DRAINAGE STRATEGY

20112 Brook Road

15.01.2021

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1.0 INTRODUCTION

This site currently has extant planning permission through application 19/05633/F which was granted permission on 04.06.2020. This permits the site to be redeveloped to provide 3 flats and 3 houses.
This application looks to alter this proposal by providing 10 residential flats on the site. All previous reports, recommendations and conditions of the previous proposal will remain relevant to this proposal also.

Through the previous application, the following comments were received and agreed:

" The Flood Risk Officer confirms that the information provided regarding infiltration testing is suitable and that this method of draining the site is not viable. The new proposals of a tank are suitable in principle provided they are being maintained privately, if they are being offered for adoption by Wessex Water then this would need to be approved by them. A full sustainable drainage strategy is now required in line with the West of England Sustainable Drainage developers guide; which provides calculations, detailed design and maintenance of the SuDS features. The Flood Risk Officer be happy for this information to be secured via condition

And;

"The Councils Flood Risk Officer originally objected to the proposal as online mapping suggests that the site was not suitable for infiltration surface water drainage. As such the drainage strategy was amended to show the use of a drainage tank. The Councils Flood Risk Officer is broadly satisfied with this but has advised a pre commencement condition securing details of a Sustainable Drainage Strategy and associated detailed design, management and maintenance plan of surface water drainage for the site using SuDS methods."

This drainage strategy proposed is the exact same as the previously agreed and permitted strategy of draining the site and will also be subject to further detailed design and calculations through condition. We therefore accept that the same condition will be imposed on this application:

The development hereby approved shall not commence until a Sustainable Drainage Strategy and associated detailed design, management and maintenance plan of surface water drainage for the site using SuDs methods has been submitted to and approved in writing by the Local Planning Authority. The approved drainage system shall be implemented in accordance with the approved Sustainable Drainage Strategy prior to the use of the building commencing and maintained thereafter for the lifetime of the development.
Reason: To prevent the increased risk of flooding by ensuring the provision of a satisfactory means of surface water disposal and that the principles of sustainable drainage are incorporated into this proposal and maintained for the lifetime of the proposal.

The following strategy looks to again agree the method of draining the site through attenuation tanks with further detailed design being provided through the above pre-commencement condition.

This strategy should be read in conjunction with the accompanying drawings, statements and reports submitted in support of this planning application.

2.0 EXISTING SITE INFORMATION & CONDITIONS

The site covers an area of approximately 467m2. It is currently occupied by a garage with office and WC and forecourt.
It enjoys site frontage to both St Paul's Road to the West and Brook Road to the South.
It is surrounded on 3 sides by residential properties.
Along Brook Road it is bookended by two Victorian residential houses that have now been subdivided into flats.
The north boundary is shared with a modern terrace of residential housing.
The east boundary has a high wall boundary to a small allotment area associated with the houses to the north.
The site benefits from proximity to a wide range facilities including public transport, schools, restaurants and supermarkets.
Access to the site is currently off Brook Road and St Paul's Road and this will continue to be the case once developed.

The site is currently 100% impermeable comprising garage buildings, loading bays and hard standing across its entire surface (refer to below photo), any surface water is discharged directly into the local drainage network.

3.0 PROPOSED DEVELOPMENT

The existing site is currently vacant and was most recently used as a car sales forecourt and vehicle repairs garage / office. The site has been vacant since 2017 and was marketed in 2018 but no suitable tenant was found. (Please refer to economic statement). The site is a brownfield site located in South Bristol and it currently has extant permission for redevelopment to residential.

This application seeks to alter this permission to provide 10 highly sustainable, low energy flats set within three blocks.

The site is not in a designated Conservation Area.

The proposed design has been laid out to respect its immediate context whilst also responding to the orientation and environmental factors present on the site.

Please refer to the proposed site block plan for further details on the overall site layout and the proposed floor plans for the various flat type's internal layout and configuration.

4.0 PROPOSED DRAINAGE STRATEGY

4.1 Policy Guidance

The proposed design, layout and drainage strategy has been considered and designed against the following guidance:

- The Non Statutory Technical Standards for SuDs in conjunction with NPPF and PPGs.

