TECHNICAL NOTE: FLOOD RISK ASSESSMENT & DRAINAGE PHILOSOPHY

Bingham Hall Partnership Limited has been commissioned by Portabella to undertake the Civil and Structural Engineering aspects of the proposed housing development at Bonvilston. An initial activity of the commission is to prepare a flood risk and drainage assessment for the proposed development in support of the Planning Application.

This technical note has been prepared by Bingham Hall Partnership Limited in advance of the Planning Application; the overall intent being to relay the research and design process undertaken to date, together with the design intent for the proposed foul and surface water drainage systems serving the proposed development.

SITE LOCATION

The proposed housing scheme is in the heart of Bonvilston, a plot of land that is largely greenfield, the exception being a residential building located towards the south of the development site, see Figure 1 below; the site boundary is edged in red. The site is bounded by A48 highway to the south running along the front of the site; existing housing lies to the west and northern boundaries; and The Red Lion public house is to the east of the site. The site area is approximately 8,950m^2 and can be found at National Grid Reference: ST 066740 (306603E;174063N).

Figure 1. Site Location Plan

PROPOSED DEVELOPMENT

The proposed housing development comprises of a total of nine plots; six larger plots that occupy the majority of the bounded site and three smaller plots towards the south end of the site. The development will be complete with a new access road off the A48 that runs along the western boundary of the site. See Figure 2 below for the proposed site plan.

