

STORMWATER AUDIT (STAGE 1)

JBA Project Code 2019s1152
Contract Residential Development at Farrankelly, Delgany, Co. Wicklow
Client Cairn Homes
Date 18th September 2019 – P01
Author Leanne Leonard
Subject **Stormwater Audit - Stage 1 Report**

1 Proposed Residential Development at Farrankelly, Delgany, Co. Wicklow.


1.1 Introduction

JBA Consulting have been contracted by Cairn Homes to undertake a Stage 1 audit of the surface water drainage design for the proposed development at Farrankelly, Delgany, Co. Wicklow. The surface water audit was undertaken in advance of a planning submission.

The audit has been completed in accordance with Dún Laoghaire Rathdown County Council's (DLRCC) Stormwater Audit Procedure (Rev 0, Jan 2012). The results of the audit are set out in the table below.

This audit should be submitted to Dun Laoghaire Rathdown County Council (DLR) Planning Department prior to submission of the planning application.

1.2 Stage 1 Audit

| Design Parameter | Audit Result |
|----------------------------|--|
| Proposed Development | <p>The subject site is located at Farrankelly in Co. Wicklow. It is bound to the south by Glenbrook estate, to the south-east by Eden Gate housing estate, to the west by further residential properties, to the north by green field and commercial businesses and to the east by the Kilcoole Road (R761). The site is outlined in red Figure 1-1 below.</p> <p>Access will be provided via the existing Kilcoole Road (R671) to the east, the existing Priory Road to the south and via the existing industrial estate to the north.</p> <p>The site slopes steeply in a northerly direction at an average gradient of approximately 1 in 10.</p>  <p><i>Figure 1-1 - Site Location</i></p> <p>The proposed development will consist of the construction of 426 residential units containing a mix of houses, duplex units, apartments, a childcare facility and sports pitches.</p> <p>The total site area is stated to be 21 hectares (ha).</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 reference documents were considered as part of this surface water audit:</p> <ul style="list-style-type: none">Greater Dublin Strategic Drainage Strategy (GDSDS); |

