

# REGIONAL ATTENUATION POND 2A, CHERRYWOOD

## Part VIII Department Comments Response Report

Stage Approval | April 2021



## Regional Attenuation Pond 2A, Cherrywood

### Part VIII Department Comments Response Report

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APPENDIX A DLRCC INTERNAL DEPARTMENT COMMENTS

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## 1. INTRODUCTION

This report has been prepared by Roughan & O'Donovan Consulting Engineers (ROD) in response to comments received from Dun Laoghaire Rathdown County Council (DLRCC) internal departments regarding the Regional Attenuation Pond 2A at Cherrywood, Dublin 18. As part of the Part VIII Statutory Process, the planning documents for Regional Attenuation Pond 2A were distributed amongst the internal departments within DLRCC for comment.

Responses have been prepared for each of the comments made relating to the planning documents and these are outlined below. Each item is numbered according to the reference system used in each of the DLRCC Departments comment schedules.

This report should be read in conjunction with the following documents:

- P2ACH-ROD-EWE-SW\_AE-RP-EN-30001 (Appropriate Assessment Screening Report)
- CWP0796568 (Arboricultural Assessment Report)
- Archaeological Assessment Report
- P2ACH-ROD-EWE-SW\_AE-RP-EN-30002 (Ecological Impact Assessment Report)
- P2ACH-ROD-GEN-SW\_AE-DR-CD-30000 to 30003 and 30006 to 30009 (Engineering Drawings)
- P2ACH-ROD-GEN-SW\_AE-RP-CD-30001 (Engineering Report)
- P2ACH-ROD-GEN-SW\_AE-FR-EN-30001 (Flood Risk Assessment Report)
- P2ACH-ROD-EWE-SW\_AE-RP-EN-30003 (Habitat Management Plan)
- P2ACH-ROD-EWE-SW\_AE-RP-EN-30004 (Invasive Species Management Plan)
- P2ACH-ROD-EWE-SW\_AE-RP-EN-30005 (Environmental Impact Assessment Screening Report)
- Landscape Plan
- Planting Details
- Schedule of Landscape Works - Maintenance & Management
- Tree Constraints Plan
- Tree Protection Plan

The following Internal Departments within DLRCC have provided comment on the Part VIII planning documents:

- Forward Planning Infrastructure
- Traffic & Road Safety
- Planning
- Community & Cultural Development
- Architects Department
- Parks
- Infrastructure & Climate Change
- Road Project Office
- Road Forward Planning's
- Housing
- Environment
- I&CC Climate Change
- Municipal Services – Water Services
- Municipal services – Road Maintenance

## 2. FORWARD PLANNING INFRASTRUCTURE COMMENTS & RESPONSES

The Forward Planning Infrastructure Department had no comments on the Part VIII planning documents. They made the following note:

***A note to advise that whilst I am on the circulation list for Part 8 Proposals, please note that in this instance our Dept, FPI is the sponsoring department. On this basis, I note that I fully endorsed the Part 8 package as proposed for circulation and as such have no comments to make.***

## 3. TRAFFIC & ROAD SAFETY COMMENTS & RESPONSES

The Traffic & Road Safety had no comments on the Part VIII planning documents. They made the following note:

***The Traffic and Road Safety Section has no objection to the proposed development.***

## 4. PLANNING DEPARTMENT COMMENTS & REPOSES

The Planning Department made the following comment:

***The Planning Authority have reviewed the draft proposal and note 'No Objection'. The applicant is advised to prepare Environmental Impact Assessment Report (EIAR) Screening documentation for the Part 8 development proposed.***

EIA Screening Report has been prepared to supplement the planning application.

## 5. COMMUNITY & CULTURAL DEVELOPMENT COMMENTS & RESPONSES

The Community & Cultural Development Department had no comments on the Part VIII planning documents. They made the following note:

***I can confirm that Community and Cultural Development Department have no objection to this proposed development proceeding to Part 8***

## 6. ARCHITECTS DEPARTMENT COMMENTS & RESPONSES

The Architects Department made a number of comments in relation to the Part VIII planning documents.

***Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW\_AE-DR-CD-30007(S4\_P03) Proposed Greenway/Temporary Construction Access Route indicates (comments below are common for other drawings within the Part 8 package):***

***1. 'Proposed surface water drainage by others' indicated in hatch grey line to SE of dlr housing lands at Lehaunstown boundary. This was raised previously and we were advised that it would be removed from drawings. Should it remain dlr***

***May be obligated to facilitate drainage through site by 3rd party and provide ancillary wayleave which may impact on site development.***

Location of surface water drainage infrastructure at this location is indicative only. Drawings P2ACH-ROD-GEN-SW\_AE-DR-CD-30002, 30007, 3008 and 30009 have been updated to remove the indicative location of pipe network.

***2. Following same approximate route is what appears to be proposed indicative route of green way in solid black line. Suggest that this is moved to align with hedgerow and site boundary to minimise impact on dlr housing lands at Lehaunstown.***

Indicative route of greenway removed from drawings.

***3. Inverted L-shape Temporary Access for Construction Stage – it is proposed by Cherrywood DAPT to offer building compound location to proposed contractor of the attenuation pond within dlr housing site at Lehaunstown. We request that when building contractor is appointed and prior to construction commencing that the attenuation pond 2a building site, building compound and route between the two is agreed and fenced off and mapped. This should be issued to dlr Architects Department for review. This is to ensure minimal negative impact to the existing dlr housing site at Lehaunstown. It should be noted that the existing topographical map issued to Housing Department on 1st February will form the basis of site survey on which the proposed dlr housing will be designed. All site excavation should be moved promptly from site and not piled on dlr housing site at Lehaunstown. This is to ensure housing designs are based on best available information and allow for design and progress to Part 8.***

Noted – construction compound and route between compound and site to be agreed with DLR Architects prior to construction. A detailed topographical survey will be undertaken at detailed design stage to facilitate the detailed design of Pond 2A. This can be provided to DLR Housing once completed.

***4. Inverted L-shape Temporary Access for Construction Stage should be left to facilitate construction of dlr housing units on this site.***

Inverted L-Shaped Temporary Access for Construction Stage to be left in place to facilitate construction of future DLR housing units on the site.

***5. Photographs of the site pre-construction and post construction should be taken and forwarded to dlr Architects Department.***

Noted. Pre-commencement and post construction photos to be taken and forwarded DLR Architects Department.

***6. Topographical survey should be completed of the dlr housing site at Lehaunstown post construction of the attenuation pond 2a for issue to dlr Architects Department.***

Noted. Topographical survey to be completed of the DLR housing site at Lahaunstown post construction of Attenuation Pond 2A and issued to DLR Architects Department.

**Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW\_AE-DR-CD-30002(S4\_P06) Proposed Pond Layout and Sections C-C & D-D.**

**7. Swale is indicated to run along north boundary of dlr housing site at Lehaunstown. It had previously been agreed to indicate culvert of same. Please revise drawings to indicate same.**

Drawings updated to indicate culvert section along swale.

**8. Map 6.1 of the Cherrywood Planning Scheme shows an upgraded road layout in the vicinity of the Housing plot. The Planning Scheme indicative access point for the site shows access through neighbouring lands. Potential permanent access point to dlr housing site at Lehaunstown would be via this area but is subject to Transport Consultation and if verified would be subject to negotiations with landowners. Access at this point would traverse proposed maintenance route of attenuation pond 2a. Please demonstrate how this will be accommodated.**

The proposed maintenance route to Pond 2A could potentially be traversed by a permanent access to serve the DLR housing site. This would involve potentially providing gates either side on the maintenance road where the proposed housing access would potentially cross. This would ensure that access to Pond 2A for maintenance purposes is kept secure at all times while also facilitating access to the DLR housing site. Drawings have been updated to indicate section of culvert along swale.

**9. It would also traverse existing 600mm dia foul sewer and ancillary 10m wayleave.**

Noted – this should be examined at planning application / design stage for the DLR housing site.

**In addition, it was advised by Cherrywood DAPT Team to Housing Department of an IW proposed route through dlr housing site at Lehaunstown. It was indicatively marked at the Cherrywood Planning Scheme stage running west to east through the centre of the centre and would require a significant wayleave. Negotiations with IW should be entered into by Cherrywood DAPT and Architects/Housing Department to ensure that design is moved to align with site boundary and indeed perhaps along north boundary, to mitigate against further wayleave restriction to future site development.**

Noted – To be dealt with separately to this planning application between DLRCC Architects / Housing Departments and Cherrywood DAPT.

## **7. PARKS DEPARTMENT COMMENTS & RESPONSES**

The Parks Department had no comments on the Part VIII planning documents. They made the following note:

***I can confirm that Parks have no objection to this Part 8***

## 8. INFRASTRUCTURE & CLIMATE CHANGE DEPARTMENT COMMENTS & RESPONSES

The Infrastructure & Climate Department did not comment or note anything on the Part VIII planning documents.

## 9. ROADS PROJECT OFFICE COMMENTS & RESPONSES

The Roads Department had no comments on the Part VIII planning documents. They made the following note:

***I confirm that I&CC Capital Projects Office have no objections to this Part.***

## 10. ROADS FORWARD PLANNING COMMENTS & RESPONSES

The Roads Forward Planning Department had no comments on the Part VIII planning documents. They made the following note:

***Transportation Planning have no objection to this Part 8. Noted that a 373m section of Greenway is proposed as part of this development which will first be used as a temporary construction access at Attenuation Pond construction stage for construction vehicles. The indicated greenway width of 4m between retaining walls on the drawing of the Proposed Greenway/Temporary Construction Access Road Layout will benefit from detailed design review and clarification of suitability for future Greenway use including any potential for alignment amendments to further improve accessibility gradients while acknowledging challenge of existing steep ground levels.***

This note will be considered at Detailed Design Stage.

## 11. HOUSING DEPARTMENT COMMENTS & RESPONSES

The Housing Department made a number of comments in relation to the Part VIII planning documents.

***Having reviewed the Part 8 Lehaunstown Attenuation Pond 2a package and in particular the Engineering Drawings (Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW\_AE-DR-CD-30007(S4\_P03) Proposed Greenway/Temporary Construction Access Route indicates (comments below stand for other drawings within the Part 8 package:***

***1. 'Proposed surface water drainage by others' indicated in hatch grey line to SE of dlr housing lands at western boundary of the site. This was raised previously with you and we were advised that it would be removed from the Part 8 drawings. Any proposal to bring a pipe through these lands would need the prior agreement of the Housing Department, in the location currently indicated, having regard to any ancillary wayleave, it would further impact on the design of future housing on the site. This should now be removed from the Part 8 drawings as it does not form part of the proposed works.***

Location of surface water drainage infrastructure at this location is indicative only. Drawings P2ACH-ROD-GEN-SW\_AE-DR-CD-30002, 30007, 3008 and 30009 have been updated to remove the indicative location of pipe network.

