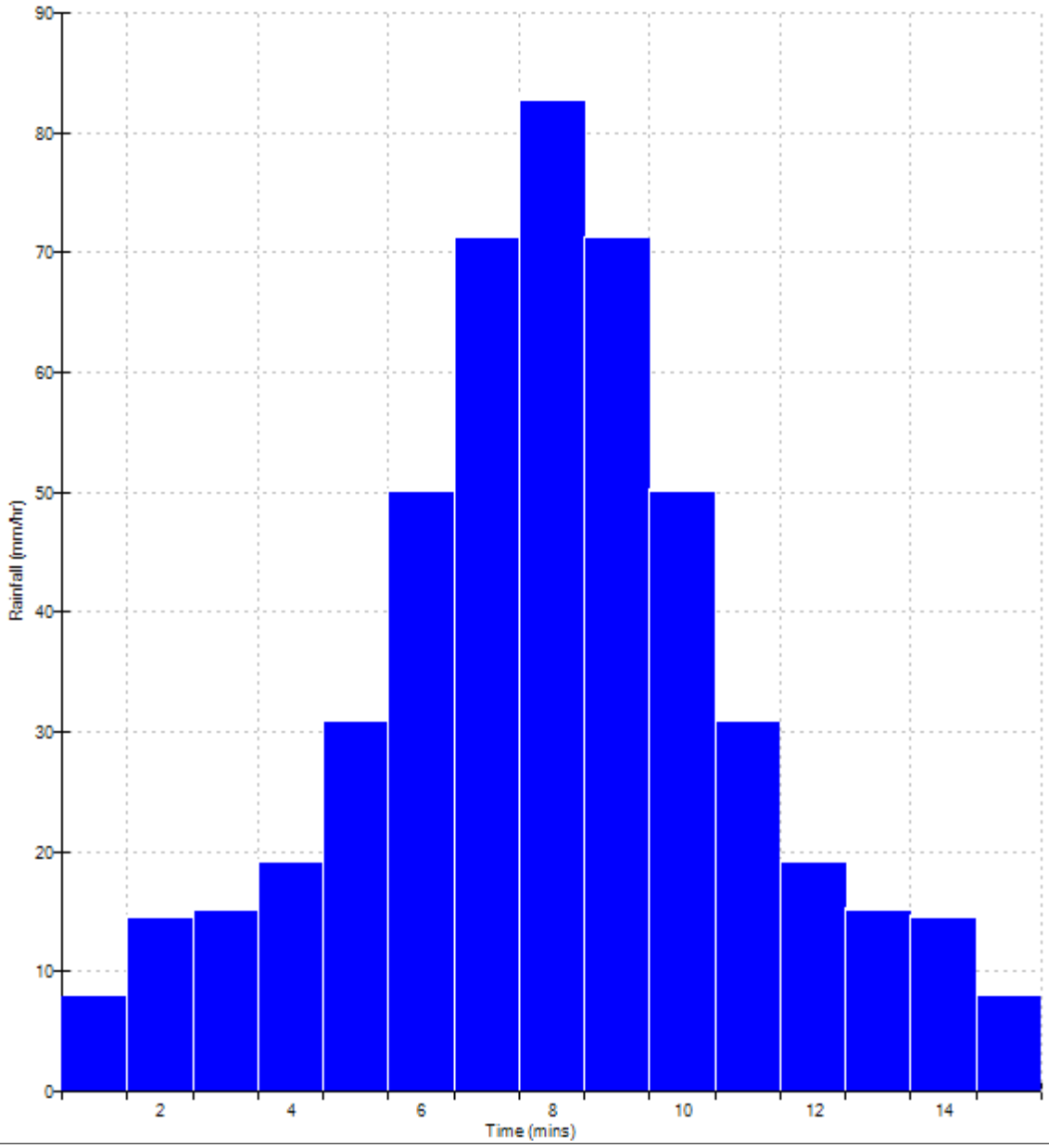
THE REQUIRED STORAGE VOLUME HAS BEEN CALCULATED USING MICRODRAINAGE AND INDICATES THAT BETWEEN 2.3m^3 AND 17m^3 OF STORAGE IS REQUIRED.

