TJ Infrastructure Ltd

Project: Springfield House, Regil

Title: SuDs Drainage Strategy and Flood Risk Assessment

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1 Introduction

1.1 Project Background

1.1.1 TJ Infrastructure (the consultant) has been commissioned by Martin Brice & Jenna Brice (the Client) to produce an SuDs Drainage Strategy and Flood Risk Assessment Report in relation to the proposed new development at Springfield House, Regil.

1.1.2 The development includes the demolition of the existing residential property and garage and the construction of a new residential property and annex.

1.2 Method

1.2.1 The report will firstly assess the existing site, including a Flood Risk Assessment, and any potential constraints to the development and the drainage strategy. It will then assess the opportunities for sustainable measures to be included with the drainage strategy and the discharge points for both foul and surface water.

1.2.2 The following report will assess the development proposals against the requirements of the NPPF and the standing advice of the Environment Agency and Lead Local Flood Authority (LLFA).

1.2.3 After the introductory section, the following is discussed:

- Section 2 describes the existing site conditions.
- Section 3 includes a Flood Risk Assessment.
- Section 4 assesses any potential constraints to the development.
- Section 5 analyses the existing site drainage.
- Section 6 proposed surface water SuDs network and outfall.
- Section 7 proposed foul water network and outfall.
- Section 8 provides the summary and conclusions.

2 Existing site

2.1 Site Description

2.1.1 The site is located within Regil, Chew Valley, Somerset accessed from The Street which is the north-south road running through the village. The site is on the southern boundary of the village with the approximate coordinates for the site E: 353799, N: 162128.

2.1.2 The proposed location of the development is on existing footprint of the dwelling and garage on the site.

2.1.3 The site surroundings are rural village consisting of a small number of residential properties locally with a large proportion of green space consisting of open fields and farms.

2.1.4 A topographical survey has been undertaken for the site. This shows that the site is sloping from north to south with levels varying between approximately 49.73mAOD and 44.10mAOD. There is also a significant local drop in levels in the middle of the site around the existing pond\stream. The topographical survey is contained in Appendix A.

2.1.5 In the surrounding area the levels fall from north to south towards the unnamed watercourse running parallel to Lower Strode road to the south. There appears to be a localised valley in the levels running along The Street road, and there is another local ‘ridge’ approximately 100m to the west, with the local high being in the middle of the village to the north. This is based on contouring information available on OS mapping.

2.2 Watercourses

2.2.1 The nearest Main River is to the south east with the lower section called the Babylon Brook, but with the upper reaches from Lower Strode being unnamed with the start of the section of the watercourse classified as Main River. This section of the watercourse is approximately 650m to the south east of the proposed development.

2.2.2 There are numerous minor watercourses in the local area which all feed towards the Babylon Brook including the spring which originates with the proposed development site.

2.2.3 A site walkover was undertaken to trace the line of the spring and the local hydrology and this identified that there is the spring within the site (there are two outlets which may be both springs, or a surface water outfall and a spring), and a field drain along the western boundary which fades out to the north and was only identifiable due to the precedent weather conditions of a period of heavy rain draining into the ditch.

2.2.4 The watercourse noted on OS mapping shows a break to the south but the watercourse continues within the site and flows southwards parallel to The Street. This then flows onto The Street at the location of a highways gully which appears to be intentionally located so as to receive the watercourse flows:

Figure 2.1 –Watercourse outfall to highway gully

2.2.5 The drainage under The Street is therefore assumed to be a highway drain\culverted watercourse following the line of the road.

2.2.6 As part of the walkover the assumed line of this drain was followed, and a large quantity of fast flowing water could be heard within the gullies indicating a continuation in the flow. Ditches\watercourses on the eastern side of The Street by Walnut Tree Farm to the south were also identified which are not indicated on mapping and again these clearly flow to gullies and to the below ground drainage:

Figure 2.2 –Watercourse\ditch discharging to gully by Walnut Tree Farm

2.2.7 This line was then followed further south along The Street and the suspected outfall by the junction of The Street, Upper Strode and Lower Strode where the unnamed upper reach of Babylon Brook runs parallel to Lower Strode:

