

Project	Kingsway Business Park		
Document Number	KBP-BWB-ZZ-XX-RP-CD-0004	BWB Ref	NTW2889
Author	David Gray	Status	S2
Checked	Matthew Bailey	Revision	P1
Approved	Rowan Jobling	Date	15.07.2022

Summary of Surface Water Sewer Modelling

- 1.1. This Technical Note provides a summary of the detailed hydraulic modelling exercises undertaken to date on the surface water sewers that serve the Kingsway Business Park.
- 1.2. The drainage strategy across the business park is split into three distinct catchments (as shown on **Figure 1.1** below).

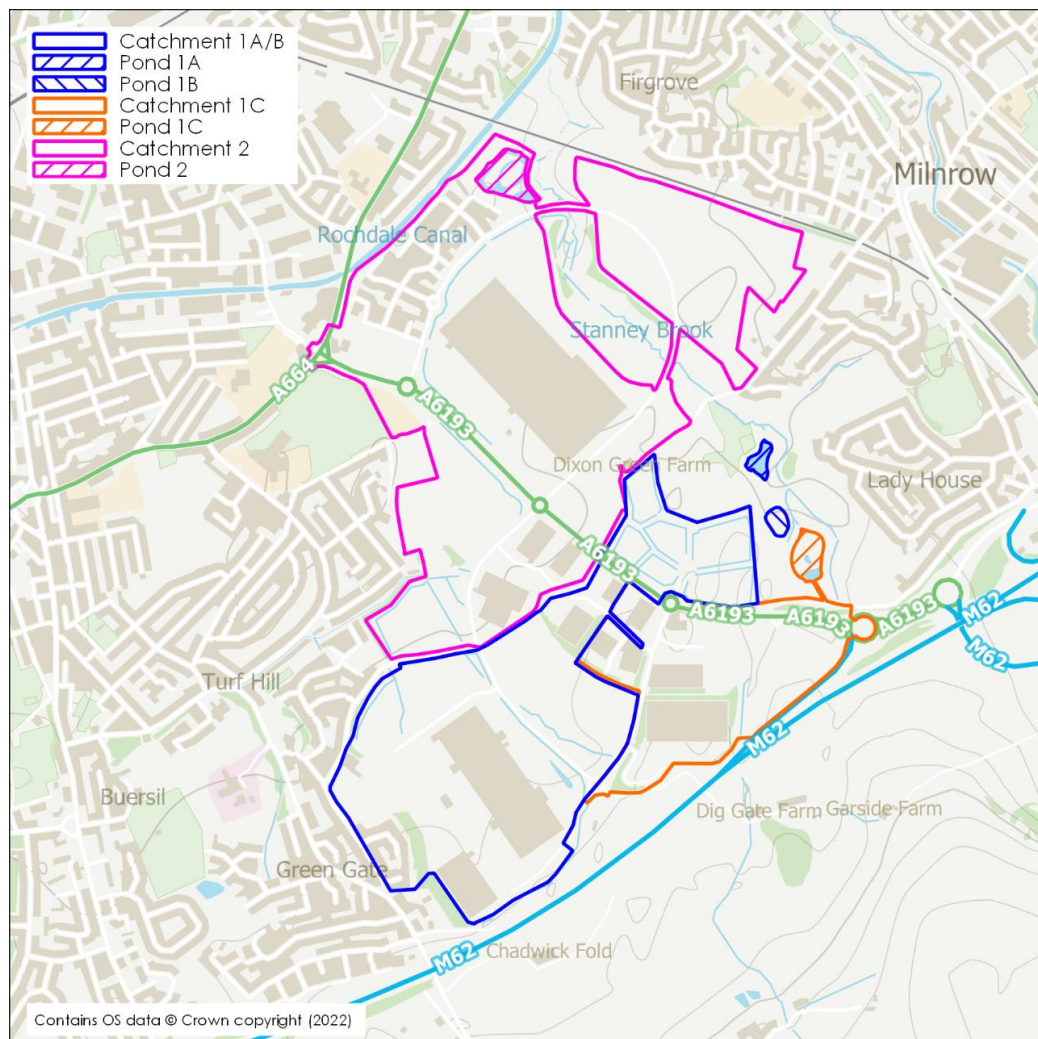


Figure 1.1: Business Park overall indicative catchments and attenuation ponds

- 1.3. Each drainage catchment is served by separate piped systems discharging to separate attenuation features. The existing drainage was constructed in 1999 and the hydraulic modelling exercises have shown that the surface water sewers have been designed to accommodate the 1 in 100-year storm event with no allowance for climate change for all plots across the business park.
- 1.4. Detailed hydraulic modelling and drawings for each drainage catchment are covered by individual reports, as listed below:
- Catchment 1A/1B – Report reference KBP-BWB-ZZ_XX-RP-CD-0001
 - Catchment 1C – Report reference KBP-BWB-ZZ_XX-RP-CD-0002
 - Catchment 2 – Report reference KBP-BWB-ZZ_XX-RP-CD-0003
- 1.5. **Table 1.1** (below) lists which Drainage catchment each development plot discharges to:

Table 1.1: Drainage Catchment Split per Plot

Drainage Catchment	Development Plots
1A/B	E (West), F, G, I, J1, J2, W
1C	C1, D1, D2, D3, D4, E(East), H
2	K, L, M, N, O, P1, P2, P3, Q, R, S, T1, T2, U1, U2, V, X

Design Parameters and Assumptions

- 1.6. The design parameters and assumptions used for each catchment vary depending on the level of information that was available at the time of the modelling work. Catchment specific information is stated in each report and key parameters are listed below:
- Impermeable areas generally taken as 90% for industrial areas and 65% for residential areas
 - Impermeable areas for roads taken as 100%
 - Where plots have been constructed, a more detailed estimate of impermeable area has been used based on the detailed drainage design
 - Network model simulation criteria set to default settings in MicroDrainage 2019.1.
 - Simulations have been run for the network model using the 'Seasonal Return Period Wizard' for all storm durations for the 1 in 100-year event on 2.5 second increments with Dynamic Time Step turned off, Dynamic Viscous Dampening and Inertia turned on.

