Flood Storage or Conveyance Compensation

5.12. No fluvial floodplain storage or conveyance capacity is displaced as a result of the proposals, therefore, no flood storage or conveyance compensation is required.

Safe Route of Access and Egress

5.13. Site users are afforded safe (typically dry) routes of access and egress via the northern, southern and western boundaries of the Site for up to and including the 1 in 1,000 year fluvial and surface water flood events (including future allowances for climate change over the lifetime of the Proposed Development).

5.14. Proposed vehicular access and egress routes to the Site are expected to be categorised as 'Low Hazard' at this location.

Residual Risk

5.15. Residual risk of flooding from exceedance flows from sewers, failure of infrastructure, or extreme groundwater conditions, are deemed to be low.

6. Surface Water Drainage Strategy

Existing Drainage Regime

Public Sewers

6.1. Anglian Water sewer records (refer to Figure 12 and Figure 13) indicate that public surface water and foul sewers bound the Site. Refer to Section 4.18 – 4.21 of this report.

Private Surface Water Sewers

6.2. A private drainage schematic plan and existing drainage layout information gathered from a utilities survey (refer to Appendix D) indicates that the Site is served by a number of points of connection to the public sewer networks. Refer to summary of private sewer outfalls in Table 1.

Table 1: Private Surface Water Sewer Outfalls

Diameter	Outfall Direction / Description	Point of Connection to AW Network (Manhole Ref.)
225mm	NW : Coldham's Lane (West of Site Access)	6751
500mm	NE : Coldham's Lane (Adjacent to Railway)	d/s of 7751
300mm	SW : York Street (Pedestrian Access)	u/s of 3652
300mm	SW : York Street (Pedestrian Access)	u/s of 3652

6.3. Runoff from the south western portion of the Site drains via building roof downpipes, traditional gullies and channel drainage systems to a 300mm surface water sewer beneath the pedestrian access adjacent to the Pets at Home store which eventually outfalls to York Street.

6.4. Western highway areas and the existing bus loop are drained, via a Class 1 bypass separator, to a second 300mm surface water sewer beneath the pedestrian access adjacent to the Pets at Home store which eventually outfalls to the York Street public sewer network.

6.5. Runoff the central and south eastern portion of the Site is drained via building roof downpipes, traditional gullies and channel drainage systems to 450mm and 600mm diameter surface water sewers, to a box culvert attenuation storage arrangement beneath the southern car park. Outflows from the attenuation storage tank are regulated by a 300mm diameter sewer located further north beneath car park areas adjacent to the access road which drains further northern car parking areas, via a Class 1 bypass separator, before routing flows in a north easterly direction towards the existing service road.

6.6. Runoff from the eastern and north eastern portion of the Site is drained via building roof downpipes, traditional gullies and channel drainage systems to a 500mm diameter surface water which routes flows in a northerly direction beneath the existing service road to a Class 1 bypass separator. Flows from the two networks combine at the north eastern end of the service yard within a 500mm diameter surface water which outfalls to the Coldham's Lane public sewer network adjacent to the railway.

6.7. Runoff from north western highway areas drain, via a Class 1 interceptor, to a 225mm diameter surface water sewer before collecting runoff from the very north western portion of the Site, eventually outfalling to the Coldham's Lane public sewer network adjacent to the western leg of the roundabout.

Private Foul Water Sewers

6.8. A private drainage schematic plan and existing drainage layout information gathered from a utilities survey (refer to Appendix D) indicates that the Site is served by a number of points of connection to the public sewer networks. Refer to Table 2.

Table 2: Private Foul Water Sewer Outfalls

Diameter	Outfall Direction / Description	Point of Connection to AW Network (Manhole Ref.)
150mm	NW : Coldham's Lane (West of Site Access)	d/s of 6802
110mm	SE : Sleaford Street (pumped)	5301

6.9. Foul flows from the northern 'half' of the Site are drained via private 100mm - 150mm diameter foul sewers in a north westerly direction to the 150mm diameter private foul sewer routed to the rear of Porcelanosa, eventually draining to the 525mm diameter public foul sewer beneath Coldham's Lane.

6.10. Foul flows from the southern 'half' of the Site are drained via private 150mm diameter foul sewers along the south western and south eastern boundaries to a private pumping station at the very southern tip of the Site at the southern end of the service road. Flows are pumped to the head of the nearby 225mm diameter public foul sewer beneath Sleaford Street.

6.11. Small sump pump arrangements serve two small retail units towards the south eastern boundary of the Site, lifting nominal flows to the local networks indicated above.

Existing Site Surface Water Runoff Assessment

Existing Site

6.12. The existing contributing surface water drainage catchment has been assessed as follows:

Impermeable Area (draining north west)	*0.590 ha*
Impermeable Area (draining north east)	*5.729 ha*
Impermeable Area (draining south west)	*0.510 ha*
Public Highways (retained as existing)	*0.730 ha*
Soft Landscape (not formally drained)	*0.720 ha*
Total Site Area	*7.850 ha*

6.13. Existing runoff rates have been modelled for a suite of storm events based upon the Flood Estimation Handbook (FEH) methodology using MicroDrainage WinDes software. Refer to calculations in Appendix E. A summary of runoff rates generated by the existing Site (excluding retained public highways) has been presented in Table 3. Note, the existing model was based on the underground services survey and private drainage schematic appended in Appendix D.