S7

The drainage system must be designed so that, unless an area is designated to hold and/ or convey water as part of the design, flooding does not occur on any part of the development for a 1 in 30 year rainfall event. We consider sustainable drainage (SuDS) to be more than just a number of drainage techniques, systems or devices. Rather it is an approach to drainage that aims to drain a site in a sustainable way with consideration to water quantity and water quality, biodiversity and amenity.

- The *West of England Sustainable Drainage Developers Guide Sections 1 + 2 (Bristol)*

4.2 Site Classification (WoE SuDs Guide)

The proposed site also takes into account the *West of England Sustainable Drainage Developers Guide Sections 1 + 2 Bristol.*
Within section 2 the site is confirmed as being in Discharge Zone 11 – Bedminster

The overarching drivers in Discharge Zone 11 are identified as:
'Reduction in existing discharge rate'.
The reason for this is because:
'History of flooding in this area with lower areas vulnerable to the effects of tide locking'.

The proposed scheme will reduce the existing discharge rate on the site by removing the existing 100% hard standing scenario and replacing it with a combination of soft landscaping, including new planting and hard landscaping. All the hard landscaping and proposed new roof areas will be drained to underground attenuation tanks sized appropriately for the site. These attenuation tanks will be fitted with a hydro brake to slowly release water into the drainage system, hereby, greatly reducing the existing discharge rate and helping to minimise flooding in the area.

The West of England Sustainable Drainage Developers Guides seek a top down hierarchical approach to drainage with the preference being in the following order

1 Into the ground by infiltration
2 Into a surface water body such as a river, ditch, pond or stream
3 Into a surface water sewer
4 Into a combined sewer

Given this, and the sites location, the following methods have been chosen/discounted:

1 - Infiltration has been proven to be non-viable on this site through the previous application
2 - There is no body of water close enough to viably discharge into
3 - Current mapping suggests that there are no surface water sewers near to the site
4- Surface water must therefore discharge into the foul sewer system along St Paul's Road. This will be via a hydro brake from attenuation tanks to ensure that there is no overloading on this system

Reduction in existing discharge rate via below ground attenuation tanks and mains water drainage

Through an increase in planter areas, much of the surface water will be utilised to water the new planting areas. Any hardstanding and roof areas will be captured through gullies and rainwater pipes/gutters and directed to an underground attenuation tank. The outlet on the attenuation tank will then be limited via Hydro brake to a discharge rate of 5 litres per second maximum that will then connect into the existing drainage system running in a southerly direction down St Paul's Road.

This provides source control measures that will ensure final discharge will be as slow as possible in its achievement thereby assisting in coping with any rainwater events.

4.3 Sustainable Urban Drainage Strategic Principles

The proposed scheme will incorporate elements of Sustainable Urban Drainage to reduce the water impact of the proposed development on the local and wider networks, both natural and manmade. The below points explain how the proposed scheme will deal with surface water discharge and how the proposals will have a net benefit to both the site on a micro level and the wider area on a macro level.
The below points are structured around the guidance given in the *West of England Sustainable Drainage Developers Guide Section 2 Bristol – SuDs Design Guide*

4.3.1 Common Considerations

The WoE SuDs Guides states, "*We recognise that a large number of developments in Bristol will be on previously developed sites that present specific challenges. Some considerations on previously developed sites are common to all regardless of location*".

- Concentration of flow - Concentrating flow from a large area in to a single discharge point increases flood risk and causes significant pollution problems. Limit this by discharging flow to multiple areas across the site.

- Existing infrastructure - Previously developed sites may be constrained by existing infrastructure. Identify these constraints early and discuss with the LPA. Historic systems may not be suitable for present day requirements and therefore may need to be changed or replaced.

- Limited space - Inner city sites are often squeezed for space. Innovative solutions will be required to make space for water. This may include denser occupancy in some parts of the site to make other parts of the site available. Source control and reduced impermeable areas are good ways of making the most of available space, and more efficient than traditional approaches.

- Exceedance - Any type of drainage system can be exceeded, it is therefore vital that exceedance is managed so that it does not become uncontrolled flooding.

In regards to concentration of flow the proposals has an increase in planted beds, meaning that water hitting the external surfaces will not gather and flow to set points but rather soak or seep into the ground at source or be captured by a number of different floor gullies. Water gathered by the proposed roofs and gutter system is fed – via multiple downpipe routes into the multiple attenuation tanks. So across the site water is not being discharged towards a single point thus reducing the risk of localised flooding.

