



## **Stag Brewery, Mortlake Amended Scheme**

### **Drainage Strategy Addendum**

**May 2019**

**Waterman Infrastructure & Environment Limited**

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**Client Name:** Reselton Properties  
**Document Reference:** WIE10667-105-R-2-2-1-DSAddendum  
**Project Number:** WIE10667

### Quality Assurance – Approval Status

This document has been prepared and checked in accordance with Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

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Issue	Date	Prepared by	Checked by	Approved by
First	May 2019	Nora Balboni	Donal O'Donovan	Peter O'Flaherty

*Nora Balboni*

*Donal O'Donovan*

*Peter O'Flaherty*

Comments

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Comments

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## Disclaimer

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## 1. Introduction

- 1.1. Waterman Infrastructure and Environment was commissioned by Reselton Properties to produce a Drainage Strategy for the proposed redevelopment of the former Stag Brewery site in Mortlake ("the Site") within the London Borough of Richmond Upon Thames (LBRuT). This was submitted for planning in February 2018. Post-planning submission, changes were made to the drainage strategy in response to comments from the Greater London Authority (GLA) and the LBRuT arboricultural officer. In addition, small amendments have been made to the proposed scheme.
- 1.2. This Drainage Strategy Addendum has been prepared to summarise the changes made to the drainage strategy post-planning and to assess the impact on drainage of the amendments to the scheme.
- 1.3. In response to the latest comments received from LBRuT's arboricultural officer dated 9<sup>th</sup> April 2019, it is considered that the drainage strategy presented in this report (as approved by the GLA) satisfies policy and best practice, whilst taking into account Site-specific constraints.

### Development Proposals

- 1.4. The proposed changes (Appendix A) to the scheme relevant to this Drainage Strategy addendum submitted for planning in February 2018 include:
  - Internal reconfiguration to building layouts and levels, including to Building 9 to allow for a continuous flood defence.
  - A reduction of four residential units in Building 2 and a reduction in overall non-residential use floor area by 6m<sup>2</sup> Gross External Area;
  - Increase in habitable room numbers and amenity space for each residential unit; and
  - Non-residential and car parking areas would remain the same as before.
  - Alterations related to building materials, façade treatments, including architectural detailing.

## 2. Surface Water Drainage

- 2.1. The proposed amendments to the scheme do not alter the proposed building layout or significantly alter the proposed landscape proposals. The surface water drainage strategy is therefore not affected. Appropriate treatment of runoff would be provided by green roofs, rainwater harvesting, permeable paving, and pollutant-intercepting biomats in the geo-cellular tanks.
- 2.2. Following planning submission in February 2018, the GLA and the LBRuT arboricultural officer provided a number of comments relating to the drainage strategy. A Briefing Note (Appendix B) was prepared demonstrating the changes to the drainage strategy that were made in response. The changes included the following:
  - The 3G sports pitch was removed from the surface water drainage catchment on the basis that it would drain freely (requested by the GLA despite the infiltration rate likely being poor/unsuitable, to be confirmed during detailed design);
  - Permeable paving extents and the rain garden would be added to the drainage strategy drawing with attenuation volumes quantified to demonstrate a reduction in runoff beyond the 50% mark; and
  - A summary of all Sustainable Drainage Systems (SuDS) included within the scheme was provided to demonstrate how these provide multiple benefits to the scheme.
- 2.3. The Briefing Note provides details of the updated drainage strategy including surface water calculations. The amended drainage strategy (Appendix B of Appendix B) demonstrates that a 69% betterment in surface water flows is achieved compared to the existing case and that the drainage strategy is integrated with the landscape proposals to provide wider amenity benefits to the scheme.
- 2.4. The GLA subsequently confirmed (Appendix C) that the drainage strategy was in line with their aspirations.
- 2.5. A Pre-Planning Enquiry was submitted to Thames Water shortly after submission of the planning application. Thames Water confirmed (Appendix D) that at the time of their response (May 2018) there was sufficient capacity to accommodate the proposed surface water flows within their network. The rates submitted to Thames Water were higher than the rates currently proposed (due to the further reductions provided by the changes to the strategy). It is therefore anticipated that there would still be capacity. The letter is valid for 12 months, i.e. due to expire in May 2019. Thames Water have been re-consulted to confirm that their response is still valid, with a response currently outstanding.

### **3. Foul Drainage**

- 3.1. The proposed amendments to the scheme include a reduction of four residential units, reducing the total number of residential units from 667 to 663. The proposed foul flow calculations have been amended to reflect this reduction (Appendix D), resulting in the same proposed foul flows (25.5 l/s). This means that the amendment resulted in a negligible reduction in flows.
- 3.2. The very minor reduction of non-residential floor areas by 6m<sup>2</sup> GEA has a negligible impact to overall foul flows and has therefore not been considered further.
- 3.3. The proposed connections into the Thames Water sewer network are as per the previous strategy, shown on the drainage strategy plan (Appendix B of Appendix B).
- 3.4. Thames Water's response to the Pre-Planning Enquiry (Appendix D) confirms that at the time of the letter (May 2018) there was sufficient capacity to accommodate the proposed foul flows. The proposed number of units has decreased as a result of the amendments, and therefore it is anticipated that there would still be capacity. Thames Water have been re-consulted to confirm that their response is still valid, with a response currently outstanding.



## 4. Conclusions

- 4.1. Following submission of the planning application in February 2018, changes were made to the proposed drainage strategy in response to comments from the GLA and LBRuT. The strategy was amended to further restrict surface water runoff, achieving a 69% betterment compared to the existing case. The attenuation provided within the proposed permeable paving and rain gardens was quantified to provide further volume in addition to that provided within the geo-cellular attenuation tanks. The permeable paving and rain gardens would provide water quality benefits in addition to the green roofs and rainwater harvesting proposed.
- 4.2. The amended drainage strategy demonstrates that it is integrated with the landscape proposals to provide wider amenity benefits to the scheme. The GLA subsequently confirmed that the drainage strategy is in line with their aspirations. In addition, Thames Water confirmed that there is capacity within their network to accommodate the proposed flows.
- 4.3. Small amendments have been made to the proposals since submission of the planning application. The proposed amendments to the scheme do alter the proposed building layout or significantly change the landscape proposals, therefore not affecting the proposed surface water drainage strategy.
- 4.4. The proposed reduction in residential units results in a negligible reduction in proposed foul flows. Thames Water have been re-consulted to confirm that there is still capacity within their network to accommodate the proposed flows.



## APPENDICES

### A. Amended Scheme Plans

#### **Appendices**

Stag Brewery, Mortlake Amended Scheme

Project Number: WIE10667

Document Reference: WIE10667-105-R-2-2-1-DSAddendum





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- CINEMA
- CORE
- FLEXIBLE USE
- GAS METER ROOM
- HOTEL
- OFFICE
- PLANT
- REFUSE
- REFUSE STORE
- RESTAURANT/BAR
- SMOKE
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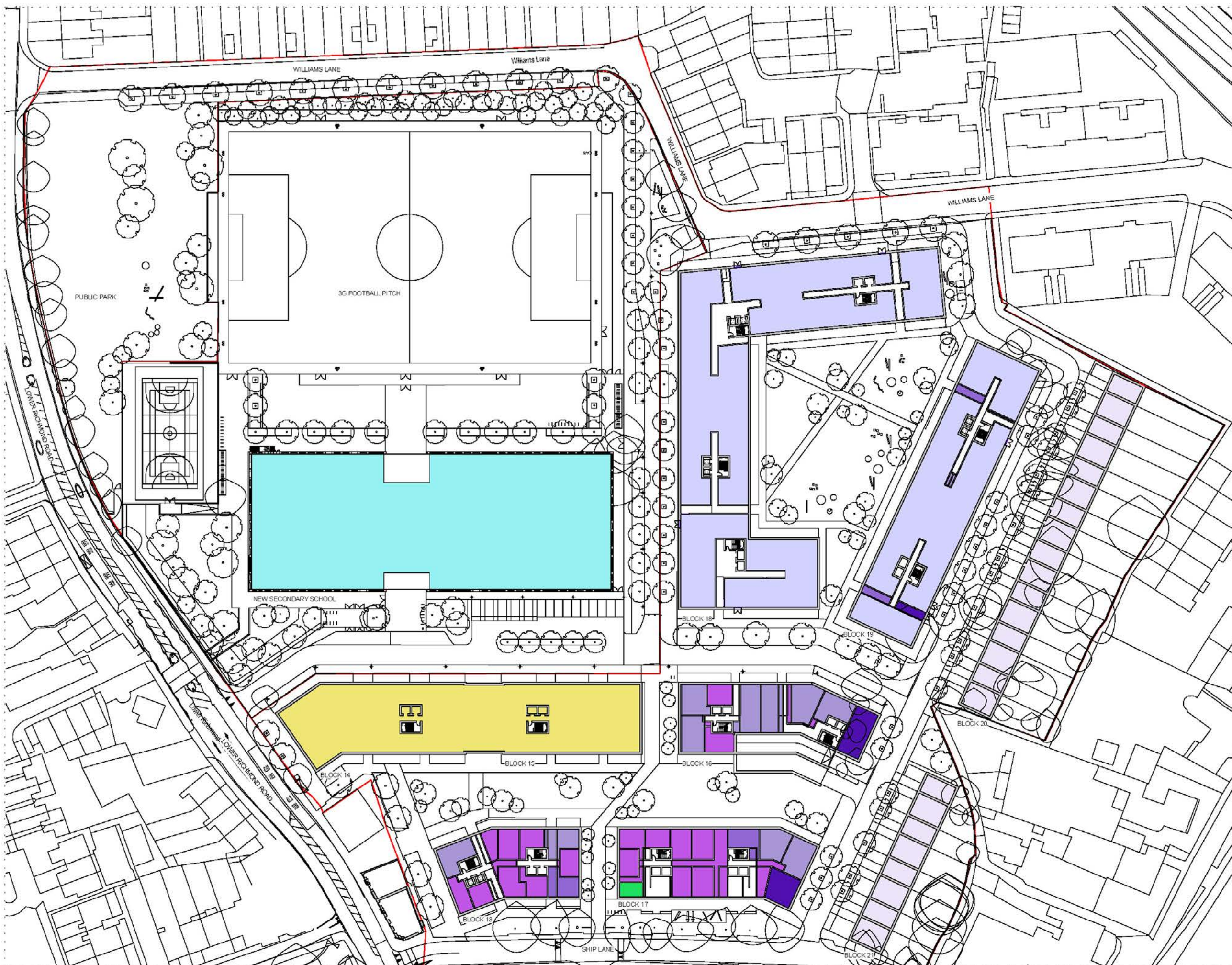
PLANNING SUBSTITUTION DRAWINGS	01/03/18	Enk	A
PLANNING APPROVALS	12/02/18	WJ	-
Revision description	Date	Check	Rev