Figure 2.3 –Outfall to unnamed watercourse to the south by Lower Strode

2.2.8 Therefore, the assumed route of the watercourse and locations of the features noted above are shown on the figure below:

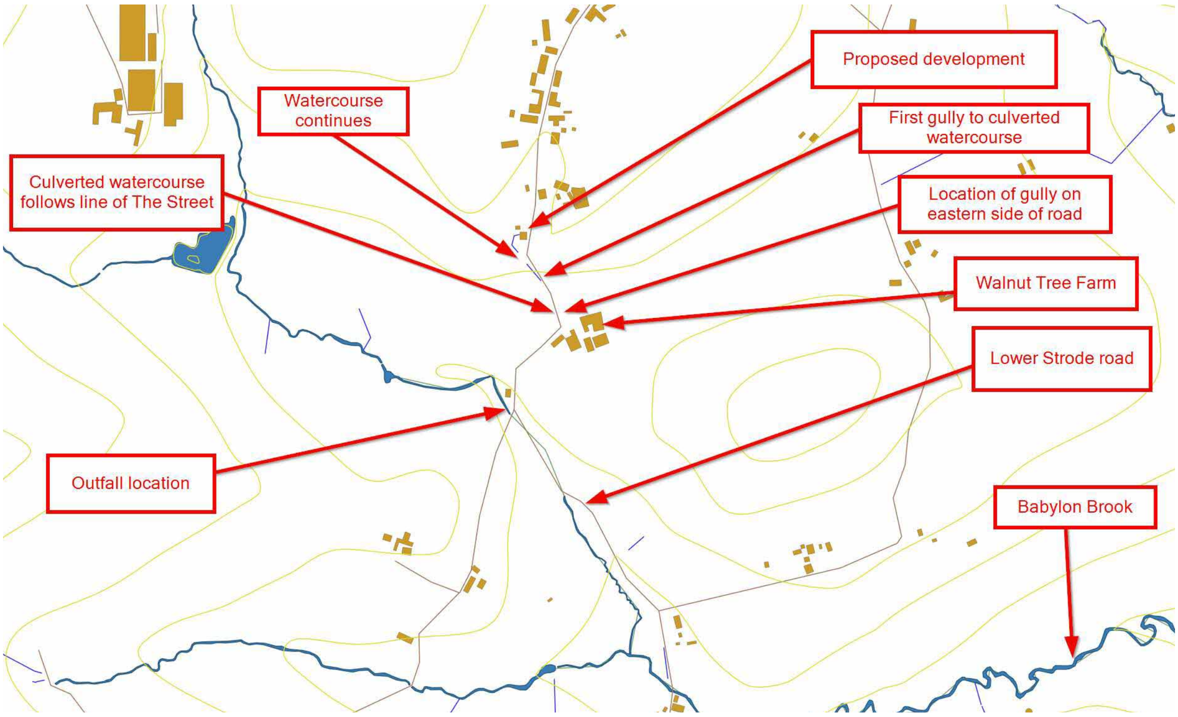

Figure 2.4 –Location of features and route of watercourse

2.3 Existing Private Drainage

2.3.1 A topographical survey identified some of the drainage features at surface level, and the site walkover has identified additional information and it is shown on the existing drainage layout drawing in Appendix B.

2.3.2 This indicates that there is a private foul run to the west of the existing dwelling which runs to a private treatment system. The type of treatment system is unknown but appears to be a septic tank, with no outfall could be identified as part of the survey.

2.3.3 The surface water connectivity could not be confirmed as part of the site walkover, but some of the RWPs discharge directly to the ground and it is assumed that the runoff would be direct to the watercourse.

2.4 Public Sewers

2.4.1 Wessex Water mapping has been checked for the site but there are no foul, surface water or combined sewers in the local area.

3 Development and Flood Risk

3.1 Proposed Development Vulnerability Classification

3.1.1 The proposals include the demolition of the existing dwelling and garage and the construction of a new dwelling and annex. From Table 2 of the PPG buildings used for dwelling houses have a vulnerability classification of More Vulnerable.

3.2 Flood Zone Classification

3.2.1 The Gov.uk website provides basic flood mapping data to determine the Flood Zoning classification for the proposed development.