**2. In the same approximate location and route of the above is what appears to be the indicative route of a proposed green way. The route of any proposed greenway should be located to minimise impact on dlr housing lands at Lehaunstown and may be more appropriate in an alternative location, it should not be identified as part of this Part 8 as it is not included in the proposed works.**

Indicative location of route removed from Drawings P2ACH-ROD-GEN-SW\_AE-DR-CD-30002, 30007, 3008 and 30009.

**3. Inverted L-shape Temporary Access for Construction Stage – it is proposed by Cherrywood DAPT to offer building compound location to proposed contractor of the attenuation pond within dlr housing site at Lehaunstown. We request that when building contractor is appointed and prior to construction commencing that the attenuation pond 2a building site, the building compound and route between the two is agreed and fenced off and mapped. This should be issued to dlr Architects Department for review and agreement. This is to ensure minimal negative impact to the existing dlr housing site at Lehaunstown. It should be noted that the existing topographical map issued to Housing Department on 1st February will form the basis of site survey on which the proposed dlr housing will be designed.**

Noted – construction compound and route between compound and site to be agreed with DLR Architects prior to construction. A detailed topographical survey will be undertaken at detailed design stage to facilitate the detailed design of Pond 2A. This can be provided to DLR Housing once completed.

**4. The housing site to made good on completion of works, and no excavated spoil or construction materials to be left behind.**

Noted – This can be incorporated into the Contract Documents for Pond 2A.

**5. All site excavation during the works should be moved promptly from site and not piled/stored on dlr housing site outside the compound area. This is to ensure housing designs are based on best available information and allow for design and progress to Part 8.**

Noted – This can be incorporated into the Contract Documents for Pond 2A.

**6. Inverted L-shape Temporary Access for Construction Stage should be left to facilitate construction of dlr housing units on this site.**

Inverted L-Shaped Temporary Access for Construction Stage to be left in place to facilitate construction of future DLR housing units on the site.

**7. Photographs of the entire housing site pre-construction and post construction should be taken and forwarded to Housing Department.**

Noted. Pre-commencement and post construction photos to be taken and forwarded DLR Housing Department.



**8. Topographical survey should be completed of the dlr housing site at Lehaunstown post construction of the attenuation pond 2a for issue to dlr Architects Department.**

Noted. Topographical survey to be completed of the DLR housing site at Lahaunstown post construction of Attenuation Pond 2A and issued to DLR Architects Department.

**Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW\_AE-DR-CD-30002(S4\_P06) Proposed Pond Layout and Sections C-C & D-D.**

**9. A swale is indicated to run along north boundary of dlr housing site at Lehaunstown. It had previously been agreed to indicate culvert of same. It is noted that the drawings showing the swale area included in this package have not yet been amended. Prior to proceeding to Part 8 we would like to see the amended drawings.**

Drawings updated to indicate culvert section along swale.

**10. Map 6.1 of the Cherrywood Planning Scheme shows an upgraded road layout in the vicinity of the Housing plot. The Planning Scheme indicative access point for the site shows future access through neighbouring lands. Potential permanent access point to dlr housing site at Lehaunstown would be via this area but is subject to Transport Consultation and if verified would be subject to negotiations with landowners. Access at this point would traverse proposed maintenance route of attenuation pond 2a. Please demonstrate how this will be accommodated. It would also traverse existing 600mm dia foul sewer and ancillary 10m wayleave.**

The proposed maintenance route to Pond 2A could potentially be traversed by a permanent access to serve the DLR housing site. This would involve potentially providing gates either side on the maintenance road where the proposed housing access would potentially cross. This would ensure that access to Pond 2A for maintenance purposes is kept secure at all times while also facilitating access to the DLR housing site. Drawings have been updated to indicate section of culvert along swale.

**11. In relation to the proposed new vehicular access which is being provided off Lehaunstown lane to service and maintain the pond, surface water and foul sewer, this access should also be made available to access to the housing site.**

Noted – drawings have been updated to include a section of culvert through the swale to facilitate access. It is noted that the proposed maintenance route for the pond is c 3.5m width at the widest point and so is potentially only suitable for one-way vehicular access or for emergency purposes.

Further to the numbered comments above, additional comments were received from DL RCC Housing Department. The Cherrywood DAPT responded to each of these comments. The responses provided by the Cherrywood DAPT are outlined below.

**It is noted that the drawings showing the swale area included in this package have not yet been amended to allow for vehicular access, we would like to see this before the proposal proceeds to the Part 8.**

Drawing alteration in progress and updated drawing will be provided prior to commencement of the Part 8 process. The drawing will show the swale area culverted for a suitable section to allow for vehicular access.

***In relation to the proposed new vehicular access which is being provided off Lehaunstown lane to enable access for maintenance of the pond, surface water and foul sewer, can this access also be used as an access to the housing site?***

Vehicular accesses should be considered in the context of the overall Housing Design for the site.

The proposed maintenance route for the pond is c 3.5m width at the widest point and so is potentially only suitable for one-way vehicular access. Given location beside protected hedgerow, a "no dig" ground reinforcement construction is proposed. This construction can be suitable for vehicular access, turning movements etc. However, this route is likely unsuitable as a primary access as there is no footpath or cycle path provision, and no space to accommodate same. Note also that the fall at this location is c. 6.25% (1:16), above the recommended 5% for universal access.

***The proposed swale to the North is shown located between the proposed access road and the housing site, while this may now be culverted is it possible that this could be located at the hedge side rather than the housing side?***

With reference to drawing no. 30002 titled Proposed Pond Plan Layout & Sections C-C & D-D, the optimum location for the swale is as designed. Note swale is located within the wayleave associated with the existing IW foul sewer.

***The red line indicates the site for the P8, there is a dog leg (upside down L) shown to the west of the site (see drawing P2Ach Gen SW AE 30001 and 30002) this is indicated as an alternative access to the proposed pond site but it is not connected to it? Could we have a bit more information on this.***

This is the haul route that has been agreed with William Neville for the construction access to the site via Grand Parade. The haul route accesses the DLR plot via a natural gap in the tree line, refer to Engineering report for further information on construction methodology. The DAPT have considered that it is not required for the housing site to be included within the red line boundary for the proposed pond development as it is within the blue line ownership boundary.

***In this area also there is a line showing proposed surface water by others, as this runs through our site connecting into the new SW pipe on the greenway I should be obliged if you would clarify what this line refers to, is the surface water not coming from the Grand Parade via the new surface water pipe along the greenway into Pond 2a or through the surface water connection to the north. Where this SW pipe joins the new SW pipe part of the Part 8 the drawing shows a blank for future connection.***

Based on an assessment of the surface water catchment to inform the design for the pond, this is an indicative location where a connection to the Housing site and/or future residential developments may connect to the surface water connection to the pond. All future connections are subject to detailed design and in the interests of clarity in the Part 8 Planning Drawings, this line can be removed as it will not be constructed as part of the proposed development of the pond.

***There is a similar spur with a blank left at the hedge opening can you clarify which development this is facilitating.***

Following consultation with the design team, it has been confirmed that this is a drafting error and will be removed.

***In the vicinity of the line showing proposed surface water by others where it joins the greenway can you clarify what the line there is showing (terminates in a triangular shape)?***

This is an indicative orientation point to the greenway as shown on Map 4.5 of the Cherrywood Planning Scheme. Only the greenway section from Grand parade to node L to node L1 will form part of the upcoming Part 8.

***Will the occupants of the housing site be able to access the greenway from the housing site?***

There will be no impediment to residents of the housing site accessing the greenway. Connections or linkages depend on the design of the Housing site.

***In the construction management plan it says that the contractor will be required to take photos in advance of the works, will this include the housing site outside the red line?***

The pond construction methodology will require construction vehicles to traverse the housing plot to access the pond 2a site. Therefore, site investigations, such as photography, topographical surveys, GPR etc. will be required as part of the detailed design in advance of construction. The DAPT have considered that it is not required for the housing site to be included within the red line boundary for the proposed pond development as it is within the blue line ownership boundary.

***The plan also refers to construction traffic and parking of vans and cars and site cabins and that they will be located on an adjoining site but this is not indicated, can you confirm that these will not be located on housing lands?***

A site compound will be required for construction of the pond. It is likely the most suitable location would be on the Housing plot, subject to the agreement of the Housing department.

***Can you confirm that if construction traffic is passing through housing lands (outside the red line of the site) that the lands will be made good on completion of works and that no excavated material or building materials will be left on the site on completion of works.***

Yes, DAPT confirms that no excavated material or building materials will be left and that the site will be returned to it's original condition following completion of pond construction works.

#### ***Additional Queries***

***1. As previously advised in advance of receipt of Cherrywood DAPT traffic consultant tender list I approached Seamus MacGearailt, ROD to request cost of preparing traffic consultancy for the housing lands. He returned email (below) advising that work would be above €3k threshold for direct appointment BUT critically suggested:***

***a. there are legal issues of property title and access rights.....***

***The current access status of the plot in question is unclear, but there seem to be two field gates that link to the stub lane that provides access to the house that is surrounded by the DLR lands. I would expect that there should be rights of way from Lehaunstown Lane to the field gates that should still attach to the lands in question. Presumably the stub lane is not in public charge. These details should all be known from the land purchase records and should be included in the brief for any formal study to be arranged.***

***Has Cherrywood DAPT access to or previously carried out legal assessment above?***

***b. In engineering terms the vehicular access requirements for a 70 unit development will be modest, and could be accommodated in a narrow shared surface driveway of no more than 5m width. The actual width available in the two access links would need to be confirmed, either from a topographical survey map if available, or from a site inspection to take measurements.***

No, the DAPT have not carried out a legal assessment of the above and suggest that Housing/Architects progress this as part of your transportation scoping works.

***Please can you forward link to latest topographical survey of the housing site***

We do not currently have a Topographical survey of the housing site. However, as part of the detailed design for the pond, to be undertaken following a successful grant of Part 8, it is intended for a Topographical survey to be undertaken on the whole site area, including the Housing plot. The DAPT will furnish you with this survey at that time. The existing pond design was based on LICAR information and that can be forwarded if you do not have it.

