

## TECHNICAL NOTE

**Job Name:** Citroen Site, Capital Interchange Way, Brentford

**Job No:** 38397

**Note No:** 38397-TN-02

**Date:** 23/04/2018

**Prepared By:** CA

**Subject:** PBA Response to the London Borough of Hounslow's (LBH) and Greater London Authority's (GLA) comments concerning drainage and flood risk.

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### 1.1 Introduction

This Technical Note (TN) has been prepared by Peter Brett Associates (PBA) in relation to the Citroen Site, Capital Interchange Way, Brentford, TW8 0EX. PBA produced a Flood Risk Assessment (FRA) and Surface Water Management Strategy (October 2017) , to accompany the planning application for the redevelopment of the above site (Ref:01508/A/P6).

The LB Hounslow resolved to refuse permission for this application on 16 February 2018. The 5<sup>th</sup> reason for refusal referred to the proposed drainage strategy. Following this, the GLA's Stage II report made reference to the Council's reason for refusal.

This TN has been prepared to address LBH's reason for refusal with respect to drainage and flood risk (ref: LBH's Delegated Report Section 13.1) and subsequent comments made by the GLA (ref: GLA Stage II Report dated 26<sup>th</sup> February. Para.45).

### 1.2 Comments by LBH and GLA

#### 1.2.1 LBH 5<sup>th</sup> reason for refusal(taken from LB Hounslow's delegated report)

**Reason 5** *The development is required to appropriately mitigate its impacts in respect of sustainable design and drainage. The information provided in supporting documentation is insufficient to determine that the development would satisfy the provisions of London Plan policies 5.3 (Sustainable design and construction) and 5.13 (Sustainable drainage) and policy EQ2 (Sustainable design and construction) of the London Borough of Hounslow Local Plan."*

#### 1.2.2 LBH's flood risk officer comments on Water Resources, Flood Risk and Drainage (taken from LB Hounslow's delegated report)

**Paragraph 7.214** *The Council's Flood Risk Management Consultant has commented that there is insufficient evidence submitted with the application to demonstrate how the site can, or cannot, incorporate smaller above ground SuDS features within the development in accordance with the drainage hierarchy*

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in LP policy 5.13, and there is similarly limited justification as to why runoff rates cannot be restricted to, or as close to, greenfield runoff rates in line with this policy.

**Paragraph 7.215** In addition, the proposed discharge rates and volumes refer to the drainage calculations in Appendix F of the Flood Risk Assessment ("FRA"); however, there are no calculations in the submitted FRA, therefore no evidence has been submitted to demonstrate the achievement of the Non-Technical Standards for SuDS S7 and S8.

### 1.2.3 GLA Stage II Report: Comments on Climate change (dated 26<sup>th</sup> February 2018)

**Paragraph 45** At consultation stage, the applicant was requested to investigate further design measures to reduce overheating, provide further details regarding the on-site heat network and energy centre. The Council also cite concerns over the drainage strategy in the fifth reason for refusal. Should the Mayor take over the determination of the application, GLA officers will work with the applicant to address the outstanding matters, to ensure compliance with London Plan Policies 5.2 and 5.13 and draft London Plan Policies SI2 and SI13.

## 1.3 PBA Responses

PBA has undertaken the FRA for the site and developed the outline surface water strategy, which is also presented in the Flood Risk Assessment and Surface Water Management Strategy dated October 2017. In response to the queries raised by LBH and GLA, relevant information from the FRA has been summarised below. Where appropriate, references are provided to appropriate sections of the FRA for further details. This note should therefore be read in conjunction with the information referenced.

### 1.3.1 Response to LBH 5<sup>th</sup> reason for refusal

In response to the LBH's Reason 5 for refusal, details of the relevant policies have also been provided below.

