

# STORMWATER AUDIT (STAGE 1)

JBA Project Code 2019s0833  
Contract Residential Development – Sector 3, Aiken’s Village, Stepside  
Client Kavanagh Burke  
Day, Date and Time 04/08/2022  
Author Michael O’Donoghue  
Subject **Stormwater Audit - Stage 1 Report**  
Revision **C03**



## 1 Proposed Residential Development, Ironborn, Sector 3, Aikens Village.

### 1.1 Introduction

JBA Consulting have been contracted by Kavanagh Burke (KB) to undertake a Stage 1 audit of the surface water drainage design for the proposed residential development at Sector 3, Aikens Village, Stepside, Dublin 18. The surface water audit was undertaken in advance of a planning submission.

Stormwater audits were previously completed for alternative layouts within this same site boundary. This audit includes the commentary on the previous iterations, as well as the latest layout for completeness. These comments are appended to this audit. The latest iteration is related to unit layout and has insignificant impact on the stormwater design.

The audit has been completed in accordance with Dún Laoghaire Rathdown County Council’s (DLRCC) Stormwater Audit Procedure as included in the DLRCC County Development Plan 2022-2028. The results of the audit are set out in the table below.

### 1.2 Stage 1 Audit

Design Parameter	Audit Result
Proposed Development	<p>The subject site is located at Aikens Village, Stepside, Dublin 18 and is a brownfield development.</p> <p>The proposed development will consist of:</p> <ul style="list-style-type: none"><li>• 438 nr apartments in 9 no. Blocks;</li><li>• 2 no. independent single level basements;</li><li>• Access Road.</li></ul> <p>The total subject site area (sub-catchment C) is stated to be 2.81 hectares (ha) with a corresponding impermeable area of 2.66 ha corresponding to a site impermeable factor of 94%.</p> <p>Drainage from sub-catchments A (2.922ha) and B (2.505ha) are drained through the subject site, total catchment area 8.24ha. Allowance is also made for the discharge of sub-catchment D (2.63Ha) but this development is not being assessed as part of this SWA.</p> <p>The subject of this Stage 1 stormwater audit is to review the proposed surface water drainage design and sustainable urban drainage system proposals for the proposed development.</p>
Relevant Studies/Documents	<p>The following documents were considered as part of this surface water audit:</p> <ul style="list-style-type: none"><li>• Greater Dublin Strategic Drainage Strategy (GSDSDS);</li><li>• Greater Dublin Regional Code of Practice for Drainage Works;</li><li>• The SUDs Manual (CIRIA C697).</li></ul>
Key Considerations & Benefits of SUDs	<p>The key benefits and objectives of SUDs considered as part of this audit and listed below include:</p> <ul style="list-style-type: none"><li>• Reduction of run-off rates;</li><li>• Provision of volume storage;</li><li>• Volume treatment provided;</li><li>• Reduction in volume run-off;</li><li>• Water quality improvement;</li><li>• Biodiversity.</li></ul>
Site Characteristics	<p><b>Soil:</b> Site infiltration tests undertaken on multiple soakaways have indicated that there</p>