DUE TO THE SMALL VOLUME OF STORAGE REQUIRED IT IS PROPOSED THAT THE REQUIRED ATTENUATION IS PROVIDED WITHIN THE DRAINAGE NETWORK.

Rainfall profile

Storm duration (mins) 15

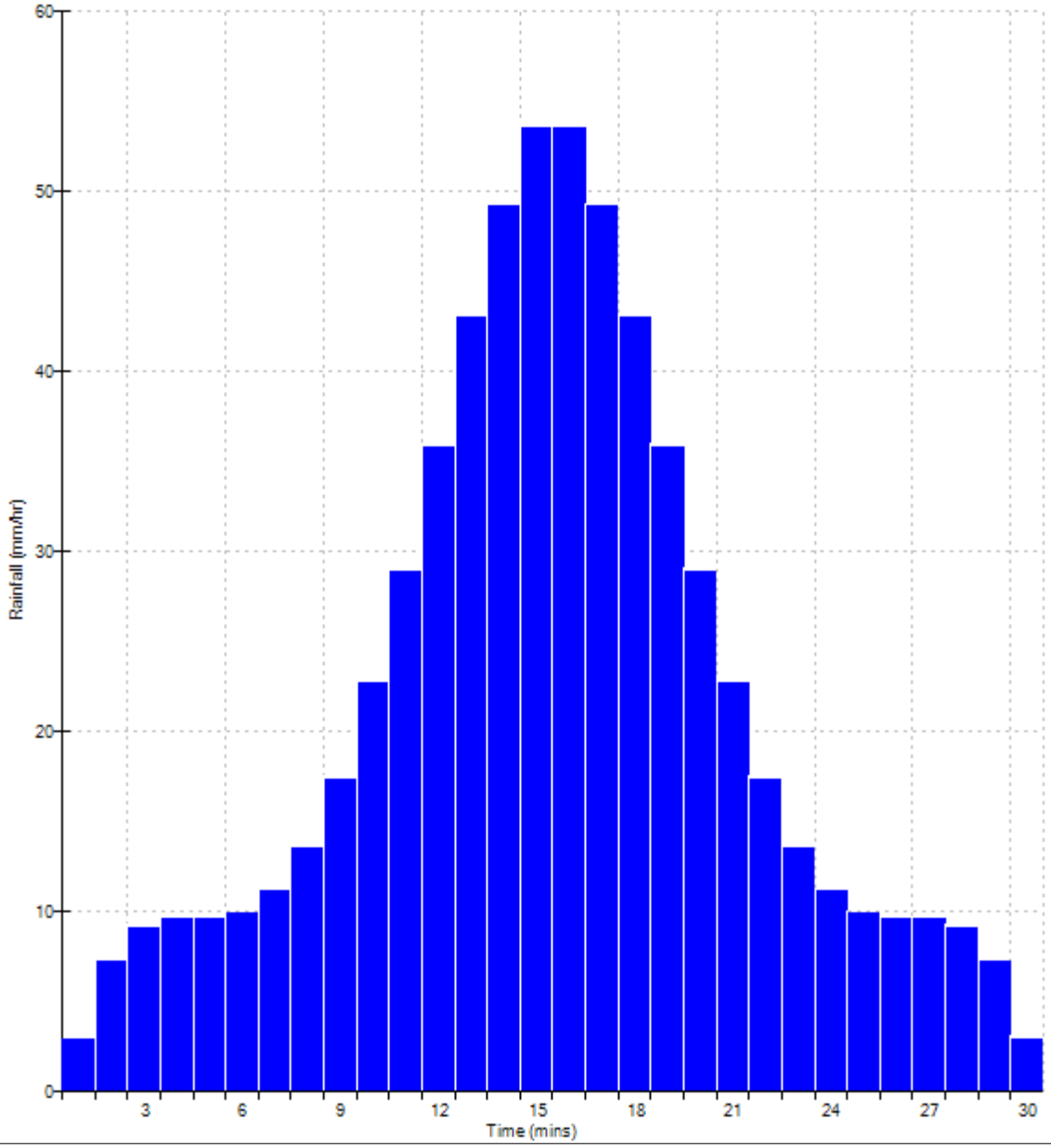
FSR Data	
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.428
Peak Intensity (mm/hr)	82.705
Ave. Intensity (mm/hr)	33.349
Return Period (years)	1