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| | <ul style="list-style-type: none">Greater Dublin Regional Code of Practice for Drainage Works;The SUDs Manual (CIRIA C753).DLR County Development Plan (2016-2022) | | | | | | | | | | | | | | | |
|--|---|------------------|------------------|---------------------------|---|--|--|-------------|---------|--------|----------|------|-------|---------------|---------|--------|
| 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">Reduction of run-off rates;Provision of volume storage;Volume treatment provided;Reduction in volume run-off;Water quality improvement;Biodiversity. | | | | | | | | | | | | | | | |
| | <p>Soil:</p> <p>While site investigation results were not provided, the ROD Engineering Report stated “The Ground Investigation Report indicates variable permeability across the site”. Because of this some measures have been incorporated into the SuDS strategy to take advantage of potential percolation, but an allowance for this has not been included in the attenuation calculations.</p> <p>The Soil at the site has been indicated as being Soil type 2 (Soil Index 0.3), a free draining soil suitable for infiltration, throughout the site on the uksuds website.</p> <p>Rainfall (basis for surface water pipeline network design):</p> <p>Rainfall parameters can be estimated using Met Eireann data, using the Flood Studies Report (FSR) values or the values in the GDSDS. The Met Eireann method can be more representative of a site if selected correctly.</p> <table><tr><td></td><td>ROD value</td><td>JBA Value</td></tr><tr><td>Rainfall model:</td><td>Met Éireann</td><td>Met Éireann</td></tr><tr><td>M5-60 (mm):</td><td>33.45mm</td><td>18.5mm</td></tr><tr><td>Ratio R:</td><td>0.27</td><td>0.265</td></tr><tr><td>M5-2day (mm):</td><td>123.9mm</td><td>69.9mm</td></tr></table> <p>The values in the Met Éireann depth duration frequency table provided by ROD are significantly higher than the values in the table obtained by JBA from Met Eireann. This would indicate that the attenuation structures have been designed conservatively and there may be opportunities to reduce these volumes at detailed design stage if required.</p> <p>ROD intend to discharge from the site as follows:</p> <ul style="list-style-type: none">Attenuation Tank A – Discharge to an existing surface water gravity sewer just to the north of the site entrance at Kilcoole Road (R761);Attenuation Tanks B, C and D – Discharge through the diverted surface water sewer that runs from Eden Gate to the south towards private lands to the north.Attenuation Tanks E and F – Discharge to the Three Trout Stream to the north of the site. <p>Although the site discharge is limited to 2 l/s/ha the capacity of the downstream networks are not known and will need to be assessed by DLRCC.</p> | | ROD value | JBA Value | Rainfall model: | Met Éireann | Met Éireann | M5-60 (mm): | 33.45mm | 18.5mm | Ratio R: | 0.27 | 0.265 | M5-2day (mm): | 123.9mm | 69.9mm |
| | ROD value | JBA Value | | | | | | | | | | | | | | |
| Rainfall model: | Met Éireann | Met Éireann | | | | | | | | | | | | | | |
| M5-60 (mm): | 33.45mm | 18.5mm | | | | | | | | | | | | | | |
| Ratio R: | 0.27 | 0.265 | | | | | | | | | | | | | | |
| M5-2day (mm): | 123.9mm | 69.9mm | | | | | | | | | | | | | | |
| SuDs Measures Considered | <p>ROD have given due consideration to the SuDS measures most applicable for this site and have provided a detailed SuDS management train. Measures include;</p> <table><tr><th>SUDS Technology</th><th>Comments</th></tr><tr><td>Green / Blue Roofs</td><td>Green roofs have been deemed unsuitable for the proposed development.</td></tr><tr><td>Swale/ Filter Drain / Infiltration trench</td><td>Gullies will discharge to filter drains alongside roads adjacent to landscaped areas. These will retain the first 5mm of rainfall.</td></tr></table> | SUDS Technology | Comments | Green / Blue Roofs | Green roofs have been deemed unsuitable for the proposed development. | Swale/ Filter Drain / Infiltration trench | Gullies will discharge to filter drains alongside roads adjacent to landscaped areas. These will retain the first 5mm of rainfall. | | | | | | | | | |
| SUDS Technology | Comments | | | | | | | | | | | | | | | |
| Green / Blue Roofs | Green roofs have been deemed unsuitable for the proposed development. | | | | | | | | | | | | | | | |
| Swale/ Filter Drain / Infiltration trench | Gullies will discharge to filter drains alongside roads adjacent to landscaped areas. These will retain the first 5mm of rainfall. | | | | | | | | | | | | | | | |

