

# RE: Proposed Erection of a Single Dwelling on Land North of 102 Truro Road, St. Austell Critical Drainage Area - Flood Risk Assessment

## Introduction

The proposal is to construct a single dwelling on Land North of 102 Truro Road, St. Austell. As part of the planning process it has become apparent that the site is in the St. Austell Critical Drainage Area. As such further consideration is required for the disposal of surface water from the development.

Paragraph 103 of the National Planning Policy Framework (NPPF) 2012 states that a Flood Risk Assessment (FRA) is required where a development is located within a Critical Drainage Area.

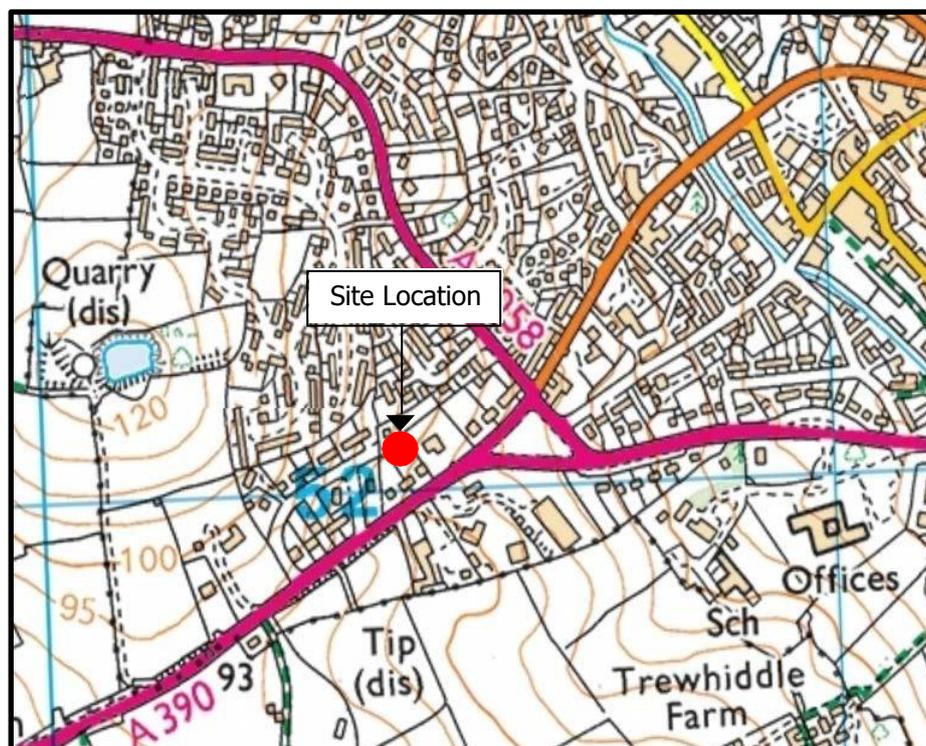
An initial inspection of the Environment Agency indicative flood map shows the site is located within Flood Zone 1 and therefore at low risk from fluvial or tidal flooding. Subsequently, the primary aim of this report is to ensure that the development of the site does not increase flood risk elsewhere. This can be achieved by providing a suitable sustainable drainage scheme that manages surface water runoff created by the development.

This report comprises the FRA for the proposed development, in line with the National Planning Policy Framework (NPPF), Planning Practice Guidance (PPG) and Drainage Guidance for Cornwall (DGfC).

## Site Description

The site currently comprises of a double garage, additional hard standing parking area with hard standing access and an unused area of garden at the rear of 102 Truro Road. The approximate Ordnance Survey Grid Reference for the site is SX 00545 52080. The proposal is to construct a single dwelling on the site with associated access and parking.

The EA indicative flood map (see Figure 2) shows the site is located within Flood Zone 1 (low probability). The Cornwall Strategic Flood Risk Assessment (SFRA) confirms that the site is located within a Critical Drainage Area. Consequently, this means that the drainage for any new building requires more detailed consideration.



**Figure 1. Site Location Plan**



**Figure 2. Environment Agency Indicative Flood Map**

## **Flood Risks**

### **Fluvial and Tidal Flooding**

The Environment Agency indicative flood map (Figure 2, above) shows that the site is in Flood Zone 1 (less than 1 in 1,000 annual probability of river or sea flooding) and not at risk from either fluvial or tidal flooding.