- Simulations have been run using both Flood Studies Report (FSR) and Flood Estimation Handbook (FEH) rainfall methodologies.
- The detention basin volumes have been checked by recreating them in AutoCAD Civils 3D Software before being input into the MicroDrainage Network Model.
- Note that the original drainage system was designed using FSR rainfall (as stated within 'Attenuation Ponds Health & Safety File'), however FEH simulations have been ran as a sensitivity test for the recreated network model.

Summary of findings from Catchment 1A/1B

- 1.7. The report and modelling results were reviewed and accepted by United Utilities and Rochdale Borough Council (correspondence contained within **Appendix A**)
- 1.8. A summary of the findings from the as-built drainage study is below:
 - The pipe network operates well for all modelled storm events up to and including the 1 in 100-year with minimal surcharging.
 - The maximum water level in the pond was higher than the original Section 104 design and is predicted to overtop the weir wall once all plots within the catchment have been developed.
 - The peak flow rate from Pond 1A/1B is shown to be lower than the consented flows to the Stanney Brook.
 - Several options were investigated to remedy the overtopping of the weir wall. The option suggested in the drainage study report was to raise the weir wall by 200mm which solved the overtopping issue.
 - In subsequent conversations and meetings with Rochdale Borough Council's drainage engineer, Stephen McCann, it was agreed that the existing orifice plate flow control would be replaced with a larger diameter orifice plate. This option lowers the anticipated maximum water level within the pond to below the weir level while maintaining peak flows below the consented flows.
 - During a site visit, it was observed that the flow control could be liable to becoming blocked with vegetation and litter. To lower the risk of future blockages, it has also been agreed to install a debris screen over the flow control.

Summary of findings from Catchment 1C

- 1.9. The report was issued to United Utilities and Rochdale Borough Council
- 1.10. A summary of the findings from the as-built drainage study is below:
- The pipe network operates well for all modelled storm events up to and including the 1 in 100-year with minimal surcharging.
 - The maximum modelled water level within Pond 1C is below the original design level and peak flows are shown to be below the consented flow rate.
 - The drainage forming catchment 1C is considered to be operating efficiently, safely and in line with the original design.