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**Stag Brewery**  
 Richmond

Drawing  
**PROPOSED DEVELOPMENT AREA 01**  
**GROUND LEVEL PLAN**

Drawn	Date	Scale
KHO	18/01/18	1:500 @ A4 1:1000 @ A3
Job Number	Drawing number	Revision
16019	C645 Z1 P 00 001	A





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- BIKE ST
- BT COMMS INTAKE
- CARE HOME
- CIRCULATION\_PLANT
- CL ST
- COMMUNITY LOCKERS
- COMMUNITY OFFICE
- LV SWITCH ROOM
- MAINTENANCE ST
- OFFICE
- REFUSE
- REPROGRAPHICS
- SCHOOL
- SERVER
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PLANNING SUBSTITUTION DRAWINGS	01/03/19	RKL	A	
PLANNING APPLICATION	12/02/19	RKL	B	

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Richmond

### Drawing PROPOSED DEVELOPMENT AREA 02 GROUND LEVEL PLAN

Drawn	Date	Scale
RKL	18/01/18	1:500 @ A4
16019	C645 Z2 P 00 002	1:1000 @ A0





## **B. Greater London Authority Briefing Note**

### **Appendices**

Stag Brewery, Mortlake Amended Scheme

Project Number: WIE10667

Document Reference: WIE10667-105-R-2-2-1-DSAddendum

# Surface Water Drainage Update Briefing Note

## Stag Brewery

**Date:** 8<sup>th</sup> January 2019

**Client Name:** Reselton Properties

**Document Reference:** WIE10667-103-BN-1-1-3

This document has been prepared and checked in accordance with  
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015 and BS OHSAS 18001:2007)

Issue	Prepared by	Checked & Approved by	
	Nora Balboni	Donal O'Donovan	Harry Chetty
First			

## 1. Introduction

1.1. Waterman Infrastructure and Environment (WIE) was commissioned by Reselton Properties to undertake a Drainage Strategy for the redevelopment of the former Stag Brewery Site in Mortlake (hereafter referred to as the 'Site'). Following planning submission in February 2018, the Greater London Authority (GLA) provided a number of comments relating to the drainage strategy.

1.2. Following two sets of comments from the GLA and responses from WIE (Appendix A) the GLA's last outstanding remark was related to the proposed discharge rate, as below:

*"I have reviewed the Applicant's second response to our Stage 1 comments. Following our previous response at the end of October the final point of contention appears to be the proposed discharge rate where the site will drain to the public sewer. It is noted that the London Plan and DEFRA national guidance require a development to achieve as close to greenfield runoff rate as possible (approximately a >90% reduction from pre-development rates for a brownfield site). In this case the Applicant is proposing to reduce the discharge by 50%, well short of the policy requirements. The Applicant should calculate the greenfield runoff rate and provide calculations showing the attenuation storage required to meet this discharge rate. The Applicant should then seek to include additional attenuation storage to get as close to this value as possible. Our original comments suggested building the biodiverse roofs as green/blue roofs to provide additional storage and this has not been addressed to date. The Applicant should then provide a clear drawing or mark up clearly showing the constraints to expanding attenuation storage if discharge at greenfield runoff rate is not proposed."*

1.3. Discussions were undertaken with the GLA in order to decide on the most preferential way forward (Appendix A). It was agreed that in order to demonstrate that the potential to restrict runoff was maximised, the following information would be provided:

1. The 3G sports pitch would be removed from the surface water drainage catchment on the basis that it would drain freely (requested by the GLA despite WIE advising the infiltration rate is likely to be poor/unsuitable);
  2. Permeable paving extents and the rain garden would be added to the drainage strategy drawing with attenuation volumes quantified to demonstrate a reduction in runoff beyond the 50% mark; and
  3. A summary of all Sustainable Drainage Systems (SuDS) included within the scheme would be provided to demonstrate how these provide multiple benefits to the scheme.
- 1.4. The purpose of this Briefing Note is to summarise the amendments to the drainage strategy that were made following the discussions with the GLA. It is considered that the amended Drainage Strategy now demonstrates that the scheme is in line with the GLA's aspirations.

## **2. Surface Water Drainage Strategy - Updates**

### **Sports Pitch**

- 2.1. In the strategy submitted for planning it was assumed that the 3G sports which would need to be positively drained due to the underlying London Clay and the likelihood of a high groundwater table due to the Site's proximity to the River Thames. This was to prevent the possibility of water logging beneath the pitch.
- 2.2. The GLA requested that the 3G sports pitch in the south west of the Site would be removed from the surface water calculations on the basis that it would drain freely. WIE advised that infiltration would likely be very poor due to the underlying clay and that the feasibility of this option would be subject to infiltration rates which would be confirmed by ground investigations during detailed design. If results show that infiltration is not feasible, then a tank would be provided as per the strategy provided previously or similar.
- 2.3. As a result of removing the sports pitch, the area of the school catchment to be drained is reduced from 2.18ha to 1.31ha. This provides a reduction in the surface water runoff that would be drained into the Thames Water sewer network.

### **Additional Attenuation**

#### **Permeable Paving**

- 2.4. In the drainage strategy submitted for planning it was stated that the inclusion of permeable paving as an attenuation feature would be further investigated during detailed design. This was to provide a conservative approach where sufficient attenuation would be provided within the tank features to achieve the required restriction.
- 2.5. Following discussions with the GLA, the porous surfacing proposed across the Site has been added to the drainage strategy drawing (Appendix B) and the attenuation volume available within has been quantified.
- 2.6. Permeable surfacing, i.e. artificial stone flag paving and porous macadam surfacing, is proposed within the school Site as per the hard landscape strategy drawing by Gillespies (Appendix C). A



permeable sub-base with 300mm depth is proposed beneath the porous surfacing surrounding the school building and beneath the MUGA sports pitch. The aggregate sub-base provides treatment of runoff as well as attenuation. A 150mm deep geo-cellular storage crate is proposed beneath the aggregate sub-base to provide additional attenuation. The geo-cellular attenuation tank previously proposed beneath the MUGA pitch has been removed as a result. The total attenuation volume available within the school catchment including for the permeable paving sub-base storage is 993m<sup>3</sup>. This allows discharge from the catchment to be reduced from the previously proposed 155.2 l/s to 16.0 l/s. This provides a 91% betterment compared to the existing rate for this catchment (187.0 l/s).

## Rain Garden

- 2.7. As per the Landscape Design and Access Statement by Gillespies<sup>1</sup>, a green link is proposed in the eastern part of the Stag Brewery component of the Site. A rain garden is proposed along the eastern edge of the green link (Appendix C). Surface water runoff from the surrounding pavement would be directed into the soil within the rain garden. The rain garden has been added to the surface water drainage strategy drawing (Appendix B).
- 2.8. The primary function of the rain garden is to provide treatment of runoff prior to discharge into the surface water network. A small volume of water would be attenuated within the rain garden itself. The northern part of the green link is located within the part of the Site from where surface water is discharged unrestricted into the River Thames. The volume available within this portion of the rain garden has therefore not been quantified.
- 2.9. Based on an attenuating depth of 150mm and a porosity of 30%, the attenuation volume available within the two sections of rain garden within Catchment 1 is 3m<sup>3</sup>. The increased attenuation from 140m<sup>3</sup> to 143m<sup>3</sup> allows the discharge rate for catchment 1 to be reduced from the previously proposed 21.3 l/s to 20.0 l/s. This provides a 53% betterment compared to the existing rate (42.8 l/s).

## Summary

- 2.10. The surface water calculations were updated (Appendix D) to reflect the reduction in the school catchment site due to the sports pitch draining freely, and the amended attenuation volumes. Table 1 outlines the discharge rates and attenuation provision for the Site, with changes to the previous strategy in **bold**.