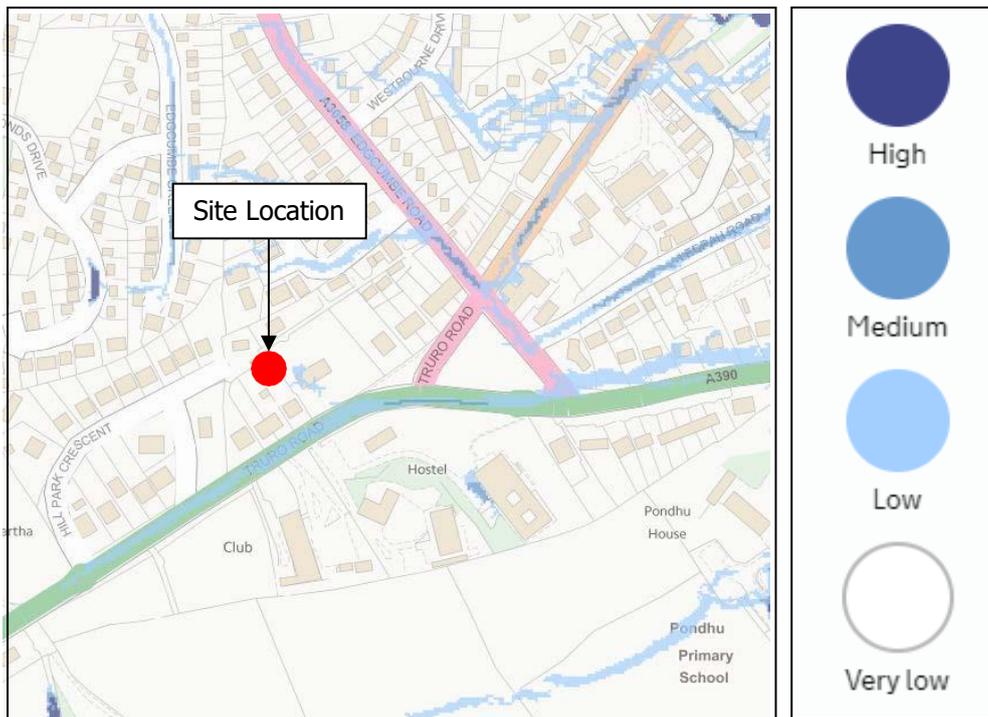
### **Groundwater Flooding**

Groundwater flooding is linked to the ability of the ground to hold water and presence of aquifers. It is considered that groundwater is not an issue on this site, furthermore the Cornwall Council Strategic Flood Risk Assessment (SFRA) highlights that the geology of Cornwall has only minor aquifers and generally does not experience much groundwater flooding. As such groundwater flooding is not considered any further in this report.

### **Overland/Surface Water Flow**

The site is situated within an existing residential area, with buildings and roads upstream of the site. It is anticipated that any overland flows generated upstream of the site would be intercepted by the road and drainage networks for the area and conveyed away from the site. As such it is considered that the site is not at risk of surface water flooding.

The Environment Agency map below shows the risk of flooding from surface water for the site. It indicates that the site is at a very low risk of surface water flooding.



**Figure 3. Environment Agency Risk of Surface Water Flooding Map**

### **Flooding as a Result of Development**

The garage, none permeable parking area and none permeable access to the garage and parking area already located on the development site covers an area of 148.21 m<sup>2</sup> and the planned single dwelling and hard standing parking area is intended to cover 162 m<sup>2</sup>, the additional 13.79 m<sup>2</sup> of paved area replacing land that is currently permeable has the potential to increase flood risk to properties down slope of the proposed development due to increased runoff. The design of the proposed surface water drainage system is key to mitigating these risks.

By designing the site's surface water drainage infrastructure in accordance with the advice reproduced below, the proposed development will not increase flood risk to third parties down slope and has potential to provide betterment.

### **Cornwall Council, DEFRA and Environment Agency Advice**

Advice on the drainage of developments located within Critical Drainage Areas is provided within Drainage Guidance for Cornwall (DGfC). This document is currently under review though advice appropriate to the proposed development considered within this report is reproduced below for ease of reference:

#### **"Critical Drainage Areas**

##### ***B 2-B 3 – Development of 1-3 dwellings***

- *Following the Building Regulations Drainage hierarchy, surface water should: -*
  - i. *Drain to a soakaway or infiltration system designed in accordance with the SuDs Manual - CIRIA C697, using a minimum of a 30-year return period storm.*

Where an FRA demonstrates that infiltration is not possible: -

- ii. *A sustainable drainage system should be provided discharging at a rate not exceeding 1.5 litres/second per dwelling, with attenuation provided up to the 30- year storm.*

*(Products exist that allow individual properties to restrict run-off to this rate, using private underground storage tanks. A discharge of 1.5 litres/second is typically achieved on the commercially available systems using a proprietary device on the outlet with an orifice of around 30mm. This is combined with a sediment trap and a filter to prevent blockage. Storage is provided on the property in an underground tank or crate system, operating with a maximum depth of water of approximately 500mm. The size of the tank will need to be based on the impermeable area draining to the system. It should be noted that due to the small orifice size these systems would remain in private ownership as they are unlikely to be adopted.)*

- *The design must take into account the appropriate allowance for increased rainfall from climate change, based on the lifetime of the development, the guidance in Annex B of PPS25 and the PPS25 Practice Guide. This is currently an increase in rainfall intensity of 30%.*
- *Safe and appropriate flow routes from blockage and exceedance of the drainage system must be evaluated. This must demonstrate no property flooding or increase in flood risk either offsite or to third parties."*

With regards to the guidance above, two drainage options are proposed below dependent on ground conditions.