Summary of findings from Catchment 2

- 1.11. The report and modelling results have been reviewed and accepted by Rochdale Borough Council (correspondence contained within **Appendix A**)
- 1.12. Untitled Utilities have reviewed the report and commented on some minor flooding located within Sir Isaac Newton Way. This was discussed with United Utilities who were happy with the explanation and had no further concerns (correspondence contained within **Appendix A**).
- 1.13. A summary of the findings from the as-built drainage study is below:
- The pipe network operates well for all modelled storm events up to and including the 1 in 100-year with one area of minimal flooding within Sir Isaac Newton Way.
 - The flooding was in the short duration, high intensity rainfall event and would be expected to pond within the road corridor for a short time before draining back into the sewer network once the peak storm has passed.
 - The flooding in the sewer network is unrelated to water levels in Pond 2.
 - The maximum modelled water level within Pond 2 is below the original design level and peak flows are shown to be below the consented flow rate.
 - The drainage forming catchment 2 is considered to be operating efficiently, safely and in line with the original design.

Appendix A

Correspondence with United Utilities and Rochdale Borough Council

David Gray

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 19 August 2021 20:36
To: David Gray; Rowan Jobling; Iqbal Rassool; Wastewater Developer Services
Cc: Matthew Bailey; Stephen McCann; Ward, David; John Copestake; Brennan, Adam; Walker, Jillian
Subject: GENQ 4200041062 Kingsway Business Park, Rochdale OL16 4JN

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Good evening all and thank you for taking my call earlier David,

Firstly I would like to thank bwb for pulling together the modelling report, it has certainly helped clarify matters. Following a conversation between myself and Stephen McCann at the Lead Local Flood Authority we are now in a position to accept the proposed modelling report essentially as a drainage masterplan for the Business Park moving forward. However, we would request that this is subject to the provision of the mdx. Microdrainage model files being provided to Stephen at the Council for review against the modelling report to ensure its accuracy.

Once reviewed and the Lead Local Flood Authority are happy with the model outputs we will both be providing comments on the individual plots/below planning applications in turn:

DC/21/2987 – 21/00881/REM
DC/21/3213 – 21/01039/DOC
DC/21/3492 – 21/01041/DOC

As a point of note, we understand that there are a number of concerns the Lead Local Flood Authority have about Plot J2 which should be addressed but this sits outside United Utilities remit to comment.

I am on annual leave from tomorrow until Tuesday 24th August and for further information in my absence, I would suggest that Stephen McCann or David Gray would be best placed to answer any queries but I hope that this brings everyone together onto the same page.

Kind regards,



Robert Brenton
Developer Engineer
Developer Services & Metering
Customer Services
M: 07880299827
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David Gray

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 16 November 2021 17:07
To: David Gray; john.ruckledge@environment-agency.gov.uk; Darren Clark; Tracy Hibbert; Gerard Proudman; Michael Cummings
Subject: Kingsway park pond 1A - minor change of orifice plate on outlet to Stanney Brook.

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

To All

The matter of the capacity and flow discharge from the Kingsway Park Drainage Ponds to Stanney brook was raised when BWB submitted Drainage Details for Planning Applications for the latest Kingsway Plots G, I and J2. When BWB ran the drainage model with the new plots being developed it was realised that the pond would just overtop in a 1 in 100 year storm including climate change allowance of 40%. Although this is a rare event, it was deemed necessary to avoid the overtopping. David Gray looked at options and came up with a simple but effective proposal:-

- to change the low level orifice plate in the outlet weir wall (to Stanney Brook) from 200 to 226mm dia.

This does not require major works and will fulfil the original agreed discharge flow rate to Stanney Brook. It will also and keep water levels under the crest of the weir wall, and maintain a minimum of 300mm freeboard within the pond.

Therefore, I am suggesting that David Gray now organises the replacement of the orifice plate. In terms of installation, BWB will need to arrange to do this when water levels are low [and](#) obtain access through the gates. I have advised David that he can contact Michael Cummings to arrange access?