Rainfall profile

Storm duration (mins) 30

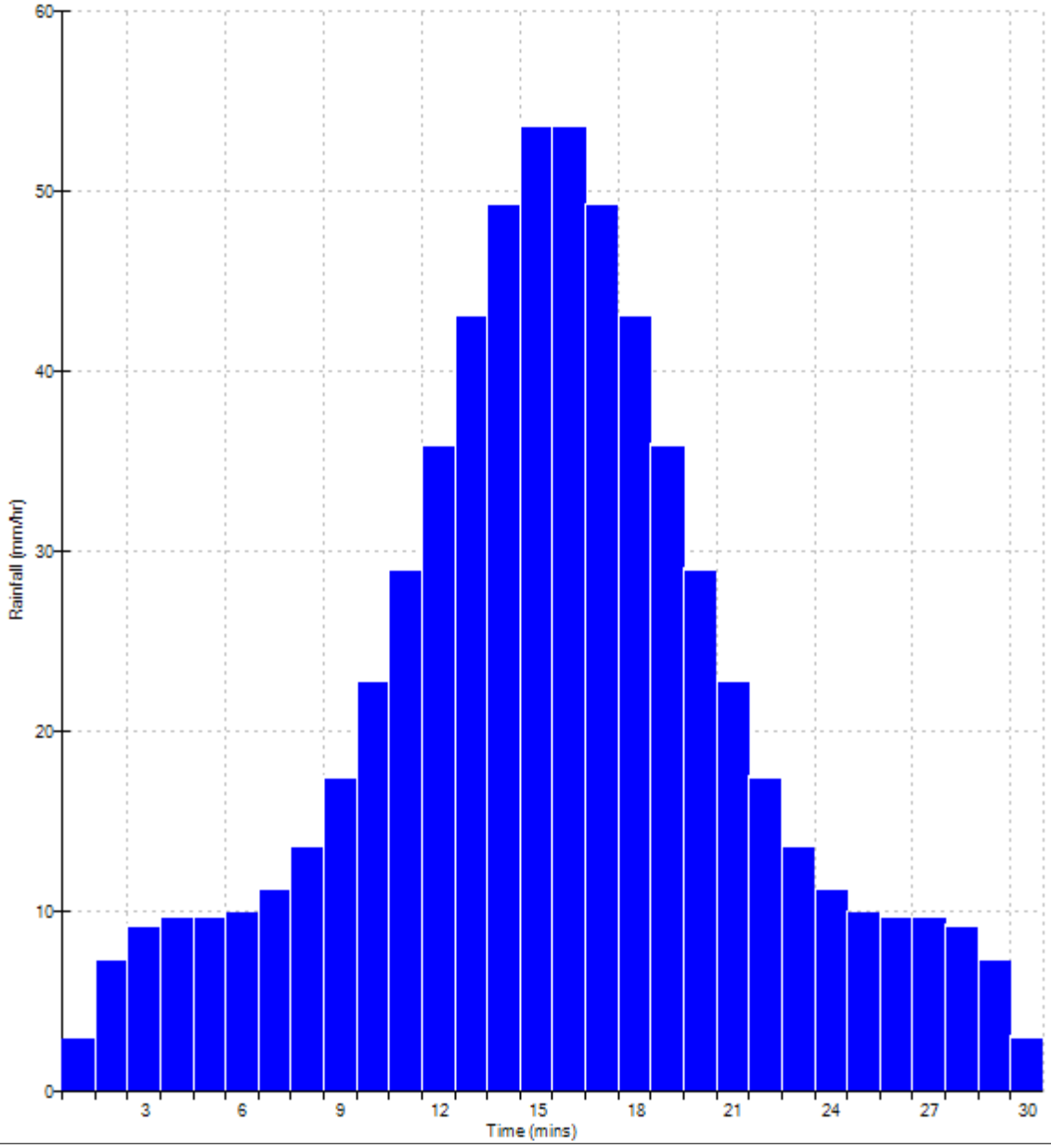
FSR Data	
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.428
Peak Intensity (mm/hr)	53.575
Ave. Intensity (mm/hr)	21.603
Return Period (years)	1



