STORMWATER AUDIT (STAGE 1)

JBA Project Code	2025s1606
Contract	Phase 2 Ringwood – Stage 1 SWA
Client	MHL and Associates Ltd.
Prepared by	Jack Shanahan & Aneeque Ahmed
Subject	Stormwater Audit Stage 1 Report

Revision History

Issue	Date	Status	Issued to
S3-P01	07-07-2026	First Issue	MHL & Associates
A3-C01	17-07-2026	Final Issue	MHL & Associates

1 Introduction

JBA Consulting have been contracted by Coakley O'Neill Town Planning Ltd. to undertake a Stage 1 SW Audit of the surface water drainage design for the proposed Largescale Residential Development (LRD), Ringwood Phase 2, Blarney, Co. Cork. The Consultant for the SW design is MHL and Associates Ltd Consulting Engineers (MHL). The drainage network for this development is being designed for the planning stage.

In the absence of a defined audit procedure by Cork City Council (CCC) the audit has been completed generally in accordance with Cork City Development Plan 2022-2028, Cork City Council Surface Water Management Advice Note (December 2022), the Greater Dublin Strategic Drainage Strategy (GDSDS), CIRIA C753 – The SuDS Manual and Dún Laoghaire Rathdown County Council's Stormwater Audit Procedures (DLRC Development Plan 2022-2028, Appendix 7) as set out below:

Stage 1 – Pre-Planning Stage: *A Stage 1 Audit shall be carried out of the applicant's proposed Stormwater drainage proposals based on the drawings* submitted for *planning approval.*

The Stage 1 Audit report must be submitted to Municipal Services *for approval prior to lodging the planning application. All recommendations shall be complied with, unless otherwise agreed in writing with* [CCC].

In certain circumstances, where there has been a constructive engagement with Municipal Services on SuDS proposals from an early stage of the design process, consideration may be given for waiving the requirement of a Stage 1 Audit.

The subject of this Stage 1 Stormwater audit is to review the proposed surface water drainage design and sustainable urban drainage system (SuDS) proposals for the proposed development.

1.1 Report Structure

The feedback form in Appendix A identifies queries raised in this report which are to be answered by the Design Engineers. This outlines any changes or clarifications as a result of the audit process. Once an 'Acceptable' status is achieved for each query the audit is deemed to be closed out.

This report summarises and assesses the initial proposals by the designer. The results of the audit are set out hereunder, where items raised in the feedback form are shown in bold within the report.

1.2 Relevant Studies and Documents

The following documents were considered as part of this surface water audit:

- Greater Dublin Strategic Drainage Strategy (GDSDS)
- Greater Dublin Regional Code of Practice for Drainage Works
- The SUDs Manual (CIRIA C753)
- BRE Digest 365
- Cork City Development Plan 2022-2028

The following documentation was provided by MHL on 2nd July 2026:

- JBA SW Audit Checklist-P01-MHL 07.2026
- BLR-2-02-SW-ZZZ-RP-MHL-CE-009 Rev C DIA-
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00550
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00551
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00552
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00553
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00554
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00555
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00556
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00557
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00558
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00559
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00560
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00561
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00562
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- BLR-2-02-SW-ZZZ-DR-MHL-CE-00566
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00567
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00568
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00569
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00570
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00571
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- BLR-2-02-SW-ZZZ-DR-MHL-CE-00575
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- BLR-2-02-SW-ZZZ-DR-MHL-CE-00583
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00584
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00585
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00586
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00587
- BLR-2-02-SW-ZZZ-DR-MHL-CE-00588

1.3 Key Considerations and Benefits of SuDS

The key benefits and objectives of SuDS considered as part of this audit are illustrated below:

- Water Quality
- Water Quantity
- Amenity
- Biodiversity

These can be achieved by:

- Storing runoff and releasing it slowly (attenuation)
- Harvesting and using the rain close to where it falls.
- Allowing water to soak into the ground (infiltration)
- Slowly transporting (conveying) water on the surface
- Filtering out pollutants
- Allowing sediments to settle out by controlling the flow of the water.

1.3.1 SuDS Management Train

A SuDS Management Train is a robust pollutant removal strategy. The treatment train can comprise four stages:

1. *Prevention*
2. *Source Control*
3. *Site Control*
4. *Regional control*

2 Proposed Phase 2 LRD at Ringwood, Sheen Upeer, Blarney, Co. Cork.

2.1 Site Characteristics

The proposed site is located at Ringwood, Blarney, County Cork, to the south of the N20 National Primary Route and east of Station Road. The lands, referred to as the Ringwood Phase 2 site, are situated approximately 0.5–1.0 km east of Blarney Business Park. The site lies in close proximity to the strategic road network, with the N20 providing direct connectivity to Cork City and the wider region. Site location plan is shown below:

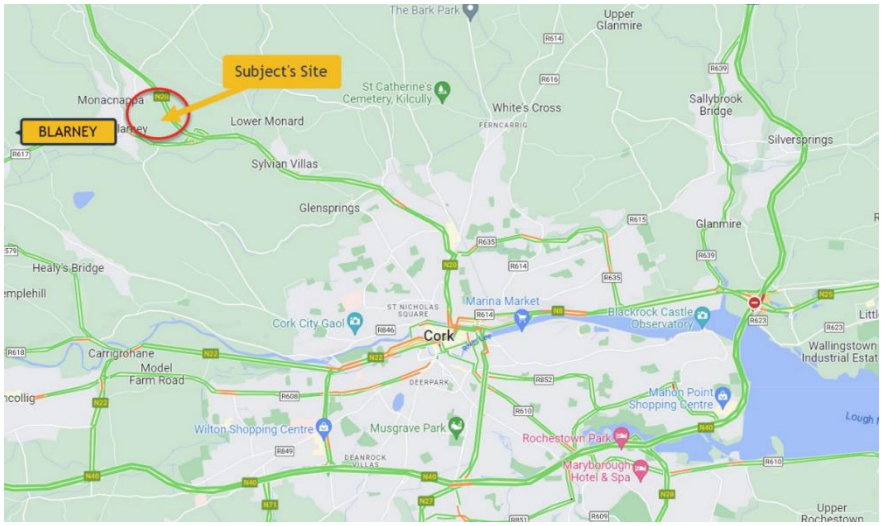


Figure 2-1 Site Location Plan (Extract from MHL DIA report)

The proposed development comprises Phase 2 of the Ringwood Large-Scale Residential Development (LRD) and provides (i) 319 no. residential dwellings comprising of 157 no. terraced, end-of-terrace, and semi-detached houses (including 129 no. 3-bed and 28 no. 4-bed units); 48 no. back-to-back duplexes provided in 4 no. blocks (including 32 no. 2-bed and 16 no. 3-bed units); and 114 no. apartments provided in 2 no. 5-storey buildings (including 54 no. 1-bed and 60 no. 2-bed units.

The scheme also includes a two-storey primary care centre incorporating GP services, together with the refurbishment and redevelopment of existing farm outbuildings for retail/pharmacy use and café/restaurant use.

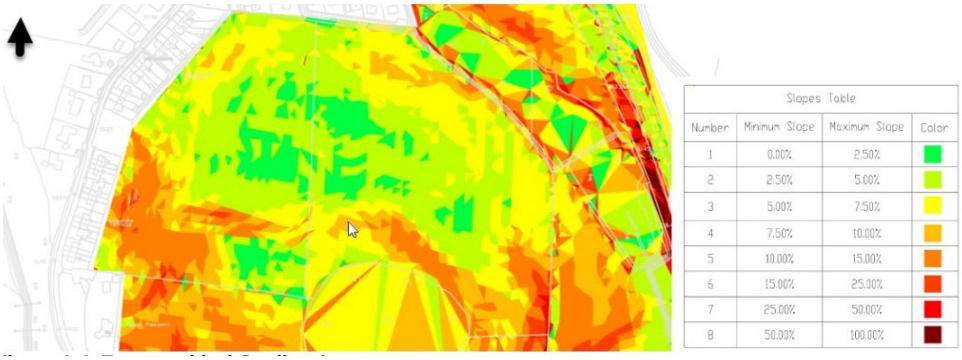
The adjacent figure shows the development plan for the site as part of Phase 2.



Figure 2-2 Development Site Layout (Extract from MHL DIA report)

A new site access is proposed from the R617, supported by associated pedestrian and cyclist infrastructure. The development incorporates car parking provision, including electric vehicle charging points, as well as bicycle and motorcycle parking, and delivers a range of private, communal and public open spaces, hard and soft landscaping, boundary treatments and amenity areas, including a new wetland public amenity area. All associated site development works are proposed, including surface water drainage infrastructure incorporating nature-based Sustainable Drainage Systems (SuDS) measures, as illustrated on the submitted development layout drawings.

As illustrated by the topographical grading assessment included within the Drainage Impact Assessment (DIA), the site may be characterised by undulating topography with variations in ground levels across the site, as shown in figure below:



Slopes Table

Number	Minimum Slope	Maximum Slope	Color
1	0.00%	2.50%	
2	2.50%	5.00%	
3	5.00%	7.50%	
4	7.50%	10.00%	
5	10.00%	15.00%	
6	15.00%	25.00%	
7	25.00%	50.00%	
8	50.00%	100.00%	

Figure 2-3 Topographical Grading Assessment (Extract from MHL DIA report)

Higher ground and steeper gradients are generally located along portions of the site boundaries, while the central areas of the site are situated at comparatively lower elevations and are characterised by gentler slopes. The overall landform exhibits a general west-to-east and south-to-north fall, with surface gradients gradually reducing toward the lower-lying areas. These lower-gradient zones locally form shallow valley-type features, which influence the natural surface water drainage patterns across the site.

DIA identifies the River Martin as the closest surface water body to the proposed development, located immediately to the west of the site and flowing generally in a south-westerly direction. In addition, a small tributary of the River Blarney is located approximately 130 m east of the site, which conveys flows downstream and ultimately discharges to the River Blarney at a location approximately 1 km downstream of its closest point to the site. This tributary flows through adjacent agricultural lands and passes beneath the R617 and the N20 slip road prior to entering the main channel and is also referred to as the Shean Upper Stream. These watercourses form the primary receiving surface water features in the vicinity of the proposed development.



Figure 2-4 Surface Water Features (Extract from MHL DIA report)

2.2 Review of SW Drainage Proposals

2.2.1 Ground Investigations

Ground investigation works were carried out in November 2023 by Priority Geotechnical Limited, with the Factual Ground Investigation Report included within the information package provided. The investigation comprised seven trial pits (TP01–TP07) excavated to depths ranging from approximately 2.65 m to 4.60 m below existing ground level. The key observations and results of the investigation are summarised below:

- The ground conditions encountered generally comprise topsoil layers of approximately 300 mm to 400 mm thickness, underlain by sandy gravel and gravelly clay extending to depths of between approximately 2.3 m and 4.6 m below existing ground level, with weathered siltstone encountered beneath these deposits to depths of approximately 2.0 m to 3.7 m below existing ground level.
- Groundwater was encountered locally within Trial Pit TP07 at a depth of approximately 2.35 m below existing ground level, where a steady rate of groundwater inflow was observed. The factual report notes that trial pits were open for a limited duration and that equilibrium groundwater levels may not have been fully established during excavation.
- BRE Digest 365 soakaway testing was undertaken at four locations (TP01, TP02, TP05 and TP07), with reported infiltration coefficients ranging from approximately 2.11×10^{-6} m/s at TP02 to 5.35×10^{-6} m/s at TP07.