There is an email trail below.

Any comments / queries – please address them to David and myself.

I can forward the diagram of the location of the orifice plate – upon request.

regards

Stephen McCann

Drainage & Flooding Engineer

Highways, Property & Strategic Housing



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✉ stephen.mccann@rochdale.gov.uk

Rochdale Borough Council
Floor 2, Number One Riverside
Smith Street, Rochdale, OL16 1XU

From: David Gray <David.Gray@bwbconsulting.com>

Sent: 07 November 2021 16:30

To: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>

Cc: Iqbal Rassool <Iqbal.Rassool@bwbconsulting.com>; Peter Davies <Peter.Davies@bwbconsulting.com>; Darren Clark <Darren.Clark@gleeds.com>; Davies, Nick <nick.davies@wilsonbowden.co.uk>; Ellis, Dave <dave.ellis@wilsonbowden.co.uk>; Henson, Henry <henry.henson@wilsonbowden.co.uk>

Subject: RE: Kingsway - Question to EA re. Weir Wall to Stanney Brook

Hi Steve,

Following our discussion last week on the weir wall at Kingsway after reviewing John's email below, I have remodelled the outflow orifice so that the proposed flows are closer to the consented flows of 304 l/sec. The modified orifice is 226mm diameter (upsized from 200mm) with the higher orifice remaining as 250mm. This seems like an eminently sensible resolution.

This does lower water levels within the basin to just below the existing weir wall as shown in the extracts from Microdrainage below. The existing weir is set at 148.25m, the modelled water level is shown to be 148.231m and the flow is 303.4 l/sec.

From previous conversations, you suggested that you would be happy with the original situation, however John's email suggests that the outflow from the pond needs to stay within the consented discharge, which we understand to be 304 l/sec. In this situation, who makes the final decision on the acceptable flow rates? At the Outlet from Pond 1A, Stanney Brook is classed as Ordinary Watercourse so falls under the remit of the LLFA so I would think that myself as LLFA Officer can approve this modification to the orifice plate. Stanney Brook changes to 'Main River' after crossing Buckley Hill lane.

The revised hydraulic modelling shows that altering the orifice does lower the estimated water levels to just below the existing weir wall while keeping within the 304 l/sec flow rate, would this proposal be acceptable to RBC?

I understand that RBC are responsible for maintenance of the pond, are you able to confirm if this extends to the outfall structure as well? If not, are you able to confirm who is responsible for the outfall structure? I understand that Environment received monies from the Developer and now maintain the pond and structures. The managers are Tracy Hibbert and Gerard Proudman who have been cc'd to this email.

I am happy to run through the revised modelling and discuss with yourself this week and agree the best way forward.

Kind Regards

David Gray

Principal Engineer | BWB Consulting Limited

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ
M 07437 015 337 T 0115 924 1100

David Gray

From: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>
Sent: 22 April 2022 15:52
To: David Gray
Subject: FW: Drainage Consultation Ref: 22/00373/FUL Plot M Kingsway
Attachments: Drainage Consultation 22-00373 FUL.docx

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Hi David,

For your ref. see appended and below.

Thanks v much for sending all the extra info this morning. The complexity of the mdx models is beyond my familiarity with using MicroDrainage but your explanations filled in the gaps so I have been able to be confident in 'approving' the proposals.

regards

Stephen McCann

Drainage & Flooding Engineer
Highways, Property & Strategic Housing



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✉ stephen.mccann@rochdale.gov.uk

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From: Stephen McCann
Sent: 22 April 2022 15:50
To: Michael Doyle <Michael.Doyle@Rochdale.Gov.UK>; 'Mohammed.Aljafarawi@uuplc.co.uk' <Mohammed.Aljafarawi@uuplc.co.uk>
Subject: Drainage Consultation Ref: 22/00373/FUL Plot M Kingsway

Hello Michael (Principal Planning Officer) and Mohammed (UU Engineer),

Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

I have written my consultation, appended.