Table 3: Existing Site Brownfield Runoff Analysis

Return Period (1 in X Years)	Brownfield Rate (NW Outfall) Model Node 5.003 (l/s)	Brownfield Rate (NE Outfall) Model Node 1.012 (l/s)	Brownfield Rate (SW Outfall) Model Node 4.001 (l/s)	Brownfield Runoff Rate (Site) (l/s)
2 (Q_{BAR})	53.8	242.8	68.8	365.4
30	65.2	431.9	114.1	611.2
100	65.4	487.7	119.1	672.2
100 + 40% CC	66.0	553.3	126.3	745.6

Pre-Developed ‘Greenfield’ Site

6.14. The proposed drainage regime should aim to restrict surface water runoff from the Site, as close as reasonably practicable, to the greenfield runoff rate, in line with the CCoC LLFA Surface Water Planning Guidance (2024). The greenfield run off rates for the Site are summarised in Table 4. The proposed discharge rates for the Development will be restricted via the use of SuDS attenuation features and flow control devices at the Site outfall. The proposals are discussed in further detail in Summary of SuDS Design and Approach section. The UK SuDS Online Tool calculation results are available in Appendix E, using Institute of Hydrology 124 methodology based upon subsoil conditions with a soil class of 2.

6.15. As per the LLFA Surface Water Planning Guidance, the development should restrict flows using a simple control to ‘QBAR greenfield’ runoff rate. The QBAR ‘greenfield’ runoff rate has been calculated to be 1.35 l/s/ha.

Table 4: Greenfield runoff rates summary

Return Period (1 in X Years)	Greenfield Runoff Rate (l/s/ha)
QBAR	1.35
1	1.17
30	3.3
100	4.79
200	5.66

Drainage Hierarchy

6.16. Proposed management of surface water runoff from the Site has been assessed in line with the Drainage Hierarchy advocated by the LLFA and best practice and is summarised in Table 5 below, in descending order of preference.

Table 5: Drainage Hierarchy

Drainage Method	Comments
1. Store rainwater for later use;	Spatial provision will be made within the buildings for rainwater harvesting infrastructure to allow reuse of harvested rainwater for WC flushing. Rainwater harvesting will also be provided beneath external areas with a significant water demand to provide irrigation for orchards, food growing areas and areas of soft landscaping and trees.
2. Use infiltration techniques, such as porous surfaces in non-clay areas;	Underlying Made Ground associated with former landfill activity, together with a relatively shallow groundwater table, effectively precludes the disposal of runoff to ground via infiltration.
3. Attenuate rainwater in ponds or open water features for gradual release;	Due to the urban nature of the Site and the lack of available external space, land availability for significant ponds or open water features is extremely limited. A dry basin feature (impermeable membrane lined) has been integrated within the external landscaping proposals within the western portion of the Site, which will provide a degree of attenuation. Rain gardens comprising shallow detention areas for runoff will be included within the soft landscaping proposals, taking due regard for tree root protection zones.
4. Attenuate rainwater by storing in tanks or sealed water features for gradual release;	Surface water attenuation storage will be provided at roof level of selected buildings (subject to constraints from roof top M&E plant, exhaust gas flues, light wells, and access shafts). Storage will be provided within blue roof attenuation cells and/or the substrate of proposed green roof areas. Strategically located surface water attenuation storage will also be provided in the form of below ground storage tanks with

		associated flow control devices designed to regulate runoff from external hardstanding areas and overflows from roof level storage. Further attenuation and source control will be provided within the void storage inherent within the permeable substrate of lined and under-drained permeable paving.
5.	Discharge rainwater direct to a watercourse;	The Site lies a significant distance from a watercourse. The requirement to cross third party land and public highway precludes the potential to discharge directly to a watercourse.
6.	Discharge rainwater to a surface water sewer/drain; and	The Site is currently served by private surface water sewers connecting to public surface water sewers. Discharge to surface water sewer will therefore remain the primary means of disposal of surface water runoff from the Site, albeit at a significantly reduced overall discharge rate.
7.	Discharge rainwater to the combined sewer.	No surface water runoff will be discharged to the public combined sewer network.

Sustainable Drainage Systems

6.17. Sustainable drainage (SuDS) techniques will be used for the disposal and management of surface water runoff from the proposed development, taking into account Site-specific constraints.

6.18. SuDS mimic the natural drainage system and provide a method of surface water drainage which can decrease the quantity of water discharged, and hence reduce the risk of flooding. In addition to reducing flood risk, SuDS features can improve water quality, and provide biodiversity and amenity benefits.

6.19. A variety of SuDS are available to reduce or temporarily hold back the discharge of surface water runoff. The potential for SuDS was considered throughout the design development. Table 6 outlines SuDS techniques and their constraints and opportunities at the Site.