The existing infrastructure has been in place for many years and has coped however our proposals will improve on this significantly. By using the control sources referenced in above the proposals will greatly lessen the impact that water has on this site over the current scenario.

There is limited space available on the site as described in section 4.8. The proposed scheme deals with water at source and whilst still considering all the other aspects that go into making a successful scheme we recognise that any system can be exceeded. However, given the design calculations set out in section 4.7, the proposed system has a large amount of tolerance to deal with additional water. The proposals would dramatically better the site in regards to surface water runoff than the existing scenario.

4.3.2 Source Control SuDs

The WoE SuDs Guides states the following:

- *Source control SuDs will allow the attenuation volume to spread over different areas and keep water at or near the surface. Not utilising this will result in a significant attenuation volume in a single location and also make managing the peak discharge rate a potential problem*

- *Another benefit of source control SuDs is their ability to improve water quality and boost amenity and biodiversity. Rather than using a large attenuation tank, allowing runoff to discharge through a series of source control SuDs such as permeable paving, green roofs, rain gardens, etc. will reduce capital costs and the maintenance liability associated with a tank and flow control device.*

- *By utilising a series of source control SuDs there is the potential to have zero discharge from site; this will result in a reduced annual water bill for the occupier, reduction in downstream flood risk and improvement in overall water quality.*

- *Source control measures also provide a treatment stage, for example: using a section of permeable paving will constitute a treatment stage, which cannot be achieved when using conventional gullies and asphalt. As gullies are not considered a treatment stage, utilising these will require the addition of a treatment stage, such as filter strip or swale, prior to discharging to the receiving water body/sewer.*

The proposed scheme uses source control to percolate / attenuate and manage the volume of water that falls on the site before it flows into the local drainage network.

Any water landing directly on the proposed new roofs is collected via gutters and fed via downpipes to ground level and into attenuation tanks.

The proposals also incorporate areas of new soft landscaping, and new planting which all assist with the attenuation and filtering of water at source. This is a huge improvement on the existing scenario.

Whilst we cannot achieve zero discharge from the site, by incorporating the above principles we will dramatically reduce the existing discharge of water entering the local and wider drainage systems. Please refer to the indicative design calculations provided later in this drainage strategy.

4.4.3 Maintenance of the Attenuation Tanks system

The maintenance and upkeep of this system will be maintained privately and remain the responsibility of the Landlord.

4.5 Soft Landscaping

The proposed scheme will replace the 100% hard standing, which is a combination of tarmac and concrete, with approximately 52.6m2 of soft landscaping. This will be of mixed shrub planting to the building perimeters and external areas.

The soft landscaping has the added benefit of naturally filtering the water, therefore improving the water quality and biodiversity in general.

This, on its own, is a great improvement on the site, and when it is combined with the proposed rainwater harvesting system the proposed scheme will be attenuating most of the water that hits the surface.

4.6 Design Calculations

The following design calculations should demonstrate how the proposed design effectively attenuates water at source and how the proposals will have a large net benefit to the impact of water on the site and in the local area. Although a relatively small site, all these potential savings add up to have a larger impact on Bristol as a whole.

The site area is approximately 467m2 (*currently all hard standing/impermeable*)
Proposed Impermeable Area 414.4m2 (*Roof & Hardstanding area*)
Proposed Soft Landscaping 52.6m2 (*Shrub Planting beds*)
Assumptions: (*figures taken from WoE SuDs Guide*)

1 Storage requirement rate of 30 litres / m2 of impermeable area
2 Maximum Discharge rate of 5 litres / sec

Estimated Storage required by non-permeable area: 30 litres x 495m2 = 12.43m3 storage capacity required.
Estimated storage required by permeable area (soft landscaping)
Allowing a void ratio in the top soil of 0.1 and a min depth of the top soil at 0.3m the calculation looks like this: 52.6m2 x 0.1 x 0.3 = 1.578m3.

These calculations suggest that an attenuation tank with 12.43m3 storage capacity and a maximum discharge rate of 5 litres / sec will be sufficient for the site.

The site coverage is currently 100% impermeable surfacing discharging directly into the wider drainage system. Our strategy will provide a significant betterment on the discharge rate into this system and offset the discharge into the system to outside of peak rainfall times.