The two MicroDrainage Models, which Mohammed asked me to look at are pretty complex. I've talked to David Gray of BWB a couple of times about this and he's shown me the models in online Teams Screenshare and he has provided details to satisfy me that the system is well designed.

Mohammed, feel free to ring me to discuss OR you can ask David Gray. There are quite large flows coming off Plot M into the adopted Michael Faraday Ave sewer, but this was originally planned as such.

regards

Stephen McCann

Drainage & Flooding Engineer

Highways, Property & Strategic Housing



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 stephen.mccann@rochdale.gov.uk

Rochdale Borough Council

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David Gray

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 11 February 2022 09:49
To: David Gray; 'Stephen McCann'
Cc: Wastewater Developer Services; Francis Comyn; 'Darren.Clark@gleeds.com'
Subject: MicroDrainage- pde 4200045304 Plot M Kingsway Business Park Rochdale OL16 4UG
Attachments: Existing SW Network Model - P1.MDX

This email originated from outside of our organisation. Please exercise caution with content, links and attachments.

Good Morning David,

Thanks for the prompt response. I am happy with your explanation, I don't have any further concerns. I would like to receive a modelling results confirmation to proceed.

Stephen,

Could you run the model as you did for catchment 1A as a sense check? Then provide confirmation of this results please.

Kind regards,



Mohammed Aljafarawi
Developer Engineer
Developer Services & Metering
Customer Services
Email: Mohammed.Aljafarawi@uuplc.co.uk
M: 07950474499
unitedutilities.com

From: David Gray
Sent: 10 February 2022 14:38
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>; 'Stephen McCann' <>
Cc: Francis Comyn <>; Darren Clark <>; Davies, Nick <nick.davies@wilsonbowden.co.uk>
Subject: RE: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

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Mohammed, Steve,

Please find attached the MDX for Network 2 (Plot M catchment) file as mentioned in the email below.

Mohammed, the flooding occurs in the sewers located quite some way from Pond 2 and is not affected by the water level within Pond 2 or the flow rate from Pond 2.

As shown in the extract below, the flooding occurs at MH S317 in the short duration (30 min) / high intensity rainfall event and is due to the flow rate exceeding the capacity of the pipe for a short duration. Based on

the volume shown in the hydraulic model, any flooding would be entirely contained within Sir Isaac Newton Water and drain back down into the system once the peak storm has passed. This is standard practice for designing drainage systems.

In reality, surface water drainage features (gullies, slot drains, kerb drains) are not designed generally designed a much lower storm event, typically the 5 year storm. So although the model shows flooding in the 100 year storm, the water would not have drained into the sewers in the first instance. The surface water would pond on the road surface as the capacities of the road gullies would have been exceeded before the capacity of the sewers.

1.006	S306	30 minute 100 year Winte	148.876	147.154	2.494	0.000	1.34	
1.007	S315	30 minute 100 year Winte	148.210	146.712	2.427	0.000	1.44	
1.008	S316	30 minute 100 year Winte	147.154	146.248	2.262	0.000	1.26	
9.000	SPM	30 minute 100 year Winte	148.105	145.997	1.960	0.000	0.84	
1.009	S317	30 minute 100 year Winte	145.764	145.776	2.192	13.308	1.01	
10.000	SPV	30 minute 100 year Winte	148.108	145.509	1.383	0.000	0.03	
1.010	S318	30 minute 100 year Winte	145.562	145.508	2.310	0.000	1.03	

If it would be beneficial, I would be happy to attend a Teams meeting to discuss this in more detail and answer any other queries you may have.

Kind Regards

David Gray

Principal Engineer | BWB Consulting Limited

5th Floor, Waterfront House, Station Street, Nottingham, NG2 3DQ

M 07437 015 337 **T** 0115 924 1100

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>

Sent: 10 February 2022 13:46

To: 'Stephen McCann' <Stephen.McCann@Rochdale.Gov.UK>; David Gray <David.Gray@bwbconsulting.com>

Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>

Subject: RE: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

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Good afternoon Stephen,

Thanks for your email, I had this morning a conversation with my colleague Robert, I understand that previously both of you deals with Catchment 1A/B (blue in the below picture).

