

# Access Storage Reading Drainage Strategy

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## 1.0 Introduction

### 1.1 Project Background

Curtins has been appointed by Access Self Storage Ltd to prepare a Drainage Strategy to aid in discharging planning conditions for the proposed re-development of their site in Reading.

This report is based on current best practice guidance, referenced where relevant.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design, and are deemed a material derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

### 1.2 Proposed Development

The development site is situated on Portman Rd, Reading adjacent to the junction with the A329 Oxford Road, Reading.

The current proposal is for the re-development of the 2 storey building located at Portman Rd, Reading to extend the existing operational building by 2,000m<sup>2</sup>.



Figure 1. Site Location Plan

## 2.0 Flood Risk

Curtins have completed a Flood Risk Assessment report for the development to support the planning application. The FRA and local authority SFRA identified that the site location is in Flood Zone 1 as defined by the Environmental Agency's flood map (Figure 2), meaning that the annual probability of flooding from rivers or maritime sources is less than 0.1%. However, due to its close location to Flood Zone 2, the EA have been contacted to confirm flood risk level within the development. To date, no information has been received.

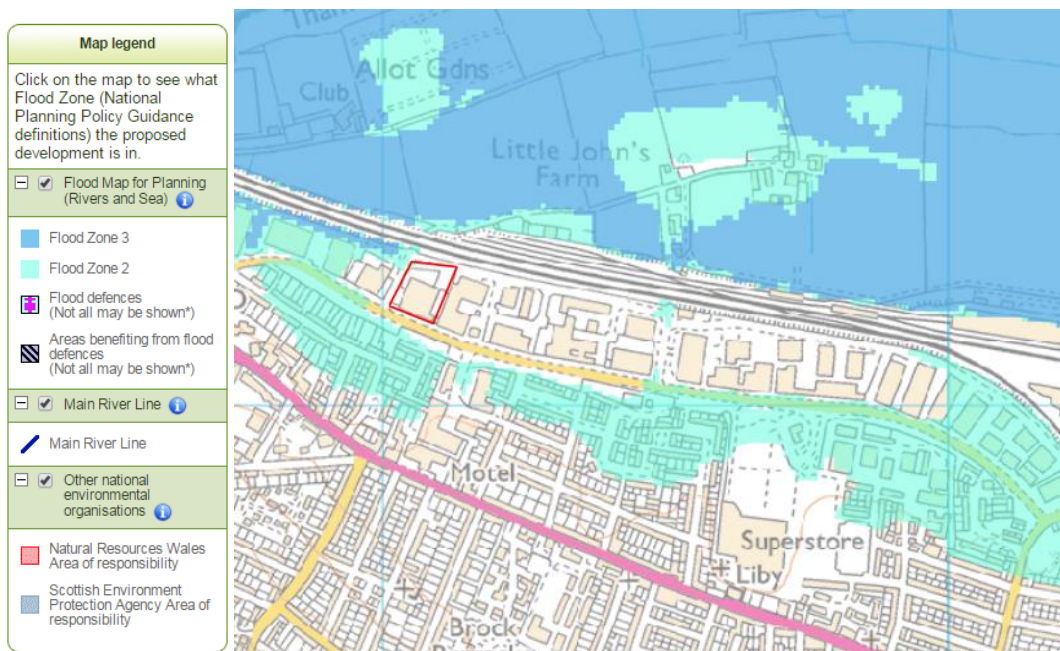


Figure 2. Environment Agency Flood Map

### 2.1 Reading Borough Council Flood Risk Assessment

Reading Borough Council Strategic Flood Risk Assessment (SFRA), produced by Jacobs in March 2009, where used as reference to produce the Flood Risk Assessment report.

The named Flood Risk Assessment and copies of Flood Zone Map and Historic Flood Map have been included in Appendix B of this report. The plans do not indicate any historical flooding problems at the development site and conclude there is a low risk of flooding to the site.

### 3.0 Existing Drainage

As the existing network is unknown, a CCTV survey is advised to confirm the extent of existing network and its condition before designs progress in order to validate design intents.

Sewer records are also to be obtained to confirm existing sewers. Connection consents will be required for discharge of surface water networks from relevant authorities.

## 4.0 Proposed Drainage Strategy

### 4.1 General

The development will utilise existing drainage network where possible and will have a separate surface and foul water system (See proposed drainage layout within Appendix A).

No survey of the on-site drainage is available at present therefore it is assumed that the whole of the site is drained to the north into the existing public sewer. As before, a CCTV survey is advised.

It is proposed that the drainage for the development will be designed to mimic the existing strategy as closely as possible using existing connections to the public sewers.