Table 1: Attenuation Requirements

Catchment	Area (ha)	Existing Rate (l/s)	Proposed Rate (l/s)	Attenuation (m <sup>3</sup> )	Betterment (%)
East part of the Stag Brewery component of the Site – 1	0.30	42.8	<b>20.0</b>	<b>143</b>	<b>53</b>
East part of the Stag Brewery component of the Site – 2	0.25	35.7	17.8	117	50
East part of the Stag Brewery component of the Site – 3	0.18	25.7	12.8	84	50

<sup>1</sup> Gillespies (February 2018). Stag Brewery, Mortlake Landscape Design and Access Statement: Application A

Catchment	Area (ha)	Existing Rate (l/s)	Proposed Rate (l/s)	Attenuation (m <sup>3</sup> )	Betterment (%)
West part of the Stag Brewery component of the Site – School	1.31	187.0	16.0	993	91
West part of the Stag Brewery component of the Site – 4	1.07	152.7	76.2	499	50
West part of the Stag Brewery component of the Site – 5	0.54	77.1	38.5	252	50
West part of the Stag Brewery component of the Site – 6	0.38	54.0	26.9	177	50
West part of the Stag Brewery component of the Site – 7	0.79	112.8	56.3	369	50
<b>Sub-Total</b>	<b>4.82</b>	<b>688</b>	<b>265</b>	<b>2634</b>	<b>62</b>
<b>Total (accounting for increased discharge to the River Thames)</b>	<b>5.89</b>	<b>840.8</b>	<b>265</b>	<b>2634</b>	<b>69</b>

- 2.11. When accounting for the maximised attenuation volumes, in addition to maximising the area of the Site that is discharged into the River Thames, the proposed drainage strategy provides a 69% betterment compared to the existing rate.
- 2.12. It is considered that the proposed reduction in flows satisfies the GLA aspirations. In addition, in response to a pre-planning enquiry, Thames Water have stated that there is capacity within their network for the proposed surface water flows as per the previous strategy (Appendix E), which were higher than the revised flows presented in this Briefing Note. Surface water flows would only be conveyed within the Thames Water network for a short section (maximum of circa 350m), prior to discharging into the River Thames.

## SuDS

- 2.13. A range of SuDS features are proposed throughout the development to ensure that appropriate treatment is provided prior to discharge into the River Thames and the Thames Water sewer network, including the following methods:
- Rainwater harvesting butts throughout the development reduce runoff and facilitate water re-use for irrigation;
  - Green roofs intercept and treat rainwater at source. The green roofs are designed such that a variety of planting can be sustained (as per Gillespie's landscape strategy);
  - The aggregate sub-base beneath the porous surfacing provides treatment of runoff prior to being attenuated within the underlying geo-cellular crates;

- The large number of tree pits and planters throughout the development (in addition to the rain garden in the green link) provide a soft surface allowing rainwater to filter through and hold back a nominal amount of runoff; and
  - Pollutant-intercepting biomats within the geo-cellular crates provide additional treatment for any residual pollution.
- 2.14. The drainage strategy is integrated with the landscaping strategy, ensuring that the SuDS features provide amenity and sustainability benefits for the Site.

### **3. Conclusion**

- 3.1. The previous drainage strategy submitted for planning demonstrated that the minimum policy requirements, i.e. 50% restriction of flows, was achievable. Although permeable paving and rain garden were already proposed, the attenuation provided within these features was not quantified to provide a conservative approach.
- 3.2. Following discussions with the GLA, the sports pitch was removed from the drainage catchment and the additional attenuation volumes were quantified along with the increase in discharge to the River Thames. This demonstrates that a 69% betterment compared to the existing rate can be achieved.
- 3.3. A variety of SuDS are proposed throughout the Site which provide treatment of runoff as well as amenity benefits.
- 3.4. It is considered that the amended drainage strategy satisfies policy, best practice, and the GLA's aspirations.



## APPENDICES

### **Appendices**

Surface Water Drainage Update Briefing Note  
WIE10667-103-BN-1-1-3  
WIE10667



## A. Greater London Authority Correspondence

### **Appendices**

Surface Water Drainage Update Briefing Note  
WIE10667-103-BN-1-1-3  
WIE10667



## Nora Balboni

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**From:** Nora Balboni  
**Sent:** 12 December 2018 09:24  
**To:** Stuart McTaggart  
**Cc:** Anna Gargan; Ellen Smith; Donal O'Donovan; Abby Crisostomo; Katherine Wood  
**Subject:** RE: Stag Brewery (GLA ref: 4172a/b) drainage strategy [Filed 12 Dec 2018 09:24]

Hi Stuart

Thank you for confirming.

As discussed, we will provide a Briefing Note which will cover the following:

- Amended drainage strategy plan to show permeable paving extents;
- Volume calculations to estimate the attenuation available within the permeable paving sub-base and rain garden feature to show that a restriction of surface water runoff beyond the minimum 50% requirement is achieved;
- Sports pitch in south-west of site removed from surface water calculations under the assumption that it would drain freely, subject to ground investigations during detailed design; and
- Summary of all SuDS included.

Kind regards,

**Nora Balboni**  
Flood Risk Engineer  
Waterman Infrastructure & Environment Ltd

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**From:** Stuart McTaggart <Stuart.McTaggart@london.gov.uk>  
**Sent:** 11 December 2018 15:23  
**To:** Nora Balboni <nora.balboni@watermangroup.com>  
**Cc:** Anna Gargan <AGargan@geraldev.com>; Ellen Smith <ellen.smith@watermangroup.com>; Donal O'Donovan <donal.odonovan@watermangroup.com>; Abby Crisostomo <Abby.Crisostomo@london.gov.uk>; Katherine Wood <Katherine.Wood@london.gov.uk>  
**Subject:** Re: Stag Brewery (GLA ref: 4172a/b) drainage strategy [Filed 12 Dec 2018 09:17]

Hi Nora,

To summarise our chat earlier:

1. The intent of the original drainage strategy was to show that it is possible within site constraints to meet the absolute minimum requirements of London Plan policy 5.13.
2. We would like to see that all efforts have been made to get as close to possible to the policy targets (i.e. greenfield runoff, drainage hierarchy, and a preference for SuDS with multiple benefits). We expect that on large sites such as this the policy targets should be able to be met in most cases.
3. Waterman will produce an addendum to the drainage strategy to more clearly show how the drainage will integrate SuDS with multiple benefits and identify an approximate maximum reduction in discharge rate. Where appropriate the reduction in discharge rate can be caveated with assumptions/risks that need confirmation during detailed design (e.g. infiltration rates of the subgrade below the 3G pitch).

Regards,

**Stuart McTaggart**  
**Flood Risk, Drainage & Water Policy Officer**  
Development, Enterprise & Environment  
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Web: [Greening London / Greater London Authority](#)

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**From:** Nora Balboni <[nora.balboni@watermangroup.com](mailto:nora.balboni@watermangroup.com)>

**Sent:** 04 December 2018 10:32

**To:** Stuart McTaggart <[Stuart.McTaggart@london.gov.uk](mailto:Stuart.McTaggart@london.gov.uk)>

**Cc:** Anna Gargan <[AGargan@geraldeve.com](mailto:AGargan@geraldeve.com)>; Ellen Smith <[ellen.smith@watermangroup.com](mailto:ellen.smith@watermangroup.com)>; Donal O'Donovan <[donal.odonovan@watermangroup.com](mailto:donal.odonovan@watermangroup.com)>

**Subject:** RE: GLA Flood Feedback

Hi Stuart

Thanks for your comments. Please feel free to give me a call to discuss as I don't have your contact number.

We understand that developments should aim to achieve greenfield runoff rates, or as close as feasible. To endeavour to achieve this we took the following approach:

1. As per the drainage hierarchy, the amount of surface water that could be discharged into the River Thames was maximised by incorporating the innovative shallow conveyance channel system;
2. For the remaining site, where discharge into the Thames was not feasible due to levels or crossing third party land, as many tanks were incorporated as possible. The horizontal constraints for the tanks include the basement extent, proposed building outlines, and landscaping. The vertical constraints include the required soil depth for tree pits and achieving a gravity connection into the surrounding sewer network. London Borough of Richmond accepted the 50% restriction during pre-application consultation. Conscious that the constraints of the site preclude a greater reduction in runoff, Thames Water were consulted to ensure that the surrounding sewer network has sufficient capacity. Thames Water confirmed capacity for both surface and foul water flows. It is important to note that the surface water flows from the development are only conveyed within the Thames Water network for maximum of 350m before discharging into the River Thames.

We are keen to find a solution to reduce runoff further to find an agreeable solution. I would appreciate your thoughts on the following options:

- Allowing the proposed sports pitch to drain freely, i.e. excluding it from the surface water calculations and therefore reducing the size requirement for the tank beneath the MUGA pitch. Subject to levels I could explore the possibility of directing surface water from other areas into this tank, reducing the restriction beyond the 50% mark. In the current strategy we assumed that the pitch would need to be positively drained due to the underlying London Clay to avoid potential water logging beneath the pitch. However, if no other areas would drain towards the pitch, allowing it to free drain could be considered.
- We took a conservative approach when designing the current drainage strategy, assuming 100% impermeable proposed area (discounting the park area in the south eastern corner of the site). We did not quantify the attenuation available within the rain garden along the green link and within the permeable paving, to demonstrate the worst-case scenario that the minimum required restriction (i.e. 50%) can be achieved within the tanks themselves. I will do a quick calculation to demonstrate the additional attenuating volume that these features would hold, reducing the restriction beyond the 50% mark.



- Exploring further areas for incorporation of permeable paving.
- The current proposals do not include for blue roofs. However, green roofs are proposed throughout the development, which, although not quantifiable, provide a betterment to the surface water runoff regime.

Let me know whether you find the above agreeable, I will then amend the drainage strategy drawing to show the constraints to the attenuation volumes and incorporate any changes, and will re-issue for you to review.

Kind regards,

**Nora Balboni**  
Flood Risk Engineer  
Waterman Infrastructure & Environment Ltd

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**From:** Anna Gargan  
**Sent:** 28 November 2018 16:51  
**To:** 'Ellen Smith'; 'Nora Balboni'  
**Cc:** Guy Duckworth; Susie Taylor; Neil Henderson  
**Subject:** GLA Flood Feedback

Hi Ellen / Nora,

I hope you are well.