### **Drainage Design – Infiltration System (Option 1)**

As per the guidance outlined above, the preferable drainage solution for the site would be to drain all surface water runoff from the development to a ground soakaway designed to a minimum 30-year return period storm. In this case a 100-year return period has been used with a 40% climate change allowance, based on experience of Cornwall Council requirements for other residential sites.

The Building Regulations Part H places several restrictions on the siting of soakaways which should be complied with. This includes that soakaways should not be sited within 5m of any building or road. They should also be sufficiently far from other soakaways and drainage fields so that the overall soakage capacity of the ground is not exceeded or the effectiveness of the units impaired.

To provide a detailed design for such an infiltration system, site investigation would be required to ascertain the percolation rates of the sub-soil. As the site investigation has not yet been carried out, an infiltration rate of 0.15m/hr has been assumed to produce an outline design of the soakaway system.

The development consists of a single dwelling and associated parking. The total footprint of the building and parking/drive area is 162m<sup>2</sup>. Runoff would originate from the rooftop area and parking/drive areas.

As such a single soakaway system has been sized, which would serve the total impermeable area. The suggested dimensions of the soakaway 3.2m (width) x 3.2m (length) x 1.32m (depth), respectively, based on Stormbloc® modular infiltration units with a 95% void ratio.

The soakaway is based on the worst-case design storm (100 year) with rainfall intensities increased by 40% to allow for the effects of climate change over the lifetime of the development.

A system of downpipes and gullies would convey surface water from the impermeable areas of the development into the soakaways. At this stage, the connections to the soakaway are indicative.

## **Drainage Design – Attenuation System (Option 2)**

If a soakaway drainage system is unfeasible say due to poor percolation test results, the development will need to be attenuated on site, and discharged to a suitable receptor at an appropriate rate in line with the requirements of DGfC.

There appear to be no watercourses near the site to allow a surface water discharge. According to South West Water Mapping, there is a combined sewer approximately 100m to the south east of the site, in Edgcumbe Road; there are no surface water sewers near the site. This sewer appears to be the most appropriate receptor for runoff, if soakaways are unfeasible.

The greenfield runoff rate for the development has been calculated, using the ICP SUDS method, to be 0.3 l/s based on a return period of 100 years. Drainage guidance for Cornwall says that the flow rate should be limited to 1.5 l/s per dwelling. Therefore, the flow rate has been limited to 1.5 l/s for each dwelling on this site.

Surface water originating from the impermeable areas of the development (roofs, parking) would drain via a positively piped drainage system towards a flow control device. The MicroDrainage Software has been used to size the storage required to facilitate a discharge limited to 3.0 l/s from the site. These calculations indicate a minimum tank size of 11.4m<sup>3</sup> to accommodate the worst-case design storm (100-year) with rainfall intensities increased by 40% to allow for the effects of climate change as required by Cornwall Council.

The minimum tank size could be achieved by using an attenuation tank with dimensions 3.2m (w) x 3.2m (l) x 1.32m (d), based on modular units with a 95% void ratio. If the upstream flow rate exceeds 3.0 l/s, the system will back up into the proposed attenuation tank.

## **Exceedance Events**

### **Infiltration System (Option 1)**

During any rainfall event in excess of the design storm described above, or should pipework or gullies become blocked, the system has potential to become surcharged. It is anticipated that surcharging of the system would result in the exceedance flows flowing overland and would run in a southeasterly direction away from the site and would be picked up by the highway system in Edgcumbe Road.

Due to the storage provided in the system the rate/volume of runoff from the site in an exceedance event would be less than would occur in the pre-development scenario.

### **Attenuation System (Option 2)**

During any rainfall event in excess of the design storm described above, or should pipework or gullies become blocked, the system has potential to become surcharged. Should this occur, flow would enter the overflow pipe incorporated into the system; as such no additional water would be seen at the surface.

## **Maintenance**

Management and maintenance responsibility for the surface water drainage system will fall to the site owner. Maintenance will include regular (recommended to be at six monthly intervals) inspection of the upstream silt trap serving the systems with removal and disposal of any silt or debris (e.g. leaves) that has accumulated in an appropriate manner.

## **Conclusions**

- The site is within the St. Austell Critical Drainage area and special consideration has been given to surface water drainage of the site. The proposed drainage infrastructure has been designed in accordance with guidance outlined in the DGfC.
- Two potential drainage options have been outlined to drain surface water from the development, depended on ground conditions.
- The potential surface water drainage layout will control the surface water runoff rate from the site and ensure it meets the drainage guidance for this area.
- The drainage systems will remain in private ownership and the property owner will be responsible for maintenance of the system. Maintenance will comprise periodic inspection of chambers and removal of silt and debris as necessary.
- Provided the recommendations outlined in this report are adopted in the development proposal then there is the capacity to manage the surface water runoff from the development onsite. With regard to the criteria outlined in the NPPF, PPG and DGfC, the development is appropriate on this site from a flood risk perspective.