Policy	PBA Response in Relation to the Flood Risk and Surface Water Strategy	
<b>LONDON PLAN - POLICY 5.3 SUSTAINABLE DESIGN AND CONSTRUCTION</b> Strategic A. The highest standards of sustainable design and construction should be achieved in London to improve the environmental performance of new developments and to adapt to the effects of climate change over their lifetime. Planning decisions B. Development proposals should demonstrate that sustainable design standards are integral to the proposal,	A Flood Risk Assessment (FRA) has been undertaken for the site as a part of the planning application process. The site located in Flood Zone 1, which is the lowest risk category and therefore appropriate for a residential development.  Please refer to Section 3 of the FRA and Surface Water Management Strategy report for further details of the flood risk from various sources. Summary of the risks assessed are provided below.	
	Source of Flooding	Risk of Flooding to Site

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<p>including its construction and operation, and ensure that they are considered at the beginning of the design process.</p> <p>C. Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:</p> <ul style="list-style-type: none"> <li>a) minimising carbon dioxide emissions across the site, including the building and services (such as heating and cooling systems)</li> <li>b) avoiding internal overheating and contributing to the urban heat island effect</li> <li>c) efficient use of natural resources (including water), including making the most of natural systems both within and around buildings</li> <li>d) minimising pollution (including noise, air and urban runoff)</li> <li>e) minimising the generation of waste and maximising reuse or recycling</li> <li>f) <b>avoiding impacts from natural hazards (including flooding)</b></li> <li>g) ensuring developments are comfortable and secure for users, including avoiding the creation of adverse local climatic conditions</li> <li>h) securing sustainable procurement of materials, using local supplies where feasible, and</li> <li>i) promoting and protecting biodiversity and green infrastructure.</li> </ul> <p>LDF preparation</p> <p>D. Within LDFs boroughs should consider the need to develop more detailed policies and proposals based on the sustainable design principles outlined above and those which are outlined in the Mayor's supplementary planning guidance that are specific to their local circumstances.</p>	<table border="1"> <tr> <td>Tidal</td><td>Low/Negligible Risk</td></tr> <tr> <td>Fluvial</td><td>Low/Negligible Risk</td></tr> <tr> <td>Land Drainage (i.e. Surface Water/ Pluvial)</td><td>Low/Negligible Risk</td></tr> <tr> <td>Ground water</td><td>Medium Risk – Issue requires consideration but not a significant constraint to development</td></tr> <tr> <td>Reservoir, Canals, Ponds and Other Artificial Sources</td><td>Low/Negligible Risk</td></tr> <tr> <td>Sewers and Water Mains</td><td>Low/Negligible Risk</td></tr> </table>	Tidal	Low/Negligible Risk	Fluvial	Low/Negligible Risk	Land Drainage (i.e. Surface Water/ Pluvial)	Low/Negligible Risk	Ground water	Medium Risk – Issue requires consideration but not a significant constraint to development	Reservoir, Canals, Ponds and Other Artificial Sources	Low/Negligible Risk	Sewers and Water Mains	Low/Negligible Risk
Tidal	Low/Negligible Risk												
Fluvial	Low/Negligible Risk												
Land Drainage (i.e. Surface Water/ Pluvial)	Low/Negligible Risk												
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Reservoir, Canals, Ponds and Other Artificial Sources	Low/Negligible Risk												
Sewers and Water Mains	Low/Negligible Risk												
<p><b>LONDON PLAN - POLICY 5.13 SUSTAINABLE DRAINAGE</b> Planning decisions</p>	<p>The drainage layout has been developed following prevailing National, Regional and Local policy requirements. See Section 6 of the FRA report for further details. How the drainage strategy is developed using the sustainable drainage hierarchy is detailed below in the next section of this Table, which shows an extract from the FRA report.</p> <p>Flood risk is mitigated by providing a surface water drainage strategy that was developed based on a 1 in 100year rainfall event plus 40% allowance for climate change. Onsite attenuation is provided within permeable paving and below ground grate system to restrict the surface water discharge to three times greenfield rate.</p> <p>Table 6.1 of the report provided the comments in relation to the items in the drainage hierarchy. An extract is provided below for reference.</p>												