***Access to the Housing Lands***

***a. Can we use the proposed maintenance road to Pond 2a on North boundary of Housing Lands site as permanent access to Housing site?***

See above

***b. Please forward on final design layout for Part 8 – showing proposed maintenance entrance and length of culverted swale.***

See above

***c. If 'no' to sharing use of the maintenance access for pond 2a, and if access via the 'two field gates that link to the stub lane that provides access to the house that is surrounded by the DLR lands' is physically and legally permissible can we use this as access point?***

See above re: maintenance access route. It is considered likely that the "field gate" access point will be required for access to/egress from the housing development.

***d. If no to both of above, it would look like the only other option is purchasing the house and its lands.***

***This may if this is the case – can we access the housing lands at existing housing junction with existing road?***

N/A

***For note. I do not have any record of existing house septic tank or percolation area. It could be within dlr Housing Lands boundary***

Noted

***We would welcome copy of Topographical study when completed and in interim 'LICAR' information***

Existing Cherrywood Topo survey forwarded on 01/02/21.

***Confirmation that dlr Housing Lands can have permanent access onto Lehaunstown Lane via existing entrance. In the absence of this can you advise if it is the preference that dlr Housing lands access site via North boundary and negotiation with adjoining land owners? If this is the case can the site be accessed through the existing entrance until the lands to the North are being developed. Is the spur road to the existing house being upgraded?***

Map 6.1 of the Cherrywood Planning Scheme shows an upgraded road layout in the vicinity of the Housing plot. The Planning Scheme indicative access point for the site shows an indicative access through neighbouring lands. DAPT advise that your Transport Consultant do a full scope out of access to the housing site as part of your infrastructure scoping.

***Please outline the blue line, delineating DLR site interest, missing from Part 8 draft drawings***

Noted, DAPT will consult with Planning colleagues regarding the inclusion or otherwise of the Blue line on the Part 8 Drawings.

***Please outline site which will remain available for housing development i.e. within dlr Housing Lands and area of same (for design information not for placing on Part 8 drawings) on the completion of Pond 2a***

All lands zoned for residential development as per the Planning Scheme will be available for housing development following the completion of Pond 2A.

***ROD's Preliminary Construction Management Plan states that all construction traffic will go via the area designated 'greenway' running along Neville's site parallel to the shared boundary hedgerow to the south of dlr Housing Lands. Please remove red outline L-shaped spur and contained road as an alternative route through Housing Lands for Part 8 design.***

ROD will be asked to review the wording with respect to construction access. The Haul road agreed with W. Neville and sons is necessary for construction access to the site and for construction of the pond. This haul road follows the alignment of a section of the future greenway before accessing the west side of the dlr lands via a natural gap in the treeline. It will be necessary for haulage trucks to access via this route as the topography does not allow for trucks to utilise the full extent of the proposed greenway as far as the pond. A "2-step" operation is proposed to be in operation i.e. track construction vehicles to manoeuvre through the housing lands in the construction of the pond, haulage vehicles to only go as far as the access point.

***Assume from description and your response to our previous queries that it is now intended that the Building Compound and Facilities will be located on the dlr Housing Lands – please provide description.***

Please see the attached indicative site compound layout, drawing ref: 30012. Please note that sketch is purely indicative as the appointed Contractor may have other preferences for their compound layout. Given the steep topography of the lands, ROD have chosen a relatively flat area to show the compound. If the compound was to be located closer to the proposed Pond, it would result in the Contractor having to potentially provide significant levels of temporary fill in the area to accommodate his set up. It's worth noting that if a Contractor who is already undertaking works elsewhere within Cherrywood is appointed to construct the pond, they may opt to use an existing compound if considered suitable.

***Please confirm that site photos of dlr Housing lands will be provided to Housing prior to the commencement of any construction i.e. lands within the blue line but outside the area the subject of the Part 8***

Yes, all site photos of dlr Housing lands will be provided prior to construction.

***Indicate where dlr housing lands will connect to attenuation pond***

This is dependent on the design for the Housing lands. DAPT are happy to engage with Housing during their design process. It should be noted that the Planning Scheme requires for the Housing site to attenuate surface water at plot level in the first instance before connection to the regional pond.

***Note that the site east boundary of dlr housing lands do not appear to follow the existing hedgerow and that the proposed cycle route is set back within the site with an additional area in corner removed from dlr housing potential? Please clarify why?***

The greenway route is as shown to ensure a link can be provided to the proposed greenway within the linear park and to avoid encroachment on the protected badger set area. The route alignment has the potential to be refined with input from Housing on development proposals for this area of the site and with input from the neighbouring residential development (W. Neville).

## **12. ENVIRONMENT DEPARTMENT COMMENTS & RESPONSES**

The Environment Department had no comments on the Part VIII planning documents. They made the following note:

***I can confirm that Environmental Enforcement have no objection to this Part 8.***

## **13. I&CC – CLIMATE ACTION COMMENTS & RESPONSES**

The I&CC Climate Action Department had no comments on the Part VIII planning documents. They made the following note:

***I can confirm that the Climate Action Section has no objections to this Part 8 - Proposed Regional Attenuation Pond 2A, Cherrywood SDZ.***

## 14. MUNICIPAL SERVICES - WATER SERVICES DEPARTMENT COMMENTS & RESPONSES

The Water Services Department within DLRCC commissioned JBA Consulting Engineers to undertake a review of the engineering proposals for the Part VIII planning application for Attenuation Pond 2A. JBA Consulting Engineers prepared a technical note which outlined their assessment of the engineering proposals and made recommendation for further information to be provided. The further information recommended to be provided is outlined below along with ROD responses. ROD also undertook extensive liaisons with JBA Consulting Engineers over the course of March and April 2021 prior to lodging the Part VIII planning application.

**1. Please provide a breakdown of catchment and contributing areas (including runoff percentage) which should be referenced to the catchment area plan shown in Figure 3.1 in the report.**

Refer to Appendix B of this document for supplementary information outlining breakdown of catchment and contributing areas. The catchment area breakdown was reviewed and accepted by JBA on the 27<sup>th</sup> April 2021 prior to the Part VIII planning application being lodged.

**2. Please provide suitable hydraulic output to show how the treatment volume and attenuation volumes have been arrived at.**

Refer to Appendix B of this document for supplementary information outlining the discharge inflow input, attenuation volume and discharge outflow outputs from the hydraulic model undertaken. The hydraulic models were also provided to JBA Consulting Engineers as part of the review process in which they deemed the modelling process undertaken by ROD appropriate for a Part VIII planning application on the 27<sup>th</sup> April 2021.

Since the design was first issued, DLRCC have requested that a permanent pool of water be incorporated into each of the pond tiers. The total treatment volume for the upstream catchment (public roads only) was determined in accordance with Equation 23.1 of the CIRIA SuDS Manual (C753). Only public roads have been considered as it is assumed that private development plots will be required to provide treatment at source for their development runoff in accordance with the SDZ Planning Scheme Chapter 4 Section 4.1.2. A permanent pool of 0.6m in depth will be incorporated into each of the pond tiers, giving a total permanent pool volume of 1,048m<sup>3</sup> to satisfy the treatment volume requirements. Additional treatment will also be offered by the incoming and outfall swales. Refer to Appendix B of this report for accompanying calculations. This approach was reviewed and considered acceptable by JBA Consulting Engineers / DLRCC Water Services Department at a meeting held on the 12<sup>th</sup> March 2021.

**3. A Stormwater Audit Stage 1 should be provided (PI7) if required by DLRCC**

A detailed review of the engineering design and accompanying design models was undertaken by JBA Consulting Engineers over the course of March and April 2021 in which they concluded that the overall schematisation and representation of the modelling assumptions and the basis for the design appears appropriate for a Part 8 planning application and that minor clarifications may be required at detailed design stage.

## **15. MUNICIPAL SERVICES – ROAD MAINTENANCE DEPARTMENT COMMENTS & RESPONSES**

The Road Maintenance Department had no comments on the Part VIII planning documents. They made the following note:

***I can confirm that Road Maintenance has no objection to this Part 8.***



## **APPENDIX A DLRCC INTERNAL DEPARTMENT COMMENTS**

# NOTE TO FILE

JBA Project Code Q21-0290  
Contract Pond 2A Cherrywood SDZ- Part 8 Planning  
Client Dun Laoghaire Rathdown CC (DLRCC)  
Day, Date and Rev 12 Feb 2021 – P01  
Author Chris Wason  
Subject Review of Storm Water submission