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| | <p>Filter drains have also been proposed for the final pipe run to attenuation tank F.</p> <p>Permeable Paving Permeable paving has been proposed for car park areas. Roof water is discharged to permeable paving which has an outlet to the SW network at the downstream end of the stone network. As the paving is unlined, there may be opportunities for infiltration in areas of good permeability.</p> <p>Soakaways Soakaways have not been proposed as part of the development. This is due to the fact that despite suitable ground tests on the neighbouring development, soakaways did not work as designed and resulted in remedial works.</p> <p>Petrol Interceptor Petrol interceptors have been included for all attenuation tanks. The locations of the interceptors for tanks B, C and D should be relocated to the upstream end of the tank at detailed design stage.</p> <p>Other Sediment Management n/a</p> <p>Surface Water Attenuation Attenuation will be provided by way of six StormTech underground attenuation structures. Storage is based on assuming runoff from the site is controlled by flow control devices. The site runoff has been limited to 2 l/s/ha.</p> <p>Site Run-off Rates Limited to 2 l/s/ha, which is less than the calculated QBAR value based on a Soil type 2.</p> <p>Rainwater Harvesting RWH has not been proposed within the development.</p> <p>Detention Basins, Retention Ponds, Stormwater Wetlands Detention basins, retention ponds etc. have been deemed unsuitable due to space constraints.</p> <p>Tree Root Structural Cell Systems, Bio-retention, rain garden A number of gullies surrounding green open spaces will discharge to tree pits and landscaping within each of these zones. An overflow will be provided from the tree pit to the SW network.</p> | |
| Surface Water Drainage Design | <p>It is proposed that all storm runoff from the development will be attenuated. Attenuation tanks A-D will discharge to two separate existing surface water sewers and attenuation tanks E and F will discharge to the Three Trout Stream. Microdrainage has been used for network design and excel workbooks have been used for the attenuation sizing. JBA have the following comments;</p> <ol style="list-style-type: none"> 1. A return period of 5 years has been used for network design – Acceptable. 2. The attenuation tanks have been sized for the 100 year rainfall event with a climate change allowance of 10% included in the attenuation design – Acceptable. 3. All tanks will attenuate flows to 2l/s/ha for all rainfall events - Acceptable | |
| SUDs Management Train | <p>Source Control and Site Control are addressed by the use of SuDS devices (interception storage) and attenuation with outflow controlled by flow control devices. Petrol interceptors have been proposed prior to discharge from the site.</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> | |

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| | <table><tr><th></th><th>No. of treatment train components recommended</th><th>Comment/Proposals</th></tr><tr><td>Roof areas</td><td>1</td><td>Roof water will discharge to permeable paving at the front of the houses prior to discharging to the main SW network.</td></tr><tr><td>Residential roads, parking areas, commercial zones</td><td>2</td><td>Permeable paving has been proposed for car-parking areas to the front of the houses and public car-parking areas. A bypass interceptor has been proposed for all flows prior to discharge from site. Gullies will discharge to tree pits surrounding green open spaces. Filter drains have been proposed to roads adjacent to landscaped spaces.</td></tr><tr><td>Refuse collection, industrial areas, loading bays, lorry parks and highways.</td><td>3</td><td>Not applicable.</td></tr></table> | | No. of treatment train components recommended | Comment/Proposals | Roof areas | 1 | Roof water will discharge to permeable paving at the front of the houses prior to discharging to the main SW network. | Residential roads, parking areas, commercial zones | 2 | Permeable paving has been proposed for car-parking areas to the front of the houses and public car-parking areas. A bypass interceptor has been proposed for all flows prior to discharge from site. Gullies will discharge to tree pits surrounding green open spaces. Filter drains have been proposed to roads adjacent to landscaped spaces. | Refuse collection, industrial areas, loading bays, lorry parks and highways. | 3 | Not applicable. |
|--|--|---|---|-------------------|------------|---|---|--|---|---|--|---|-----------------|
| | No. of treatment train components recommended | Comment/Proposals | | | | | | | | | | | |
| Roof areas | 1 | Roof water will discharge to permeable paving at the front of the houses prior to discharging to the main SW network. | | | | | | | | | | | |
| Residential roads, parking areas, commercial zones | 2 | Permeable paving has been proposed for car-parking areas to the front of the houses and public car-parking areas. A bypass interceptor has been proposed for all flows prior to discharge from site. Gullies will discharge to tree pits surrounding green open spaces. Filter drains have been proposed to roads adjacent to landscaped spaces. | | | | | | | | | | | |
| Refuse collection, industrial areas, loading bays, lorry parks and highways. | 3 | Not applicable. | | | | | | | | | | | |
| Climate Change | An allowance of 10% increase in flows has been included for climate change to the rainfall intensities for the purposes of sizing the attenuation storage. | | | | | | | | | | | | |
| Discharge Rate / Flow Control | The discharge rate from the development will be 2 l/s/ha which is less than Qbar. While the flow control devices haven't yet been specified it is envisaged that V-notched weirs may be used due to the lack of maintenance required with them and their low risk of blockage in comparison to hydrobrake devices. | | | | | | | | | | | | |
| Volume Storage and floor levels | Finished floor levels are shown to be above the TWL of the proposed attenuation systems. | | | | | | | | | | | | |
| Treatment Volume / Water Quality Improvement | Interception storage is currently proposed by way of permeable paving, filter drains and tree pits. The attenuation structures will also allow some percolation to occur. | | | | | | | | | | | | |
| Biodiversity | Tree pits. Site and landscape site plan to consider same in more detail at detail design stage. | | | | | | | | | | | | |
| Return Period | A 100-year return period plus 10% for climate change has been used in the design for the attenuation systems. | | | | | | | | | | | | |
| Health & Safety and Maintenance Issues | <p>The proposed drainage system comprises SuDS devices, traditional gullies, manholes, attenuation systems, and underground pipes. These elements are considered acceptable from a Health & Safety perspective once supplier/manufacturers guides are followed and complied with during the detailed design, construction and operation.</p> <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>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> | | | | | | | | | | | | |