Table 6: Sustainable Drainage Techniques

SuDS Technique	Constraints / Comments	✓/×
Rainwater harvesting (source control)	Spatial provision will be made within the buildings for rainwater harvesting infrastructure to allow reuse of harvested rainwater for WC flushing. Rainwater harvesting will also be provided beneath external areas with a significant water demand to provide irrigation for orchards, food growing areas and areas of soft landscaping and trees.	✓
Green roofs (source control)	All office unit blocks will have a green / blue roof	✓
Infiltration devices & Soakaways (source control)	Underlying Made Ground associated with former landfill activity, together with a relatively shallow groundwater table, effectively precludes the disposal of runoff to ground via infiltration.	×
Pervious surfaces (source control)	As per 'infiltration devices' above. Lined and under-drained permeable paving will be provided across selected non-trafficked hard landscape areas and public realm.	✓
Swales, filter drains & perforated pipes (permeable conveyance)	As per 'infiltration devices' above. Effectively precludes the use of filter drains for conveyance or for the disposal of surface water runoff to ground.	×

SuDS Technique	Constraints / Comments	✓/×
Filter Strips (permeable conveyance)	Selected areas of edge treatment to soft landscaping and rain gardens will function as filter strips for treatment of surface water runoff.	✓
Infiltration basins (end of pipe treatment)	Underlying Made Ground associated with former landfill activity, together with a relatively shallow groundwater table, building footprint coverage (lack of external areas) effectively precludes the use of infiltration basins for the disposal of surface water runoff to ground.	×
Bioretention Systems / Rain Garden (end of pipe treatment)	Selected tree pits proposed within the hard landscape can provide bioretention opportunities, subject to species type. Rain gardens will be included within the scheme for the disposal and treatment of surface water runoff from community areas and public realm. Planters will provide further opportunities for bioretention.	✓
Ponds / Basin (end of pipe treatment)	A wetland feature has been integrated within the external landscaping proposals within the southern portion of the Site. Lack of available external areas precludes the use of larger ponds or basins.	✓
Attenuation (Blue Roof)	Blue roof geo-cellular cells and associated waterproof membrane / insulation will be provided at roof level of selected buildings (subject to constraints from roof top M&E plant, exhaust gas flues, light wells, and access shafts). Potentially further limited by the aspirations for rainwater harvesting.	✓
Attenuation Underground (end of pipe treatment)	Below ground attenuation storage with appropriate flow control devices will be provided beneath selected locations to ensure higher magnitude events and overflows from rainwater harvesting arrangements will be managed at source.	✓

Climate Change Allowances

6.20. The NPPF and PPG place emphasis on the need to fully consider – and design for – the impacts of climate change as set out in the planning guidance. The potential increase in peak rainfall intensity needs to be considered in the surface water drainage strategy for new developments.

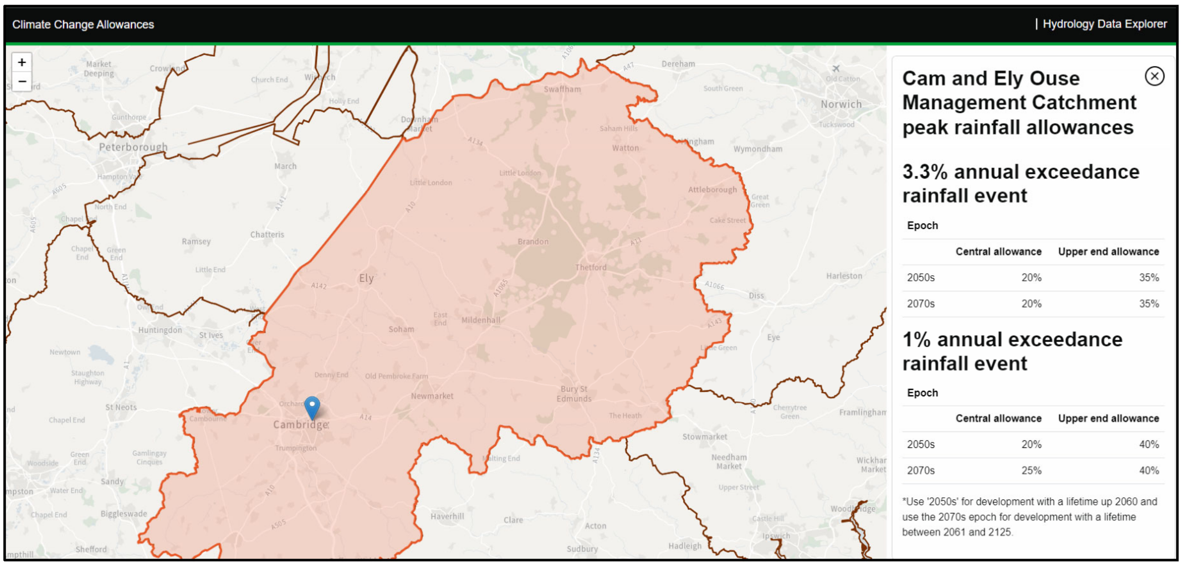
6.21. The EA's online *Guidance Flood risk assessments: climate change allowances* (2022) states to consider development to have a minimum lifetime of a 100 years.