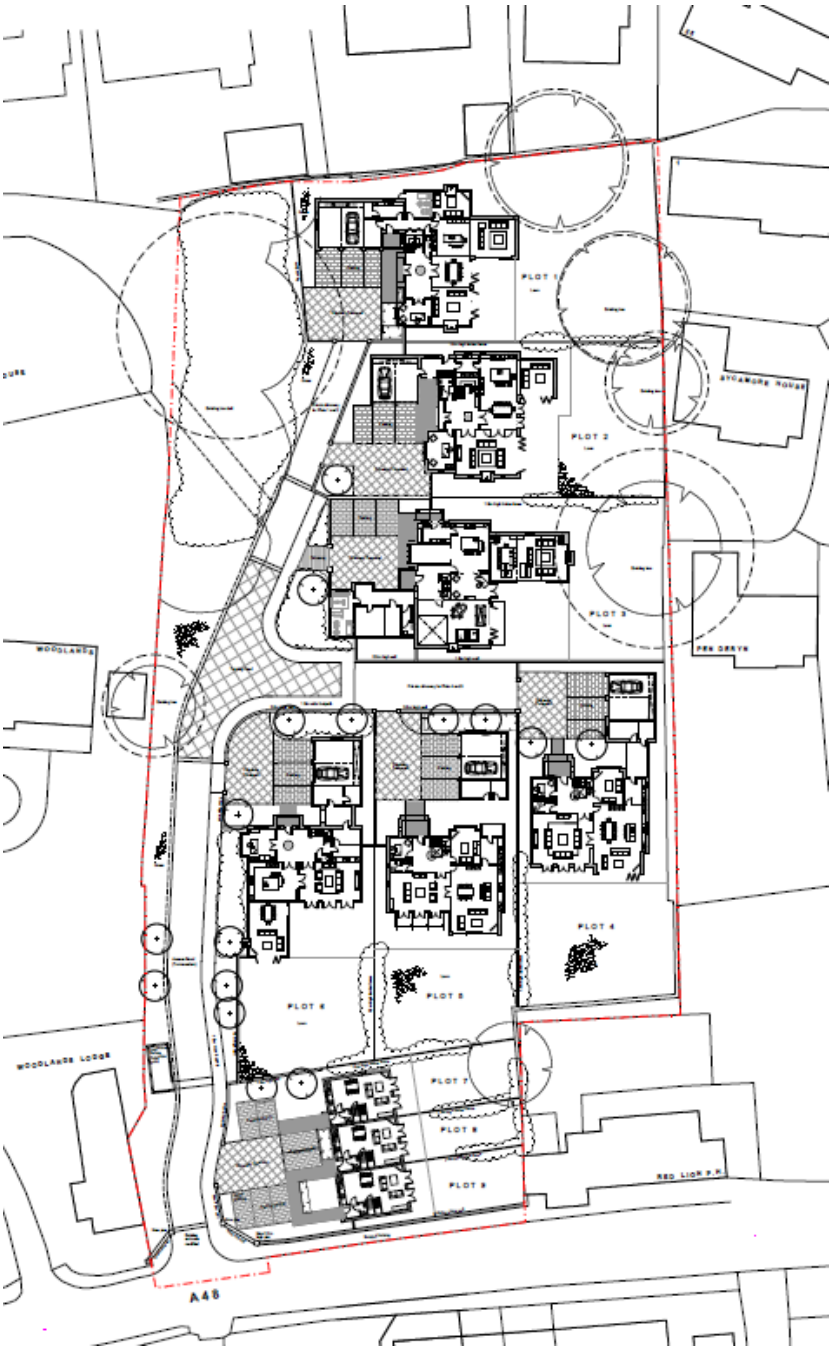

Figure 2. Proposed Site Plan

FLOOD RISK ASSESSMENT

Technical Advice Note 15 provides technical guidance which supplements the policy set out in Planning Policy Wales in relation to development and flood risk, providing a framework within which the risks arising from river, coastal and surface water flooding are considered. In line with TAN15, this section of the report includes a brief review of flooding from rivers & sea; surface water runoff; overwhelmed sewers and drainage systems, and flooding from reservoirs, canals, lakes and other artificial sources.

Bingham Hall Partnership Limited has consulted the website of Natural Resources Wales. The Development Advice Map (DAM) on the website is based on Natural Resource Wales' extreme flood outlines (Zone C) and the British Geological Survey drift data (Zone B). The Zone B data was originally published in 2004, and updated in 2017, whilst the Zone C data is revised quarterly. An extract of the DAM is presented in Figure 3 below and indicates that the subject site is located entirely within what is referred to as 'Zone A' on the development advice map and TAN 15. TAN 15 describes Zone A as "Considered to be at little or no risk of fluvial or tidal/coastal flooding". The TAN defines the use of an 'A' zone within the precautionary framework as "Used to indicate that justification test is not applicable and no need to consider flood risk further". The map also indicates there is little or no risk of flooding from other sources such as reservoirs, sea or any other sources of surface water overland flows.

Consequently, the proposed development is not considered to be at risk of flooding.