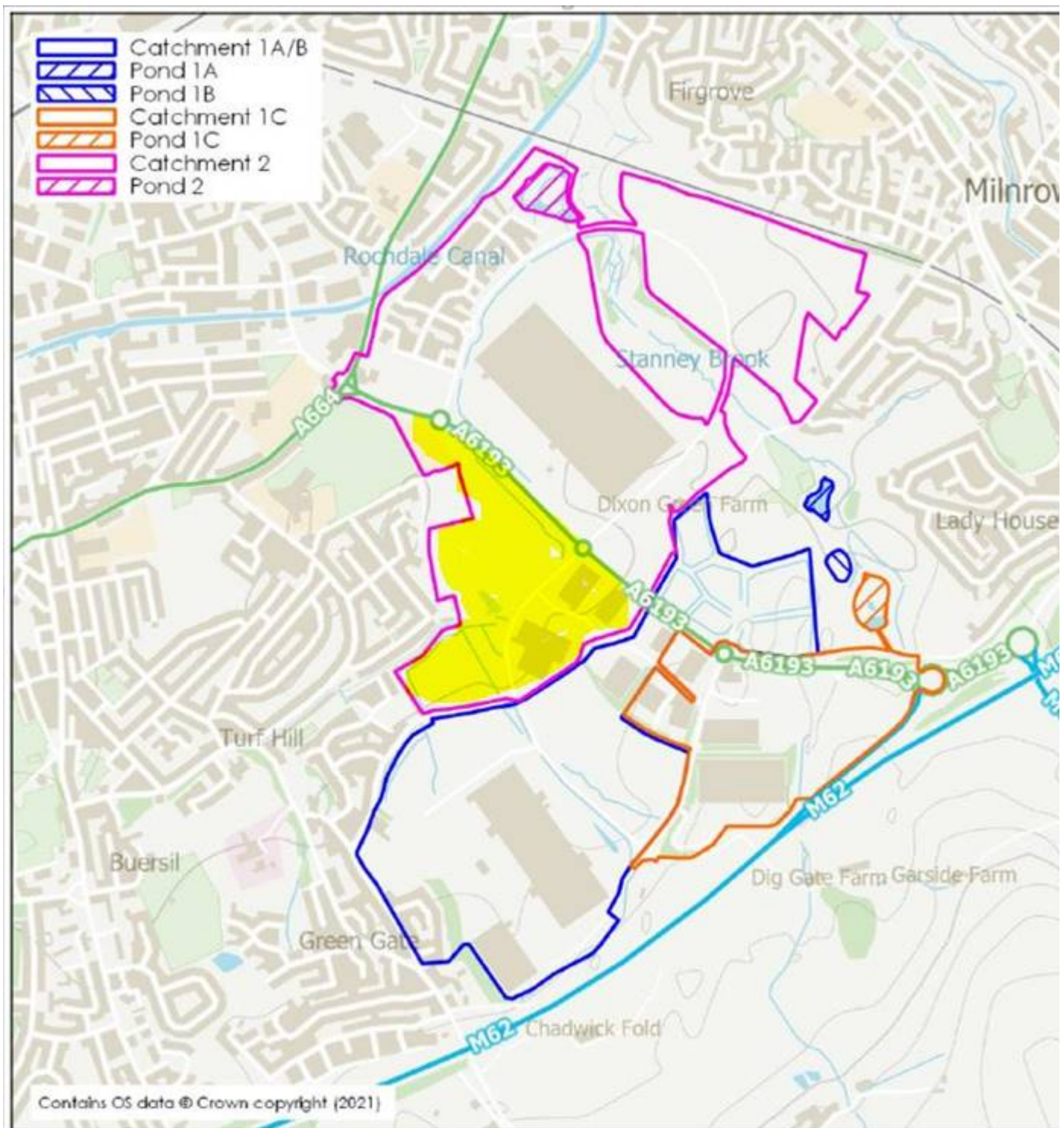


Figure 1.1: Business Park overall indicative catchments and attenuation ponds.

Currently, we are dealing with catchment 2 (pink colour), the developer contact our team regarding plot M (highlighted in yellow).