6.22. The proposed surface water drainage strategy should be designed so that for the upper end allowance in the 3.3% and 1% annual exceedance probability event:

- There is no increase in flood risk elsewhere
- The Proposed Development will be safe from surface water flooding

6.23. As shown in Figure 15, the Site is located within the Cam and Ely Ouse Management Catchment. Therefore, for the 3.3% Annual Exceedance Event (AEP) climate change factor is 35% and for the 1% AEP (1 in 100-year AEP) the climate change factor to be used is 40%. This is also in line with the CCoC LLFA *Surface Water Planning Guidance (2024).*

Figure 15: Climate change allowances for the Site (EA, 2024).



Proposed Catchment Areas and Maximum Discharge Rate

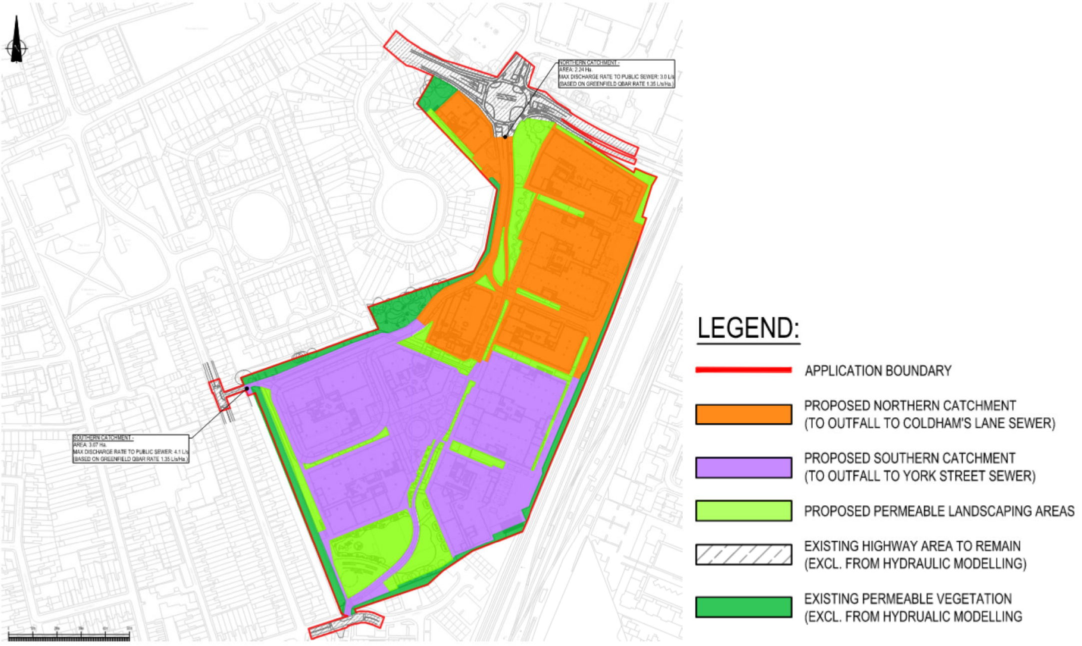
6.24. An extract of the proposed catchment area plan is shown in Figure 16 and refer to Appendix F for full drawing *17469-WAT-OTT-XX-DR-C-920509- Proposed Surface Water Catchment Layout.* The Proposed Development includes a full application Site boundary area of 7.85 Ha, with a total proposed impermeable area of 5.31 Ha, which includes all the building roof areas and public realm / private roads/ footways/ cycleways.

6.25. The Site is split into two catchments, the Northern catchment (2.24 Ha) and Southern catchment (3.07 Ha), which discharge to Coldham's Lane and York Street respectively.

6.26. It should be noted that;

- The existing public highway areas (Coldham's Lane junction roundabout, Sleaford Street and York Street junctions) are to be retained and maintain their existing drainage regime. The application will involve some relining of kerbing and lane directions, with replacement of any drainage features such as gullys as required.
- Existing trees and hedges along the Site boundary are to be retained. The areas have been excluded from hydraulic calculations as it will retain existing drainage regime and assumed to be 100% permeable.
- The proposed roof runoff is assumed to be 100% impermeable but should be noted there are areas of green roof which have not been included in the hydraulic model and attenuation calculations but will provide water quality benefits and increase the time of concentration for these areas.

Figure 16: Extract of proposed catchment layout.



6.27. Based on the impermeable area of each catchment, the respective maximum discharge rates for each catchment are;

- Northern catchment – impermeable area 2.24 Ha, therefore using the equivalent greenfield QBAR rate of 1.35 l/s/ha, this would be a maximum discharge rate of 3.0 L/s to the public surface water sewer at Coldham's Lane
- Southern catchment – impermeable area 3.07 Ha, therefore using the equivalent greenfield QBAR rate of 1.35 l/s/ha, this would be a maximum discharge rate of 4.1 L/s to the public surface water sewer at York Street

6.28. As noted previously, the total existing discharge rate for the QBAR (1–2-year event) is 365.4 L/s into the existing Anglian Water sewers from the Site. The proposed total QBAR rate is now 7.1 L/s, therefore this will be a betterment of 98% and thus significantly reducing the likelihood of downstream flooding and an improvement to the capacity of the local drainage network for the surrounding areas.