3.2.2 This planning mapping indicates that the site is entirely located within an area classified as Flood Zone 1, with the nearest Flood Zones associated with the Babylon Brook to the south around Lower Strode.

3.2.3 Given the relative levels between the site and Lower Strode flooding is unlikely to affect the site.

3.3 Fluvial Flooding

3.3.1 The Gov.uk website provides basic flood risk mapping data to determine the flood risk classification for the proposed development.

3.3.2 This mapping mirrors the Flood Zone mapping for the proposed development being only associated with the Babylon Brook to the south.

3.3.3 There is a watercourse within the development and one running along the western boundary. The western boundary appears to be an intercept for runoff from the adjacent fields but would therefore not have a significant greenfield runoff flow due to the small catchment, and the flow is effectively directed to the formalised watercourse avoiding the existing and proposed development.

3.3.4 The main watercourse flow is from a spring into the main channel and therefore the flows are not likely to be flashy in response to rainfall events. Where there is a large flow the channel is relatively large and several metres below the existing and proposed levels, and therefore unlikely to create a flood risk issue.

3.3.5 Fluvial flooding to the development is considered to be low.

3.4 Coastal/Tidal Flooding

3.4.1 Given the inland location of the site tidal flooding to the development is considered to be negligible.

3.5 Flood Defences

3.5.1 There are no flood defences serving the development.

3.6 Flooding from Climate Change

3.6.1 There is no climate change information available with the mapping information above, however as noted the relative levels means the effects of climate change will not increase the flood risk sufficiently to affect the proposed development.

3.6.2 Climate change will be taken in to account for the proposed development as detailed in section 6 below.

3.7 Flooding from Groundwater

3.7.1 There is a spring within the development site and several noted in the local area, however, these all seem to freely flow into local watercourses. Given the relative levels between the emergence of the spring on site and the proposed FFLs it would seem unlikely that groundwater could build up sufficiently to affect the proposed development.

3.7.2 Flood risk from groundwater is considered to be low.

3.8 Flooding from Adopted Sewers

3.8.1 As there are no adopted sewers in the local area there is no flood risk.

3.9 Flooding from Private Drainage

3.9.1 The proposed development will replace the existing buildings but retain the access vehicular hardstanding. The proposed development will also include a SuDs scheme to manage flows up to the 1 in 100 year plus climate change event and therefore flooding from private drainage will be low.

3.9.2 There are no adjacent properties where other private networks would affect the site. Localised flooding within the village would follow the overland flow route along The Street.

3.10 Flooding from Surface Water

3.10.1 Surface water flood maps are available on the Gov.uk website. This mapping mirrors the Flood Zone mapping for the proposed development being only associated with the Babylon Brook to the south but extending further up the reach of the watercourse to the north west.

3.10.2 There are other main local drainage routes running east from the north of Regil and further to the east. Locally there is a very small area of low risk noted along The Street which is the local valley in the area from the OS contouring information.

3.10.3 Based on the above the flood risk from surface water is considered to be low.

3.11 Flooding from Reservoirs, Canals and Artificial Sources

3.11.1 There are no canals within the vicinity of the site that could present a risk to the site.

3.11.2 The Environment Agency Flood Risk from Reservoirs Map indicates that the site is not at risk of flooding from reservoirs.

3.11.3 Because of the above flooding from reservoirs or canals is deemed to be low.

3.12 Overall Flood Risk

3.12.1 As noted in the previous sections the flood risk to the proposed development is considered to be low from all sources and therefore is suitable for the type of development proposed.

3.13 The Sequential Test

3.13.1 The aim of the Sequential Test is to guide development away from areas at risk of flooding towards land situated within the Environment Agency's Flood Zone 1 classification.

3.13.2 As the site is wholly within Flood Zone 1 the Sequential Test is not required.

3.14 The Exception Test

3.14.1 The flood risk from all sources has been considered above as low from all sources and therefore the Exception Test is not required.

4 Site Constraints

4.1 Background

4.1.1 The following is an assessment of the potential constraints to the proposed development which may have an effect on the design proposals. This assessment is based on the information which is available at the time of writing and additional constraints may become apparent through the design process.

4.2 Flood Risk

4.2.1 Section 3 assessed flood risk from all sources and noted them to be low. This is reliant on maintaining the existing watercourse routes through the proposed development.