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| | <p>Depending on the flow control device used, regular maintenance may be required to remove any blockages, particularly in the wake of heavy rainfall events or local floods.</p> <p>Regular maintenance and cleaning of the isolator row will be required to remove any sediments, particularly in the wake of heavy rainfall events or local floods.</p> |
| Design Review Process | <p>Upon review of the initial drainage design, JBA Consulting provided feedback, resulting in some modifications, namely:</p> <ul style="list-style-type: none">• SW from front roofs will pass through permeable paving prior to entering the SW network;• Road gullies now discharge to tree-pits around green-open spaces;• All discharges from site will pass through a flow control device;• The inclusion of filter drains alongside roads adjacent to landscaped areas; |
| Summary & Compliance with Guidelines | <p>DBFL have provided a reasonable system to comply generally with SuDS techniques and generally, JBA would be happy with the intent shown.</p> <p>The design will need to be fully developed for detailed design stage and details of all proposals provided on drawings for DLRCC approval, such as;</p> <ul style="list-style-type: none">• Careful consideration should be given to the flow control device selection at detailed design stage to ensure that the discharge from the site does not exceed 2 l/s/ha, to take into account hydraulic performance, actual head behind the unit, maximum potential clear passage size and maintenance requirements, depending on the device used.• Proper detail design and construction of SuDS devices is paramount to ensure long term optimum hydraulic performance as well as maximisation of biodiversity opportunity. It is recommended that a collaborated approach to detail design is adopted between engineers, architects, ecologists and landscape architects.• At detail design stage it is recommended that exceedance flows are further considered to suitably manage potential exceedance flow that may enter and/or exit the site. The interception of any exceedance flows are to be captured and returned to the drainage network.• Maintenance regime for each of the components on site.• There is scope to further reduce the volume of the attenuation systems at detailed design stage using less conservative values for the M5_60 and M5_2 day rainfall depths. <p>See audit trail for comments.</p> |
| Audit Result | <p>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.</p> |

Audit Report Prepared by: Leanne Leonard BEng (Hons) MIEI Engineer

Approved by: Declan White BEng (Hons) CEng MIEI IMaPS 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 (Punch Consulting Engineers). 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: | Residential Development at Farrankelly, Delgancy, Co. Wicklow |
| Date: | 06/09/2019 |
| JBA Reviewers | Alex Woodger - Assistant Engineer |