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<p>A. <i>Development should utilise sustainable urban drainage systems (SUDS) unless there are practical reasons for not doing so, and should aim to achieve greenfield run-off rates and ensure that surface water run-off is managed as close to its source as possible in line with the following drainage hierarchy:</i></p> <ol style="list-style-type: none"> <li><i>store rainwater for later use</i></li> <li><i>use infiltration techniques, such as porous surfaces in non-clay areas</i></li> <li><i>attenuate rainwater in ponds or open water features for gradual release</i></li> <li><i>attenuate rainwater by storing in tanks or sealed water features for gradual release</i></li> <li><i>discharge rainwater direct to a watercourse</i></li> <li><i>discharge rainwater to a surface water sewer/drain</i></li> <li><i>discharge rainwater to the combined sewer.</i></li> </ol> <p><i>Drainage should be designed and implemented in ways that deliver other policy objectives of this Plan, including water use efficiency and quality, biodiversity, amenity and recreation.</i></p> <p><i>LDF preparation</i></p> <p>B. <i>Within LDFs boroughs should, in line with the Flood and Water Management Act 2010, utilise Surface Water Management Plans to identify areas where there are particular surface water management issues and develop actions and policy approaches aimed at reducing these risks.</i></p>	Hierarchy Ref.	Consideration
	1	The use of rainwater harvesting is to be considered at the detailed design stage but it is unlikely to provide the required attenuation volume and negate the need for a positive drainage system.
	2	Whilst the site is underlain by the Kempton Gravel Formation, the underlying strata is prone to high groundwater levels with historic records of groundwater flooding in the vicinity of the site. On this basis, the use of infiltration techniques is not considered feasible.
	3	Due to space constraints on-site, the use of large open water features is not considered feasible.
	4	The surface water attenuation volume is proposed to be provided on site by crate-based attenuation tank systems and oversize pipes. Permeable paving areas with connections to the wider drainage network is proposed for the access road area and adjacent parking bays. The extent of the permeable paving, depth of the sub-base and the connection points to the drainage network are to be further detailed at the next design stage. Flow control devices will be used to restrict the discharge from the site to three times the greenfield rate which offers considerable betterment compared to the existing status. Green roofs are proposed at podium level.
	5	Due to distance to the nearest watercourse, this option is not feasible.
	6	The surface water will be discharged to the surface water sewer located in Capital Interchange Way. Although the current TWUL asset records do not show these, correspondence with TWUL have indicated that these are assets owned by TWUL which are not yet captured on their records.
	7	n/a

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### **LONDON BOROUGH OF HOUNSLOW'S LOCAL PLAN - POLICY EQ3 FLOOD RISK AND SURFACE WATER MANAGEMENT**

- *We will achieve this by:*
  - a) ***Using the sequential and exceptions tests to inform planning decisions in flood risk areas to ensure inappropriate development is avoided;***
  - b) ***Promoting improved surface water drainage across the borough, by working with partners to identify, manage and reduce the risk of surface water flooding;***
  - c) *Promoting the opening up of river corridors and making space for water through the creation of buffer zones to watercourses and increasing floodplain connectivity;*
  - d) *Working with partners to ensure the provision and maintenance of flood defences, in line with the Infrastructure Delivery Plan;*
  - e) *Encouraging the take-up of opportunities to improve flood resistance and resilience in the borough's existing built environment, including drainage improvements, flood guards and raising electrical sockets and other vulnerable fittings; and,*
  - f) *Working with the Environment Agency to implement actions of the Thames Estuary 2100 plan.*
- *We will expect development proposals to:*
  - g) ***Prepare flood risk assessments, consistent with the requirements of the Environment Agency and the Strategic Flood Risk Assessment, and apply the sequential approach within site boundaries to ensure flood risk is further decreased;***

In line with the Local Plan requirements, the flood risk has been assessed for the site and Section 5 of the FRA report provides further details about the Sequential Test. See extract of the report for information.