4.3 Watercourses

4.3.1 The watercourses are to be retained in their existing condition as part of the development proposals to not adversely affect the local habitat. As such no outfalls should be made directly into the watercourse but localised mini-swales can be included which directs any outfalls without directly interfering with the existing banks.

4.4 Adjacent Development

4.4.1 At the time of writing no adjacent proposed development has been identified which needs to be taken into consideration with the proposed development.

4.5 Public Sewers

4.5.1 As there are no public sewers running through the site there are no constraints on the new development.

4.6 Geological Setting

4.6.1 Infiltration testing was not undertaken on site due to the presence of the spring which indicates a groundwater level which would be prohibitive to infiltration techniques with current design standards.

4.7 Additional Constraints

4.7.1 No additional constraints have been identified for the proposed development.

5 Existing Drainage

5.1 Existing Drainage

5.1.1 As noted above there is limited information on the existing surface water network but it is likely to be a series of direct outfalls to the watercourse.

5.2 Greenfield Runoff Rates

5.2.1 The equivalent Greenfield runoff rates the site have been determined using the FEH methodology for the existing impermeable area of 460m^2. The greenfield discharge rates are as follows:

Return Period	Discharge Unit Rate (l\s)
2	0.2
Qbar	0.3
30	0.5
100	0.6

5.3 Existing Discharge Rates

5.3.1 The existing discharge rate has been determined through assessment of the potential catchment generation using the Rational Method as detailed in the SuDs Manual. This is because the existing pipework is unlikely to be the limiting factor on flows given the multiple outlets over a small area.

5.3.2 Using the FEH point data to generate rainfall characteristic of the site the average 1 in 100 year 15min rainfall is 91.3mm/hr. This is likely to be the critical storm duration for the site given the small size of the catchment with a time of concentration less than 15mins, but this being the shortest duration produced by calculation methods. Based on the existing impermeable area of 460m^2 this gives a peak runoff rate of 11.7 l/s.

5.4 Foul Drainage

5.4.1 The existing foul network has been determined by the topographical survey and site walkover. This identified a single main foul run to the west of the existing dwelling running under the wing to the west. This flows to a treatment unit, which is likely a septic tank, with an unconfirmed outfall. The layout is included on the layout within

Appendix A.

6 Proposed Surface Water Drainage

6.1 Discharge Locations

6.1.1 The hierarchy of discharge receptors gives the following order of priority with the next level only permissible for use where the above receptors cannot be achieved by reasonably practicable means:

- An adequate soakaway or some other adequate infiltration system,
- A watercourse,
- A surface water sewer,
- A combined sewer.

6.1.2 Infiltration testing has not been undertaken due to the presence of springs on site which indicates a raised groundwater table which would preclude the use of soakaways. The main hardstanding is the vehicular entrance and this is being retained from the existing case and therefore would not be environmentally friendly, or proportional, to replace with permeable hardstanding.

6.1.3 The second receptor is a watercourse and as there is an existing running through the development this should be the receptor of the flows.

6.2 Discharge Rate

6.2.1 Based on the discussion in section 5 the existing discharge rate for the 1 in 100 year event is 11.7 l/s, and therefore in accordance with best practice the proposed SuDs will provide a 50% betterment and therefore 5.9l/s. With a climate change allowance of 45% on the 1 in 100 year event, and 40% on the 1 in 30 year event in accordance with the Avon Bristol and North Somerset Streams Management Catchment peak rainfall allowances.

6.3 Attenuation

6.3.1 An appraisal of the attenuation options for the site has been developed with the design team. Due to the constraints of not wanting to include any works within the existing watercourse to protect the habitat this limits options available for the provision of attenuation. Therefore, the main attenuation will be formed via a geocellular attenuation tank under the footprint of the existing garage to minimise earthworks. This will be connected by a filter drain through the centre of the tank to provide water quality.

6.3.2 A water butt has also been included on the annex building for plant and garden watering.

6.4 Proposed Surface Water Network

6.4.1 Based on the above assessment the site will discharge at 5.9 l/s for all events up to and including the 1 in 100 year +CC event across the range of durations.