| Item No. | JBA Review Comment | Comment/Clarification Request/Suggested Mitigation | Response from Client/Client Representative | Acceptable / Not Acceptable | | | | | | | | | | | | | | | | | | |
|--------------------------------|---|---|--|-----------------------------|----------------|-------------|-------------|------------|-------|-------|---------|-------|-------|--------------------------------|-------|-------|--------------------------------|-------|-------|----------------|---|------------|
| | 06/09/2019 | | 16/09/2019 | | | | | | | | | | | | | | | | | | | |
| Documents reviewed: | App A PFRA Map.pdf App B CFRAM.pdf App C Flood Records.pdf App D Drainage Districts.pdf App E Subsoil Map.pdf App F Old Map Cassini 6 Inch.pdf App F Old Map Historic 25 Inch.pdf App G Flood Extents Future Scenario.pdf FK-ROD-XX-XX-RP-C-FRA.pdf FK-ROD-Z0-XX-DR-C-0001.pdf FK-ROD-Z0-XX-DR-C-0002.pdf FK-ROD-Z0-XX-DR-C-0003.pdf FK-ROD-Z0-XX-DR-C-0004.pdf FK-ROD-Z0-XX-DR-C-0005.pdf FK-ROD-Z0-XX-DR-C-0009.pdf FK-ROD-Z0-XX-DR-C-0010.pdf FK-ROD-Z0-XX-DR-C-0030.pdf FK-ROD-Z0-XX-DR-C-0031.pdf FK-ROD-Z0-XX-DR-C-0032.pdf FK-ROD-Z0-XX-DR-C-0033.pdf FK-ROD-Z0-XX-DR-C-0034.pdf FK-ROD-Z0-XX-DR-C-0039.pdf FK-ROD-Z0-XX-DR-C-0041.pdf FK-ROD-Z0-XX-DR-C-0042.pdf FK-ROD-Z0-XX-DR-C-0043.pdf FK-ROD-Z0-XX-DR-C-0044.pdf FK-ROD-Z0-XX-DR-C-0045.pdf | | | | | | | | | | | | | | | | | | | | | |
| | FK-ROD-Z0-XX-DR-C-0094.pdf FK-ROD-Z0-XX-DR-C-95.pdf FK-ROD-Z0-XX-DR-C-0096.pdf FK-ROD-XX-XX-RP-C-EngRpt.pdf | | | | | | | | | | | | | | | | | | | | | |
| 1 | Greenfield Runoff Section 6.2 of the Engineering Report states that the discharge rate is limited from 2.85l/s/ha to 3.28l/s/ha depending on the zone that the attenuation tank is located in. The attenuation calculations provided in Appendix D show the discharge rate as high as 4.25 l/s/ha for Network D. Table 6.3 in the GSDSDS states that the maximum discharge rate should be Qbar or 2 l/s/ha, whichever is the greater. | ROD to provide calculations to determine Qbar for each of the catchments. | Following discussions with Wicklow County Council, we confirm that it is requirement for the attenuation flows to be designed for 2 litres/sec/ha and not Qbar (which is greater). This requirement results in increased storage areas over and above that required under the GSDSDS, which in turn will provide additional storage for greater storm events. Text to this effect has been added to the Engineering Planning report for clarity. | Acceptable | | | | | | | | | | | | | | | | | | |
| 2 | Rainfall Values for rainfall characteristics and runoff coefficients are not within acceptable limits. <table><tr><td></td><td>ROD Value</td><td>JBA Value</td></tr><tr><td>Rainfall Model</td><td>Met Éireann</td><td>Met Éireann</td></tr><tr><td>M5-60 (mm)</td><td>17.10</td><td>18.50</td></tr><tr><td>Ratio R</td><td>0.250</td><td>0.265</td></tr><tr><td>Summer Runoff Coefficient (Cv)</td><td>0.600</td><td>0.750</td></tr><tr><td>Winter Runoff Coefficient (Cv)</td><td>0.840</td><td>0.840</td></tr></table> | | ROD Value | JBA Value | Rainfall Model | Met Éireann | Met Éireann | M5-60 (mm) | 17.10 | 18.50 | Ratio R | 0.250 | 0.265 | Summer Runoff Coefficient (Cv) | 0.600 | 0.750 | Winter Runoff Coefficient (Cv) | 0.840 | 0.840 | ROD to review. | We agree with the figures raised in the audit and have rerun the model for these figures. This has not resulted in any additional issues in the overall system. | Acceptable |
| | ROD Value | JBA Value | | | | | | | | | | | | | | | | | | | | |
| Rainfall Model | Met Éireann | Met Éireann | | | | | | | | | | | | | | | | | | | | |
| M5-60 (mm) | 17.10 | 18.50 | | | | | | | | | | | | | | | | | | | | |
| Ratio R | 0.250 | 0.265 | | | | | | | | | | | | | | | | | | | | |
| Summer Runoff Coefficient (Cv) | 0.600 | 0.750 | | | | | | | | | | | | | | | | | | | | |
| Winter Runoff Coefficient (Cv) | 0.840 | 0.840 | | | | | | | | | | | | | | | | | | | | |
| 3 | Pipe Capacity A number of pipes across the three networks are under-sized for expected flow in a 5 year return period. | ROD to review. | We believe the pipes in question are downstream of the flow control devices as no other issues have shown up when we run the models. Due to legacy issues, the attenuation storage was designed separately to the pipe network. However, this indicates that the pipes downstream of the flow controls are receiving the full unrestricted flows instead of their actual flows. | Acceptable | | | | | | | | | | | | | | | | | | |