*"5.2.4 For the purposes of this assessment, the proposed use for residential development fall within the 'More Vulnerable' classification whilst the flexible use spaces fall within the 'Less Vulnerable' classification. A NPPF Sequential Test is not required as the site is located within Flood Zone 1 (defined as a 'Low' probability of flooding) and is therefore sequentially preferable. According to NPPG Table 3, 'More Vulnerable' and 'Less Vulnerable' uses are considered appropriate for Flood Zone 1 without the need to apply the Exception Test."*

In accordance with the latest EA's Climate Change Guidance (2016) the outline surface water drainage design includes 40% climate change allowance in the attenuation storage calculations. See Appendix A of this note for further calculation information.

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<p>h) <i>Incorporate necessary flood resistance and resilience measures, including ensuring that adequate flood defences are in place and maintained through the lifetime of the development;</i></p> <p>i) <b><i>Incorporate sustainable drainage systems and avoid non-permeable hard standings with the aim of achieving greenfield runoff rates and being consistent with the Surface Water Management Plan;</i></b></p> <p>j) <i>Where adjacent to the River Thames, demonstrate that they will not preclude future rising or set back of the defence as identified in the Thames Estuary 2100 Plan to ensure adequate flood protection of the lifetime of the development.</i></p>	
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### 1.3.2 Response to LBH's flood risk officer comments on Water Resources, Flood Risk and Drainage

Comment	PBA Response in Relation to the Flood Risk and Surface Water Strategy
<p>Insufficient evidence submitted to demonstrate how the site can, or cannot, incorporate smaller above ground SuDS features within the development in accordance with the London Plan Policy 5.13's drainage hierarchy.</p>	<p>The SuDS features for the scheme have been developed in conjunction with the wider landscape strategy. The site offers limited scope for open SuDS features due to the building layout and access arrangements. The limited infiltration potential also prevents including extensive SuDS features which will require infiltration to the ground.</p> <p>The developer's aspiration is to utilise the main square area as a market space, hence restricting the surface finishes required for this area. There is limited scope to accommodate rain gardens and bio retention areas to the boundary of the buildings.</p> <p>The proposed landscape layout currently shows soft landscaping around the peripheries of the site.</p> <p>When undertaking drainage calculations, it is best practice not to include the storage available in these type of SuDS features to provide a conservative design.</p>
<p>Limited justification as to why runoff rates cannot be restricted to, or as close to, greenfield runoff rates in line with the London Plan Policy 5.13.</p>	<p>The site is an existing brownfield site. As a part of the proposals, the surface water drainage is restricted to three times greenfield rate in line with London Plan Sustainable Design and Construction Supplementary Planning Guidance (April 2014). The proposals offer significant betterment from the existing situation.</p> <p>Paragraph 3.4.9 of the London Plan Sustainable Design and Construction Supplementary Planning Guidance (April 2014) which states that '<i>There may be situations where it is not appropriate to discharge at greenfield runoff rates. These include, for example, sites where the calculated greenfield runoff rate is extremely low and the final outfall of a piped system required to achieve this would be prone to blockage. An appropriate minimum discharge rate would be 5 litres per second per outfall.</i></p> <p>Paragraph 3.4.10 of the London Plan Sustainable Design and Construction Supplementary Planning Guidance (April 2014) which states that '<i>All developments on greenfield sites must maintain greenfield runoff rates. On previously developed sites, runoff rates should not be more than three times the calculated greenfield rate. The only exceptions to this, where greater discharge rates may be acceptable,</i></p>



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	<p><i>are where a pumped discharge would be required to meet the standards or where surface water drainage is to tidal waters and therefore would be able to discharge at unrestricted rates provided unacceptable scour would not result.'</i></p> <p>Due to the limited space available for attenuation, the propped rate, equivalent to three times the greenfield rate, is the lowest rate the discharge from the site can be restricted to</p>
The proposed discharge rates and volumes refer to the drainage calculations in Appendix F of the FRA. However, there are no calculations in the submitted FRA, therefore no evidence has been submitted to demonstrate the achievement of the Non-Technical Standards for SuDS S7 and S8.	Please find calculations enclosed in Appendix A of this TN.