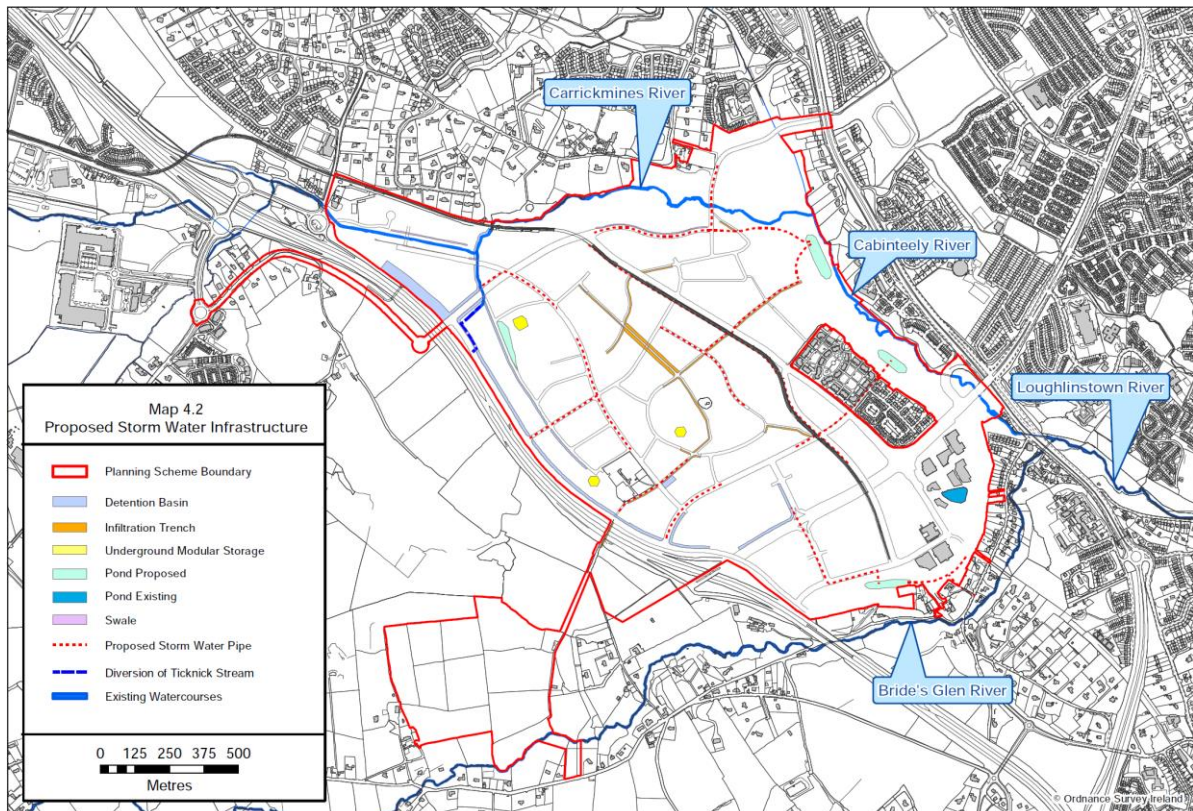
**JBA**  
consulting

## 1 Background

At the request of the DLRCC JBA have been engaged for the purposes of reviewing the engineering proposals for Pond 2A - Part 8 Planning Submission in Cherrywood SDZ. The submission has been made by Roughan & O'Donovan consulting engineers on behalf of the Development Agency Project Team (DAPT).

The application concerns the provision of the regional treatment pond as provided for in the Cherrywood SDZ along with associated drainage infrastructure.

Figure 1 - High level SW proposals in the SDZ



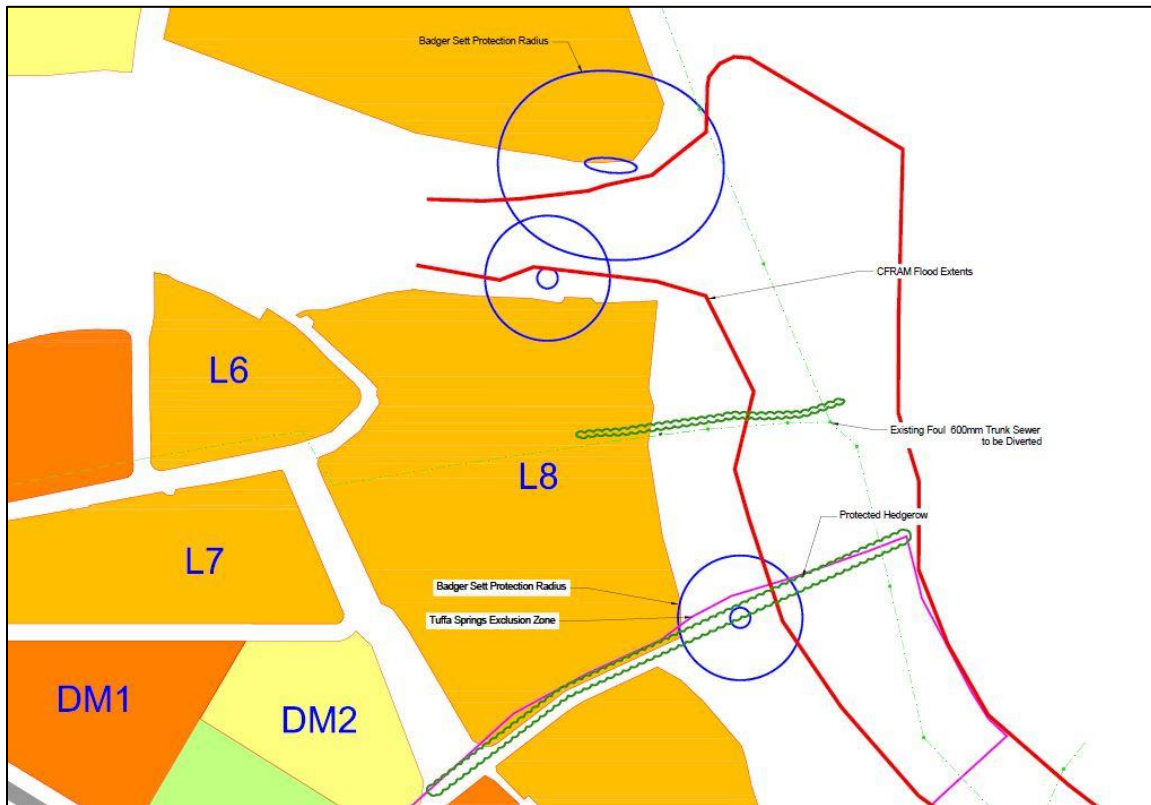
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JBA Project Code Q21-0290  
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**JBA**  
consulting

There are a number of physical constraints identified in the designated pond areas as indicated below;

Figure 2- Physical constraints



## 2 Documents Received

This report is based on the following relevant documents received from DLRCC.

- Engineering Report - P2ACH-ROD-GEN-SW\_AE-RP-CD-30001\_P03 dated 4/12/20
- Engineering Drawings;
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30001(S4\_P02)
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30002(S4\_P06)
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30003(S4\_P04)
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30006(S4\_P03)
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30007(S4\_P03)
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30008(S4\_P02)
  - P2ACH-ROD-GEN-SW\_AE-DR-CD-30009(S4\_P02)

## 3 Relevant Guidelines & Regulations

The following documents have been considered as part of the review:

# NOTE TO FILE

JBA Project Code	Q21-0290
Contract	Pond 2A Cherrywood SDZ- Part 8 Planning
Client	Dun Laoghaire Rathdown CC (DLRCC)
Day, Date and Rev	12 Feb 2021 – P01
Author	Chris Wason
Subject	Review of Storm Water submission

1. Cherrywood Planning Scheme (April 2014)
2. SuDS Manual (CIRIA C753-2015)
3. Greater Dublin Code of Practice for Drainage Works
4. The Greater Dublin Strategic Drainage Study, GSDSDS
  
5. Pond 2A – Concept Design Report – June 2019 by JBA

## 4 Review of Part 8 Proposals

### 4.1 Overview of submission

The pond is to provide final treatment and attenuation for the designated area to be served for which individual plots should already have their own flow control and SuDS measures and regional roads will have interception of flow provided.

General concepts;

- The design takes into consideration the constraints identified above.
- The stated limiting pass forward flow is 1 l/s/ha
- The overall catchment area is approximately 38.8 ha.
- The pond will accommodate flow from the 100-year storm + 10% climate change.
- Manholes are to be fitted with 600mm sumps to capture any silt.
- Two routes will be provided to convey storm runoff to the pond.
- The pond will act as a cascading weir tiered system with 4 tiers.
- The outlet flow control is a v notch weir.
- A 5m wide maintenance track is provided around the pond at a cross fall of 1:15

### 4.2 Treatment and Attenuation

The sizing of the pond for treatment is provided by interception of flow from the 1 in 1 year storm in accordance with guidance provided in the CIRIA C753 SuDS Manual. No treatment volume is given in the report.

A total attenuation volume of approximately 2,700m<sup>3</sup> is to be provided for the 100-year storm +10 % climate change.

The hydraulic analysis was undertaken using Flood Modeller Software.

Treatment requirements are assessed in accordance with the pollution risk management method “Simple Index Approach” as outlined in CIRIA C753.

A total contributing area of 23.37 ha. Is indicated in Table 3.1 of the report which equates to approximately 60% of the gross area which does not seem unreasonable.

### 4.3 Previous Reports

A review of the detailed report for revised SWMP prepared by Arup, on which the Pond 2A design is based indicated a total area of 43.8ha contributing but this includes some of the area for L4 north of the river which is to be considered independently. Therefore, the reduction in area to 38.8 ha. seems to be reasonable.

However, there is no breakdown table provided to demonstrate what areas are catered for in the ROD report.

## 5 Conclusions and Recommendations

The proposed design for Pond 2A looks to be workable and keeps within constraints identified. The pond design is not strictly in accordance with pond design recommendations in the CIRIA C753 but due to the very tight constraints this is deemed to be an acceptable compromise under the circumstances. Preliminary Construction Management Plan and an Operation and Maintenance Plan have been provided.

# NOTE TO FILE

JBA Project Code	Q21-0290
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**JBA**  
consulting

However, it is not clear on how the catchment areas have been broken down and how the 1 in 1 year storm (for treatment of flows) and the 1 in 100 year + CC (attenuation volume) have been arrived at. No details of the flow control have been provided although a v-notch weir is proposed.

The development is considered to be appropriate in principle, subject to confirmation that the pond has been adequately sized.

It is recommended that a request for further information be issued seeking the following;

1. Please provide a breakdown of catchment and contributing areas (including runoff percentage) which should be referenced to the catchment area plan shown in Figure 3.1 in the report.
2. Please provide suitable hydraulic output to show how the treatment volume and attenuation volumes have been arrived at.
3. A Stormwater Audit Stage 1 should be provided (PI7) if required by DLRCC

## 6 Overall Design Responsibility

Whereas, we have reviewed the above planning application, the review has been primarily by way of planning assessment. We have not undertaken any calculations and rely on the Applicants design team as regards overall design responsibility.