The above calculations prove that the proposals are capable of managing the control of water at source and without adversely affecting the local networks. This will be subject to further calculations and clarification at detail design stage and will be submitted to the LPA through planning conditions.

4.7 SuDs Technologies not used in this Scheme

As mentioned several times in the WoE Suds Guide, it is recognised and appreciated that previous uses and brownfield sites come with a wide variety of constraints that have to be considered. The proposed site is relatively small and is surrounded by existing development, which limits the opportunity for extensive SuDs features. This is not a greenfield site where space is abundant.
The proposed layout has been set out with the following key principles in mind:

- rationalisation of existing urban massing and street grain
- provide strong street frontages to St Paul's Road and Brook Street
- provide enough dwellings to make the scheme economically viable

The proposed site layout has taken all this into account and we believe that the proposed site plan would provide a very pleasant environment to live in.
With the above in mind the following Sustainable Urban Drainage systems have not been pursued:

- Swales – not enough available room on site to be effective
- Detention / Infiltration Basins – not enough available room on site to be effective

4.8 Further Design & Future Maintenance of SuDs Systems

The WoE SuDs Guides states the following:

- *At the detailed design stage, further site investigations should be conducted providing additional information of site specific ground conditions. The findings of investigations should be used in conjunction with the Sustainable Drainage Strategy (surface water) to develop the detailed design.*
- *A properly-functioning SuDs should be low-tech and involve a defined minimum level of maintenance to which the SuDs must be maintained. The responsibilities for its ownership and future maintenance should be identified during the detailed design stage and presented as part of the planning application submission.*
- *When planning a sustainable drainage system, developers need to ensure their design takes account of the construction, operation and maintenance requirements of both surface and subsurface components, allowing for any personnel, vehicle or machinery access required to undertake this work.*
- *Management and Maintenance plans will need to allow the Local Planning Authority to satisfy themselves that the proposed minimum standards of operation area appropriate and that there are clear arrangements in plan for ongoing maintenance over the life time of the development. It is critical that the most appropriate party own and maintain the feature.*

The proposed SuDs systems are low tech in nature, with any potential maintenance of the systems under the direct control of the landlord who will be retaining the freehold of the property and selling the flats off under a leasehold title arrangement

A detailed SuDS design will be undertaken and submitted to the Local Authority prior to construction through a pre-commencement condition as agreed through the extant previous planning permission.

A Construction Management Plan will be submitted to the Local Authority prior to construction to ensure that the proposals meet the requirements.

4.9 Planning Conditions

The above drainage strategy, indicative design calculations and supporting drawings demonstrate that an acceptable and appropriate SuDS strategy is achievable on the site.
As agreed through the previous planning application, we are more than happy to accept that the detailed design of this drainage strategy would be subject to the following condition.
This condition is stated in the *West of England Sustainable Drainage Developers Guide Section 2 Annex – SuDs Planning Practice Note* as a potential way to facilitate this application.

Condition: B24a Sustainable Drainage System (SuDs)
The development hereby approved shall not commence until a Sustainable Drainage Strategy and associated detailed design, management and maintenance plan of surface water drainage for the site using SuDs methods has been submitted to and approved in writing by the Local Planning Authority. The approved drainage system shall be implemented in accordance with the approved Sustainable Drainage Strategy prior to the use of the building commencing and maintained thereafter for the lifetime of the development.
Reason: To prevent the increased risk of flooding by ensuring the provision of a satisfactory means of surface water disposal and that the principles of sustainable drainage are incorporated into this proposal and maintained for the lifetime of the proposal.

This would allow the design team and the client to spend additional money and time developing the detailed design and specification safe in the knowledge that the site has been granted a planning consent and that the proposals are viable in this location.

5.0 Summary

The proposed scheme will greatly reduce the existing discharge rate on the site by removing the existing 100% hard standing scenario and replacing it with a combination of soft landscaping and hard landscaping, as well as, rainwater storage through attenuation tanks.

All these proposed features will have a positive net impact on the surface water discharge associated with this site and will reduce the potential for both localised and wider spread flooding.

This strategy us unchanged from the previous extant permission, and we are happy to accept the same planning condition as attached to the extant permission to facilitate further detailed design prior to construction.

Tom Schular
15.01.2021

6.0 Attachments

20112_350_Proposed Site Drainage Plan