Rainfall profile

Storm duration (mins) 30

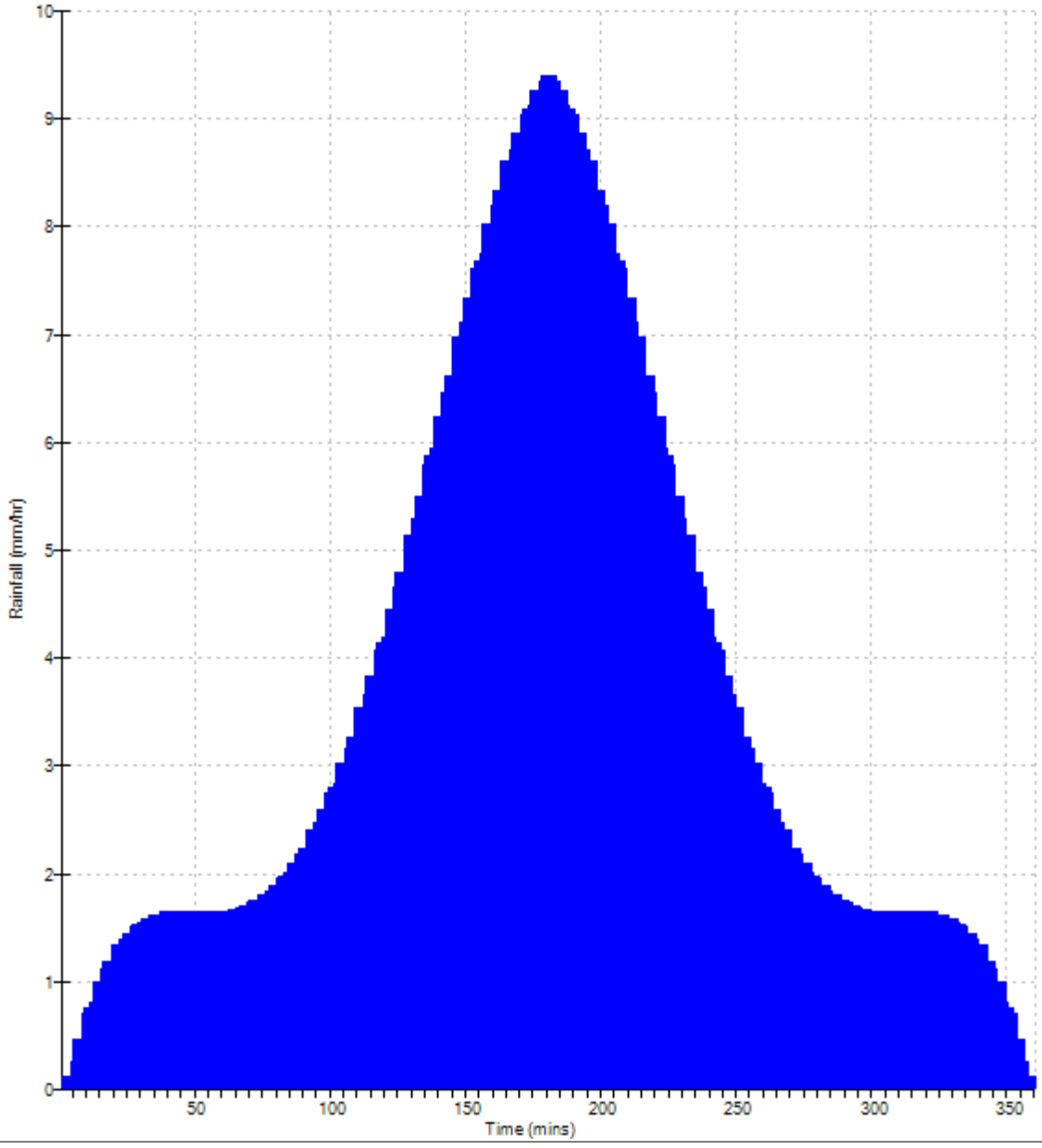
FSR Data	
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.428
Peak Intensity (mm/hr)	53.575
Ave. Intensity (mm/hr)	21.603
Return Period (years)	1