Department	Comments
Forward Planning Infrastructure	<p>A note to advise that whilst I am on the circulation list for Part 8 Proposals, please note that in this instance our Dept, FPI is the sponsoring department.</p> <p>On this basis, I note that I fully endorsed the Part 8 package as proposed for circulation and as such have no comments to make.</p>
Traffic & Road Safety	The Traffic and Road Safety Section has no objection to the proposed development.
Planning Dept	The Planning Authority have reviewed the draft proposal and note 'No Objection'. The applicant is advised to prepare Environmental Impact Assessment Report (EIAR) Screening documentation for the Part 8 development proposed.
Community & Cultural Development	I can confirm that Community and Cultural Development Department have no objection to this proposed development proceeding to Part 8
Architects Dept	<p>Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW_AE-DR-CD-30007(S4_P03) Proposed Greenway/Temporary Construction Access Route indicates (comments below are common for other drawings within the Part 8 package):</p> <ol style="list-style-type: none"> <li>1. 'Proposed surface water drainage by others' indicated in hatch grey line to SE of dlr housing lands at Lehaunstown boundary. This was raised previously and we were advised that it would be removed from drawings. Should it remain dlr May be obligated to facilitate drainage through site by 3<sup>rd</sup> party and provide ancillary wayleave which may impact on sitedevelopment.</li> <li>2. Following same approximate route is what appears to be proposed indicative route of green way in solid black line. Suggest that this is moved to align with hedgerow and site boundary to minimise impact on dlr housing lands at Lehaunstown.</li> <li>3. Inverted L-shape Temporary Access for Construction Stage – it is proposed by Cherrywood DAPT to offer building compound location to proposed contractor of the attenuation pond within dlr housing site at Lehaunstown. We request that when building contractor is appointed and prior to construction commencing that the attenuation pond 2a building site, building compound and route between the two is agreed and fenced off and mapped. This should be issued to dlr Architects Department for review. This is to ensure minimal negative impact to the existing dlr housing site at Lehaunstown. It should be noted that the existing topographical map issued to Housing Department on 1<sup>st</sup> February will form the basis of site survey on which the proposed dlr housing will be designed. All site excavation should be moved promptly from site and not piled on dlr housing site at Lehaunstown. This is to ensure housing designs are based on best available information and allow for design and progress to Part 8.</li> <li>4. Inverted L-shape Temporary Access for Construction Stage should be left to facilitate construction of dlr housing units on this site.</li> <li>5. Photographs of the site pre-construction and post construction should be taken and forwarded to dlr Architects Department.</li> <li>6. Topographical survey should be completed of the dlr housing site at Lehaunstown post construction of the attenuation pond 2a for issue to dlr Architects Department.</li> </ol> <p>Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW_AE-DR-CD-30002(S4_P06) Proposed Pond Layout and Sections C-C &amp; D-D.</p> <ol style="list-style-type: none"> <li>7. Swale is indicated to run along north boundary of dlr housing site at Lehaunstown. It had previously been agreed to indicate culvert of same. Please revise drawings to indicate same.</li> <li>8. Map 6.1 of the Cherrywood Planning Scheme shows an upgraded road layout in the vicinity of the Housing plot. The Planning Scheme indicative access point for the site shows access through neighbouring lands. Potential permanent access point to dlr housing site at Lehaunstown would be via this area but is subject to Transport Consultation and if verified would be subject to negotiations with landowners. Access at this point would traverse proposed maintenance route of attenuation pond 2a. Please demonstrate how this will be accommodated.</li> <li>9. It would also traverse existing 600mm dia foul sewer and ancillary 10m wayleave.</li> </ol>

	In addition, it was advised by Cherrywood DAPT Team to Housing Department of an IW proposed route through dlr housing site at Lehaunstown. It was indicatively marked at the Cherrywood Planning Scheme stage running west to east through the centre of the centre and would require a significant wayleave. Negotiations with IW should be entered into by Cherrywood DAPT and Architects/Housing Department to ensure that design is moved to align with site boundary and indeed perhaps along north boundary, to mitigate against further wayleave restriction to future site development.
Parks Dept	I can confirm that Parks have no objection to this Part 8
Infrastructure & Climate Change	
Road Project Office	I confirm that I&CC Capital Projects Office have no objections to this Part.
Roads Forward Planning's	<p>Transportation Planning have no objection to this Part 8.</p> <p>Noted that a 373m section of Greenway is proposed as part of this development which will first be used as a temporary construction access at Attenuation Pond construction stage for construction vehicles. The indicated greenway width of 4m between retaining walls on the drawing of the Proposed Greenway/Temporary Construction Access Road Layout will benefit from detailed design review and clarification of suitability for future Greenway use including any potential for alignment amendments to further improve accessibility gradients while acknowledging challenge of existing steep ground levels.</p>
Housing	<p>Having reviewed the Part 8 Lehaunstown Attenuation Pond 2a package and in particular the Engineering Drawings (Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW_AE-DR-CD-30007(S4_P03) Proposed Greenway/Temporary Construction Access Route indicates (comments below stand for other drawings within the Part 8 package:</p> <ol style="list-style-type: none"> <li>1. 'Proposed surface water drainage by others' indicated in hatch grey line to SE of dlr housing lands at western boundary of the site. This was raised previously with you and we were advised that it would be removed from the Part 8 drawings. Any proposal to bring a pipe through these lands would need the prior agreement of the Housing Department, in the location currently indicated, having regard to any ancillary wayleave, it would further impact on the design of future housing on the site. This should now be removed from the Part 8 drawings as it does not form part of the proposed works.</li> <li>2. In the same approximate location and route of the above is what appears to be the indicative route of a proposed green way. The route of any proposed greenway should be located to minimise impact on dlr housing lands at Lehaunstown and may be more appropriate in an alternative location, it should not be identified as part of this Part 8 as it is not included in the proposed works.</li> <li>3. Inverted L-shape Temporary Access for Construction Stage – it is proposed by Cherrywood DAPT to offer building compound location to proposed contractor of the attenuation pond within dlr housing site at Lehaunstown. We request that when building contractor is appointed and prior to construction commencing that the attenuation pond 2a building site, the building compound and route between the two is <b>agreed and fenced off</b> and mapped. This should be issued to dlr Architects Department for review and agreement. This is to ensure minimal negative impact to the existing dlr housing site at Lehaunstown. It should be noted that the existing topographical map issued to Housing Department on 1<sup>st</sup> February will form the basis of site survey on which the proposed dlr housing will be designed.</li> <li>4. The housing site to made good on completion of works, and no excavated spoil or construction materials to be left behind.</li> <li>5. All site excavation during the works should be moved promptly from site and not piled/stored on dlr housing site outside the compound area. This is to ensure housing designs are based on best available information and allow for design and progress to Part 8.</li> <li>6. Inverted L-shape Temporary Access for Construction Stage should be left to facilitate construction of dlr housing units on this site.</li> <li>7. Photographs of the entire housing site pre-construction and post construction should be taken and forwarded to Housing Department.</li> </ol>

	<p>8. Topographical survey should be completed of the dlr housing site at Lehaunstown post construction of the attenuation pond 2a for issue to dlr Architects Department.</p> <p>Consultant Engineers ROD drawing P2ACH-ROD-GEN-SW_AE-DR-CD-30002(S4_P06) Proposed Pond Layout and Sections C-C &amp; D-D.</p> <p>9. A swale is indicated to run along north boundary of dlr housing site at Lehaunstown. It had previously been agreed to indicate culvert of same. It is noted that the drawings showing the swale area included in this package have not yet been amended. Prior to proceeding to Part 8 we would like to see the amended drawings.</p> <p>10. Map 6.1 of the Cherrywood Planning Scheme shows an upgraded road layout in the vicinity of the Housing plot. The Planning Scheme indicative access point for the site shows future access through neighbouring lands. Potential permanent access point to dlr housing site at Lehaunstown would be via this area but is subject to Transport Consultation and if verified would be subject to negotiations with landowners. Access at this point would traverse proposed maintenance route of attenuation pond 2a. Please demonstrate how this will be accommodated. It would also traverse existing 600mm dia foul sewer and ancillary 10m wayleave.</p> <p>11. In relation to the proposed new vehicular access which is being provided off Lehaunstown lane to service and maintain the pond, surface water and foul sewer, this access should also be made available to access to the housing site.</p>
Environment	I can confirm that Environmental Enforcement have no objection to this Part 8.
I&CC – Climate Action	I can confirm that the Climate Action Section has no objections to this Part 8 - Proposed Regional Attenuation Pond 2A, Cherrywood SDZ.
Municipal Services – Water Services	see JBA report
Municipal Services – Road Maintenance	I can confirm that Road Maintenance has no objection to this Part 8.



- We would welcome copy of Topographical study when completed and in interim 'LICAR' information  
Existing Cherrywood Topo survey forwarded on 01/02/21.
- Confirmation that dlr Housing Lands can have permanent access onto Lehaunstown Lane via existing entrance. In the absence of this can you advise if it is the preference that dlr Housing lands access site via North boundary and negotiation with adjoining land owners? If this is the case can the site be accessed through the existing entrance until the lands to the North are being developed. Is the spur road to the existing house being upgraded?  
Map 6.1 of the Cherrywood Planning Scheme shows an upgraded road layout in the vicinity of the Housing plot. The Planning Scheme indicative access point for the site shows an indicative access through neighbouring lands. DAPT advise that your Transport Consultant do a full scope out of access to the housing site as part of your infrastructure scoping.
- Please outline the blue line, delineating DLR site interest, missing from Part 8 draft drawings  
Noted, DAPT will consult with Planning colleagues regarding the inclusion or otherwise of the Blue line on the Part 8 Drawings.
- Please outline site which will remain available for housing development i.e. within dlr Housing Lands and area of same (for design information not for placing on Part 8 drawings) on the completion of Pond 2a  
All lands zoned for residential development as per the Planning Scheme will be available for housing development following the completion of Pond 2A.
- ROD's Preliminary Construction Management Plan states that all construction traffic will go via the area designated 'greenway' running along Neville's site parallel to the shared boundary hedgerow to the south of dlr Housing Lands. Please remove red outline L-shaped spur and contained road as an alternative route through Housing Lands for Part 8 design.  
ROD will be asked to review the wording with respect to construction access. The Haul road agreed with W. Neville and sons is necessary for construction access to the site and for construction of the pond. This haul road follows the alignment of a section of the future greenway before accessing the west side of the dlr lands via a natural gap in the treeline. It will be necessary for haulage trucks to access via this route as the topography does not allow for trucks to utilise the full extent of the proposed greenway as far as the pond. A "2-step" operation is proposed to be in operation i.e. track construction vehicles to manoeuvre through the housing lands in the construction of the pond, haulage vehicles to only go as far as the access point.
- Assume from description and your response to our previous queries that it is now intended that the Building Compound and Facilities will be located on the dlr Housing Lands – please provide description.  
Please see the attached indicative site compound layout, drawing ref: 30012. Please note that sketch is purely indicative as the appointed Contractor may have other preferences for their compound layout. Given the steep topography of the lands, ROD have chosen a relatively flat area to show the compound. If the compound was to be located closer to the proposed Pond, it would result in the Contractor having to potentially provide significant levels of temporary fill in the area to accommodate his set up. It's worth noting that if a Contractor who is already undertaking works elsewhere within Cherrywood is appointed to construct the pond, they may opt to use an existing compound if considered suitable.