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	<p>is no permeability on site and the groundwater is no more than 2m deep.</p> <p><b>Topography:</b>                  There is a natural fall in a southern direction towards Village Road where foul and storm services exist.</p> <p><b>Greenfield Runoff Rate (basis of surface water attenuation design):</b>                  The Greenfield Runoff Rate for the greater catchment (8.24ha) has been calculated by Kavanagh Burke using the Institute of Hydrology Report 124 (IH124) method for flood estimation on small catchments.</p> <table border="1" data-bbox="617 703 1088 766"> <tr> <td></td> <td><b>KB value</b></td> <td><b>JBA value</b></td> </tr> <tr> <td><b>Qbar:</b></td> <td><b>58.6 l/s</b></td> <td><b>58.60 l/s</b></td> </tr> </table> <p>Notwithstanding the above, the hydrobrake as fitted to the existing attenuation tank (volume of 1113m<sup>3</sup>) towards the southern boundary of sub-catchment C is controlling discharge to 53.3l/sec and will continue to be the rate of discharge going forward. Therefore, the discharge rate is slightly lower than Qbar.</p> <p><b>Calculations</b></p> <p>Additional attenuation volume of 1559m<sup>3</sup> is being provided by way of an underground RC tank to supplement the existing storage for the 1 in 100-year storm event + 20% climate change including for run-off from relevant green open spaces. This is sufficient storage for the developed area considering green and blue roofs are also provided.</p>		<b>KB value</b>	<b>JBA value</b>	<b>Qbar:</b>	<b>58.6 l/s</b>	<b>58.60 l/s</b>														
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<p>SUDs Measures Considered</p>	<p>Kavanagh Burke confirmed the following SUDs measures were considered and conclusions reached:</p> <table border="1" data-bbox="617 1228 1404 1879"> <thead> <tr> <th>SUDS Technology</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td><b>Green Roofs</b></td> <td>An extensive green blue roof is proposed for 70% of the total roof area for sub-catchment C.</td> </tr> <tr> <td><b>Blue Roofs</b></td> <td>An extensive green blue roof is proposed for 12,650m<sup>2</sup> of the roof area of sub-catchment C.</td> </tr> <tr> <td><b>Swale/ Filter Drain / Infiltration trench</b></td> <td>No swales or filter drains are proposed/required. An infiltration / interception trench on the northern side of apartment block E will intercept any overland flows from the central landscaped area and prevent overland flows from discharging off site unattenuated.</td> </tr> <tr> <td><b>Permeable Paving</b></td> <td>No applicable.</td> </tr> <tr> <td><b>Soakaways</b></td> <td>Ground conditions unsuitable, not applicable.</td> </tr> <tr> <td><b>Petrol Interceptor</b></td> <td>There is an existing petrol interceptor on the discharge pipe from the final attenuation tank.</td> </tr> <tr> <td><b>Other Sediment Management</b></td> <td>Surfsep screening is proposed upstream of the final attenuation tank to minimise silt and debris entering the system and to provide suitable points for regular maintenance.</td> </tr> <tr> <td><b>Surface Water Attenuation</b></td> <td>Attenuation will be provided by way of green / blue roofs, existing and proposed underground attenuation tanks. Full details to be agreed with the Local Authority.</td> </tr> <tr> <td><b>Site Run-off Rates</b></td> <td>The GSDS requires that the discharge rate equals the 1 year greenfield run-off rate in the 1</td> </tr> </tbody> </table>	SUDS Technology	Comments	<b>Green Roofs</b>	An extensive green blue roof is proposed for 70% of the total roof area for sub-catchment C.	<b>Blue Roofs</b>	An extensive green blue roof is proposed for 12,650m <sup>2</sup> of the roof area of sub-catchment C.	<b>Swale/ Filter Drain / Infiltration trench</b>	No swales or filter drains are proposed/required. An infiltration / interception trench on the northern side of apartment block E will intercept any overland flows from the central landscaped area and prevent overland flows from discharging off site unattenuated.	<b>Permeable Paving</b>	No applicable.	<b>Soakaways</b>	Ground conditions unsuitable, not applicable.	<b>Petrol Interceptor</b>	There is an existing petrol interceptor on the discharge pipe from the final attenuation tank.	<b>Other Sediment Management</b>	Surfsep screening is proposed upstream of the final attenuation tank to minimise silt and debris entering the system and to provide suitable points for regular maintenance.	<b>Surface Water Attenuation</b>	Attenuation will be provided by way of green / blue roofs, existing and proposed underground attenuation tanks. Full details to be agreed with the Local Authority.	<b>Site Run-off Rates</b>	The GSDS requires that the discharge rate equals the 1 year greenfield run-off rate in the 1