| Item No. | JBA Review Comment | Comment/Clarification Request/Suggested Mitigation | Response from Client/Client Representative | Acceptable / Not Acceptable |
|---------------------|---|--|---|-----------------------------|
| 4 | <p><u>Variable Head Discharge</u></p> <p>The network has been designed in MicroDrainage and the attenuation volumes have been sized using an excel spreadsheet (excel printouts provided in Appendix D of the Engineering Report).</p> <p>Section 6.6 in Volume 2, Chapter 6 of the GSDSDS states "<i>Assessment of the storage requirement using models is normally carried out by applying the maximum discharge flow rate as the discharge limit. This method provides a reasonable estimate of the volume needed. However, depending on the configuration and design of the storage system, this will under-predict the volume by as much as 20 or 30% due to the variable head-discharge curve for any throttle if this is not represented in the model.</i> "</p> | <p>ROD to:</p> <p>a) Include variable head discharge factor in excel attenuation calculations or</p> <p>b) To include the flow control devices in the MicroDrainage models and undertake relevant simulations for each network to assess the performance of the systems.</p> | <p>We have updated the references on the drawings and in the report from 'hydro-brake' to flow control device. We agree that if hydrobrakes are employed, the system would need to take account of the kickback flows but at this planning stage, it is not possible to confirm if the flow control is to be a Hydrobrake or other system such as a v-notched weir.</p> | Acceptable |
| 5 | <p><u>SuDS treatment train</u></p> <p>From the drawings and Engineering Report provided it is not clear if the treatment train has been addressed sufficiently.</p> <p>We note that the Engineering Report lists attenuation tanks, permeable paving and soakaways as the SuDS measures included in the design.</p> <p>Although permeable paving has been provided for car parking spaces and driveways within the site it's not clear if these will discharge back to the main surface water system.</p> <p>As the soakaways haven't been identified on the drawings it's not clear what is contributing to them and whether an overflow back to the SW network will be provided.</p> | ROD to clarify. | <p>The references to soakaways is an error and has been removed from the report. This is due to the fact that despite suitable ground tests on the neighbouring development, soakaways did not work as designed and resulted in remedial works. Instead, the suds measures include for the permeable paving (through which roof drainage will also flow), gullies discharging to tree pits, and permeable attenuation tanks to discharge to ground and take advantage of whatever recharge is available. The final discharge is also run through petrol interceptors as per the drawings.</p> | Acceptable |
| 6 | <p><u>Interception</u></p> <p>Further to point 6 above it's not clear if the first 5mm of rainfall has been intercepted.</p> | ROD to clarify. | <p>The Engineering report has been updated to include for road gullies to discharge to tree-pits around the green-open spaces. There are also a number of pipes that can be constructed as filter drains allowing the first 5mm of run-off to be contained within the site, which has also been noted within the report and drawings. When combined with the permeable nature of the attenuation tanks, we are of the opinion that this results in the first flush of rainfall being intercepted and contained within the site.</p> | Acceptable |