The DIA proposes the use of infiltration-based SuDS measures as part of the surface water management strategy, as set out in Section 3.3 (Interception Storage), Section 8 (SuDS Selection Hierarchy) and Appendix A (SuDS Details), where infiltration via permeable paving, soakaways, tree pits and infiltration layers beneath attenuation structures is relied upon within the drainage design.

However, it is not clear from the submitted information whether groundwater monitoring (e.g. standpipe installations or seasonal observations) has been undertaken to establish the highest anticipated winter groundwater table. Confirmation of seasonal groundwater levels is required to demonstrate compliance with BRE Digest 365 and CIRIA C753, which require a minimum vertical separation of 1.0 m between the base of any infiltration feature or permeable liner and the highest expected groundwater level.

MHL to confirm if groundwater monitoring has been undertaken to estimate the highest expected winter groundwater table. It is important that 1.0m separation distance is maintained between any permeable liners and the highest winter groundwater level.

2.2.2 Design Parameters

Rainfall parameters can be estimated using Met Éireann 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. The design values used by MHL and considered by JBA are shown below:

Rainfall parameters	Designer values	JBA Comment
M5_60	17.0mm	16mm –Met Éireann
Ratio R	0.300	0.210 – Met Éireann
SAAR (mm)	1176mm	1144mm – Met Éireann.
Soil Type/SPR	Soil Type 3 (SPR = 0.30) UKSuDs	Unclear which is intended as SPR of 0.3 corresponds to Soil Type 2.

Rainfall parameters	Designer values	JBA Comment
Qbar l/s	Catchment 2a – 3.9l/s Catchment 2b – 6.3l/s Catchment 2c – 10.5l/s Catchment 2d – 12.3l/s Catchment 2e – 7.2l/s Catchment 2f – 10.2l/s	Catchment 2a – 3.8l/s Catchment 2b – 6.1l/s Catchment 2c – 10.2l/s Catchment 2d – 11.9l/s Catchment 2e – 7.0l/s Catchment 2f – 9.9l/s UKSuDS using same areas and most recent SAAR values
Climate Change	20%	OK
Urban Creep	10% (Listed in audit checklist)	It is unknown where it is applied

The M5_60, R-ratio and SAAR values differ from the most recent Met Éireann data. MHL to review and update if necessary.

The JBA Checklist provided notes 10% Urban Creep has been applied. However, it is not clear exactly where it has been applied. MHL to clarify.

Qbar calculation for Phase 2 has been undertaken using a total contributing catchment area of 9.57 ha. This information is identifiable within the UKSuDS calculation sheets. However, the basis for this total area is not clearly presented on the drainage drawings or within the main body of the DIA. As such, it is not evident how the 9.57 ha relates to the overall site boundary, nor which areas have been included or excluded from the Qbar assessment and provide rationale for the same.

MHL to confirm whether Soil Type 2 or Soil Type 3 is intended to be used for the design.

2.3 Surface Water Drainage Strategy

2.3.1 Site Drainage Strategy

The submitted drainage assessment indicates that Phase 2 of the development is divided into six independent surface water catchments (Catchments 2A–2F), as illustrated on Figure 2-5. Each catchment is designed to operate autonomously, with controlled discharge arrangements to adjoining drainage networks and receiving watercourses.

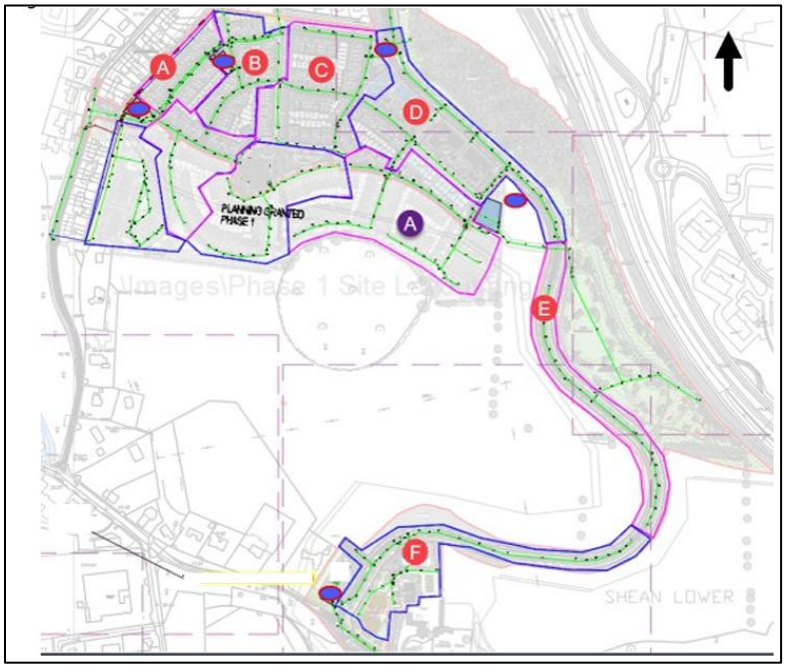


Figure 2-5 – Sub-catchment layout (Extract from MHL DIA report)

Surface water runoff from the western portion of the Ringwood Phase 2 site is proposed to discharge to an existing on-site storm sewer, which ultimately outfalls to the River Martin. Runoff from the eastern portion of the site is proposed to discharge to an existing culvert located along the eastern boundary of the site. Whereas, for the southern portion of Ringwood Phase 2, including the Development Spine Road and Primary Care Centre (PCC) areas, it is stated that flows draining southward towards the development junction with the R617 are to be attenuated.