Summary of Design Parameters and Results

6.29. The proposed surface water drainage system would be designed to convey surface water only, with foul water being discharged separately. The design would be in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings, BS EN 12056 – Gravity Drainage Systems Inside Buildings, and Approved Document H of Building Regulations.

6.30. In accordance with the requirements of the NPPF, Local Plan policies, and SFRA guidance, 'post development' runoff rates will be restricted to those rates generated by the 'pre-developed' site, or less, for up to and including the critical 1% annual probability storm event taking into account the impacts of climate change (applied as a 40% uplift in peak rainfall intensity) for the lifetime of the development.

6.31. A suite of SuDS measures have been proposed to manage runoff at source and improve water quality and biodiversity post-development.

6.32. With additional areas of proposed soft landscaping such as rain gardens, tree pits and informal usable space, the existing impermeable catchment contributing surface water runoff to the drainage network will be reduced post-development.

6.33. A summary of the design parameters and policy references can be found in Table 7 below.

Table 7 Summary of design and modelling parameters.

Parameter	Design Value	Related Guidance / Policy
Modelling Software	Autodesk InfoDrainage	Not applicable. Note, latest drainage modelling package which allows use of FEH2022.
Design rainfall input	FEH2022	CCoC LLFA *Surface Water Planning Guidance (2024)*.
Design storm for attenuation requirements	1 in 100 years	CCoC LLFA *Surface Water Planning Guidance (2024)*.
Additional allowance for climate change	40%	EA Climate Change Guidance CCoC LLFA *Surface Water Planning Guidance (2024)*.
CV value	1.0	CCoC LLFA *Surface Water Planning Guidance (2024)*. As shown in the Proposed Drainage Results in Appendix F, all 'Inflows' (catchments) are set to 1.0.
Maximum discharge rate	QBAR greenfield	CCoC LLFA *Surface Water Planning Guidance (2024)*. A Simple Flow Control manhole is proposed to restrict the Site peak flow rate to equivalent greenfield QBAR.

6.34. An extract of the proposed surface water drainage layout is shown in Figure 17 and the full drawing *17469-WAT-OTT-XX-DR-C-920510-P02- Proposed Drainage Layout* can be found in Appendix F. The Infodrainage summary of SuDS features (referred to as stormwater controls in the software) are presented in Table 8.

6.35. Note:

- Blue roofs assumed to have crated system with 95% void ratio and 100mm deep. As noted on Proposed Drainage Layout, hydraulic modelling based on blue roof providing flow restriction before entering sitewide network.
- Rain gardens utilise ponding storage and gravel attenuation layer (30% void ratio). Refer to InfoDrainage modelling for depths used in Appendix G Proposed Modelling and Calculations.
- Below ground attenuation tanks assumed to have crated system with 95% void ratio with minimum 1m cover to ground level.
- Permeable paving assumed to have 30% void ratio gravel and designed to be non-

infiltrating (lined with impermeable membrane).

- For full extents of surface finishes and soft landscaping refer to Landscape Statement and Design Access Statement.
- Design volumes subject to review at detailed design following development of final surface levels.

Figure 17: Extract of proposed surface water layout.

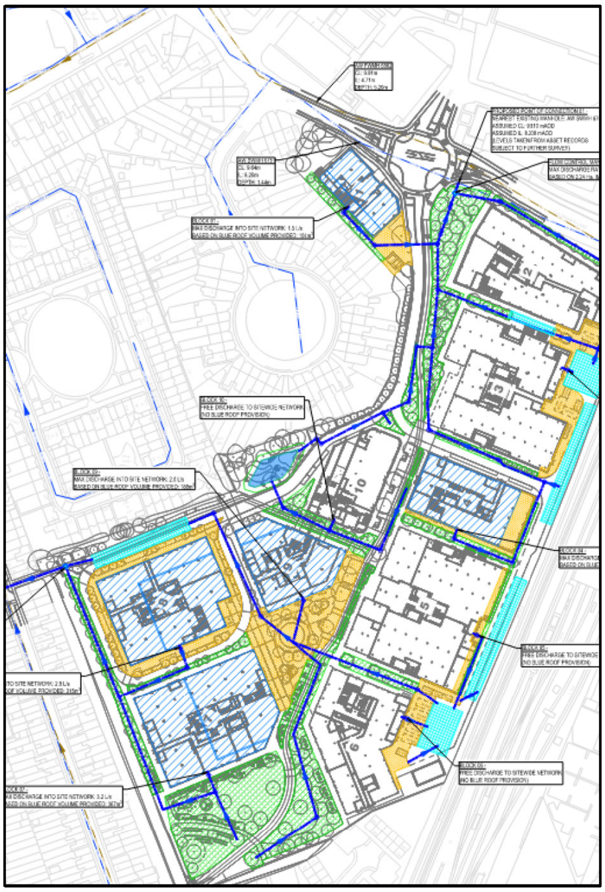


Table 8 Summary of stormwater controls (SuDS) and design volumes.