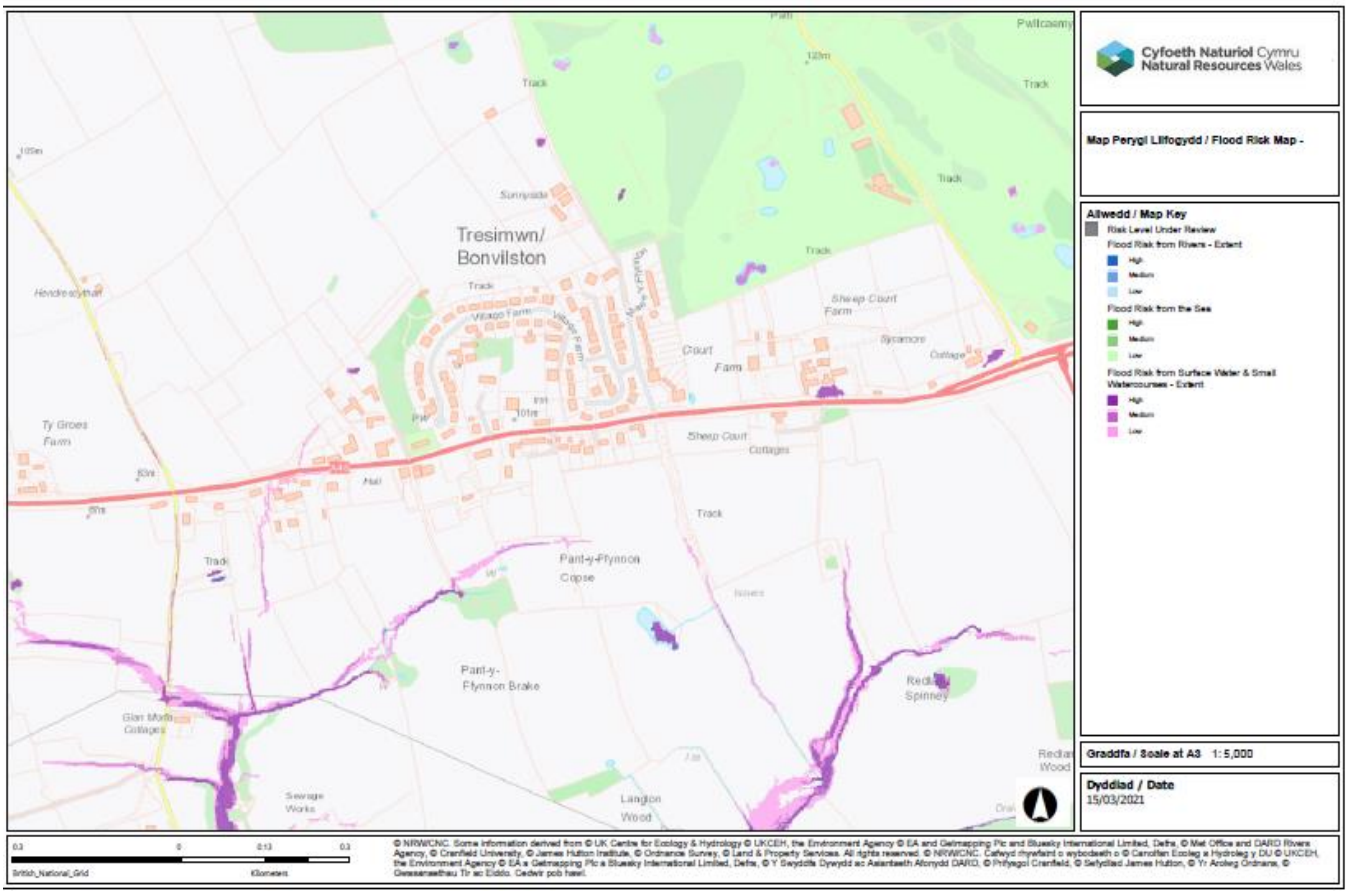

Figure 3. Extract of NRW Development Advice Map

EXISTING DRAINAGE

Figure 4 below gives an extract of DC/WW's adopted sewer plan showing sewers local to the development area (indicated by the blue boundary line). The extract indicates an existing combined water sewer along the south boundary of the site serving the existing house, which is intended to be demolished as part of this proposed development and the Red Lion public house.