The GLA has provided the following response to Flood comments issued on 20 November 2018.

Please can you review and respond. The officer states that he is happy to speak with you directly.

Kind regards,  
Anna

*"I have reviewed the Applicant's second response to our Stage 1 comments. Following our previous response at the end of October the final point of contention appears to be the proposed discharge rate where the site will drain to the public sewer.*

*It is noted that the London Plan and DEFRA national guidance require a development to achieve as close to greenfield runoff rate as possible (approximately a >90% reduction from pre-development rates for a brownfield site). In this case the Applicant is proposing to reduce the discharge by 50%, well short of the policy requirements. The Applicant should calculate the greenfield runoff rate and provide calculations showing the attenuation storage required to meet this discharge rate. The Applicant should then seek to include additional attenuation storage to get as close to this value as possible. Our original comments suggested building the biodiverse roofs as green/blue roofs to provide additional storage and this has not been addressed to date. The Applicant should then provide a clear drawing or markup clearly showing the constraints to expanding attenuation storage if discharge at greenfield runoff rate is not proposed.*

***I am happy to discuss directly with the Applicant's consultant to resolve this if required.***

Regards,

**Stuart McTaggart**  
Flood Risk, Drainage & Water Policy Officer  
Development, Enterprise & Environment

Greater London Authority  
City Hall, The Queens Walk, London SE1 2AA

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Stag Brewery – Response to GLA Comments received 25 October 2018

Original GLA comment	Further comment	Waterman Response
<b>Flood Risk</b>		
<p>The proposed development complies with London Plan Policy 5.12 (and draft Policy SI12) relating to flood risk, however conditions relating to the need for increased flood defences, inclusion of property level protection measures and the future Ship Lane flood gate will be required, in agreement with the Environment Agency.</p>	<p>The applicant has provided sufficient justification that a condition would not be appropriate for a future Ship Lane Flood gate. For those parts of the development with ground levels below the reference flood level it is proposed that self-activating barriers be installed for the car park entrances and flood proof doors and/or demountable barriers will be installed. These must be appropriately conditioned.</p>	<p>Noted.</p>
<p>In both cases [discharge to River and rest of site restricted to 50%] it points to the presence of a new extensive basement that is preventing optimising the drainage design. Given that the basement is a proposed new structure this is not deemed to be an acceptable rationale for not optimising the drainage design.</p>	<p>The applicant's response does not address the issue of the basement being a new structure and therefore not being an acceptable rationale for not optimising the drainage design. The applicant advises that a rain garden will be provided along the green link although it is not clear where it would be located and it is considered there is potential for more than one such feature in the proposed landscaping.</p>	<p>The drainage strategy has been optimised, achieving the following:</p> <ol style="list-style-type: none"> <li>1. Maximising gravity discharge into the River Thames;</li> <li>2. Minimising runoff discharged into sewers;</li> <li>3. Maximising attenuation while achieving gravity discharge to the surrounding Thames Water sewer network;</li> <li>4. Inclusion of a range of SuDS features to provide water quality and amenity benefits (i.e. green roofs, permeable paving/porous surfacing with aggregate sub-base, rainwater harvesting, and rain garden).</li> </ol>
<p>The area of site draining directly to the River Thames seems to ignore the presence of the proposed public realm and in particular the "Green Link" (ref Drainage Layout Sheet 3). The surface water drainage should be integrated within these elements with surface water directed across the surface rather than proposing a large array of permavoid cells to convey the surface water underground. This will not only provide a whole host of benefits to the public realm but will also help to improve the water quality of the surface water if managed by nature based SuDS solutions. The reference to potential contaminated land issues seems to have been used as thinly veiled excuse and is unlikely to be a barrier to above ground SuDS. At present the proposal makes no reference to water quality when it really should do given that it is</p>	<p>The applicant has provided justification as to why it would not be feasible to direct all surface water to rain gardens but does not consider other greener conveyance features. The applicant has highlighted where water quality is considered in the drainage strategy however some measures are described as 'potential'. It is recommended that clear demonstration of water quality in the final design is conditioned.</p>	<p>The main green link (i.e. rain garden) is located in the eastern part of the Stag Brewery site, running from Lower Richmond Road north eastwards towards the River Thames, as per the Landscape DAS (reference: P10736-00-001). The rain garden would channel and treat runoff as it is conveyed towards the River Thames. However, due to levels, it is not feasible to direct all surface water from this part of the site into the green link. As a result, a network of shallow geo-cellular storage conveyance channels is proposed. These would convey and treat runoff (via pollutant-intercepting biomats within the tanks) prior to discharging into the Thames. There are a large number of planters proposed across the site, which would allow surface water runoff to filter through the soil providing treatment, prior to discharge into the geo-cellular conveyance channels and eventually the River Thames.</p>

<p>proposing discharging into a waterbody.</p>		<p>The basement is an essential part of the scheme to provide required car and cycle parking and plant. Locating these elements at grade would unlikely to be acceptable in planning and design terms and would have a significant negative impact on place making. Importantly, notwithstanding this, the basement does not preclude the scheme from optimising the drainage design by achieving a considerable restriction of runoff while discharging via gravity and including a variety of SuDS features. The presence of the basement does not limit the inclusion of the rain garden or the other SuDS features listed above, which together provide amenity benefits across the site and treatment of runoff prior to discharge.</p>
<p>Although the preference would be to see the entire site drain to the River Thames via gravity direct discharge, it is noted however that the Thames Water surface water sewer, that the development proposes to connect into for the rest of the development, does in fact discharge into the River Thames adjacent to the site. Therefore, proposing a restricted discharge rate into this stretch of existing network, assuming there is capacity, is deemed to be acceptable. However, the Drainage Strategy is proposing a 50% reduction on flow rates by referring to the density of development as a rationale for not being able to achieve greenfield. This argument is not accepted for this development. Given the areas of public realm proposed, it is deemed that there is more that could be done to manage surface water within the landscaping by utilising nature based SuDS solutions that are incorporated within the public realm. This will provide far greater benefits to the development than directing all surface water straight into a series of underground attenuation tanks and could ultimately provide significant opportunities for evapotranspiration losses. The drainage strategy ostensibly needs a rethink as the current proposals are far from being integrated into the masterplan for this site.</p> <p>The proposed development does not comply with London Plan Policy 5.13 (and draft Policy SI.13). Justification as to why the development is not able to achieve greenfield or three times greenfield runoff is necessary. The general approach of relying on</p>	<p>The applicant has provided reasonable justification with regards to the size of attenuation being restricted however it is not suitably clarified why further above ground SuDS (including conveyance features) cannot be implemented to reduce the discharge rate further.</p>	<p>A variety of above-ground SuDS features are included within the proposals as outlined above (i.e. green roofs, permeable paving, and rain gardens). These intercept runoff at source, providing treatment, prior to being discharged into the River or the Thames Water network. It is considered that given the nature of the site, the potential for above-ground SuDS has been maximised.</p>

<p>underground attenuation rather than maximising green infrastructure-based and above ground SuDS strategies through the integration with the landscaping proposals is not deemed to be acceptable. In addition to this the lack of water quality treatment for the section of the site directly drainage to the River Thames is not acceptable.</p>		
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**Stag Brewery – Response to GLA Stage 1 Comments dated 30 July 2018**

**(Ref: GLA/4172,4172a&4172b/01/KW)**

Ref.	Comment	Waterman Response
70	<p>The proposed development complies with London Plan Policy 5.12 (and draft Policy SI12) relating to flood risk, however conditions relating to the need for increased flood defences, inclusion of property level protection measures and the future Ship Lane flood gate will be required, in agreement with the Environment Agency.</p>	<p>In the existing situation there is no raised defence in Ship Lane. Instead the defence is formed by ground levels in the public highway itself, which rise away from the river. Ship Lane is a public highway and therefore outside of the applicant's ownership. Whilst some works would take place to Ship Lane (wider footways and landscaping (including retention of all trees) to provide a functional and attractive street) these would not impact on the existing flood defence level provided by the highway.</p> <p>Whilst the applicant is not responsible for installing a flood defence across Ship Lane, options were discussed with the EA at a meeting on the 26th September 2016 that could be implemented by others in the future. It would not be feasible for a permanent defence to be located across Ship Lane as this would block access along the public highway. Instead, a demountable defence would be more suitable for this location. The defence would need to tie into the existing Maltings Building on the Stag Brewery Site. On the other side of the public highway the defence would need to tie into the existing public house (noted as a defence on the Environment Agency's flood map). As a result, a condition relating to the offsite future flood defence on Ship Lane would not be appropriate.</p> <p>As stated in #4.2.3 of the FRA, the FFL for ALL residential property is at a minimum elevation of 7.03 mAOD; there is accordingly no need for "residential" PLP measures. The majority of non-residential property also satisfies this condition, the exceptions being discussed in the FRA. The specific protection measures that are required are presented in the FRA and comprise:</p> <ul style="list-style-type: none"> <li>• Flood Proof Doors to protect the Boathouse (B09) whose FFL is at 4.25 mAOD (note that these doors do NOT form part of the formal tidal defences).</li> <li>• Flood-proof doors for the sub-station (in building B10) in the event of breach/overtopping.</li> <li>• Self-activating flood barrier (SAFB) for the entrance to the Basement Car Park from Mortlake High Street in the event of breach/overtopping. Note that the entrance off Ship Lane and the entrance to the car park on the west of Ship Lane are at a safe level.</li> </ul> <p>Please note that these issues are being discussed and progressed separately with the Environment Agency.</p>
71	<p>The scheme is not currently proposing to achieve greenfield run-off rates and the presence of the large basement is a barrier to optimising the sustainable drainage of this site. Further justification is required on the drainage strategy to ensure compliance with London Plan Policy 5.13 and draft Policy SI13. The general approach of relying on underground attenuation rather than</p>	<p>The potential to restrict runoff to greenfield rates was explored during the design process and where feasible runoff has been directed directly to the River Thames, minimising runoff discharged to sewers. The attenuation volume has been maximised while achieving gravity discharge, which is considered a more sustainable option than pumping. Due to the depth of the existing Thames Water sewers surrounding the site, the tanks cannot</p>