### 1.3.3 Response to GLA Comments on Climate change

Response to the LBH's 5<sup>th</sup> reason for refusal is provided in Section 1.3.1 above. The principles and the drainage hierarchy advocated in the Draft London Plan Policy S113 are in line with the existing Policy 5.13 to which a response has been provided in Section 1.3.1 above.



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### Appendix A – Calculations

#### Existing run-off rates

##### Summary of Results for 15 minute 1 year Winter I+0%

Pipe Number	US/MH Name	Event	First (Y) Flood	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	15 minute 1 year Winter I+0%		10.000	9.222	-0.778	0.000	0.11		139.7	OK
1.001	2	15 minute 1 year Winter I+0%		10.000	9.089	-0.778	0.000	0.11		139.0	OK

##### Summary of Results for 15 minute 30 year Winter I+0%

Pipe Number	US/MH Name	Event	First (Y) Flood	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	15 minute 30 year Winter I+0%		10.000	9.417	-0.583	0.000	0.36		453.5	OK
1.001	2	15 minute 30 year Winter I+0%		10.000	9.285	-0.582	0.000	0.36		453.5	OK

##### Summary of Results for 15 minute 100 year Winter I+0%

Pipe Number	US/MH Name	Event	First (Y) Flood	US/CL (m)	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status
1.000	1	15 minute 100 year Winter I+0%		10.000	9.534	-0.466	0.000	0.56		692.0	OK
1.001	2	15 minute 100 year Winter I+0%		10.000	9.403	-0.464	0.000	0.56		692.5	OK

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### Greenfield runoff rate (ICP SUDS)

Rural Runoff Calculator

Micro Drainage

**ICP SUDS**

**ICP SUDS Input (FSR Method)**

Return Period (Years)

Area (ha)

SAAR (mm)

Soil

Growth Curve

**Partly Urbanised Catchment (QBAR)**

Urban

Region

**Results**

QBAR rural (l/s)

QBAR urban (l/s)

**Return Period Flood**

Region	QBAR (l/s)	Q (1 yrs) (l/s)	Q (30 yrs) (l/s)	Q (100 yrs) (l/s)
Region 1	5.2	4.4	7.9	8.9
Region 2	5.2	4.5	7.8	9.0
Region 3	5.2	4.5	7.9	8.4
Region 4	5.2	4.3	8.2	9.2
Region 5	5.2	4.5	9.3	11.0
Region 6/Region 7	5.2	4.4	9.0	10.4
Region 8	5.2	4.1	8.2	9.0
Region 9	5.2	4.6	7.7	8.4

OK Cancel Help

Enter Return Period between 1 and 1000

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Attenuation storage based on restricting the discharge to 3 x Greenfield runoff rate

**Quick Storage Estimate**

**Variables**

FEH Rainfall ▼ Cv (Summer) 0.750

Return Period (years) 100 Cv (Winter) 0.840

Site Location Impermable Area (ha) 0.920

GB 518950 178250 TQ 18950 7825 ... Maximum Allowable Discharge (l/s) 31.2

C (1km) -0.025 D3 (1km) 0.231 Infiltration Coefficient (m/hr) 0.00000

D1 (1km) 0.325 E (1km) 0.313 Safety Factor 2.0

D2 (1km) 0.267 F (1km) 2.515 Climate Change (%) 40

Analyse OK Cancel Help

Enter Climate Change between -100 and 600

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