| 7 | <p><u>Runoff coefficients</u></p> <p>It's unclear how the impermeability factors, ranging between 0.34 and 0.4, have been determined.</p> | ROD to clarify runoff factors used and which Criterion in Table 6.3 of the GSDSDS they comply with (i.e. Criterion 2: 100% paved, 0% permeable, or Criterion 4: 80% paved & soil SPR%) | <p>ROD have not used the GSDSDS for the Impermeability factors but instead have calculated this for the actual layout. Please see attached calculation. Considering the requirement of Wicklow County Council to use a run-off rate of 2/l/s/ha which is less than greenfield, this would still provide adequate storage.</p> | See note 11 below |
| 8 | <p><u>Level of service</u></p> <p>Criterion 3 in Table 6.3 of the GSDSDS states that floor levels should be at least 500mm above maximum river level and adjacent on-site storage retention. Details such as ground level, invert level and top water level have not been provided for the attenuation structures.</p> | At detailed design stage ROD to ensure that all finished floor levels are at least 500mm above maximum river levels and the top water levels of adjacent attenuation structures. | <p>We confirm that the finished floor levels are a minimum of 500mm above the top of water levels in all adjacent attenuation tanks. This is being added to the drawings for clarity.</p> | Acceptable |
| 9 | <p><u>Car-Parking</u></p> <p>It appears that the western most carpark has uncontrolled flows to the outfall pipe</p> | ROD to review. | <p>No flow control device has been provided from the car parking to the pitches as this is captured in the attenuation tank to the north-east. In addition, much of the car park has been designed as grass-crete to reduce the overall flows from this area.</p> | Acceptable |
| 10 | <p><u>Playing Pitches</u></p> <p>Pitches are proposed but it is not clear if positive drainage is to be provided and if they will be drained to the proposed stormwater system which may require additional storage requirements</p> | ROD to review. | <p>We confirm there is no discharge from the pitches proposed as this is open green space.</p> | Acceptable |
| | 18/09/2019 | | | |
| Documents provided: | <p>FK-ROD-XX-XX-RP-C-EngRpt.docx</p> <p>FK-ROD-Z0-XX-DR-C-0031.pdf</p> <p>FK-ROD-Z0-XX-DR-C-0032.pdf</p> <p>FK-ROD-Z0-XX-DR-C-0033.pdf</p> <p>FK-ROD-Z0-XX-DR-C-0034.pdf</p> <p>16146_Areas20190620.xls</p> <p>16146 - Network A.MDX</p> <p>16146 - Network B.MDX</p> <p>16146 - Network C.MDX</p> <p>(Note: although some names remain unchanged the above listed documents have been revised by ROD to reflect their responses above)</p> | | | |
| 11 | <p><u>Impermeability Factors</u></p> <p>From the calculation sheet provided, it appears as though the impermeability factors represent the percentage of impermeable areas within the catchments. Has 100% runoff been assumed from these areas, in compliance with Criterion 2, Table 6.3 in the GSDSDS?</p> | ROD to clarify the runoff factors used in the design. | <p>We confirm that 100% run-off rate has been used with the imperability factors as per item 7 above.</p> | Acceptable |
| 12 | <p><u>Tree pits</u></p> <p>As tree pits need to be well drained an overflow or underdrain from the tree pits to the SW network would prevent problems in areas with low infiltration.</p> | ROD to consider including an outlet from tree pits to the SW network. | <p>An overflow has been added to the proposed tree pits.</p> | Acceptable |