SuDS Feature (Stormwater Control)	DESIGN VOLUMES		
	Northern Catchment	Southern Catchment	Total Attenuation
Blue Roofs	284	870	1,154
Rain Gardens	3,423	3,675	7,098
Below Ground Attenuation Tanks	891	1,188	2,079
Permeable Paving	874	1,632	2,506
Detention Basin	626	-	626
	6,098	**7,365**	**13,463**

6.36. A network analysis was completed for the 1 in 2 year, 1 in 30 year plus 35% climate change and 1 in 100 year plus 40% climate change rainfall return periods, the Infodrainage summary report can be found in Appendix G. There was no flooding in any events with some surcharging in sewers in the 1 in 100 year plus 40% climate change event, however as noted in the results summary, all stormwater contols had additional capacity in all design events therefore able to accommodate exceedance events.

Outfall Details

6.37. As noted previously, the Site will have two catchments and each will have its respective outfall, one at the northern end of the Site, Coldham's Lane and one at the southern end at York Street.

6.38. The northern connection point to the Anglian Water surface water sewer is downstream of Manhole 6751. The cover level and invert level of the connection point are subject to further survey works and indicative levels have been interpolated from asset records.

6.39. The southern connection point to the Anglian Water surface water sewer is upstream of Manhole 3652. The cover level and invert level of the connection point are subject to further survey works and indicative levels have been interpolated from asset records.

6.40. Both connection points are subject to approval with Anglian Water Predevelopment Enquiry and Section 106 Sewer Connection Agreement.

6.41. A pre-development enquiry was submitted to Anglian Water 16th July 2024, they have confirmed there is capacity for the Proposed Development (approval given 5th August 2024 InFlow Reference PPE-021139). Refer to Appendix H for full correspondence.

Non-Technical Summary

6.42. The surface water drainage strategy developed by WIE can be summarised as follow:

- Where demand and practical considerations allow, harvested water will be filtered, treated and re-used for WC flushing within the Site, and for irrigation of soft landscaping within the public realm. Note, the rainwater harvesting will provide a betterment to the site-drainage system providing additional storage however the surface water drainage strategy outlined in this report does not utilise the rainwater harvesting attenuation volume as a conservative approach.
- Office blocks will have blue roofs to provide attenuation and restrict flows entering the sitewide network
- External areas of public realm, and lightly trafficked areas will be formed from permeable paving with permeable subgrade allowing disposal of runoff to perforated pipes which will connect to the main surface water network. The permeable paving will be lined with an impermeable membrane to prevent any surface water entering the ground water system.
- Flow control will be provided to ensure that excess surface water runoff is released in a managed and controlled manner for design storm events taking into account future climate change allowances.
- Post-development surface water runoff rates and discharge volumes are considerably less than for the existing site in line with Local Plan Policy 32. BREEAM sustainability aspirations, provision of a suite of on-site SuDS measures within the landscape will seek to control flow to pre-development 'greenfield' runoff rates, achieving a 98% betterment in flow rates post-development.

- Water quality benefits will be gained via integration of multiple treatment trains, including filter media, green roofs, rain gardens, and permeable paving. These are discussed in detail in the next Section.
- Autodesk Infodrainage was used for drainage calculations for hydraulic modelling. FEH22 rainfall data was procured and used in the model and design parameters for the Hydraulic Calculations were taken from the CCoC LLFA *Surface Water Planning Guidance (2024).*