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	<p>year event and equals the 1 in 100 greenfield peak for the 1 in 100-year event. KB propose to limit discharge to less than Qbar for all storm events.</p> <p><b>Rainwater Harvesting</b> Considered but not proposed due to continuous maintenance requirements.</p> <p><b>Detention Basins, Retention Ponds, Stormwater Wetlands</b> Not required, attenuation strategy already from historical planning and subsequent development.</p>												
Surface Water Drainage Design	All surface water flows generated by the proposed development will be attenuated and discharged to an existing stormwater sewer network.												
SUDs Management Train	<p><b>Source Control</b> and <b>Site Control</b> are addressed by the use of green/blue roofs, infiltration (interception storage) and attenuation with outflow controlled by a Hydrobrake. Nominal infiltration, through the green/blue roof and construction of filtration / interception trench north of apartment Block E has been included in the design for interception storage. A petrol interceptor and silt trap are also incorporated into the design as a final level of treatment for all surface water generated within the development.</p> <p><b>Regional Control</b> does not apply at the level of this development.</p> <p>As recommended with the SUDs Manual (Table 3.3) assuming effective pre-treatment is in place the following number of treatment train components are recommended:</p> <table border="1" data-bbox="618 1113 1421 1581"> <thead> <tr> <th></th> <th>No. of treatment train components recommended</th> <th>Comment/Proposals</th> </tr> </thead> <tbody> <tr> <td>Roof areas</td> <td>1</td> <td>Green roof/blue roof + surfsep screening + petrol interceptor.</td> </tr> <tr> <td>Residential roads, parking areas, commercial zones</td> <td>2</td> <td>Not applicable</td> </tr> <tr> <td>Refuse collection, industrial areas, loading bays, lorry parks and highways.</td> <td>3</td> <td>Refuse collection is provided for within the basement and will not be exposed to the elements. Furthermore, basement drainage will be collected and pumped to the foul sewer system.</td> </tr> </tbody> </table> <p>A Hydrobrake and associated storage structure is provided for the attenuation of storm flows prior to discharge off-site.</p> <p>Generally, site proposals meet the treatment train recommendations within the SUDs Manual.</p>		No. of treatment train components recommended	Comment/Proposals	Roof areas	1	Green roof/blue roof + surfsep screening + petrol interceptor.	Residential roads, parking areas, commercial zones	2	Not applicable	Refuse collection, industrial areas, loading bays, lorry parks and highways.	3	Refuse collection is provided for within the basement and will not be exposed to the elements. Furthermore, basement drainage will be collected and pumped to the foul sewer system.
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Refuse collection, industrial areas, loading bays, lorry parks and highways.	3	Refuse collection is provided for within the basement and will not be exposed to the elements. Furthermore, basement drainage will be collected and pumped to the foul sewer system.											
Climate Change	An allowance of 20% increase in flows has been included for climate change. This adequately addresses Section 16.12 of the “Development Management – Thresholds Information Document”.												
Discharge Rate / Flow Control	Existing operation and maintenance practices to be continued.												
Volume Storage	KB have provided calculations for the proposed attenuation volume. Currently,												