	<p>maximising green infrastructure-based and above ground SuDS strategies through the integration with the landscaping proposals is not acceptable. In addition to this the lack of water quality treatment for the section of the site directly draining to the River Thames is not acceptable.</p>	<p>feasibly be made any deeper without requiring pumping, thus precluding the possibility to achieve greenfield rates.</p> <p>Providing a 50% restriction to the existing rate has been agreed with the London Borough of Richmond upon Thames. In addition, Thames Water have confirmed that there is capacity in their network to serve the proposed flows (surface and foul).</p> <p>The potential for SuDS was considered throughout the design process with workshops being held by the design team to ensure constraints are taken into account and opportunities are maximised. As per the FRA submitted with the planning application (reference: WIE10667-101-R-9-5-1-DS) and the Landscape DAS (reference: P10736-00-001) by Gillespies, the following SuDS are proposed:</p> <ul style="list-style-type: none"> <li>- Green roofs;</li> <li>- Permeable paving (or porous surfacing with an aggregate sub-base) for all roads that are not to be adopted. These areas would treat the runoff within the aggregate sub-base prior to discharge into the drainage system. The exact location of the permeable surfacing would be confirmed during detailed design;</li> <li>- Rainwater harvesting is proposed in the form of rainwater butts throughout the development;</li> <li>- Rain garden along the green link proposed within the detailed part of the application (east of Ship Lane); and</li> <li>- Pollutant-intercepting biomats within the geo-cellular attenuation tanks/culverts, which intercept and treat any residual pollutants that may be present within the surface water.</li> </ul> <p>For the section of the site discharging into the River Thames (east of Ship Lane), there are a number of SuDS proposed which would treat runoff prior to discharge. These include the rain garden, planters, and the potential for permeable paving adjacent to the Thames. In addition to the biomats within the shallow geo-cellular tanks within the podium build-up, a downstream defender can be incorporated if found necessary, to be confirmed during detailed design.</p>
72	<p>The proposed development is compliant with London Plan Policy 5.15 (and draft Policy SI15) for water use, which should be maintained through detailed design. Detailed comments have been provided to the applicant.</p>	<p>Comment by Hoare Lea: The comments state that the scheme is in accordance with policies and that this should continue throughout the design. This would be ensured throughout the design development.</p>



**Stag Brewery – Response to GLA comments dated 18<sup>th</sup> June 2018**

**Surface Water Management**

GLA comment	Waterman Response
<p>In both cases [discharge to River and rest of site restricted to 50%] it points to the presence of a new extensive basement that is preventing optimising the drainage design. Given that the basement is a proposed new structure this is not deemed to be an acceptable rationale for not optimising the drainage design.</p>	<p>The potential to restrict to greenfield runoff rates and the potential for inclusion of SuDS was considered throughout the design process with workshops being held by the design team to ensure constraints are taken into account and opportunities are maximised.</p> <p>The drainage strategy has been optimised given the constraints of the existing site. Discharge into the River Thames has been maximised through the use of flat conveyance routes above the basement as detailed within the Drainage Strategy submitted for planning (reference: WIE10667-101-R-9-5-1-DS). For the remaining areas of the site, gravity discharge into the River Thames was not possible due to levels and/or crossing third party land. The drainage design therefore maximises attenuation whilst allowing for gravity discharge into the surrounding Thames Water sewer network and the River Thames.</p> <p>The drainage strategy also optimises the use of SuDS as described in the Drainage Strategy submitted with the planning application and the Landscape DAS (reference: P10736-00-001) by Gillespies. These are:</p> <ul style="list-style-type: none"> <li>- Green roofs;</li> <li>- Permeable paving (or porous surfacing with an aggregate sub-base) for all roads that are not to be adopted. These areas would treat the runoff within the aggregate sub-base prior to discharge into the drainage system. The exact location of the permeable surfacing would be confirmed during detailed design;</li> <li>- Rainwater harvesting is proposed in the form of rainwater butts throughout the development;</li> <li>- Rain garden along the green link proposed within the detailed part of the application (east of Ship Lane); and</li> <li>- Pollutant-intercepting biomats within the geo-cellular attenuation tanks/culverts, which intercept and treat any residual pollutants that may be present within the surface water.</li> </ul>
<p>The area of site draining directly to the River Thames seems to ignore the presence of the proposed public realm and in particular the “Green Link” (ref Drainage Layout Sheet 3). The surface water drainage should be integrated within these elements with surface water directed across the surface rather than proposing a large array of permavoid cells to convey the surface water underground. This will not only provide a whole host of benefits to the public realm but will also help to improve the water quality of the surface water if managed by nature based SuDS solutions. The reference to potential contaminated land issues seems to have been used as thinly veiled excuse and is unlikely to be a barrier to above ground SuDS. At present the proposal makes no reference to water quality when it really should do given that it is proposing discharging into a waterbody.</p>	<p>Water quality is considered within the drainage strategy, paragraph 4.32. For the section of the site discharging into the River Thames (east of Ship Lane), there are a number of SuDS proposed which would treat runoff prior to discharge. These include the rain garden, planters, and the potential for permeable paving adjacent to the Thames. In addition to the biomats within the shallow geo-cellular tanks within the podium build-up, a downstream defender can be incorporated if found necessary, to be confirmed during detailed design.</p> <p>It would be unfeasible to direct all surface water runoff from this part of the development into the rain gardens within the green link. Due to the depth of build up above the ground floor slab the distance drainage can run in this zone is limited, hence why the shallow geo-cellular conveyance channels are provided adjacent to the</p>



	<p>buildings (so that falls from the rainwater pipes are minimised). The use of shallow geo-cellular conveyance channels is the design solution that ensures that discharge to the River Thames is maximised. A more traditional system would have been to drop downpipes into the basement where they could have run at high level, however due to the required falls this would have severely limited the area of the site that could have discharged to the river by gravity. The benefit of the geocellular channels is that they would be able to be laid flat ensuring gravity discharge to the river from a much larger area of the site. The potential contamination issues are not a preclusion to SuDS, however they are a reason for infiltration drainage not being practical (along with the likely groundwater levels due to proximity to the River Thames).</p>
<p>Although the preference would be to see the entire site drain to the River Thames via gravity direct discharge, it is noted however that the Thames Water surface water sewer, that the development proposes to connect into for the rest of the development, does in fact discharge into the River Thames adjacent to the site. Therefore, proposing a restricted discharge rate into this stretch of existing network, assuming there is capacity, is deemed to be acceptable. However, the Drainage Strategy is proposing a 50% reduction on flow rates by referring to the density of development as a rationale for not being able to achieve greenfield. This argument is not accepted for this development. Given the areas of public realm proposed, it is deemed that there is more that could be done to manage surface water within the landscaping by utilising nature based SuDS solutions that are incorporated within the public realm. This will provide far greater benefits to the development than directing all surface water straight into a series of underground attenuation tanks and could ultimately provide significant opportunities for evapotranspiration losses. The drainage strategy ostensibly needs a rethink as the current proposals are far from being integrated into the masterplan for this site.</p> <p>The proposed development does not comply with London Plan Policy 5.13 (and draft Policy SI.13). Justification as to why the development is not able to achieve greenfield or three times greenfield runoff is necessary. The general approach of relying on underground attenuation rather than maximising green infrastructure-based and above ground SuDS strategies through the integration with the landscaping proposals is not deemed to be acceptable. In addition to this the lack of water quality treatment for the section of the site directly drainage to the River Thames is not acceptable.</p>	<p>The potential to restrict runoff to greenfield rates was explored during the design process and where feasible runoff has been directed directly to the River Thames, minimising runoff discharged to sewers. The part of the site located west of Ship Lane cannot be discharged directly into the Thames without crossing third-party land.</p> <p>For flows going to the Thames Water sewer network (where it was not possible to discharge into the river), a 50% reduction in rates compared to the existing case is achieved, which was agreed with the London Borough of Richmond upon Thames. The proposed flows (surface and foul water) have also been agreed with Thames Water. A restriction greater than this would make gravity discharge unfeasible due to the larger attenuation requirement. The attenuation volume has been maximised while achieving gravity discharge, which is considered a more sustainable option than pumping. Due to the depth of the existing Thames Water sewers surrounding the site, the tanks cannot feasibly be made any deeper without requiring pumping, thus precluding the possibility to achieve greenfield rates.</p> <p>The SuDS outlined in the response to the previous comment provide treatment to the surface water runoff prior to discharging into the sewer system/the River Thames. The green roofs provide treatment in line with CIRIA SuDS Manual for roof runoff, and the rain garden and permeable paving provide treatment for runoff arising from other hard-standing areas of the development. The attenuation tanks would be fitted with pollutant-intercepting biomats which provide an additional level of treatment prior to discharge into the Thames Water network/the River. This is considered to be acceptable in line with latest guidance.</p>