- Please confirm that site photos of dlr Housing lands will be provided to Housing prior to the commencement of any construction i.e. lands within the blue line but outside the area the subject of the Part 8

Yes, all site photos of dlr Housing lands will be provided prior to construction.

- Indicate where dlr housing lands will connect to attenuation pond

This is dependent on the design for the Housing lands. DAPT are happy to engage with Housing during their design process. It should be noted that the Planning Scheme requires for the Housing site to attenuate surface water at plot level in the first instance before connection to the regional pond.

- Note that the site east boundary of dlr housing lands do not appear to follow the existing hedgerow and that the proposed cycle route is set back within the site with an additional area in corner removed from dlr housing potential? Please clarify why?

The greenway route is as shown to ensure a link can be provided to the proposed greenway within the linear park and to avoid encroachment on the protected badger set area. The route alignment has the potential to be refined with input from Housing on development proposals for this area of the site and with input from the neighbouring residential development (W. Neville).

## Queries - Pond 2a

It is noted that the drawings showing the swale area included in this package have not yet been amended to allow for vehicular access, we would like to see this before the proposal proceeds to the Part 8.

*Drawing alteration in progress and updated drawing will be provided prior to commencement of the Part 8 process. The drawing will show the swale area culverted for a suitable section to allow for vehicular access.*

In relation to the proposed new vehicular access which is being provided off Lehaunstown lane to enable access for maintenance of the pond, surface water and foul sewer, can this access also be used as an access to the housing site?

*Vehicular accesses should be considered in the context of the overall Housing Design for the site.*

*The proposed maintenance route for the pond is c 3.5m width at the widest point and so is potentially only suitable for one-way vehicular access. Given location beside protected hedgerow, a "no dig" ground reinforcement construction is proposed. This construction can be suitable for vehicular access, turning movements etc. However, this route is likely unsuitable as a primary access as there is no footpath or cycle path provision, and no space to accommodate same. Note also that the fall at this location is c. 6.25% (1:16), above the recommended 5% for universal access.*

The proposed swale to the North is shown located between the proposed access road and the housing site, while this may now be culverted is it possible that this could be located at the hedge side rather than the housing side?

*With reference to drawing no. 30002 titled Proposed Pond Plan Layout & Sections C-C & D-D, the optimum location for the swale is as designed. Note swale is located within the wayleave associated with the existing IW foul sewer.*

The red line indicates the site for the P8, there is a dog leg (upside down L) shown to the west of the site (see drawing P2Ach Gen SW AE 30001 and 30002) this is indicated as an alternative access to the proposed pond site but it is not connected to it? Could we have a bit more information on this.

*This is the haul route that has been agreed with William Neville for the construction access to the site via Grand Parade. The haul route accesses the DLR plot via a natural gap in the tree line, refer to Engineering report for further information on construction methodology. The DAPT have considered that it is not required for the housing site to be included within the red line boundary for the proposed pond development as it is within the blue line ownership boundary.*

In this area also there is a line showing proposed surface water by others, as this runs through our site connecting into the new SW pipe on the greenway I should be obliged if you would clarify what this line refers to, is the surface water not coming from the Grand Parade via the new surface water pipe along the greenway into Pond 2a or through the surface water connection to the north. Where this SW pipe joins the new SW pipe part of the Part 8 the drawing shows a blank for future connection.

*Based on an assessment of the surface water catchment to inform the design for the pond, this is an indicative location where a connection to the Housing site and/or future residential developments may connect to the surface water connection to the pond. All future connections are subject to detailed design and in the interests of clarity in the Part 8 Planning Drawings, this line can be removed as it will not be constructed as part of the proposed development of the pond.*

There is a similar spur with a blank left at the hedge opening can you clarify which development this is facilitating.

*Following consultation with the design team, it has been confirmed that this is a drafting error and will be removed.*

In the vicinity of the line showing proposed surface water by others where it joins the greenway can you clarify what the line there is showing (terminates in a triangular shape)?

*This is an indicative orientation point to the greenway as shown on Map 4.5 of the Cherrywood Planning Scheme. Only the greenway section from Grand parade to node L to node L1 will form part of the upcoming Part 8.*

Will the occupants of the housing site be able to access the greenway from the housing site?

*There will be no impediment to residents of the housing site accessing the greenway. Connections or linkages depend on the design of the Housing site.*

In the construction management plan it says that the contractor will be required to take photos in advance of the works, will this include the housing site outside the red line?

*The pond construction methodology will require construction vehicles to traverse the housing plot to access the pond 2a site. Therefore, site investigations, such as photography, topographical surveys, GPR etc. will be required as part of the detailed design in advance of construction. The DAPT have considered that it is not required for the housing site to be included within the red line boundary for the proposed pond development as it is within the blue line ownership boundary.*

The plan also refers to construction traffic and parking of vans and cars and site cabins and that they will be located on an adjoining site but this is not indicated, can you confirm that these will not be located on housing lands?

*A site compound will be required for construction of the pond. It is likely the most suitable location would be on the Housing plot, subject to the agreement of the Housing department.*

Can you confirm that if construction traffic is passing through housing lands (outside the red line of the site) that the lands will be made good on completion of works and that no excavated material or building materials will be left on the site on completion of works.

*Yes, DAPT confirms that no excavated material or building materials will be left and that the site will be returned to it's original condition following completion of pond construction works.*

### **Additional Queries**

1. As previously advised in advance of receipt of Cherrywood DAPT traffic consultant tender list I approached Seamus MacGearailt, ROD to request cost of preparing traffic consultancy for the housing lands. He returned email (below) advising that work would be above €3k threshold for direct appointment BUT critically suggested:
  - a. *there are legal issues of property title and access rights.....*  
*The current access status of the plot in question is unclear, but there seem to be two field gates that link to the stub lane that provides access to the house that is surrounded by the DLR lands. I would expect that there should be rights of way from Lehaunstown Lane to the field gates that should still attach to the lands in question. Presumably the stub lane is not in public charge. These details should all be known from the land purchase records and should be included in the brief for any formal study to be arranged.*

**Has Cherrywood DAPT access to or previously carried out legal assessment above?**

- b. *In engineering terms the vehicular access requirements for a 70 unit development will be modest, and could be accommodated in a narrow shared surface driveway of no more than 5m width. The actual width available in the two access links would need to be confirmed, either from a topographical survey map if available, or from a site inspection to take measurements.*

*No, the DAPT have not carried out a legal assessment of the above and suggest that Housing/Architects progress this as part of your transportation scoping works.*

**Please can you forward link to latest topographical survey of the housing site**

2. *We do not currently have a Topographical survey of the housing site. However, as part of the detailed design for the pond, to be undertaken following a successful grant of Part 8, it is intended for a Topographical survey to be undertaken on the whole site area, including the Housing plot. The DAPT will furnish you with this survey at that time. The existing pond design was based on LICAR information and that can be forwarded if you do not have it.*
- Access to the Housing Lands
- a. Can we use the proposed maintenance road to Pond 2a on North boundary of Housing Lands site as permanent access to Housing site?  
*See above*
- b. Please forward on final design layout for Part 8 – showing proposed maintenance entrance and length of culverted swale.  
*See above*
- c. If 'no' to sharing use of the maintenance access for pond 2a, and if access via the 'two field gates that link to the stub lane that provides access to the house that is surrounded by the DLR lands' is physically and legally permissible can we use this as access point?  
*See above re: maintenance access route. It is considered likely that the "field gate" access point will be required for access to/egress from the housing development.*
- d. If no to both of above, it would look like the only other option is purchasing the house and its lands.  
This may If this is the case – can we access the housing lands at existing housing junction with existing road? *N/A*
3. For note. I do not have any record of existing house septic tank or percolation area. It could be within dlr Housing Lands boundary. - *Noted*

## **APPENDIX B SUPPLEMENTARY INFORMATION**

Catchment Area Breakdown				
	Area	Imp. Area	Imp. Area	
Catchment Areas (Refer to Figure 3.1 of Eng Report)	ha	(%)	ha	Comment
L1	3.626	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 8.001 in Microdrainage Results Printoff)
L2	2.455	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 7.001 in Microdrainage Results Printoff)
L3	2.431	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 12.001 in Microdrainage Results Printoff)
L4 and Partially L5	4.650	N/A - Flow Restricted to 1l/s/ha prior to discharging from plots in Model	N/A	Developer plots runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 9.001 in Microdrainage Results Printoff)
Partially L5	0.653	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 13.001 in Microdrainage Results Printoff)
L6	0.781	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 10.001 in Microdrainage Results Printoff)
L7	1.508	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 15.001 in Microdrainage Results Printoff)
L8	2.307	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 21.001 in Microdrainage Results Printoff)
T1 and T3	2.418	N/A - Flow Restricted to 1l/s/ha prior to discharging from plots in Model	N/A	Developer plots runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 4.001 in Microdrainage Results Printoff)
T2	3.151	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 5.001 in Microdrainage Results Printoff)
T4 and T5	3.456	N/A - Flow Restricted to 1l/s/ha prior to discharging from plots in Model	N/A	Developer plots runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 18.001 in Microdrainage Results Printoff)
DM1 and DM2	2.304	N/A - Flow Restricted to 1l/s/ha prior to discharging from plots in Model	N/A	Developer plots runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 20.001 in Microdrainage Results Printoff)
DM5	2.111	N/A - Flow Restricted to 1l/s/ha prior to discharging from plot in Model	N/A	Developer plot runoff limited to 1l/sec/ha in Model (Refer to Pipe Run 19.001 in Microdrainage Results Printoff)
Roads	6.347	80.00	5.08	Road runoff restricted to 1l/sec./ha at Pond 2A Outfall (Refer to Pipe Run 1.010 in Microdrainage Results Printoff)
Total Catchment			38.20	ha
Road Area			6.35	ha
Road Area (Impermeable)			5.08	ha
Developer Area			31.85	ha

Arena Road  
Sandyford  
Dublin 18, Ireland

Cherrywood Pond 2A



Date 23/04/2021  
File CATCHMENT MODEL\_P06 (0.8 IF ROADS).MDX

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Checked by LS

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Network 2019.1

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm - Catchment A

Simulation Criteria

Areal Reduction Factor 1.000 Hot Start Level (mm) 0 Foul Sewage per hectare (l/s) 0.000 MADD Factor \* 10m³/ha Storage 2.000 Flow per Person per Day (l/per/day) 0.000  
Hot Start (mins) 0 Manhole Headloss Coeff (Global) 0.500 Additional Flow - % of Total Flow 0.000 Inlet Coefficient 0.800