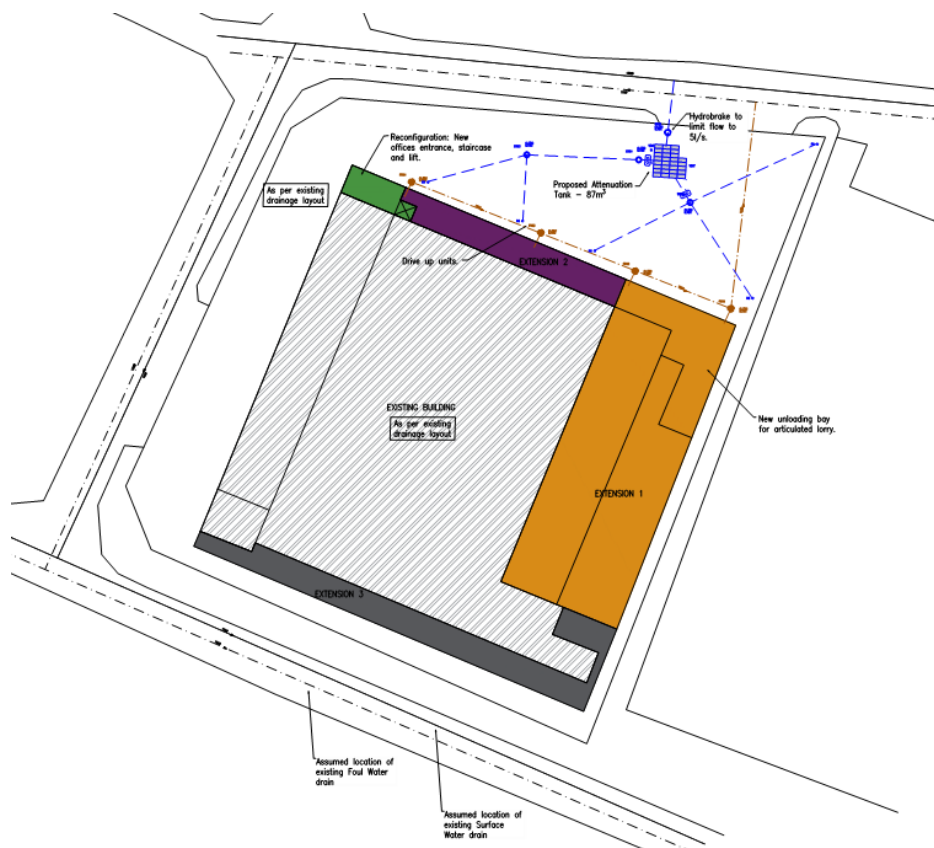


Figure 3. Proposed drainage network

## 4.2 Foul Water

It is intended that foul water will discharge by gravity to the public sewer. Whilst this is expected to be via the existing network, we have indicated an outfall to the north as shown on Figure 3 in absence of other information.

There is a potential for foul water flows into the public sewer network to increase as a result of the development, however, these will be negligible in comparison with existing discharge rates.

## 4.3 Surface Water

It is proposed to discharge surface water by gravity to the north of the site into existing network (Figure 3). As extents of the existing drainage network are currently unknown, this design is based on information available at present. Above ground designs should be managed in such a way as to achieve optimal connectivity into the storage network and volume set out within this report and strategy drawings.

In order to ensure that the surface water run-off from the site is properly managed, an assessment of the existing and proposed developments has been carried out. The final design of the surface water networks need to be in accordance with legislation set by the Environmental Agency and Thames Water. It is necessary to calculate the peak surface runoff rate for the existing arrangement and proposed development areas.

### Hydrological Characteristics of the site (approximate):

M5-60                      18.800

Rainfall Ratio    0.400                                              Post-Development Imp Area    0.2ha

### Proposed Site Peak Runoff Rate (Unrestricted):

Peak Runoff (Q) = 2.78 x Runoff Coefficient (C) x Rainfall Intensity (j) x Catchment Area (A)

$Q \text{ (l/s)} = 2.78 \times 1.0 \times 50 \text{ (mm/hr)} \times 0.2 \text{ (ha)}$

$Q = 27.8/\text{s}$

*\*Exact area TBC*

The proposed peak runoff rate will be reduced on-site with the SuDS solution proposed on Section 5.

In order to avoid low flows and ongoing maintenance issues, SW discharge rates for the development area should be set at 5l/s/hectare.

In line with CIRIA C753 The SuDS Manual, surface water runoff on to a site should endeavour to be controlled as close to the source as possible. In order to ensure that the surface water run-off from the site is properly managed, an assessment of the existing and proposed developments has been carried out within the Sustainable Drainage Strategy within Section 5 of this report.

---

## 5.0 Sustainable Drainage Strategy (SuDS)

### 5.1 Sustainable Drainage Strategy (SuDS) Hierarchy

Developments should utilise sustainable drainage systems (SuDS) unless there are practical reasons for not doing so. As mentioned previously, the design should aim to reduce run-off rates and ensure that run-off is managed as close to its source as possible as per the drainage hierarchy (see Figure 4).