The proposed surface water drainage infrastructure comprises a combination of a conventional storm drainage pipe network and SuDS measures. Hydraulic design and attenuation storage are based on assessment of storm events up to and including the 1 in 100-year return period with climate change allowance, with post-development surface water discharge from each catchment restricted to the greenfield runoff rate (Qbar). Flow control devices (e.g. hydrobrakes or equivalent) are proposed at each catchment outfall to regulate discharge in accordance with this requirement.

The SuDS strategy adopts a management train approach, incorporating measures such as swales, tree pits and basins. A plot-level drainage strategy is also proposed, whereby runoff from front roof areas is directed to permeable paving, while runoff from rear roof areas is directed to soakaways, subject to ground

conditions. In addition, petrol interceptors are proposed on all sub-catchments prior to discharge to existing drainage networks and receiving watercourses.

2.3.2 SuDS Measures Considered

SuDS Technology	Comments
Blue/Green Roofs	None proposed.
Swale, Filter Drain, Infiltration Trench	Swales will run alongside road edges where practical and will receive runoff from the development's roads and footpaths. The swales will be a shallow landscaped depression at the surface with a drainage layer beneath and will be utilised to convey surface water flows.
Tree Pits	Tree pits will mostly be located adjacent to roads and will provide infiltration of rainwater runoff from these roads. The drainage pipe within the gravel bed for the tree pits will be set at 100mm above the bed formation providing (assumed 30% voids) an interception storage of approximately 15m³ will be achieved assuming a 5m² area for each of the 100 tree pits.
Bioretention Areas/ Rain Gardens	Rain gardens are included in section 8 of the DIA but no further details on same. SuDS Selection Hierarchy Sheet shows (disconnect downpipes/RWPs into planted areas with overflow).
Permeable Paving	Permeable paving is proposed for private parking spaces at dwellings, covering a total area of circa 8075m². The drainage pipe within the stone bed for these areas will be set 100mm above the bed formation (assumed 35% voids)
Soakaways	Soakaways are referenced as part of the plot-level strategy, with roof runoff described as being collected via rain harvesting/water butts and discharged to a soakaway via a distribution connection. **MHL to provide detailed section drawing of the soakaway based on SI data.**
Detention Basins, Retention Ponds, Stormwater Wetlands	**A number of detention basins have been proposed in the proposed development. These have capacities ranging from 34m3 to 184m3. In addition, a larger "regional basin" has been proposed towards the east of the site.**
Rainwater Harvesting	The storm water from the rear roof areas within each property shall be collected by rain harvesting/water butts and discharged to a soakaway via distribution connection.
Petrol Interceptor	There are 6 no. different catchment areas that eventually discharge to the public stormwater network/existing watercourses from the development. Each local network will have a petrol interceptor incorporated into the system.
Attenuation Tank	RC tanks are proposed within the development with attenuation storage is stated to be provided in detention basins and concrete attenuation tanks. These are designed to cater for the 1 in 100-year event with 20% climate change allowance. **MHL to provide detailed section drawing of the attenuation tank**
Flow Control	A number of Hydrobrake flow controls are proposed throughout the site. They are each set to the Qbar value for the relevant sub-catchments.

2.3.3 Review of drainage design and drawings

A review of the submitted drainage drawings identified a number of presentation, coordination and consistency issues that require clarification, as outlined below:

- The drawing layouts do not include a key plan to clearly identify drawing extents and sheet coverage. As a result, it is difficult to understand how the individual drawings relate to one another and to the overall development layout.
- While SuDS measures are referenced within the drainage strategy, their representation on the layout drawings is limited. In particular, swales are not clearly shown, and where swales are proposed, their hydraulic connection to the storm sewer network is not readily discernible from the drawings. Additional clarity is required to illustrate the location, extent and connectivity of SuDS features so that the proposed SuDS management train can be clearly understood.
- The layout drawings do not include attenuation tank or detention basin dimensions, which are key parameters required to understand and verify the proposed attenuation strategy. MHL is to provide a single schedule confirming each tank/basin reference, associated sub-catchment, storage volume, base level, top water level, freeboard, flow control rate and outfall.
- A further inconsistency was identified on drawings BLR-2-02-SW-ZZZ-DR-MHL-CE-00566 and BLR-2-02-SW-ZZZ-DR-MHL-CE-00567, which refer to an outlet from a StormTech system, despite no StormTech system being identified elsewhere within the drawings or drainage strategy.