<p>The proposed inclusion of green roofs is welcomed however it is recommended that if attenuation opportunities are as limited on the site as stated within the report that blue/green roofs should be incorporated to assist with these issues.</p>	<p>The potential for inclusion of blue roofs was explored during the design development. The inclusion of blue roofs would not have removed the requirement for underground tanks as runoff from the roads and other associated hard-landscaping would require to be attenuated.</p> <p>It was considered that green roofs (alongside the other SuDS proposed) to provide treatment and the geo-cellular tanks to provide the attenuation volume would be the best solution for providing the necessary attenuation volume and achieving the required water quality benefits.</p>
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## Flood Risk

GLA comment	Hydrologic Response
<p>Finished floor levels for all residential properties are proposed to be 1m above reference flood levels. For those parts of the development with ground levels below the reference flood level it is proposed that self-activating barriers be installed for the car park entrances and flood proof doors and/or demountable barriers will be installed</p>	<p>The specific protection measures that are required are presented in the FRA and comprise:</p> <ul style="list-style-type: none"> <li>• Flood Proof Doors to protect the Boathouse (B09) whose FFL is at 4.25 mAOD (note that these doors do NOT form part of the formal tidal defences).</li> <li>• Flood-proof doors for the sub-station (in building B10) in the event of breach/overtopping.</li> <li>• Self-activating flood barrier (SAFB) for the entrance to the Basement Car Park from Mortlake High Street in the event of breach/overtopping. Note that the entrance off Ship Lane and the entrance to the car park on the west of Ship Lane are at a safe level.</li> </ul>
<p>All other sources of flooding are considered to be low, except for surface water flooding, where portions of the site are identified on EA mapping as having a low/medium risk of surface water flooding and a few areas of high risk. This risk is heavily influenced by the existing development's building make up and the existing levels on site. With the proposed changes the SW flood extents will likely change with new flow routes created as a result. Surface water on the site will need to be appropriately managed so as not to increase risk both on the site and to the surrounding areas.</p>	<p>Post-development, rain water falling onto the site would be captured within the on-site drainage network, providing the adequate amount of attenuation and restriction prior to discharge. The drainage network would be designed to deal with all events up to and including the 1 in 100 year plus 40% climate change. In addition, the provision of soft landscaping as part of the proposals would reduce the amount of surface water runoff within the site compared to the existing case.</p>
<p>The Flood Emergency Plan (Appendix G of the FRA) identifies the presence of safe and dry access and egress routes (within Flood Zone 1) provided for all. It also references that there will be a future need for a tidal flood gate along Ship Lane to prevent inundation. This will require suitable conditions to be set following advice from the EA.</p>	<p>Whilst the applicant is not responsible for installing a flood defence across Ship Lane, options were discussed with the EA at a meeting on the 26th September 2016 that could be implemented by others in the future. It would not be feasible for a permanent defence to be located across Ship Lane as this would block access along the public highway. Instead, a demountable defence would be more suitable for this location. The defence would need to tie into the existing Maltings Building on the Stag Brewery Site. On the other side of the public highway the defence would need to tie into the existing public house (noted as a defence on the Environment Agency's flood map). As a result, a condition relating to the offsite future flood defence on Ship Lane is simply not appropriate. It will not be required for some decades and will involve third parties.</p>
<p>The proposed development complies with London Plan Policy 5.12 (and draft Policy SI.12), however conditions</p>	<p>These issues have been previously commented on, but are restated here:</p>

relating to the need for increased flood defences, inclusion of property level protection measures and the future Ship Lane flood gate will be required.

- A Condition relating to the increase of flood defences is appropriate.
- Note that as stated in #4.2.3 of the FRA, the FFL for ALL residential property is at a minimum elevation of 7.03 mAOD; there is accordingly no need for "residential" PLP measures. The majority of non-residential property also satisfies this condition, the exceptions being discussed in the FRA. The specific measures have been re-stated in this response.

As noted in this response, a Condition for the Ship Lane flood gate is not considered to be appropriate.

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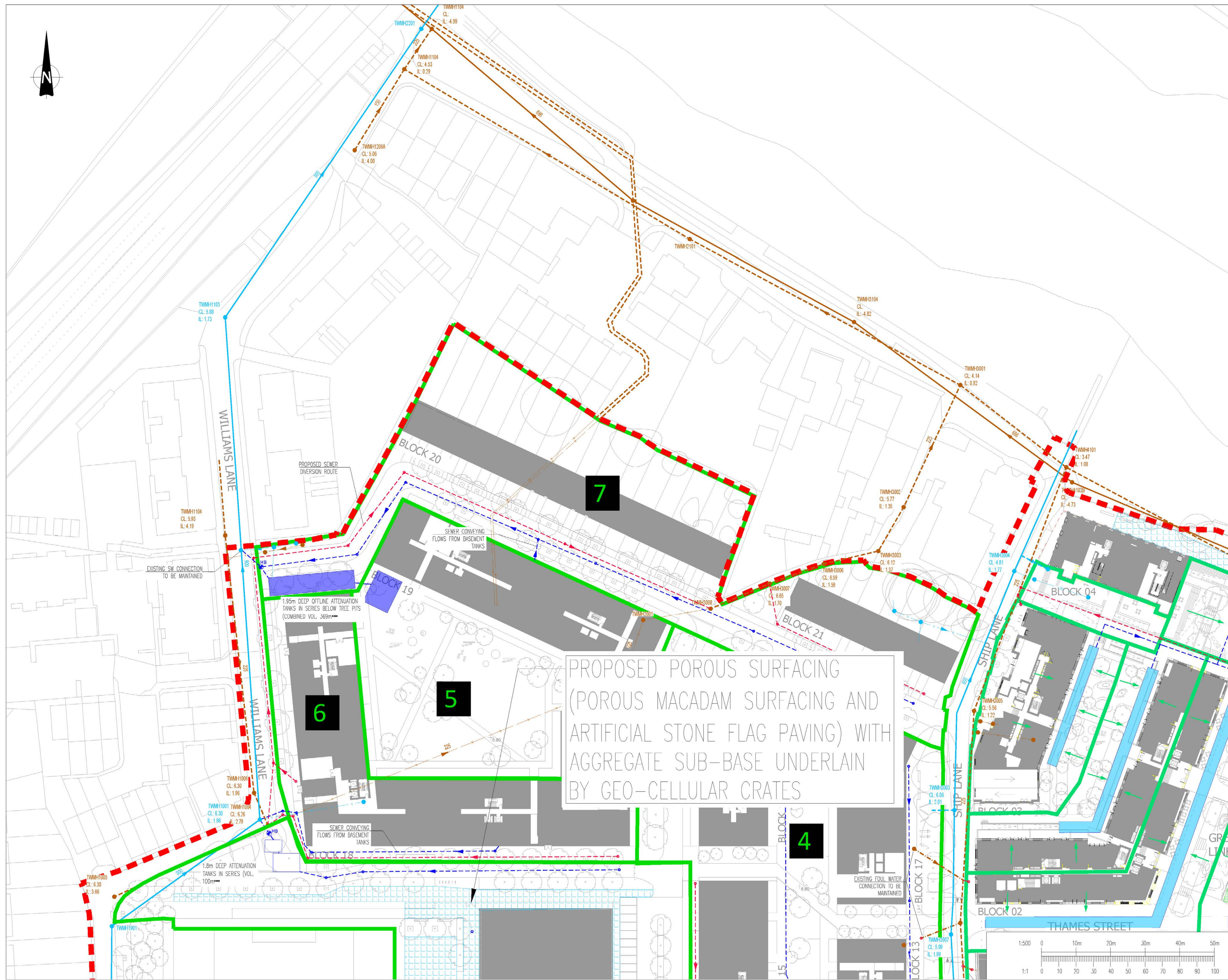
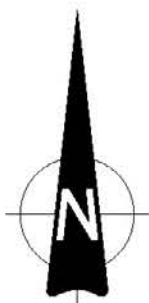


## **B. Amended Drainage Strategy Drawing**

### **Appendices**

Surface Water Drainage Update Briefing Note  
WIE10667-103-BN-1-1-3  
WIE10667





**LEGEND**

- EXISTING PRIVATE SURFACE WATER SEWER
- EXISTING PRIVATE FOUL SEWER
- EXISTING PUBLIC SURFACE WATER SEWER
- EXISTING PUBLIC FOUL SEWER
- EXISTING PUBLIC RISING MAIN
- EXISTING SEWER TO BE ABANDONED
- PROPOSED FOUL WATER SEWER
- PROPOSED SURFACE WATER SEWER
- PROPOSED ATTENUATION TANK
- PROPOSED CONVEYANCE CHANNEL
- PROPOSED POROUS SURFACING
- PROPOSED RAIN GARDEN
- APPLICATION A BOUNDARY
- APPLICATION B (SCHOOL) BOUNDARY
- SURFACE WATER DRAINAGE CATCHMENT

- NOTES**
- 1) EXISTING DRAINAGE LAYOUT BASED ON THAMES WATER SEWER RECORDS AND PENBORN TECHNICAL SERVICES DRAWING (REF: P97907/01).
  - 2) THE PART OF THE DEVELOPMENT WEST OF SHIP LANE IS SUBMITTED AS AN OUTLINE APPLICATION. THE BASEMENT PLAN PROVIDED (REF: 16019\_0345\_Z2\_P\_01\_001 - RECEIVED FROM SQUIRE & PARTNERS 29.01.2018) IS INDICATIVE ONLY AND SUBJECT TO THE PARAMETER PLANS SUBMITTED.
  - 3) DRAINAGE SUBJECT TO DETAILED DESIGN.