Number of Input Hydrographs 0 Number of Online Controls 14 Number of Offline Controls 0 Number of Storage Structures 14 Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 15.700 Cv (Summer) 0.750  
Region Scotland and Ireland Ratio R 0.263 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep Fine DTS Status ON DVD Status OFF Inertia Status OFF

Profile(s)

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080  
Return Period(s) (years) 5, 100  
Climate Change (%) 10, 10

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water			Pipe		Level Exceeded
									Level (m)	Depth (m)	Volume (m³)	Flow / Cap. (l/s)	Overflow (l/s)	
S1.000	S1	15 Winter	100	+10%	100/15 Summer				73.323	0.748	0.000	1.01	130.7	SURCHARGED
S1.001	S2	15 Winter	100	+10%					68.492	-0.154	0.000	0.60	191.0	OK
S1.002	S3	15 Winter	100	+10%					63.614	-0.112	0.000	0.84	306.2	OK
S1.003	S4	15 Winter	100	+10%	100/15 Summer				62.321	0.596	0.000	0.99	378.0	SURCHARGED
S2.000	S5	15 Winter	100	+10%					64.408	-0.092	0.000	0.61	31.5	OK
S3.000	S6	15 Winter	100	+10%					71.349	-0.151	0.000	0.22	18.7	OK
S4.000	S7	15 Winter	100	+10%					73.492	-0.983	0.000	0.07	474.3	OK
S4.001	S8	4320 Winter	100	+10%	5/2160 Winter				70.193	0.460	0.000	0.00	2.2	SURCHARGED
S3.001	S7	15 Winter	100	+10%					68.438	-0.063	0.000	0.72	55.7	OK
S5.000	S10	15 Winter	100	+10%					70.497	-1.128	0.000	0.06	617.8	OK
S5.001	S11	4320 Winter	100	+10%	100/360 Winter				65.143	0.339	0.000	0.01	3.2	SURCHARGED
S2.001	S6	15 Winter	100	+10%					63.492	-0.009	0.000	0.95	96.4	OK
S6.000	S6	15 Winter	100	+10%	100/15 Summer				59.312	0.812	0.000	1.12	46.5	SURCHARGED
S7.000	S14	15 Winter	100	+10%					67.470	-1.005	0.000	0.06	481.5	OK
S7.001	S15	5760 Winter	100	+10%	5/2880 Winter				61.039	0.361	0.000	0.00	2.3	SURCHARGED
S2.002	S6	30 Winter	100	+10%	100/15 Summer				58.424	0.536	0.000	1.01	159.0	SURCHARGED
S8.000	S15	15 Winter	100	+10%					64.589	-0.886	0.000	0.15	722.6	OK
S8.001	S16	4320 Winter	100	+10%	100/240 Winter				62.755	0.454	0.000	0.00	3.6	SURCHARGED
S1.004	S5	30 Winter	100	+10%	100/15 Summer				57.797	0.479	0.000	1.15	543.6	SURCHARGED
S1.005	S6	30 Winter	100	+10%					55.562	-0.238	0.000	0.58	556.3	OK
S1.006	S7	30 Winter	100	+10%					49.911	-0.188	0.000	0.73	586.1	OK
S1.007	S8	30 Winter	100	+10%					44.577	-0.223	0.000	0.63	598.9	OK
S9.000	S23	15 Winter	100	+10%					46.965	-0.810	0.000	0.22	898.9	OK
S9.001	S24	4320 Winter	100	+10%	5/720 Winter				43.851	0.675	0.000	0.01	4.5	SURCHARGED
S10.000	S25	15 Winter	100	+10%					41.444	-1.331	0.000	0.03	155.6	OK
S10.001	S26	7200 Winter	100	+10%					40.677	-0.053	0.000	0.00	0.6	OK
S1.008	S9	30 Winter	100	+10%					37.901	-0.218	0.000	0.64	603.1	OK
S11.000	S1	15 Winter	100	+10%					73.521	-0.054	0.000	0.93	231.1	OK
S12.000	S2	15 Winter	100	+10%					68.526	-0.199	0.000	0.58	475.3	OK
S12.001	S3	4320 Winter	100	+10%	5/2160 Winter				59.755	0.476	0.000	0.00	2.2	SURCHARGED



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Network 2019.1

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm - Catchment A

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surchage	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Surcharged Flooded			Pipe Flow (l/s)	Status	Level Exceeded	
									Level (m)	Depth (m)	Volume (m³)				
S11.001	S2	15 Winter	100	+10%					56.850	-0.233	0.000	0.46	230.9	OK	
S13.000	S3	15 Winter	100	+10%					55.996	-0.229	0.000	0.48	129.4	OK	
S13.001	S4	7200 Winter	100	+10%					55.555	-0.170	0.000	0.00	0.5	OK	
S11.002	S2	15 Winter	100	+10%	100/15 Summer				55.347	0.764	0.000	1.04	216.6	SURCHARGED	
S14.000	S3	15 Winter	100	+10%					47.388	-0.112	0.000	0.47	24.7	OK	
S15.000	S7	15 Winter	100	+10%					54.004	-0.221	0.000	0.51	298.5	OK	
S15.001	S8	5760 Winter	100	+10%	100/1440 Winter				47.856	0.122	0.000	0.00	1.2	SURCHARGED	
S11.003	S3	30 Winter	100	+10%	100/15 Summer				46.660	0.159	0.000	0.82	228.5	SURCHARGED	
S11.004	S3	30 Winter	100	+10%	5/15 Winter				45.365	0.715	0.000	1.50	233.9	SURCHARGED	
S16.000	S6	15 Winter	100	+10%	100/15 Winter				56.644	0.069	0.000	0.92	117.5	SURCHARGED	
S17.000	S7	15 Winter	100	+10%					64.395	-0.105	0.000	0.51	44.8	OK	
S18.000	S8	15 Winter	100	+10%					72.658	-0.142	0.000	0.87	683.0	OK	
S18.001	S9	4320 Winter	100	+10%	5/2160 Winter				61.667	0.497	0.000	0.01	3.5	SURCHARGED	
S17.001	S8	15 Winter	100	+10%					59.388	-0.122	0.000	0.42	46.0	OK	
S19.000	S11	15 Winter	100	+10%	100/15 Summer				62.508	0.358	0.000	1.02	363.1	SURCHARGED	
S19.001	S12	5760 Winter	100	+10%	5/1440 Winter				56.095	0.443	0.000	0.00	1.9	SURCHARGED	
S16.001	S7	15 Winter	100	+10%					53.462	-0.115	0.000	0.68	177.7	OK	
S20.000	S14	15 Winter	100	+10%	100/15 Summer				55.838	0.188	0.000	1.00	413.7	SURCHARGED	
S20.001	S15	4320 Winter	100	+10%	5/960 Winter				46.173	0.504	0.000	0.01	2.1	SURCHARGED	
S11.005	S4	15 Winter	100	+10%					43.845	-0.318	0.000	0.33	414.4	OK	
S21.000	S22	15 Winter	100	+10%	100/15 Summer				45.587	0.437	0.000	1.03	390.5	SURCHARGED	
S21.001	S23	4320 Winter	100	+10%	5/960 Winter				34.776	0.509	0.000	0.01	2.1	SURCHARGED	
S11.006	S5	15 Winter	100	+10%					33.875	-0.270	0.000	0.48	414.4	OK	
S1.009	S28	30 Winter	100	+10%	5/15 Summer				26.148	0.829	0.000	2.56	1007.9	SURCHARGED	
S1.010	S55	4320 Winter	100	+10%	100/360 Winter				25.621	0.456	0.000	0.08	38.8	SURCHARGED	

**MicroDrainage Hydrograph Export for Use in Flood Modeller**

X (Hrs) Flow: RS01 (m3/s)

0	0.001
0.4	0.001
0.8	0.001
1.2	0.002
1.6	0.003
2	0.004
2.4	0.004
2.8	0.005
3.2	0.006
3.6	0.007
4	0.008
4.4	0.008
4.8	0.009
5.2	0.01
5.6	0.011
6	0.012
6.4	0.012
6.8	0.013
7.2	0.014
7.6	0.015
8	0.016
8.4	0.016
8.8	0.017
9.2	0.018
9.6	0.019
10	0.019
10.4	0.02
10.8	0.021
11.2	0.021

11.6	0.022
12	0.023
12.4	0.023
12.8	0.024
13.2	0.025
13.6	0.025
14	0.026
14.4	0.026
14.8	0.027
15.2	0.028
15.6	0.028
16	0.029
16.4	0.03
16.8	0.031
17.2	0.032
17.6	0.032
18	0.034
18.4	0.034
18.8	0.036
19.2	0.036
19.6	0.038
20	0.039
20.4	0.04
20.8	0.041
21.2	0.042
21.6	0.043
22	0.044
22.4	0.045
22.8	0.046
23.2	0.048
23.6	0.049

24	0.05
24.4	0.051
24.8	0.052
25.2	0.054
25.6	0.055
26	0.057
26.4	0.058
26.8	0.06
27.2	0.061
27.6	0.063
28	0.064
28.4	0.066
28.8	0.067
29.2	0.068
29.6	0.07
30	0.071
30.4	0.072
30.8	0.073
31.2	0.074
31.6	0.075
32	0.076
32.4	0.077
32.8	0.078
33.2	0.079
33.6	0.08
34	0.081
34.4	0.082
34.8	0.082
35.2	0.083
35.6	0.083
36	0.083

36.4	0.083
36.8	0.083
37.2	0.082
37.6	0.082
38	0.081
38.4	0.08
38.8	0.079
39.2	0.078
39.6	0.077
40	0.075
40.4	0.074
40.8	0.073
41.2	0.072
41.6	0.07
42	0.069
42.4	0.068
42.8	0.067
43.2	0.066
43.6	0.064
44	0.064
44.4	0.062
44.8	0.061
45.2	0.06
45.6	0.059
46	0.058
46.4	0.056
46.8	0.056
47.2	0.055
47.6	0.054
48	0.053
48.4	0.052

48.8	0.051
49.2	0.05
49.6	0.049
50	0.048
50.4	0.047
50.8	0.046
51.2	0.045
51.6	0.045
52	0.044
52.4	0.044
52.8	0.043
53.2	0.042
53.6	0.042
54	0.041
54.4	0.041
54.8	0.04
55.2	0.04
55.6	0.039
56	0.039
56.4	0.039
56.8	0.038
57.2	0.038
57.6	0.038
58	0.038
58.4	0.037
58.8	0.037
59.2	0.037
59.6	0.037
60	0.037
60.4	0.037
60.8	0.037