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	KB are proposing additional attenuation volume of 1559m3 to supplement the existing attenuation volume provided for the 100-year return storm event + 20% climate change inclusive of relevant green open spaces. There is further attenuation provided within the green / blue roofs.
Volume Run-off	Greenfield run-off is currently conveyed to the southern boundary of the site and onto Village Road.
Treatment Volume / Water Quality Improvement	As interception storage currently proposed, additional treatment volume not required.
Biodiversity	Biodiversity maximised by the extent of green roof.
Return Period	A 100-year return period plus 20% for climate change has been used in the design for the attenuation systems. A model combining all elements of the surface water management systems is required at detailed design stage.
Health & Safety and Maintenance Issues	<p>Optimum performance of the SUDs treatment train is subject to the frequency of maintenance provided. At detailed design stage, it is recommended that a maintenance regime be adopted.</p> <p>Green / blue roof discharge outlets are proposed to be checked quarterly and after significant storms prevent blockages. Particular consideration is required at detailed design stage to the design, maintenance requirements and whole life plan (and replacement) of the SuDS system as a whole.</p> <p>Regular maintenance of the hydrobrake will be required to remove any blockages, particularly in the wake of heavy rainfall events or local floods.</p> <p>It is assumed that the existing petrol interceptors is fitted with an audible high-level silt and oil alarm for maintenance and safety purposes, if not, this should be modified. Regular inspection and maintenance is recommended. Please note that silt and debris removed from the petrol interceptor during maintenance will be classified as contaminated material and should only be handled and transported by a suitably licensed contractor and haulier and disposed of at a suitably licensed landfill only.</p>
Design Review Process	<p>Upon review of KB’s initial drainage design, JBA Consulting provided feedback, resulting in some modifications, namely;</p> <ul style="list-style-type: none"> <li>A filtration / interception trench has been provided to prevent surface water runoff from the green areas being conveyed off site unattenuated;</li> </ul> <p>A summary of comments and record of the audit trail are appended to this report.</p> <p>Based on this being at preliminary design stage and a Stage 1 Surface Water Audit, JBA Consulting’s comments have all been satisfactorily addressed or sufficient commitment provided that details will be confirmed at detailed design stage.</p>
Summary of items to be considered at Detailed Design Stage	<p>There are a number of items that require attention at detailed design stage. A summary of same are as follows:</p> <ul style="list-style-type: none"> <li>Maintenance regime for each of the components on site;</li> <li>Hydraulic model combining all elements of the surface water management system.</li> </ul>
Audit Result	JBA Consulting considers that the surface water drainage design for the proposed development is acceptable and meets the requirements of the Stage 1 Stormwater Audit.