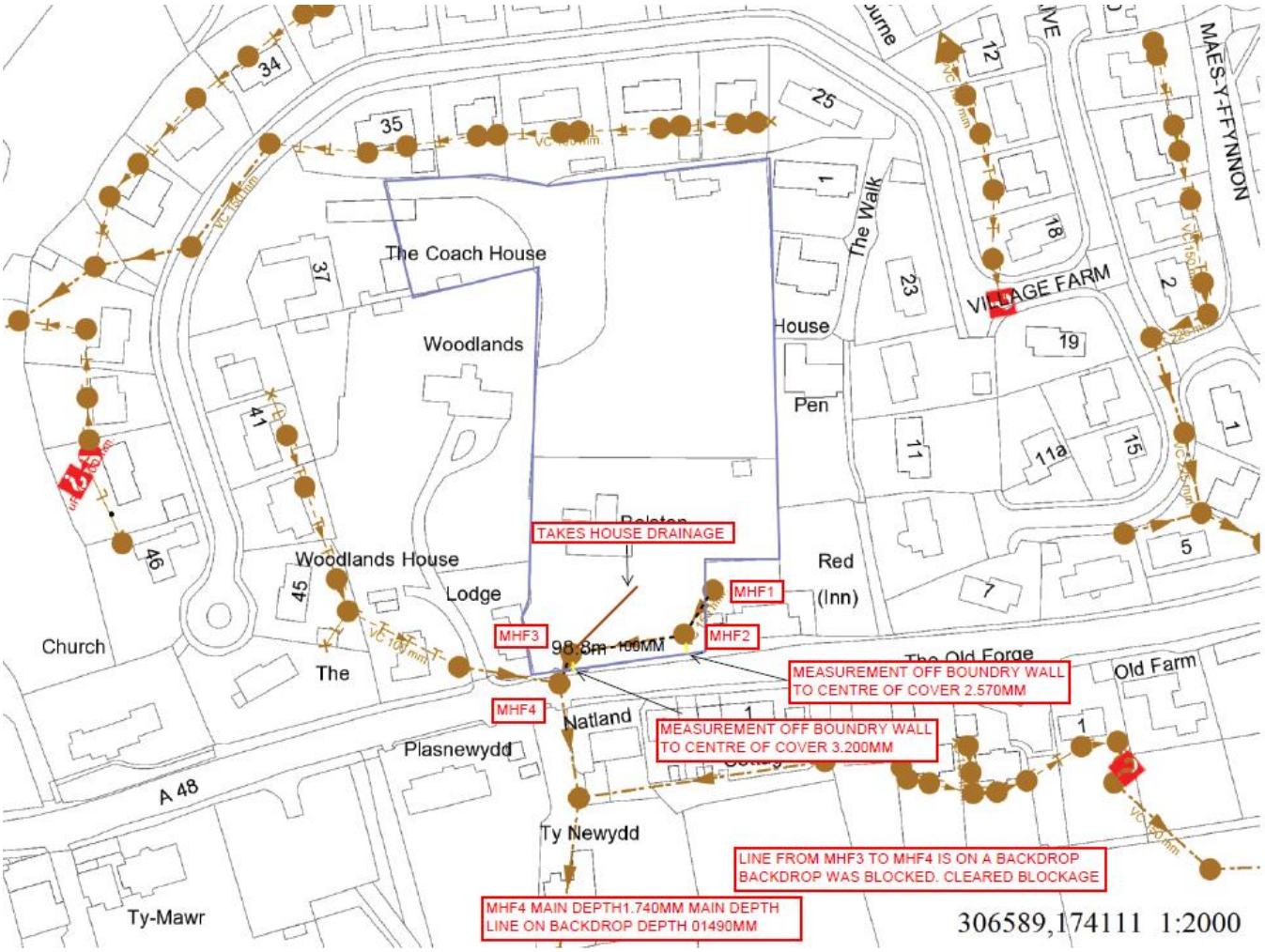

Figure 4. Extract of DCWW's Adopted Sewers

INITIAL FOUL WATER DRAIANGE ASSESSMENT

Given the largely greenfield nature of the site and the lack of existing infrastructure, a new foul water network will be required to serve the development. Foul water flows will be collected via traditional below ground pipework and directed under gravity towards the south of the site where it will connect to DC/WW's adopted combined sewer.

INITIAL SURFACE WATER DRAINAGE ASSESSMENT

The proposed surface water drainage design will consider the sequential approach as defined by the National Planning Policy Framework (NPPF), the Sustainable Urban Drainage Manual and Part H of Building Regulations.

From 7th January 2019, all new developments of more than 1no. dwelling house or where the construction area is 100m^2 or more, will require Sustainable Drainage Systems (SuDS) for surface water. From this date, SuDS on new developments must be designed and built, in accordance with the Statutory SuDS Standards published by Welsh Ministers and SuDS schemes must be approved by the local authority acting in its SuDS Approving Body (SAB) role, prior to construction work being undertaken. The principles which underpin the design of surface water management schemes to meet the Standards are as follows:

SuDS schemes should aim to address the following:

- Manage water on or close to the surface and as close to the source of the runoff as possible,
- Treat rainfall as a valuable natural resource,
- Ensure pollution is prevented at source, rather than relying on the drainage system to treat or intercept it,
- Manage rainfall to help protect people from increased flood risk, and the environment from morphological and associated ecological damage resulting from changes in flow rates, patterns and sediment movement caused by the development,
- Take account of likely future pressures on flood risk, the environment and water resources such as climate change and urban creep,
- Use the SuDS Management Train, using drainage components in series across a site to achieve a robust surface water management system (rather than using a single “end of pipe” feature, such as a pond, to serve the whole development)
- Maximise the delivery of benefits for amenity and biodiversity,
- Seek to make the best use of available land through multifunctional usage of public spaces and the public realm,
- Perform safely, reliably and effectively over the design life of the development considering the need for reasonable levels of maintenance,
- Avoid the need for pumping where possible,
- Be affordable, considering both construction and long-term maintenance costs and the additional environmental and social benefits afforded by the system.