2.3.4 Network and Attenuation Calculations

This section reviews the hydraulic modelling approach, network definition and attenuation calculations presented within the DIA. The following observations are noted:

- DIA applies different catchment areas for Qbar estimation, interception assessment and attenuation sizing. However, a consolidated catchment area schedule is not provided. MHL is to clearly present the total catchment area for each sub-catchment and demonstrate its segregation into areas contributing to attenuation storage and areas discounted under interception assumptions. This should be supported by annotated drawings and a tabulated area breakdown to clearly demonstrate how interception losses have been applied and how the residual area contributes to attenuation design.
- Site3D manhole schedule presents catchment area values associated with individual manholes. However, the schedule does not clearly demonstrate how these local areas aggregate to the total sub-catchment areas referenced elsewhere in the DIA. It is not clear whether the areas shown represent gross contributing areas or effective runoff areas following interception assumptions. MHL is to provide a reconciliation demonstrating that the sum of modelled catchment areas corresponds to the total site and sub-catchment areas used for Qbar estimation, interception assessment and attenuation sizing, and to confirm that the full Phase 2 site has been appropriately accounted for within the hydraulic model.
- DIA describes swales as shallow landscaped surface conveyance features receiving runoff from roads and footpaths, with a drainage layer beneath, intended primarily to convey surface water flows rather than provide formal attenuation storage. However, no hydraulic sizing, capacity assessment or modelling of the swales is provided. As swales form part of the surface water management train, clarification is required to confirm their design role, capacity and interaction with the piped network under design and exceedance storm events.
- Based on Section 3 of the DIA and Figure 3.10, multiple surface water outfalls are shown connecting to existing drainage networks and receiving watercourses. However, the DIA does not clearly define the downstream boundary conditions adopted within the hydraulic model at these outfalls. In particular, it is not evident whether elevated receiving watercourse levels, surcharged storm sewer conditions, or other tailwater assumptions have been applied at the outfall locations for extreme rainfall events. MHL is to confirm the outfall boundary conditions used within the hydraulic modelling and to demonstrate that potential surcharging at the receiving networks or watercourses during extreme events does not result in adverse flood risk to the development site.
- DIA proposes the use of RCC attenuation tanks in combination with detention basins, as the primary means of providing attenuation storage across the site. However, the submission does not clearly demonstrate that alternative attenuation solutions have been explored or discounted in accordance with the GDSDS and CIRIA C753, which promote the use of nature-based and surface-based SuDS measures (e.g. ponds, wetlands or proprietary modular systems) where feasible, in preference to grey structures. MHL is to confirm whether alternative attenuation options were assessed and to provide justification for the selected detention basin and RCC tank arrangement in the context of the GDSDS SuDS hierarchy.
- Review of Appendix C also identified presentation and coordination issues within the calculation appendices, including duplicated area data sheets for certain sub-catchments (e.g. Sub-Catchment 2d) and the absence of a spreadsheet of Sub-Catchment 2e.
- UKSuDS calculation sheets provided in Appendix B are incorrectly labelled and should be corrected with clear reference to the corresponding sub-catchments.
- Storm durations up to 2880 minutes have been provided in the model results. Typically, storm durations up to 10080 minutes would be run as this allows for more thorough attenuation capacity checks as it is typically attenuation where issues arise in these longer model runs.

2.3.5 Interception/Treatment

Interception of runoff is intended to prevent any runoff for small rainfall events which are less than 5mm (and up to 10mm if possible). Treatment of 15mm is required if interception is not provided.

Table 24.6 of the CIRIA manual provides indication of deemed to satisfy criteria and it is considered that this should be complied with. All *sources of runoff should also be intercepted where possible. A high level of Interception provided for some parts of the site is not to be considered as adequate compensation for a low degree of interception provision for other locations. Compliance is required for the whole site, or at least for road/paved areas, for it to be considered effective. Interception mechanisms are based on runoff retention. This can be achieved using rainwater harvesting or using soil storage and evaporation. Either infiltration or transpiration rates can dispose of the runoff from minor events to enable the next event to be captured.*

In view of above, review of the stormwater package has been carried out, and the observations are outlined as follows:

- DIA assesses interception on a volumetric basis, with the calculated interception volume deducted from the required attenuation storage. However, it is not confirmed whether interception has also been applied as an area reduction within the hydraulic model, such that the benefits of interception are reflected in pipe flow calculations and network sizing. MHL is to confirm whether interception has been applied within the hydraulic model and whether it influences pipe sizing.
- Section 3.3 of the DIA states that interception storage is to be provided via stone-filled infiltration beneath attenuation tanks. However, no attenuation tank detail drawing demonstrating this arrangement has been submitted. MHL is to provide the relevant attenuation tank detail drawing showing the proposed interception layer and confirm consistency with the DIA.
- DIA proposes the use of petrol interceptors upstream of attenuation facilities to provide pre-treatment and capture hydrocarbons prior to discharge to the downstream drainage network, which is consistent with good practice for road and parking area runoff.

2.3.6 Exceedance Flows

The submitted drainage information does not include a drawing or plan identifying exceedance flow routes across the site. As a result, it is not possible to confirm how surface water arising from blocked gullies, exceedance of gully capacity, or extreme rainfall events would be managed. MHL is requested to review and clearly demonstrate exceedance flow routes within the site, confirming that overland flows can be safely conveyed away from buildings and other vulnerable areas and directed towards appropriate low-risk pathways without increasing flood risk to properties or adjoining land

MHL is to provide an overland exceedance flow drawing and confirm that the adopted Finished Floor Level strategy is suitable relative to adjacent road levels, local exceedance routes, attenuation/basin surcharge levels and any relevant pluvial flood levels. This should be reconciled with the FRA and Cork City Council guidance.

2.4 Health & Safety and Maintenance Issues

The proposed drainage system comprises conventional drainage infrastructure, including road gullies, manholes, underground pipework and attenuation storage tanks. These elements are generally considered acceptable from a Health and Safety perspective, provided that relevant supplier and manufacturer guidance is followed during detailed design, construction and operational phases.

