

3.7 Condition 45: Drainage

"The new drainage infrastructure within the site shall be designed to achieve a combined (storm and foul) peak discharge to the existing combined sewer of 2,292 l/s or less."

3.7.1 Site Wide Drainage Infrastructure

The figure of 2292 l/s in the wording to Condition 45 describes the maximum peak (storm and foul) discharge which is permissible for the site as a whole to discharge to the existing combined sewers. The peak discharge will be split between the Camden Sewer and York Way Sewer (for areas north of the Regent's Canal) and the Camley Sewer / Fleet Sewer (for the areas south of the Regent's Canal).

The cumulative peak discharge from the many building plots and areas of infrastructure will exceed 2292 l/s under certain weather conditions. In these instances, the site wide drainage infrastructure, including online and offline attenuation (see below), will attenuate peak flows discharging from individual plots, highways and public realm, enabling cumulative peak flows to be reduced to 2292 l/s or less. The site wide surface and foul water disposal strategy can be summarised as follows:

- To provide separate surface and foul water networks where available, combining only at the final manhole prior to connection into the existing Thames Water sewerage network.
- To provide online attenuation (for example oversized pipe work) and offline attenuation (for example proprietary modular underground storage systems / tanks) to buffer peak flows generated within the site down to the agreed discharge rates into the existing Thames Water sewerage network.
- To ensure that no above ground flooding occurs during the worst case 1 in 30 year storm event.
- To ensure that no internal building flooding occurs during the worst case 1 in 100 year (+20%) storm event.
- To accord with PPS 25 and Sewers for Adoption 6th Edition's.
- To discharge at various locations into the sewerage network.
- To design the above infrastructure such that combined surface and foul water flows do not exceed 2292 l/s during a 1 in 30 storm event.

The site wide drainage infrastructure at King's Cross Central can be described in terms of three drainage infrastructure areas, incorporating both building plots and infrastructure/public realm. These are described in Table 3.3.

Drainage Infrastructure Area	Plot Developments	Infrastructure / Public Realm
Eastern Goods Yard	The Granary Complex, Q1, Q2, R1, R2, R3, R4, R5, S1, S2, T1, T2, J1, H1, K1, K2, K3, K4 and 50% of I1)	Stable Street, Wharf Road, Handyside Street, Granary Square, Cubitt Park and Handyside Park
Southern Area Infrastructure	A1, A2, A3, A4, A5, B1, B2, B3, B4, B5, B6, D1, D2, F1 and V1	King's Boulevard, Goods Way, Battle Bridge Place and Pancras Square
Remainder of the Northern Area including the Triangle Site	M1, M2, N1, N2, P1, P2, S3, S4, S5, T3, T4, T5, T6 and W1	Canal Reach and Cubitt Square

Table 3.3 Drainage Infrastructure Areas

Table 3.4 identifies the assumed peak foul and surface water flows from each of the building plots in the southern area. The foul water figures are based on CIRIA 177 Variable Peaking Factor and the assumed foul water discharges from various land uses identified in Table 3.5. The surface water peak flows are based on a 1 in 30 year storm. It should be noted that it is most unlikely that the foul and surface water peak discharges from each individual plot will coincide with each other.

Plot Reference	Assumed Peak Flows (l/s) for Plots in the Southern Area	
	Surface Water (1 in 30 year event)	Foul Water
A1	68	5.1
A2	94	7.7
A3	122	9.1
A4	155	10.6
A5	193	11.4
B1	263	17
B2	63	3.5
B3	93.5	7.6
B4	112	6.7
B5	150	9.4
B6	130	9.9
D1	40	0.5
E1	48	1.9
F1	45	2.4
V1	59	0.1
TOTALS	1635.5	102.9

Table 3.4 Peak Surface and Foul Water Flows

Generally, foul water discharges represent small but consistent flows subject to diurnal patterns. For example, residential properties will exhibit two peaks within their diurnal flow pattern, one in the morning and one in the early evening. Surface water discharges, on the other hand exhibit extreme variations in flow, directly related to rainfall intensity.

The surface water discharge from each development will have its own unique hydrograph (identifying the variation between flow and time – the peak of which only lasting for a few minutes in most cases). Each one of these peaks (within the hydrographs) combines within the main drainage infrastructure at different points in time during the storm event creating an averaged flow within the pipe network. These flows will discharge into the Thames Water network via flow hydraulic controls at the downstream end of each network. These hydraulic controls limit the discharges to a combined maximum of 2292l/s. Where the plot development discharges combine to produce flows in excess of the maximum allowable discharge, water will be held within the drainage infrastructure which has been specifically sized to accommodate these flows.

Land Use	Demand Options	Discharge to Sewer (l/day/hd)	l/s/head	Operational Hours	Population Density (m ² per person)
Residential	-	152	0.0023457	18	36.2
Student Accommodation	-	152	0.0023457	18	19.5
Retail	Large Retail	26.6	0.0009236	8	40
Food/Drink	Customer/day 2hr sittings	28.5	0.0009896	8	1.4
Education	General	19	0.0006597	8	10
Business	Without Canteen	41	0.0014236	8	12
Hotel		133	0.0046181	8	20
Leisure	Sports Club	142.5	0.0049479	8	40

Table 3.5 Foul Water Discharges from Various Land Uses

3.7.2 Zone A Drainage Infrastructure

The Zone A building, which extends across plots A1-A5, is serviced by the Southern Area Infrastructure drainage systems (Table 3.3) and will discharge via a restricted discharge into the combined Thames Water Camley Combined sewer located within Pancras Road. The proposed connections to the sewer network are shown in submitted drawings. These networks also serve the other Zone B buildings, King's Boulevard, Goods Way, Battle Bridge Place and Pancras Square. The drainage networks have been designed on SUDS principles providing an overall peak flow reduction of 10% (based on a 1 in 30 year storm).

Thames Water has approved in principle surface water discharge into the Camley Sewer for the network serving the Zone A development. The approved discharges reflect the assumptions described in Table 3.4 and 3.5. The total approved surface water discharge for Zone A is 632l/s and the foul water flow is 43.9l/s.

It should be noted that Table 3.4 does not specifically refer to public realm areas. However, they have been allowed for within the Table 3.4 figures. The public realm around Zone A, namely King's Boulevard, Battle Bridge Place and the existing Goods Way, was included in the hydraulic model used during the design of the infrastructure to ensure that each of the drainage sub-catchments (building and public realm) are attenuated and the flows into the combined Thames sewer restricted so that the permissible discharges set out in the planning permission are not exceeded.