Rainfall profile

Storm duration (mins) 360

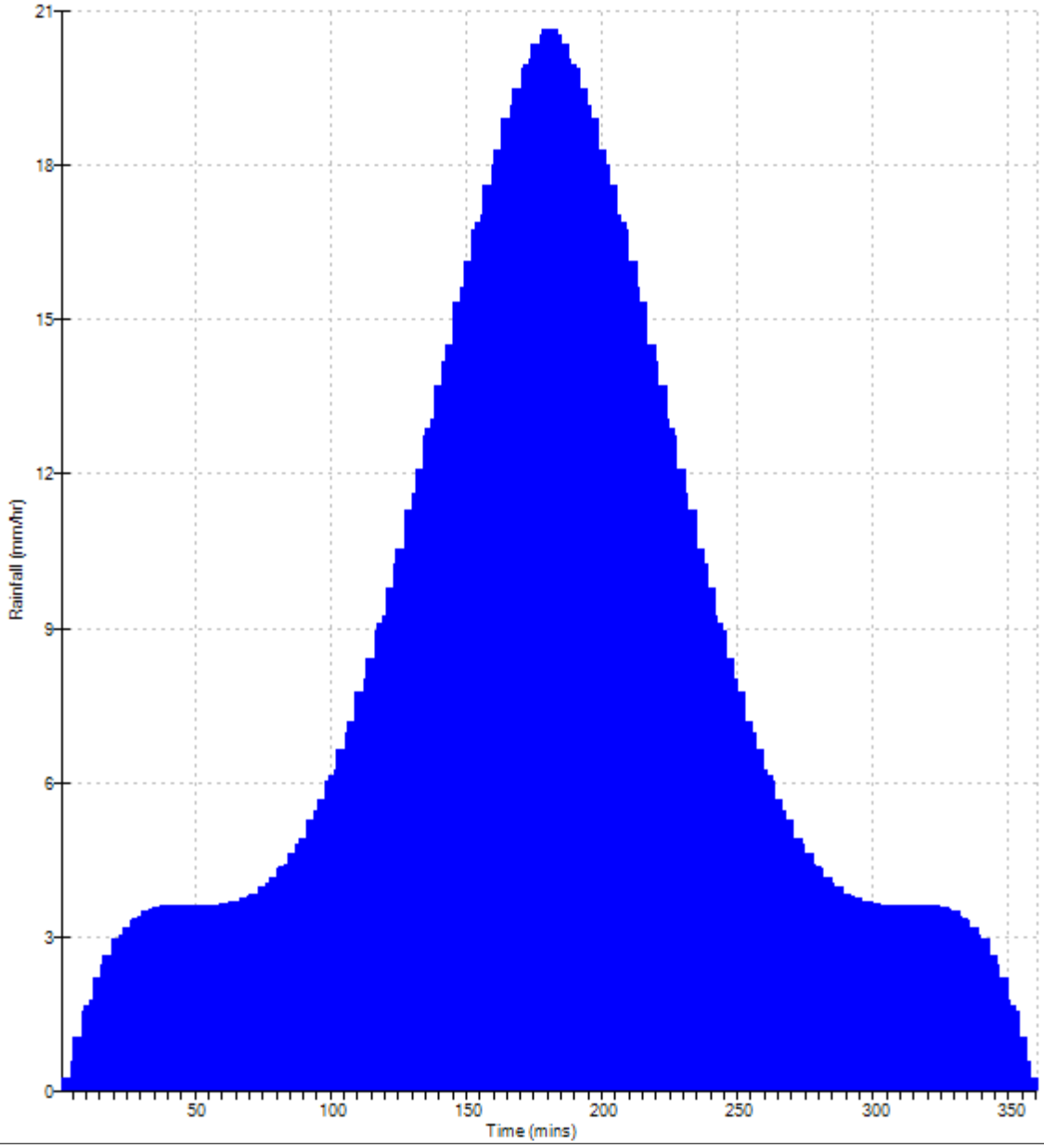
FSR Data	
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.428
Peak Intensity (mm/hr)	9.404
Ave. Intensity (mm/hr)	3.718
Return Period (years)	1