The long-term performance of the proposed SuDS management train is dependent on the implementation of an appropriate inspection and maintenance regime. While the DIA provides general commentary on maintenance requirements, it is recommended that a detailed maintenance and management plan be prepared and agreed with the Local Authority prior to the commencement of construction. This plan should clearly define inspection frequencies, access requirements, maintenance procedures, and the party responsible for long-term operation and maintenance of each drainage and SuDS element.

Specific maintenance and operational considerations identified include the following:

- Flow control devices (e.g. hydrobrakes) will require regular inspection and maintenance to prevent blockage, particularly where outlet diameters are less than 75 mm. This is especially important following heavy rainfall events or localised flooding. Consideration should be given to emergency response procedures and the provision of suitable bypass arrangements where appropriate.
- Petrol interceptors (PIs) will require routine inspection and maintenance to ensure continued effectiveness. The provision of audible alarms or warning systems is recommended to indicate when maintenance is required. Any silt or debris removed from petrol interceptors during maintenance activities will be classified as contaminated material and must be handled, transported and disposed of by suitably licensed contractors at appropriately licensed facilities.

Overall, while general maintenance guidance is provided within the DIA, clarification is required regarding the entity responsible for the long-term operation and maintenance of the drainage and SuDS infrastructure, to ensure that arrangements are in place to support safe operation and effective performance throughout the lifetime of the development.

2.5 Design Review Process and Audit Conclusions

This report outlines the review of the initial submission by the Consulting Engineers and JBA comments are also included in the Audit Feedback Form in Appendix A. This feedback form shows the audit trail and the responses from the designer. When answers to queries have been considered “Acceptable” then the audit is considered to be closed out. Some queries may be considered acceptable subject to Local Authority agreement.

2.5.1 Items to be considered at Detailed Design Stage

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 collaborative, multidisciplinary approach to detailed design is adopted, involving engineers, architects, ecologists and landscape architects, to ensure that SuDS measures are fully integrated into the overall site layout and function as intended throughout the lifecycle of the development.

As confirmed as part of this audit Groundwater monitoring over a winter period should be carried out prior to construction.

2.6 Audit Report sign off.

Audit Report Prepared by:

Jack Shanahan MEng MIEI
Graduate Engineer

Approved by:

Aneeque Ahmed M.Sc. Civil Engineer MIEAust
Senior 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. 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 lifespan, remains the responsibility of the Design Engineers.

Appendix A – Audit Feedback Form

JBA Consulting Stormwater Audit - Stage 1 Feedback Form

Project: Phase 2 Ringwood – Stage 1 SWA
Date: 17/07/2026 (C01)
JBA Reviewers Jack Shanahan & Aneeque Ahmed
Project Number: 2025s1606