6.4.2 The new dwelling will drain to the north to the location of the existing garage as the proposed attenuation location. The attenuation tank and filter drain will then feed into a proprietary orifice plate flow control with an internal leaf filter to reduce the risk of blockage. This will then outfall to a mini-swale, due to the steep drop in levels, and outfall overland to the watercourse so that no works need to be undertaken within the bank.

6.4.3 The proposed drainage strategy is shown on drawings in Appendix C along with the drainage details for the development, with corresponding hydraulic calculations in Appendix D.

6.5 Exceedance

6.5.1 The proposed site levels follow the same general levels as the existing site, this is a bowl shape with the hardstanding and proposed buildings falling towards the watercourse. Any exceedance of the drainage network would also overland flow towards the watercourse away from people and property.

6.6 Operations and Maintenance

6.6.1 A draft Operations and Maintenance Manual (O&M) has been included below. This is to be used as a template as it will need to be developed through the detailed design stage and can only be finalised after construction to accurately reflect the as-built conditions and the supplier specific details from proprietary systems:

Action	Frequency	Responsibility
As Built. Once construction of drainage network has been completed a CCTV survey should be undertaken to detect and defects which should be rectified to the original design.	Once	Main contractor
Pipe and chambers. Visual inspection of chambers, and clearance of any deleterious materials. Inspection of inlet and outlet. If any blockages are detected an inspection of the connecting pipework should be undertaken to determine potential causes.	Annually (or directly following an extreme storm event) Remedial action	Homeowner.
Flow Control (orifice). Visual inspection of the chamber. Check operation and condition of by-pass\filter. Cleansing of sump and removal of silt to be undertaken as required.	Quarterly (or directly following an extreme storm event)	Homeowner.

7 Proposed Foul Water Drainage

7.1 Discharge Locations

7.1.1 As there are no public foul sewers in the local area an alternative outfall is required. The foul outfall discharge hierarchy is as follows:

- A public sewer; or, where not reasonably practicable,
- A private sewer communicating with a public sewer; or, where that is not reasonably practicable,
- Either a septic tank which has an appropriate form of secondary treatment or another wastewater treatment system; or, where not reasonably practicable,
- A cesspool.

7.1.2 Therefore, as the first two options are not available the third outfall via a treatment system will be used. As there is a watercourse on site this will be the form of a Package Treatment Plant (PTP).

7.1.3 The daily volume base on British Water Flows and Loads 4 based on a four bedroom property is 900 l, and therefore falls below the upper threshold for General Binding Rules under the Environmental Permitting Regulations and as such no formal applications are required but these rules will be followed in perpetuity by the development.

7.1.4 As with the strategy for the storm outfall with the desire to not undertake any works within the banks of the watercourse and therefore the outlet will be via a mini-swale directing the flow to the existing watercourse.

8 Summary & Conclusion

8.1 Summary

8.1.1 The report has assessed the potential constraints to the site, including flood risk from all sources. This identified that flood risk from all sources is low. The only constraint to the development was to not include any works within the extents of the watercourse to protect the existing habitat.

8.1.2 The existing surface water runoff rate has been calculated as 11.7l/s for the 1 in 100 year event and therefore the proposed discharge rate provides a 50% betterment over this to 5.9 l/s for the 1 in 100 year plus climate change event.

8.1.3 As no works are to be undertaken within the watercourse and the existing vehicular access is to be retained the attenuation will be in the form of an attenuation tank under the footprint of the existing garage. The flow control will be in the form of an orifice plate with a leaf filter to mitigate the risk of blockage.

8.1.4 The outfall will be via a mini-swale outside of the banks of the watercourse but directing the flow to it.

8.1.5 A water butt will also be included on the annex building for plant and garden watering.

8.1.6 As there are no public foul sewers in the local area the foul will flow to a Package Treatment Plant (PTP) with an outfall to the watercourse again via mini-swale to avoid any direct works within the watercourse.

8.2 Conclusion

8.2.1 Based on the low risk of flooding from all sources, the provision of a SuDs network to manage surface water in accordance with best practice and a viable foul outfall where there are no public sewers the development is suitable for the location.

Appendix A

Topographical Survey

Appendix B

Existing Drainage Layout

Appendix C

Drawings

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Appendix D

Causeway Flow Hydraulic Modelling

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