There are six mandatory standards to be achieved within the National SuDS standards, S1 to S6. The following section has considered the Standard S1 only, specifically, the various priority levels considered for discharge of surface water.

The Statutory Standards for Sustainable Drainage Systems published by the Welsh Government sets out five priority levels regarding the destination of runoff from sites; see Table below:

Table 1. Priority Levels Considered for Surface Water Runoff Destination

Priority Level and Definition	Assessment
Priority Level 1: Collected for use	There is no foreseeable significant demand for non-potable water for this development and therefore the use of rainwater harvesting is not a viable/cost effective solution. It is however recognised a requirement of the Welsh Statutory National Standards for Sustainable Drainage Systems that as far as possible there will be no discharge from the site for the majority of rainfall events of less than 5mm. For this development it is proposed for individual plots to use either unlined or lined permeable block paved areas, rain gardens and swales. It is proposed to plant the raingardens/swales with primary native species shrub planting which will assist with storm water management through absorption and transpiration. The use of rainwater butts would also be promoted for garden irrigation use.
Priority Level 2: Infiltrated to ground	The initial site investigation report indicates the site is underlain by made ground/clayey deposits and limestone bedrock with the possibility of solution holes or cavitation being present within the limestone. Given the ground conditions are unlikely to be suitable for the use of infiltration techniques, and also as there is a risk of limestone cavitation possibly being present beneath the site, the use of soakaways or any other form of point source infiltration may not be appropriate for use on this site. Further intrusive site investigation work is proposed to examine the ground conditions in more detail which will also include additional infiltration tests. In addition, it is intended to undertake several boreholes and a ground geophysical survey to determine whether cavitation/solution features are present within the limestone bedrock.
Priority Level 3: Discharged to a surface water body	There are no watercourses on or close to the site area.
Priority Level 4: Discharged to surface water sewer.	There are no surface water sewers on or local to the site area.
Priority Level 5: Discharged to a combined sewer	There is an adopted combined sewer crossing the front part of site to which all new foul water flows from the housing will be directed. Depending on whether infiltration is possible on the site it may be necessary to discharge surface water arising from the site to this sewer but with flows being controlled to an agreed rate or the current greenfield run off rate; final rates to be discussed and agreed with asset owner DC/WW & the local authorities SuDS Approving Body.

CONCLUSIONS AND FURTHER WORK

Reference has been made to NRW's flood risk maps for the development site and has been found to lie within 'Zone A'. In line with the guidance stipulated in TAN 15; Zone A is considered to be at little or no risk of fluvial or tidal / coastal flooding and therefore does not have to be considered further.

The philosophy underpinning the management of the foul water flows for the development is to discharge all developed foul water flows from the proposed development via below ground, gravity sewers. The new network will make connection to an existing, on-site, adopted manhole that would have been known as the demarcation chamber for the existing house occupying the site. Given the new development involves the construction of a number of plots, the proposed foul water drainage network will be subject to an adoption agreement with asset owner DC/WW.

The philosophy underpinning the management of surface water runoff for the development will be subject to discussions with the local authorities SuDS Approving Body (SAB) upon receipt of further and more conclusive site information: namely the intrusive site investigation. Based on the anticipated limestone cavitation below the site, and the lack of demand for non-potable water; discharge of surface water to DCWW's combined sewer is currently deemed the most appropriate form of discharge. In line with current practice and in accordance with the SUDS manual and CIRIA document C753; the discharge of surface water runoff is anticipated to be restricted to its greenfield runoff rate for its respective drained area; additionally, to comply with the six National SuDS Standards; SuDS features will need to be incorporated upstream; extent of which to be discussed with the Vale of Glamorgan's County Borough Council's SuDS Approving Body.