Item No.	JBA Review Comment	Comment/Clarification Request/Suggested Mitigation	Response from Client/Client Representative	Acceptable / Not Acceptable
	07/07/2026	07/07/2026	15/07/2026	16/07/2026
Ref Docs	JBA SW Audit Checklist-P01-MHL 07.2026 BLR-2-02-SW-ZZZ-RP-MHL-CE-009 Rev C DIA- BLR-2-02-SW-ZZZ-DR-MHL-CE-00550 BLR-2-02-SW-ZZZ-DR-MHL-CE-00551 BLR-2-02-SW-ZZZ-DR-MHL-CE-00552 BLR-2-02-SW-ZZZ-DR-MHL-CE-00553 BLR-2-02-SW-ZZZ-DR-MHL-CE-00554 BLR-2-02-SW-ZZZ-DR-MHL-CE-00555 BLR-2-02-SW-ZZZ-DR-MHL-CE-00556 BLR-2-02-SW-ZZZ-DR-MHL-CE-00557 BLR-2-02-SW-ZZZ-DR-MHL-CE-00558 BLR-2-02-SW-ZZZ-DR-MHL-CE-00559 BLR-2-02-SW-ZZZ-DR-MHL-CE-00560 BLR-2-02-SW-ZZZ-DR-MHL-CE-00561 BLR-2-02-SW-ZZZ-DR-MHL-CE-00562		**Drawing updated:Refer to revised pack.**	drawing listing
1	Interception has been calculated as a volume and not as an area as per CIRIA SuDS Manual	**MHL to show interception as per Table 24.6 of CIRIA SuDS Manual**	**Refer to revised DIA**	See Note 24
2	The SAAR, m5-60 and Ratio r values used differ to those sourced by JBA for the site.	**MHL to review and update SAAR, m5-60 and Ratio r values used**	**SAAR, M5-60 AND R Ratios updated to JBA/ Met Eireann figures outlined in the SWA. SAAR 1144, R ratio 0.21mm, M5-60 16mm.**	Acceptable
3	The catchment areas shown in the Qbar calculations for the site do not appear to match those in the main body of the DIA.	**MHL to provide the rationale for the catchment areas used in the Qbar calculations**	**Qbar calculated through uksuds IH24 methodology. Qbars as noted identified by JBA have been incorporated into the hydraulic modelling. The local authority has requested that Qbar 1year be specified.**	See Note 25
4	Only Storm durations up to 2880 minutes have been ran when typically storm durations up to 10080 are ran. This allows for longer term checks on the attenuation capacity.	**MHL to rerun model with storm durations up to 10080 minutes**	**The hydraulic model has been updated to account for storm durations up to 10080 mins.**	Acceptable
5	The downstream boundary conditions adopted within the hydraulic model have not been defined.	**MHL is to confirm the outfall boundary conditions and demonstrate that elevated receiving water levels or surcharged downstream networks do not adversely affect the proposed drainage system.**	**The outfall boundary conditions are in accordance with the findings of the Flood Risk Assessment (FRA). The proposed stormwater outfall has been designed in line with these findings and accepted engineering practice. Based on the assessed receiving water levels, there is no indication that elevated water levels at the outfall will adversely affect the performance of the proposed drainage system. Accordingly, the proposed drainage network is not expected to be impacted by the receiving water levels under the assessed design conditions.**	Acceptable
6	In the Audit checklist it is stated that 10% Urban Creep has been applied, however it is unclear where this has been applied in the design	**MHL to show how Urban Creep has been applied in the design**	**10% urban creep applied across applicable areas (housing plots,etc)**	See Note 26
7	Details drawings for the proposed SuDS features have not been provided.	**MHL to provide details drawings for the proposed SuDS measures on site**	**Please refer to BLR-2-02-SW-ZZZ-DR-MHL-CE-00568 through to 05092**	See Note 27
8	An Overland flow path drawing has not been provided. This will prove that there will be no localised pooling on site in the case of a flood.	**MHL to provide overland flow path drawing and confirm that the adopted Finished Floor Level strategy is suitable relative to adjacent road levels, local exceedance routes, attenuation/basin surcharge levels and any relevant pluvial flood levels. This should be reconciled with the FRA and Cork City Council guidance.**	**FFL strategy has been previously reviewed as part of the FRA submitted for planning. FFL thresholds set to required levels as per JBA FRA review. Please refer to attenuation / basin layouts noting indicative surface water local exceedance routing.**	Acceptable
9	There appears to be a typo in Figure 2.1 of the DIA as it states soil type 3 for the site and a SPR of 0.3 which corresponds to soil type 2	**MHL to confirm soil type used for the design**	**Soil Type 3 .SPR 0.37**	Acceptable
10	The Petrol Interceptor detail provided has a few dimensions listed as dimension a, b, c etc. but these do not have corresponding values on the detail	**MHL to provide corresponding dimensions for petrol interceptor**	**Petrol interceptor dimensions are noted in the DIA. Type noted.**	See Note 28
11	The attenuation information provided on the surface water layouts do not appear to be consistent with the information shown in the model. Therefore a cross check cannot be completed to ensure the design proposals are consistent	**MHL to confirm attenuation details match between surface water layouts and model.**	**MHL to confirm that the attenuation details match between the surface water layouts and the hydraulic model. The revised layouts and long section should align with the hydraulic outputs sheet.**	See Note 29
12	In the DIA it is stated that swales have been proposed on the road edges however they do not appear to be visible on the surface water layouts provided. It is later stated in the SuDS selection hierarchy sheet that swales are not proposed.	**MHL to confirm whether swales are proposed and if so where are they proposed.**	**No swales proposed.**	Acceptable
13	In the DIA it is stated that tree pits have been proposed "where feasible" however they do not appear to be visible on the surface water layouts provided	**MHL to confirm whether tree pits are proposed and if so where are they proposed.**	**Refer to layout BLR-2-02-SW-ZZZ-DR-MHL-CE-0074**	Acceptable
14	It is not clear from the SI provided that groundwater monitoring has been carried out over a winter period. This is important to conform whether there is at least 1m separation to groundwater on site	**MHL to confirm whether groundwater monitoring over a winter period has been undertaken.**	**No groundwater monitoring undertaken by PGL during SI Survey.**	See Note 30