Rainfall profile

Storm duration (mins) 360

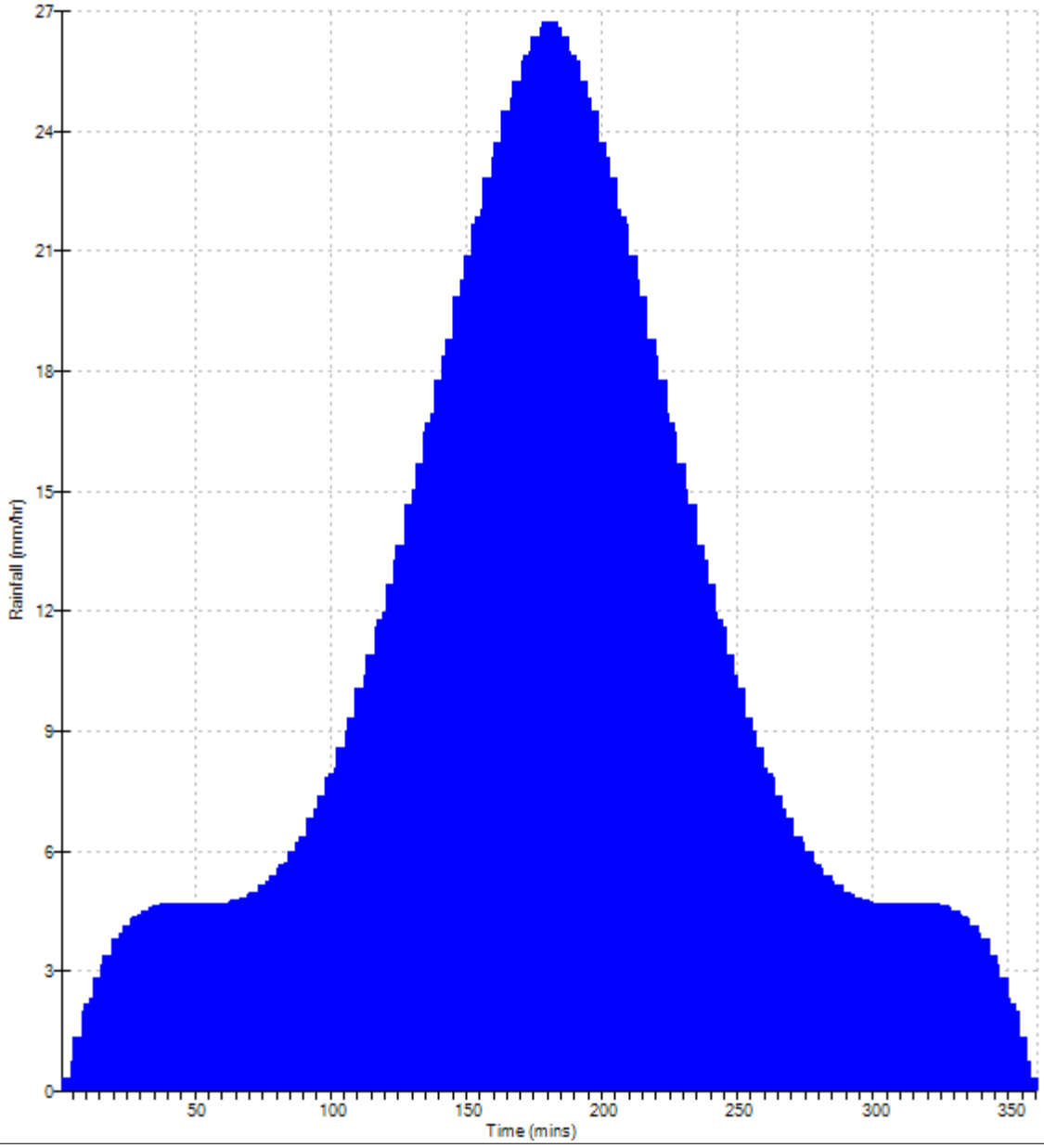
FSR Data	
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.428
Peak Intensity (mm/hr)	20.655
Ave. Intensity (mm/hr)	8.167
Return Period (years)	30



Rainfall profile

Storm duration (mins) 360

FSR Data	
Region	England and Wales
M5-60 (mm)	21.000
Ratio R	0.428
Peak Intensity (mm/hr)	26.756
Ave. Intensity (mm/hr)	10.579
Return Period (years)	100



Surface Water Attenuation Requirements – Calculated using MicroDrainage