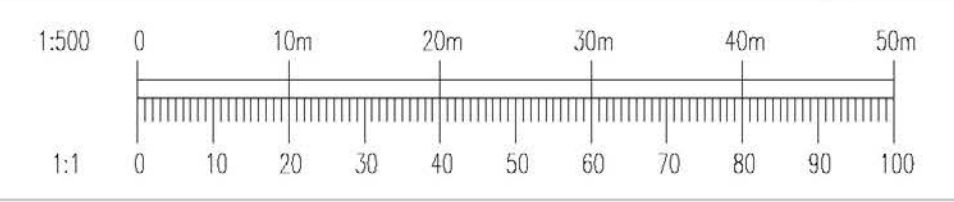
Rev	Date	Description	By
A06	20.12.18	PERMEABLE PAVING AND RAIN GARDEN ADDED	NB
A05	13.02.18	UPDATED APPLICATION BOUNDARY	NB
A04	29.01.18	UPDATED ARCHITECT LAYOUT	NB
A03	01.11.17	TEAM ISSUE	NB
A02	23.10.17	SURFACE WATER ATTENUATION AMENDED	NB
A01	29.09.17	PRELIMINARY ISSUE	MAC

**Project** STAG BREWERY  
**Title** PROPOSED FOUL AND SURFACE WATER DRAINAGE LAYOUT SHEET 1 OF 4  
**Client** RESELTON PROPERTIES LIMITED

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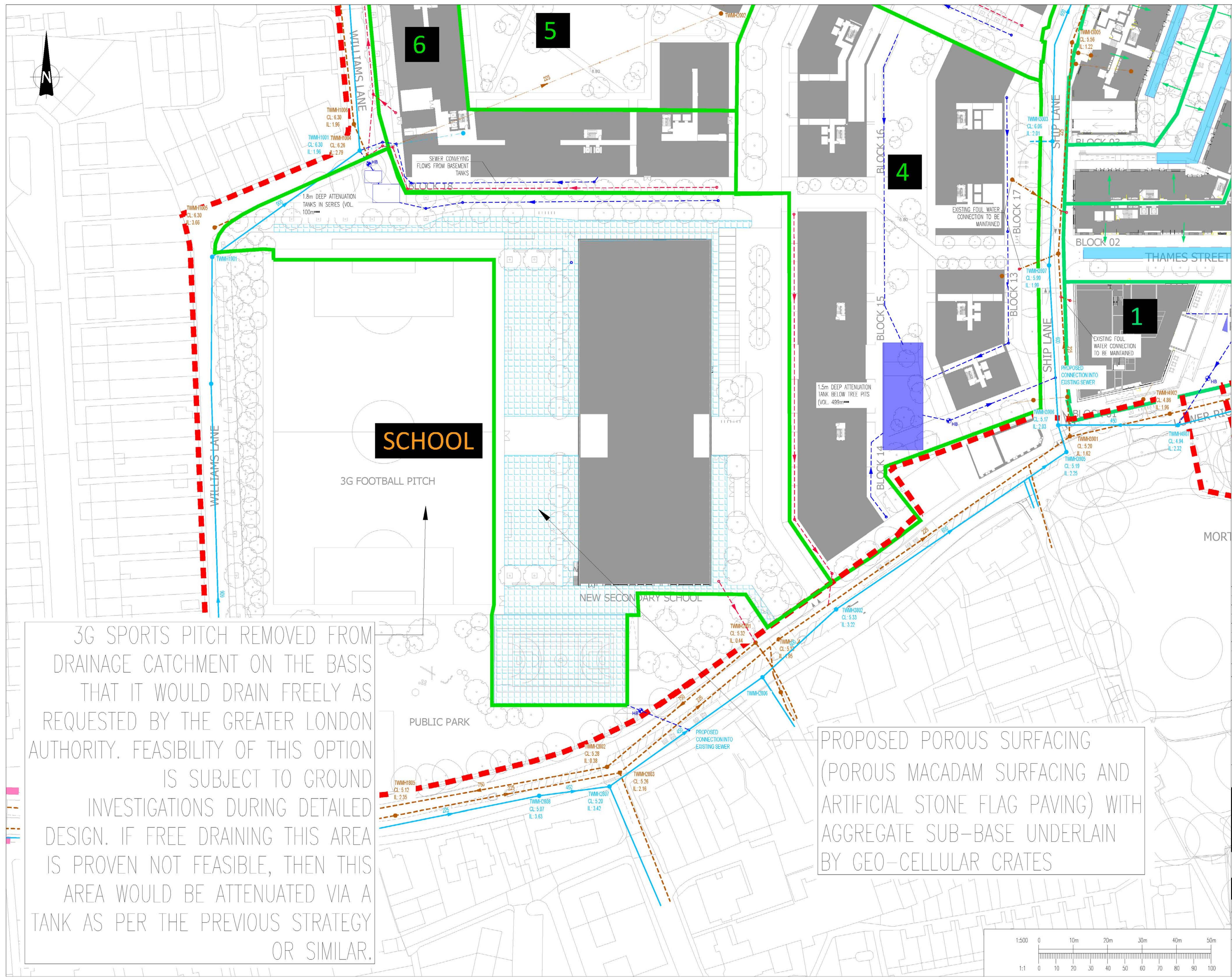
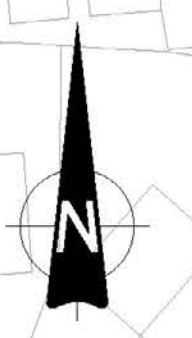
**PRELIMINARY**

Designed by	NB	Checked by	DO	Project No	WIE10667			
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Scale	A1	work to figured dimensions only	1:500	Publisher	Zone	Category	Number	Revision
WE	SA	92	0004	A06				



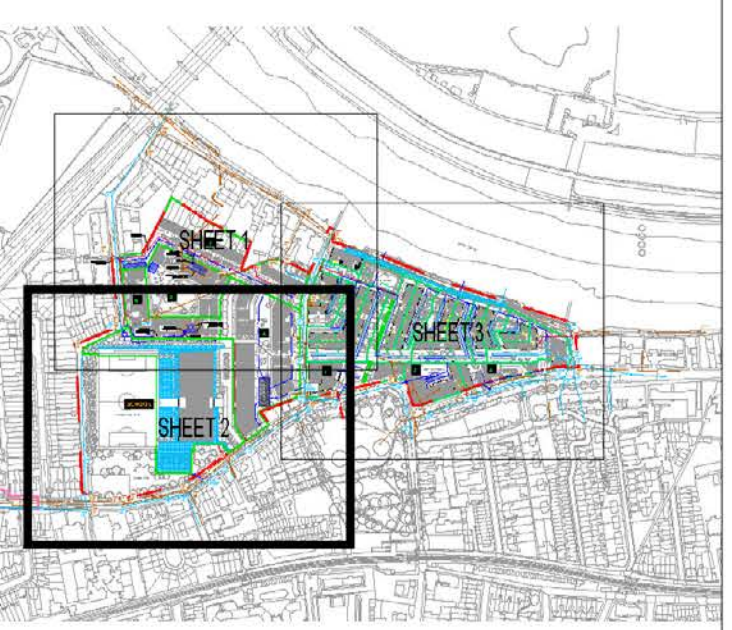
PROPOSED POROUS SURFACING (POROUS MACADAM SURFACING AND ARTIFICIAL STONE FLAG PAVING) WITH AGGREGATE SUB-BASE UNDERLAIN BY GEO-CELLULAR CRATES





- LEGEND**
- EXISTING PRIVATE SURFACE WATER SEWER
  - EXISTING PRIVATE FOUL SEWER
  - EXISTING PRIVATE COMBINED SEWER
  - EXISTING PUBLIC SURFACE WATER SEWER
  - EXISTING PUBLIC FOUL SEWER
  - EXISTING PUBLIC COMBINED SEWER
  - EXISTING PUBLIC RISING MAIN
  - EXISTING SEWER TO BE ABANDONED
  - PROPOSED FOUL WATER SEWER
  - PROPOSED SURFACE WATER SEWER
  - PROPOSED ATTENUATION TANK
  - PROPOSED CONVEYANCE CHANNEL
  - PROPOSED POROUS SURFACING
  - PROPOSED RAIN GARDEN
  - APPLICATION A BOUNDARY
  - APPLICATION B (SCHOOL) BOUNDARY
  - SURFACE WATER DRAINAGE CATCHMENT

- NOTES**
- 1) EXISTING DRAINAGE LAYOUT BASED ON THAMES WATER SEWER RECORDS AND PENBORN TECHNICAL SERVICES DRAWING (REF: P97907/01).
  - 2) THE PART OF THE DEVELOPMENT WEST OF SHIP LANE IS SUBMITTED AS AN OUTLINE APPLICATION. THE BASEMENT PLAN PROVIDED (REF: 16019\_0645\_Z2\_P1\_001 - RECEIVED FROM SQUIRE & PARTNERS 29.01.2018) IS INDICATIVE ONLY AND SUBJECT TO THE PARAMETER PLANS SUBMITTED.
  - 3) DRAINAGE SUBJECT TO DETAILED DESIGN.



3G SPORTS PITCH REMOVED FROM DRAINAGE CATCHMENT ON THE BASIS THAT IT WOULD DRAIN FREELY AS REQUESTED BY THE GREATER LONDON AUTHORITY. FEASIBILITY OF THIS OPTION IS SUBJECT TO GROUND INVESTIGATIONS DURING DETAILED DESIGN. IF FREE DRAINING THIS AREA IS PROVEN NOT FEASIBLE, THEN THIS AREA WOULD BE ATTENUATED VIA A TANK AS PER THE PREVIOUS STRATEGY OR SIMILAR.