61.2	0.037
61.6	0.037
62	0.037
62.4	0.037
62.8	0.037
63.2	0.037
63.6	0.037
64	0.037
64.4	0.037
64.8	0.037
65.2	0.037
65.6	0.037
66	0.037
66.4	0.036
66.8	0.036
67.2	0.036
67.6	0.036
68	0.036
68.4	0.035
68.8	0.035
69.2	0.034
69.6	0.034
70	0.033
70.4	0.033
70.8	0.032
71.2	0.031
71.6	0.03
72	0.029
72.4	0.028
72.8	0.027
73.2	0.027

73.6	0.027
74	0.027
74.4	0.027
74.8	0.027
75.2	0.027
75.6	0.027
76	0.027
76.4	0.027
76.8	0.027
77.2	0.027
77.6	0.027
78	0.027
78.4	0.027
78.8	0.027
79.2	0.027
79.6	0.027
80	0.027
80.4	0.027
80.8	0.027
81.2	0.027
81.6	0.026
82	0.026
82.4	0.026
82.8	0.026
83.2	0.026
83.6	0.026
84	0.026
84.4	0.026
84.8	0.026
85.2	0.026
85.6	0.026



86	0.026
86.4	0.026
86.8	0.026
87.2	0.026
87.6	0.026
88	0.026
88.4	0.026
88.8	0.026
89.2	0.026
89.6	0.026
90	0.026
90.4	0.026
90.8	0.026
91.2	0.026
91.6	0.026
92	0.026
92.4	0.026
92.8	0.026
93.2	0.026
93.6	0.026
94	0.026
94.4	0.026
94.8	0.026
95.2	0.026
95.6	0.026
96	0.026
96.4	0.026
96.8	0.026
97.2	0.026
97.6	0.026
98	0.026

98.4	0.026
98.8	0.026
99.2	0.026
99.6	0.026
100	0.025
100.4	0.025
100.8	0.025
101.2	0.025
101.6	0.025
102	0.025
102.4	0.025
102.8	0.025
103.2	0.025
103.6	0.025
104	0.025
104.4	0.025
104.8	0.025
105.2	0.025
105.6	0.025
106	0.025
106.4	0.025
106.8	0.025
107.2	0.025
107.6	0.025
108	0.026
108.4	0.026
108.8	0.026
109.2	0.026
109.6	0.026
110	0.026
110.4	0.026

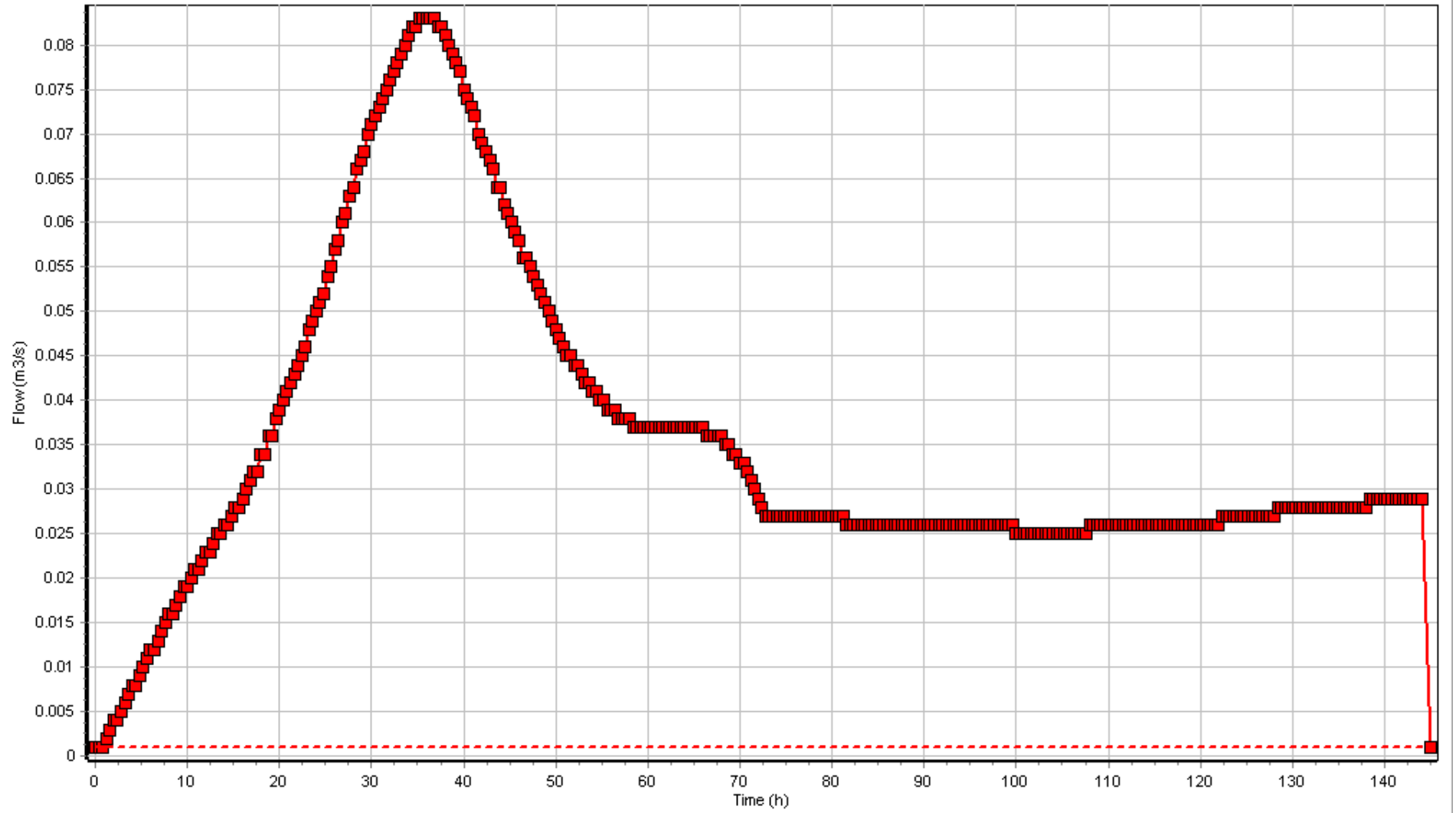
110.8	0.026
111.2	0.026
111.6	0.026
112	0.026
112.4	0.026
112.8	0.026
113.2	0.026
113.6	0.026
114	0.026
114.4	0.026
114.8	0.026
115.2	0.026
115.6	0.026
116	0.026
116.4	0.026
116.8	0.026
117.2	0.026
117.6	0.026
118	0.026
118.4	0.026
118.8	0.026
119.2	0.026
119.6	0.026
120	0.026
120.4	0.026
120.8	0.026
121.2	0.026
121.6	0.026
122	0.026
122.4	0.027
122.8	0.027

123.2 0.027  
123.6 0.027  
124 0.027  
124.4 0.027  
124.8 0.027  
125.2 0.027  
125.6 0.027  
126 0.027  
126.4 0.027  
126.8 0.027  
127.2 0.027  
127.6 0.027  
128 0.027  
128.4 0.028  
128.8 0.028  
129.2 0.028  
129.6 0.028  
130 0.028  
130.4 0.028  
130.8 0.028  
131.2 0.028  
131.6 0.028  
132 0.028  
132.4 0.028  
132.8 0.028  
133.2 0.028  
133.6 0.028  
134 0.028  
134.4 0.028  
134.8 0.028  
135.2 0.028

135.6	0.028
136	0.028
136.4	0.028
136.8	0.028
137.2	0.028
137.6	0.028
138	0.028
138.4	0.029
138.8	0.029
139.2	0.029
139.6	0.029
140	0.029
140.4	0.029
140.8	0.029
141.2	0.029
141.6	0.029
142	0.029
142.4	0.029
142.8	0.029
143.2	0.029
143.6	0.029
144	0.029
145	0.001

### Q100CC Pond 2A Input Hydrograph

Flow Boundary Data



\*\*\*\*\* Mass balance summary \*\*\*\*\*

Mass balance calculated every 8.0s

Initial volume: 145.486 m3

Final volume: 2651.13 m3

-----  
Total boundary inflow : 18315.0 m3

Total boundary outflow : 15808.6 m3

Total lat. link inflow : 0.00000 m3

Total lat. link outflow: 0.00000 m3

-----  
Max. system volume: 5639.74 m3

Max. |volume| increase: 5494.26 m3

Max. boundary inflow: 0.831123E-01m3/s

Max. boundary outflow: 0.404312E-01m3/s

-----  
Net increase in volume: 2505.64 m3

Net inflow volume: 2506.41 m3

Volume discrepancy: 0.762451 m3

Mass balance error: -0.01% (of peak system volume)

Mass balance error [2]: -0.00% (of boundary inflow volume)

\*\*\*\*\* End mass balance summary \*\*\*\*\*

20.106 Pond2A Treatment Volume (In Accordance with C753)

**EQ. 23.1 Water quality treatment volume calculation using variable rainfall depths (for Scotland)**

$$V_t = 9D \left[ \frac{SOIL}{2} + I \left( 1 - \frac{SOIL}{2} \right) \right]$$

where:

- $V_t$  = water quality treatment volume (as a function of the total development area) (m<sup>3</sup>/ha)
- $SOIL$  = soil classification (from Flood Studies or Wallingford Procedure WRAP map)
- $I$  = fraction of the area that is impervious (eg 30% impermeable area = 0.3)
- $D$  = M5-60 minute rainfall depth (ie 5-year return period, 60 minute duration storm depth determined from the Wallingford Procedure)

SOIL =	0.3
I =	0.8
D =	16.1 mm
Vt =	120.267 m3/ha
Public Road Area =	6.35 ha
Total Treatment Volume Required =	<b>764 m3</b>

Tier 1 Volume Provided (0.6m Permanent Pool):	323 m3
Tier 2 Volume Provided (0.6m Permanent Pool):	163 m3
Tier 3 Volume Provided (0.6m Permanent Pool):	232 m3
Tier 4 Volume Provided (0.6m Permanent Pool):	330 m3
Total Permanent Pool Volume Provided =	<b>1048 m3</b>