Exceedance Routes

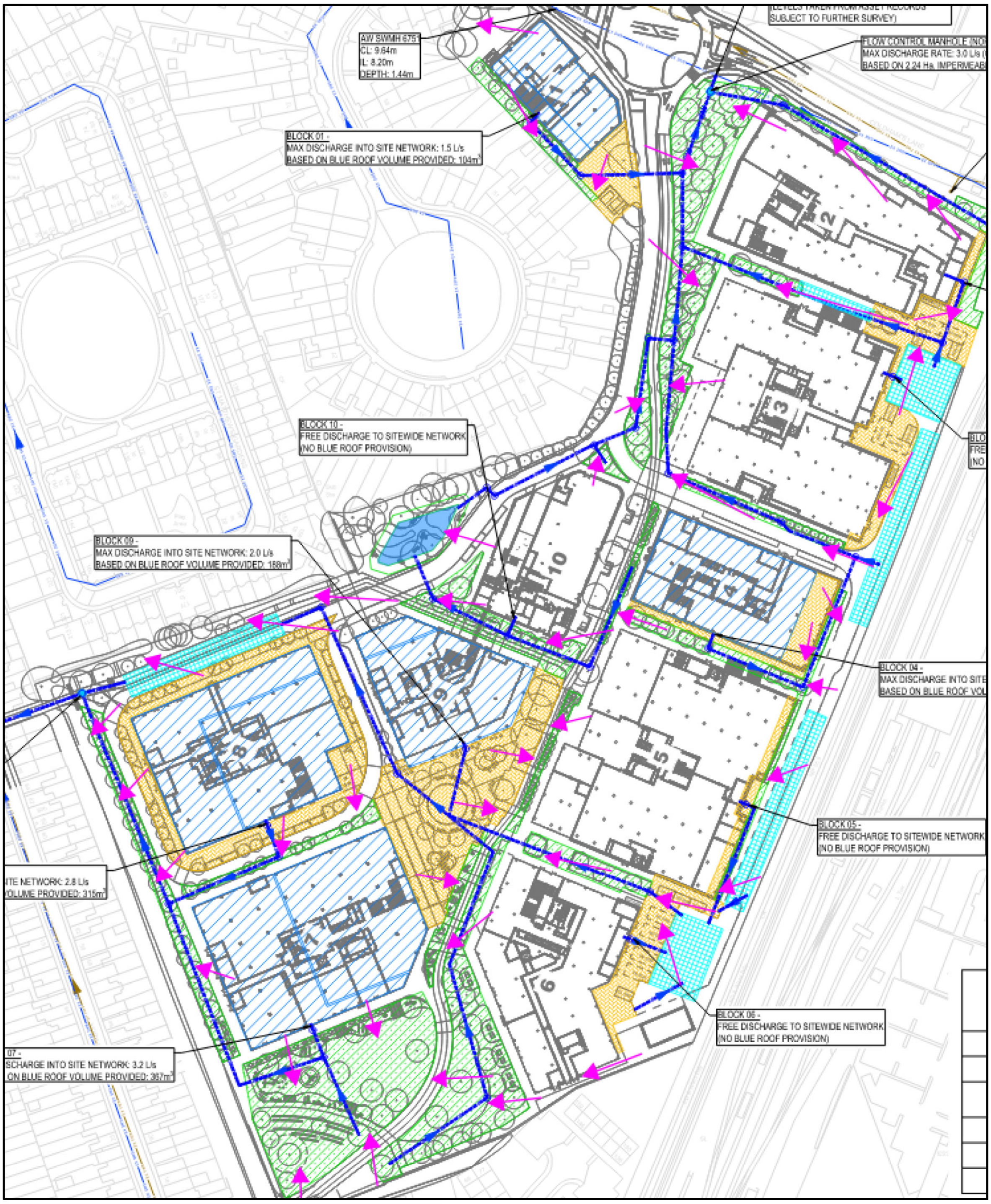
6.43. In the unlikely event of a severe blockage in the local drainage system or a storm greater than the 1 in 100 year plus 40% climate change design storm, the proposed drainage system could exceed its capacity and overflow. These exceedance flow routes, and flooded areas must be managed to minimise risks to the development and adjacent areas.

6.44. From the ground levels in the topographical survey and proposed cover levels of the drainage network manholes, flood water would flow towards the boundaries of the Site where there is extensive existing vegetation buffers, away from the building premises, whilst passing through the proposed soft landscaping areas.

6.45. There are also extensive planting areas across the plots therefore all flows that are directed towards these areas will increase the time of concentration for surface water runoff to the sewerage systems and minimise surface water runoff leaving the Site, as depicted in Figure 18.

6.46. It should also be noted, as demonstrated in hydraulic results, there is additional capacity in all the SuDS features proposed in each critical event, therefore the proposed surface water network will be able to withstand an event greater than the design event of 1 in 100 years plus 40% climate change.

Figure 18: Exceedance flow paths following topography of site and directed towards soft landscaping areas away from building premises.



7. Water Quality Management Train and Simple Index Assessment

7.1. The risk posed by surface water runoff to the receiving environment is a function of:

- The pollution hazard at a particular site (i.e., the pollutant source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels, (i.e., the pollutant pathway).
- The sensitivity of the receiving environment (i.e., the environment receptor).

7.2. The CIRIA C753 SuDS Manual, Table 26.1 suggests a Simple Index Approach for low-risk developments, which follows a three-step process, namely:

- Allocate suitable pollution hazard indices for the proposed land use.
- Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index.
- Where the discharge is protected surface waters or groundwater, consider the need for a more precautionary approach.

7.3. To successfully deliver adequate treatment, the chosen SuDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index.

7.4. Where the mitigation index of an individual components is insufficient, two components (or more) in series will be required, where: Total SuDS mitigation index = mitigation index1 + 0.5(mitigation index)

7.5. The Simple Index Approach states that if the land use varies across the “runoff area”, either:

- Use the land use type with the highest pollution hazard index
- Apply the approach for each of the land use types to determine whether the proposed SuDS design is sufficient for all.

Pollution Hazard Indices

7.6. Pollution hazard indices for the various land uses are summarised in Table 9, reproduced from Table 26.2 in CIRIA C753). The Proposed Development includes commercial (offices) roofs and non-residential roads / parking, therefore would have a medium pollution hazard level. However, as there may be delivery LGVs & HGVs, it is best practice to take the worst case hazard so *High* pollution hazard level for the Proposed Development.

Table 9: Pollution hazard indices for different land use classifications (CIRIA, 2015).