PROPOSED POROUS SURFACING (POROUS MACADAM SURFACING AND ARTIFICIAL STONE FLAG PAVING) WITH AGGREGATE SUB-BASE UNDERLAIN BY GEO-CELLULAR CRATES

Rev	Date	Description	By
A07	08.01.19	MINOR AMENDMENT TO TEXT	NB
A06	20.12.18	PERMEABLE PAVING AND RAIN GARDEN ADDED	NB
A05	13.02.18	UPDATED APPLICATION BOUNDARY	NB
A04	29.01.18	UPDATED ARCHITECT LAYOUT	NB
A03	01.11.17	TEAM ISSUE	NB
A02	23.10.17	SURFACE WATER ATTENUATION AMENDED	NB
A01	29.09.17	PRELIMINARY ISSUE	MAC

Project: **STAG BREWERY**

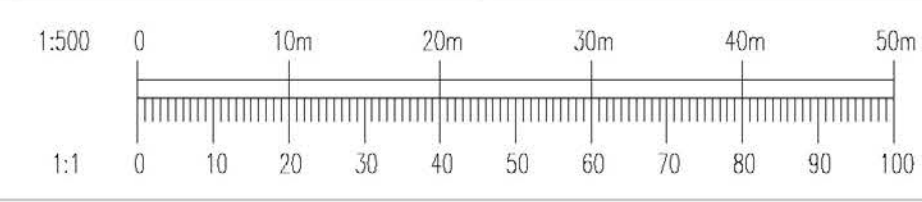
Title: **PROPOSED FOUL AND SURFACE WATER DRAINAGE LAYOUT SHEET 2 OF 4**

Client: **RESELTON PROPERTIES LIMITED**

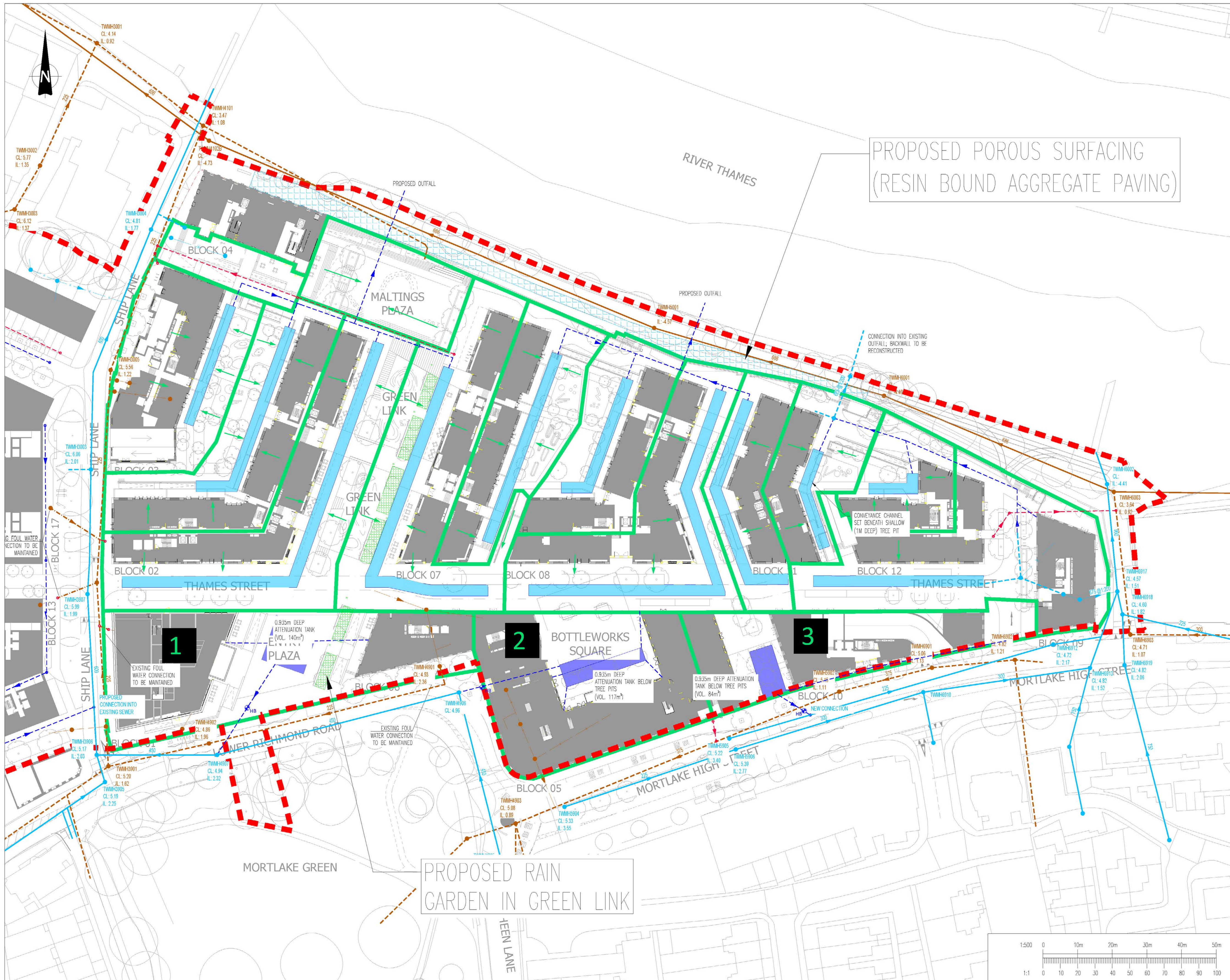


Drawing Status: **PRELIMINARY**

Designed by	Checked by	Project No		
NB	DO	WIE10667		
Drawn by	Date	Computer File No		
MAC	SEPTEMBER 2017	WIE10667-0420005.dwg		
Scalcs @ A1	work to figured dimensions only	1:500		
Publisher	Zone	Category	Number	Revision
WIE	SA	92	0005	A07







PROPOSED POROUS SURFACING  
(RESIN BOUND AGGREGATE PAVING)

PROPOSED RAIN GARDEN IN GREEN LINK

- LEGEND**
- EXISTING PRIVATE SURFACE WATER SEWER
  - EXISTING PRIVATE FOUL SEWER
  - EXISTING PUBLIC SURFACE WATER SEWER
  - EXISTING PUBLIC FOUL SEWER
  - EXISTING PUBLIC COMBINED SEWER
  - EXISTING PUBLIC RISING MAIN
  - EXISTING SEWER TO BE ABANDONED
  - PROPOSED FOUL WATER SEWER
  - PROPOSED SURFACE WATER SEWER
  - PROPOSED ATTENUATION TANK
  - PROPOSED CONVEYANCE CHANNEL
  - PROPOSED POROUS SURFACING
  - PROPOSED RAIN GARDEN
  - APPLICATION A BOUNDARY
  - APPLICATION B (SCHOOL) BOUNDARY
  - SURFACE WATER DRAINAGE CATCHMENT

- NOTES**
- 1) EXISTING DRAINAGE LAYOUT BASED ON THAMES WATER SEWER RECORDS AND PENBORN TECHNICAL SERVICES DRAWING (REF: P9790703)
  - 2) THE PART OF THE DEVELOPMENT WEST OF SHIP LANE IS SUBMITTED AS AN OUTLINE APPLICATION. THE BASEMENT PLAN PROVIDED (REF: 16019\_0345\_22\_P\_01\_001 - RECEIVED FROM SQUIRE & PARTNERS 29.01.2018) IS INDICATIVE ONLY AND SUBJECT TO THE PARAMETER PLANS SUBMITTED.
  - 3) DRAINAGE SUBJECT TO DETAILED DESIGN.



Rev	Date	Description	By
A06	20.12.18	PERMEABLE PAVING AND RAIN GARDEN ADDED	NB
A05	13.02.18	UPDATED APPLICATION BOUNDARY	NB
A04	29.01.18	UPDATED ARCHITECT LAYOUT	NB
A03	01.11.17	TEAM ISSUE	NB
A02	23.10.17	SURFACE WATER ATTENUATION AMENDED	NB
A01	29.09.17	PRELIMINARY ISSUE	MAC

**Project**  
STAG BREWERY

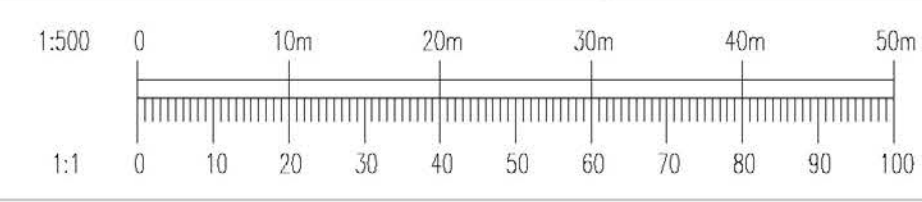
**Title**  
PROPOSED FOUL AND SURFACE WATER DRAINAGE LAYOUT SHEET 3 OF 4

**Client**  
RESELTON PROPERTIES LIMITED



**Drawing Status**  
**PRELIMINARY**

Designed by	NB	Checked by	DO	Project No	WIE10667			
Drawn by	MAC	Date	SEPTEMBER 2017	Computer File No	WIE10667-3-PR-DRAINAGE.dwg			
Scale	@ A1	work to figured dimensions only	1:500	Publisher	Zone	Category	Number	Revision
WE	SA	92	0006	A06				







## C. Hard Landscaping Strategy (Gillespies)

### **Appendices**