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15	Concrete attenuation tanks have been proposed as part of this design. Is there a reason these have not been proposed as a geocellular attenuation or possibly even as a surface level attenuation	**MHL to clarify reasoning behind concrete attenuation**	**Geocelluar attenuation tanks were previously proposed but were not considered acceptable by the local authority. Under their direction, concrete tanks have been proposed.**	Acceptable
16	Section 3.3 of the DIA states that interception storage is to be provided via stone-filled infiltration beneath attenuation tanks. However, no attenuation tank detail drawing demonstrating this arrangement has been submitted.	**MHL is to provide the relevant attenuation tank detail drawing showing the proposed interception layer and confirm consistency with the DIA.**	**No stone filled infiltration is proposed beneath attenuation tanks, as per the local authority's request.**	Acceptable
17	It is unclear from the drawings provided which areas have been assigned to each manhole. This should be clarified as it will allow a check on total areas to be carried out.	**MHL to show areas entering each manhole**	**Refer to layout BLR-2-02-SW-ZZZ-DR-MHL-CE-00588**	See Note 31
18	On Manhole SW271 two different invert levels have been quoted. When comparing the levels listed on the manhole and pipe schedule the pipe schedule would imply that the invert level is higher then that listed on the manhole schedule	**MHL to review proposed invert levels and clarify the proposed invert levels. MHL should also check other manholes' proposed invert levels for similar instances**	**SW271 updated as per latest layout**	Acceptable
19	Information relating to proposed flow controls has not been shown on the surface water layouts. As a result it is harder to cross check the proposed flow controls	**MHL to show flow control information on surface water layout to allow for confirmation of flow control values**	**Please refer to updated layouts BLR-2-02-SW-ZZZ-DR-MHL-CE-00568 through to BLR-2-02-SW-ZZZ-DR-MHL-CE-00572**	Acceptable
20	In Figure 3.8 of the DIA a run off coefficient of 0.8 is applied as part of the interception calculation. Has this been applied to the design as whole or just the interception calculation	**MHL to confirm if run off coefficient used in hydraulic Model**	**0.8 has been applied to interception calculation only.**	Acceptable
21	A detail showing the interaction between proposed "SuDS Areas" and attenuation tanks should be provided to confirm what measures will be taken to ensure there is now flow between them as stated in the DIA	**MHL to provide detail showing interaction between SuDS areas and attenuation**	**Please refer to BLR-2-02-SW-ZZZ-DR-MHL-CE-00573 and and BLR-2-02-SW-ZZZ-DR-MHL-CE-00550 through to BLR-2-02-SW-ZZZ-DR-MHL-CE-00583**	See Note 32
22	Has any modelling been carried out for the proposed rainwater butts and soakaways. This should be carried out due to the relatively low but not unfeasible infiltration rates on site to ensure these do not cause flooding on properties	**MHL to confirm if modelling of rainwater butts and soakaways was carried out**	**Hydraulic modelling has assumed roof and driveway flows are captured into the drainage network, as a worst case scenario requested by the local authority.**	Acceptable
23	Drawings 00566 and 00567 refer to an outlet from a StormTech system although no StormTech system is proposed elsewhere.	**MHL is to review and correct the drawing references.**	**Stormtech system label error. Not proposed. Concrete tanks are proposed, as per discussiong with the local authority.**	See Note 33
P02				
	16/07/2026	**16/07/2026**		
Ref Docs	RCI-JBAI-XX-XX-AU-C-0004-S0-P01.01-St1_Feedback_Form - DM 21079HD-MHL-Ringwood-Phase 02_Proposed Tank_Rev B-BLR-2-02-SW-ZZZ-DR-MHL-CE-00573 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00588 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00587 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00551 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00550 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00586 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00585 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00584 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00572 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00571 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00570 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00569 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00568 21079HD-MHL-Ringwood-Phase 02_Proposed SUDS_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-0074 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00583 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00582 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00581 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00580 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00579 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00578 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00577 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00576 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00575 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00567 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00566 21079HD-MHL-Ringwood-Phase 02_Proposed Stormwater_Rev E-BLR-2-02-SW-ZZZ-DR-MHL-CE-00565			
24	There are long stretches upstream of the proposed detention basins how will these be intercepted before entering the network	**MHL to review possibility of obtaining interception from upstream SuDS measures**	Driveways and roof areas to be intercepted by impermable paving in driveways.	Acceptable
25	The areas used in the Qbar calcs do not appear to match the sub-catchment areas in the DIA.	**MHL to provide reasoning for different areas used in Qbar calculation**	Qbar calucated as per areas set out in Drawings 00566 and 00567 .	Acceptable
26	In the areas shown in drawing 00588 it is unclear for those with Urban creep that the area shown is before or after the additional 10% is applied	**MHL to confirm whether these areas have urban creep included or not**	Yes urban creep has been applied.Area applied with 10% in roof and driveways. Please refer to Drawings 00566 and 00567 .	Acceptable
27	Drawings should be provided for all proposed SuDs measures, tree pits etc., similar to that shown in Figure 10.3 of the DIA.	**MHL to provide details drawings for the proposed SuDS measures on site**	BLR-2-02-SW-ZZZ-DR-MHL-CE-00568 to BLR-2-02-SW-ZZZ-DR-MHL-CE-0074 noted details of suds in plan and cross section developed for planning stage. Further detailed design layouts will be developed prior to construction / planning compliance stage	Acceptable
28	A table showing the dimensions of each model proposed should be included on the petrol interceptor detail for completeness	**MHL to include summary of petrol interceptor dimensions in detail drawing**	Please refer to Drawings 00564.	Acceptable

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29	Information such as attenuation areas, porosity, tank height, tank invert should be shown on the plan drawings to allow for crosschecking with the model	**MHL to provide attenuation information on plan drawings**	Please refer to Drawings 00566 and 00567 .	**Acceptable**
30	Groundwater monitoring over a winter period should be carried out prior to construction starting to ensure that there is sufficient seperation to the groundwater table	**MHL to ensure groundwater monitoring over a winter period is carried out**	As part of detailed design, pre construction, the appointed contractor is to ensure groundwater monitoring is installled.	**Acceptable**
31	It is acknowledged that this drawing has been provided. However due to the scale of the drawing it is tough to assess. Alternatively could the areas in the model be shown in the model outputs	**MHL to include areas entered in model outputs**	Please refer to BLR-2-02-SW-ZZZ-DR-MHL-CE-00593	**Acceptable**
32	It is acknowledged that this drawing has been provided. However, it is not clear whether there will be an impermeable liner at the base of the detention basin like the sides or not.	**MHL to clarify if impereable liners are to be proposed at detention basin base**	Yes impermeable liners are proposed	**Acceptable**
33	This stormtech note does not appear to have been removed in the drawings provided in this package	**MHL to remove reference to stormtech tanks as they are not proposed**	Stormtech lablel removed in drawings .Please refer to Drawings 00566 and 00567 .	**Acceptable**
P03				
	17/07/2026	**17/07/2026**		
Ref Docs	RCI-JBAI-XX-XX-AU-C-0004-S0-P02.01-St1_Feedback_Form DM 16-07-2026 BLR-2-02-SW-ZZZ-DR-MHL-CE-00564 BLR-2-02-SW-ZZZ-DR-MHL-CE-00566 BLR-2-02-SW-ZZZ-DR-MHL-CE-00567 BLR-2-02-SW-ZZZ-DR-MHL-CE-00593			