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Liquid Hydrocarbons (Free Floating Oils)
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (commercial / industrial roofs)	Low	0.3	0.2 – 0.8	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Liquid Hydrocarbons (Free Floating Oils)
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

Pollution Mitigation Indices

7.7. The SuDS strategy for the proposed Development will include open SuDS and permeable paving to provide water quality uplift in accordance with the CIRIA C753 SuDS manual.

7.8. The pollution mitigation indices for different SuDS components are shown in Table 10 (reproduced from Table 26.3 in CIRIA C753).

Table 10: Indicative SuDS mitigation indices for discharge to surface water (CIRIA, 2015).

Type of SuDS Component	TSS	Metals	Liquid Hydrocarbons
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention System	0.8	0.8	0.8
Permeable Pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.		

Notes

- *SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.*
- *Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be considered during the design of the maintenance plan.*
- *Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.*

The Proposed Management Train

7.9. A SuDS Management Train is a robust pollutant removal strategy. Using a number of different SuDS components in series will help target a good range of particulate-bound and dissolved pollutants, will deliver gradual improvement in water quality and will act as a buffer for accidental spills and intermittent high pollutant loads.

7.10. Where two components (or more) in series are utilised for the Site, the

Total SuDS mitigation index = mitigation index1 + 0.5(mitigation index)

Note, a factor of 0.5 is used to account for the reduced performance of secondary or tertiary components associated with already reduced inflow concentrations.

7.11. To successfully deliver adequate treatment, the chosen SuDS components should have a total pollution mitigation index that equals or exceeds the pollution hazard index for each contaminant type. As demonstrated in Table 11, the proposed management train is sufficient for the land uses proposed and the total SuDS mitigation index is greater than the hazard index for each contaminant type.

Table 11: Summary of simple index approach assessment for roofs and highway catchments.

Land-use Classification	**Pollution Hazard Indices**		
	TSS	Metals	Hydrocarbons
Commercial Roof Catchment Public Realm Catchment retail (Medium pollution hazard level)	0.7	0.6	0.7
Non-residential parking (retail / offices) and delivery vehicles HGVS / Vans (High pollution hazard level)	0.8	0.8	0.8
SuDS Components	Pollution Mitigation Indices		
	TSS	Metals	Hydrocarbons
Permeable paving (not designed for infiltration)	0.7	0.6	0.7
Bioretention System*	0.4	0.4	0.4
Total Mitigation	1.1	1.0	1.1
Sufficiency of Water Treatment	1.1 > 0.7 Sufficient for Medium Hazard level	1.0 > 0.6 Sufficient for Medium Hazard level	1.1 > 0.7 Sufficient for Medium Hazard level
	1.1 > 0.8 Sufficient for High Hazard level	1.1 > 0.8 Sufficient for High Hazard level	1.1 > 0.8 Sufficient for High Hazard level

** Pollution mitigation index reduced by factor of 0.5*

7.12. Sediment should be removed as far upstream in the drainage system as possible. Sediment control components that are located close to the runoff surface allow sediment build-up to occur gradually in dry features and at shallow depths, facilitating the breakdown and degradation of the organic particulates and straightforward and cost-effective sediment removal. Sediment trapping provides important removal of a range of contaminants that are adsorbed onto sediment surfaces and upstream sediment controls protect downstream components from damage or poor performance due to sediment build-up either on the surface or within subsurface media or soils. All road gullies will be specified to have silt traps to provide suitable measures against silt and sediment buildup downstream in the network of bioretention systems.

8. Proposed Foul Water Drainage Strategy

Design Principles

8.1. The proposed foul drainage would be designed in accordance with BS EN 752 – Drain and Sewer Systems Outside Buildings, BS EN 12056 – Gravity Drainage Systems Inside Buildings, and Approved Document H of Building Regulations.

8.2. Gravity discharge of foul flows towards the Coldham's Lane public foul sewer network is targeted as part of the Proposed Development, seeking to minimise the reliance upon pumping of flows to the Sleaford Street public sewer network. Localised 'sump pump' arrangements would be specified as part of the M&E strategy to serve localised lower ground floor areas, where appropriate.

8.3. An alternative option proposed is a discharge point at York Street, subject to final MEP design and outfall locations of each plot, the sitewide foul drainage can discharge to two locations similarly to the surface water strategy.

Capacity Existing Network

8.4. A pre-development enquiry was submitted to Anglian Water 16th July 2024, they have confirmed there is capacity for the Proposed Development (approval given 5th August 2024 InFlow Reference PPE-0211319). Refer to Appendix H for full correspondence.

8.5. New connections made to the public sewer system would be made through a Section 106 New Sewer Connection Agreement with Anglian Water, under the Water Industry Act 1991. This should be completed at the next stage of design post determination.

8.6. Note, consultations with Anglian Water highlighted trade effluent (waste from the lab blocks) would need to be discussed at a later stage, as to complete their capacity assessment they would require finalised tenant information (such as tenant name, lab use, waste type, quantities per day, and operating times) therefore for this Outline application, only *domestic* (office) waste was considered.