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Audit Report Prepared by: Michael O’Donoghue BEng (Hons) CEng MIEI  
Associate Director

Approved by: Chris Wason BEng CEng MICE  
Principal Engineer

**Note:**

*JBA Consulting Engineers & Scientists Ltd. role on this project is as an independent reviewer/auditor. JBA Consulting Engineers & Scientists hold no design responsibility on this project. All issues raised and comments made by JBA are for the consideration of the Design Engineer (KB). Final design, construction supervision, with sign-off and/or commissioning of the surface water system so that the final product is fit for purpose with a suitable design, capacity and life-span, remains the responsibility of the Design Engineers.*



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## Appendix A – Audit Trail Record



JBA Consulting Stormwater Audit	
Project:	2019s0833 - Res. Development, Aikens Village Stepside Dublin 18
Date:	18/01/2021
JBA Reviewers	Leanne Leonard - Engineer

Item No.	JBA Review Comment	Comment/Clarification Request/Suggested Mitigation	Response from Client/Client Representative	Acceptable / Not Acceptable
		<b>10/12/2019</b>	<b>11/12/2019</b>	<b>12/12/2019</b>
	<b>Documents Received</b> - Kavanagh Burke Drainage Design Report - Drainage Layout Plan Ref: D1636 D2 PL1 - Storm Long Sections Ref: D1636 D11 PL1			
1	<b>Storm Sewer Diversion</b> With diversion of the 525mm diameter storm sewer north of apartment block F and G, it is assumed that the said diversion does not reduce the capacity of the network and does not need upsizing.	Kavanagh Burke to review and advise	The falls on the proposed diversion are less than those of the existing and therefore there is a reduction in capacity. However the proposed diverted network has been checked for the new falls and there is over twice the capacity than that required in the network. See attached the SW drainage calculations extracted from the report.	Acceptable
2	<b>Drainage Layout</b> Location of the hydrobrake limiting overall discharge to 53.3l/sec is not shown	Kavanagh Burke to review and advise	The hydrobrake is located in EX SWMH.5. See attached updated drawing with location shown.	Acceptable
3	<b>Drainage Layout</b> There is a 525mm diameter storm sewer along Atkinson Drive to the west of Block C which connects with the existing attenuation tank to the south of Block E. Has the associated catchment area been allowed for in the attenuation volume calculations?	Kavanagh Burke to review and advise	yes	Acceptable
4	<b>Drainage Layout</b> In the centre of all apartment blocks, there is a mixed grassed/paving surface area with no details of how the said surfaces are to be drained at detailed design stage and if interception is/can be provided.	Kavanagh Burke to review and advise	These areas have a blue roof under the paved/grassed areas and have been included in the blue roof design calculations.	Acceptable
5	<b>Outlet from Blue Roof</b> The number and rate of flow from the blue roof as regards overall attenuation is not indicated	Kavanagh Burke to review and advise	These are included in the blue roof design and have been incorporated in the attenuation and SW network design. The discharge rates are as follows: Block A-D & Podium = 7.84l/s max, Block E = 0.68l/s max, Crèche = 0.24l/s max, Block E-J & Podium = 7.75l/s max	Acceptable
6	<b>Finished Floor Levels</b> Whereas the FFL of some apartment blocks are indicated, some blocks are not, for example Block E. FFL of all blocks to be a minimum of 0.5m above the top water level in individual attenuation areas	Kavanagh Burke to review and advise	FFL's added to drawings throughout and the HWL of 0.5m below these FFL's has been maintained.	Acceptable
7	<b>Calculation of QBAR</b> It is noted that a soil classification of 4 has been assumed for the calculation of Qbar but no confirmation of same via site investigation.	Kavanagh Burke to: 1. advise if site investigation has been undertaken and/or can be provided to confirm suitability of soil classification 4 for the site	The soil classification is historical from the previous granted planning applications on this and the overall site.	Acceptable
8	<b>SuDS Measures</b> It is considered that other SuDS measures can be provided within the development to reduce runoff volumes, namely: - water butts, - rainwater harvesting.	Kavanagh Burke to review and advise	As a blue/green roof is provided over the entire footprint of all the blocks and podiums areas, then the provision of water butts is not deemed necessary. The provision of rainwater harvesting is not desirable due to the long term maintenance costs involved	Acceptable
9	<b>Drainage Layout</b> A cut-off trench north of Block E would be advantageous to cut off any overland flows in exceedance events from discharging from site unattenuated.	Kavanagh Burke to review and advise	Trench added	Acceptable
		<b>18/01/2021</b>		
	<b>Documents Received</b> - D1636 D2-Surface Water & Foul Drainage Layout PL2 - D1636 D3-Watermain Layout PL2 - D1636 D4-Bauder Blue Roof Details-Rev PL1 -D1636 D5-Manhole Details-Rev PL1 -D1636 D6-Watermain Details-Rev PL1 -D1636 D10-Foul Longitudinal Sections PL2 -D1636 D11-Surface Water Longitudinal Sections-Rev PL2 -D1636-D15-Ex. Concrete Attenuation Tank-Rev P1 -D1636-D16-Ex.SW Long Sections-P1 -D1636-D17- Green Roof Layout-P2 -D1636-D18- IW Overflow Tank Section-P1 -D1636-D19- Blue Roof Layout-P1 -D1636-D1000-New IW Foul Overflow Tank-Rev P5 -D1636-Draft Drainage Design Report 13-01-21			
10	The updated drainage layout by KB is acceptable to JBA and incorporates the comments listed above. No further suggestions or queries.	None	N/A	N/A
		<b>02/08/2022</b>		
11	<b>Documents Received</b> D1636 D2 Drainage Layout Rev IW2 SW with Sector D SW without Sector D			
12	The updated drainage layout has been assessed against the requirements of the latest development plan and is deemed acceptable by JBA.	None		N/A