The provided modelling of catchment 2 has been done in line with previous model of catchment 1A. Previously 1A showed issues at the pond but the sewer network was fine.

Where catchment 2 model shows the pond is fine but the sewer network has a small amount of flooding (13m³) within Sir Isaac Newton Way.

Also, the developer stated in the document no: KBP-BWB-ZZ-XX-RP-CD-0003, that the 'Pond 2' discharges surface water at a lower rate (444.5l/s) that of the original design intent (555l/s).

Could the developer provide the mdx. file to Stephen to run the model as you did for catchment 1A as a sense check.

Stephen, could you then provide confirmation of this results please.

Finally, whilst we have no problems with the proposal in principle...as there is a small amount of flooding on the sewer network, we request that this is investigated as there may be some remedial work to be done at the pond again as it does not appear to be passing forward the flow to the watercourse as it was originally designed to.

Kind regards,



Mohammed Aljafarawi
Developer Engineer
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Email: Mohammed.Aljafarawi@uuplc.co.uk
M: 07950474499
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From: Stephen McCann [<mailto:Stephen.McCann@Rochdale.Gov.UK>]
Sent: 09 February 2022 15:30
To: Aljafarawi, Mohammed <Mohammed.Aljafarawi@uuplc.co.uk>
Cc: Francis Comyn <Francis.Comyn@Rochdale.Gov.UK>; 'David Gray' <David.Gray@bwbconsulting.com>
Subject: RE: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304

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Hello Mohammed,

With reference to your email below, the LLFA part of the Council, myself and Francis Comyn, are aware of the upgrade proposals to the Kingsway park pond 1A, as proposed by BWB - on behalf of the Kingsway Business park developers (Wilson Bowden, Homes England, & Rochdale Development Agency?).

I have recently done a site walkover with David Gray of BWB to discuss the options. As LLFA we agree that the upgrades, which should include a better trash screen on one of the ponds and an increased orifice plate are appropriate.

The previous UU consultee, Robert Brenton (UU) was involved in looking at the Kingsway Drainage Masterplan; he may be able to update you as he has recently dealt with several recent Kingsway Business park plot planning applications.

regards

Stephen McCann
Drainage & Flooding Engineer
Highways, Property & Strategic Housing



 01706 924606



07552 570262



stephen.mccann@rochdale.gov.uk

From: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Sent: 09 February 2022 13:00
To: 'David Gray' <David.Gray@bwbconsulting.com>
Cc: Stephen McCann <Stephen.McCann@Rochdale.Gov.UK>; Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Kingsway Hydraulic Modelling, Catchment 2 - 4200045304
 Good afternoon,

Thanks for providing the report.

After reviewing the site it would appear that the drainage infrastructure was installed around the year 2000 with agreement from the Rochdale council who acted as our agent at the time.

It would appear that the previously agreed drainage strategy was to freely drain the development areas through the large-diameter adopted sewers to the pond.

The pond appears to have been designed to act as storage to contain storm events up to the 1 in 100 years storm event, and the outfall to the pond was constructed to control flows into the watercourse.

Unfortunately, legislation has changed since the surface water strategy was agreed upon and the system was installed. We must therefore speak to the LLFA to ensure that the previously agreed strategy is still acceptable.

The LLFA will have to decide whether they are happy with the current arrangement where the drainage system, attenuation pond and outfall/flow control (350mm + 200mm ORIFICE plates) has already been constructed and is operational. **OR** whether they would like to restrict and attenuate flow on site in line with the latest legislation/guidance.

- Please contact the LLFA to agree on a way forward and let me know what their position is.
- If the LLFA are willing to accept the previously agreed strategy, could you please highlight the contributing area from the proposed development and the associated pipe length in the submitted Micro Drainage calculations so that the discharge rate from the proposed parcel can be confirmed?

If we can be of any further assistance please don't hesitate to contact us further.

Kind regards,



Mohammed Aljafarawi

Developer Engineer
 Developer Services & Metering
 Customer Services

Email: Mohammed.Aljafarawi@uuplc.co.uk

M: 07950474499

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