The SuDS Hierarchy sets out the preferred method of discharging and managing water from a development site and aims to highlight why each item has been utilised or discounted.

The aim, where possible, is to deal with surface water at its source. This can be achieved through use of green/blue/brown roofs, rainwater harvesting systems and permeable surfaces etc. where runoff is managed as soon as it falls on the site.

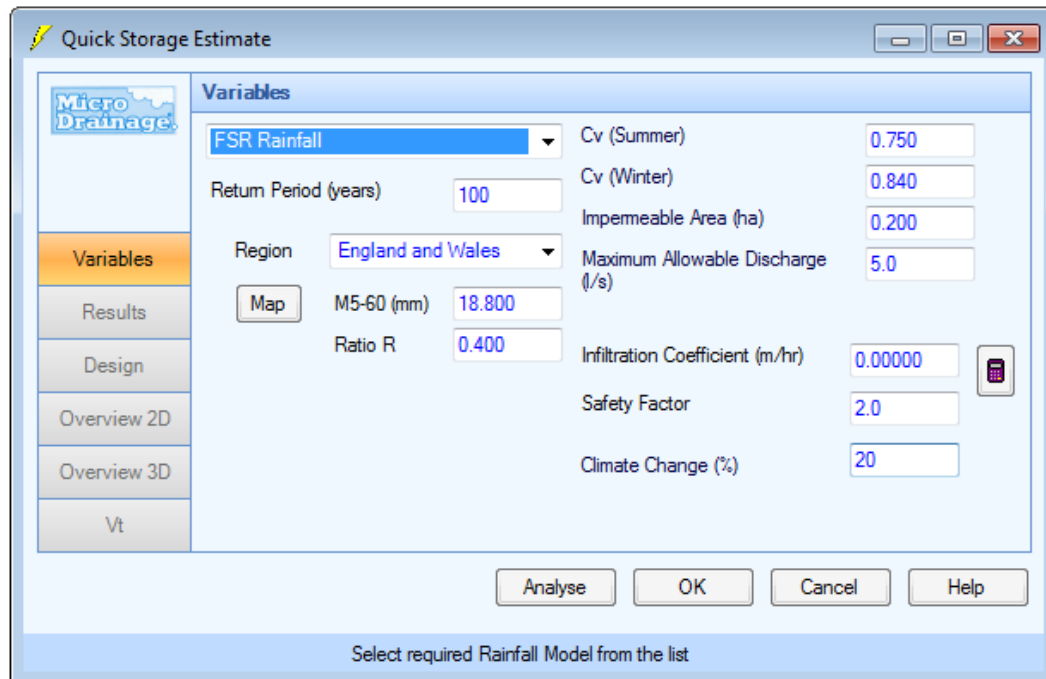
The table overleaf analyses the SuDS hierarchy and the appropriate techniques with specific focus on this project.

Figure 4: SuDS Hierarchy

| <b>SUDS<br/>Technique</b>                   |                                     | <b>Site Specific Analysis</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Most Sustainable → Least Sustainable</b> | <b>Living<br/>Roofs/Areas</b>       | An inclusion of green roofs should be reviewed by the design team.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                             | <b>Basins and<br/>Ponds</b>         | The absence of large open spaces available in this development means that basins and ponds are not possibilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                             | <b>Filter Strips<br/>and Swales</b> | Swales are not to be included within the drainage proposals, due to space limitations.<br><br>There is potential for the inclusion of filter strips in the surface water drainage strategy. Some of the landscape proposals may allow for the inclusion of filter strips at the base of the trees, aiding in water retention and managing discharge. Filter strips will also help restrict runoff close to the source which should, in turn, reduce overall attenuation requirements. However, landscape area is minimal and therefore this option is not included in the proposals at this stage. |
|                                             | <b>Infiltration<br/>Devices</b>     | The geology of Reading is characterized by river terrace deposits, including sands and gravels. An infiltration test is required to confirm the geology and infiltration rates of the site.                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                             | <b>Permeable<br/>Surfaces</b>       | Permeable surfaces allow rainwater to infiltrate through the surface and into the underlying structural layers. However, due to the necessary resurfacing works this option is not suitable.                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                             | <b>Tanked<br/>Systems</b>           | If the above techniques do not provide adequate storage to facilitate a 1 in 100 year (+climate change) storm event then below ground attenuation should be included within the drainage design to account for a reduction in flows.                                                                                                                                                                                                                                                                                                                                                               |

A quick storage calculation for the proposed development extension has determined that total storage requirements could vary between 59m<sup>3</sup> and 88m<sup>3</sup> for a 1 in 100 year storm

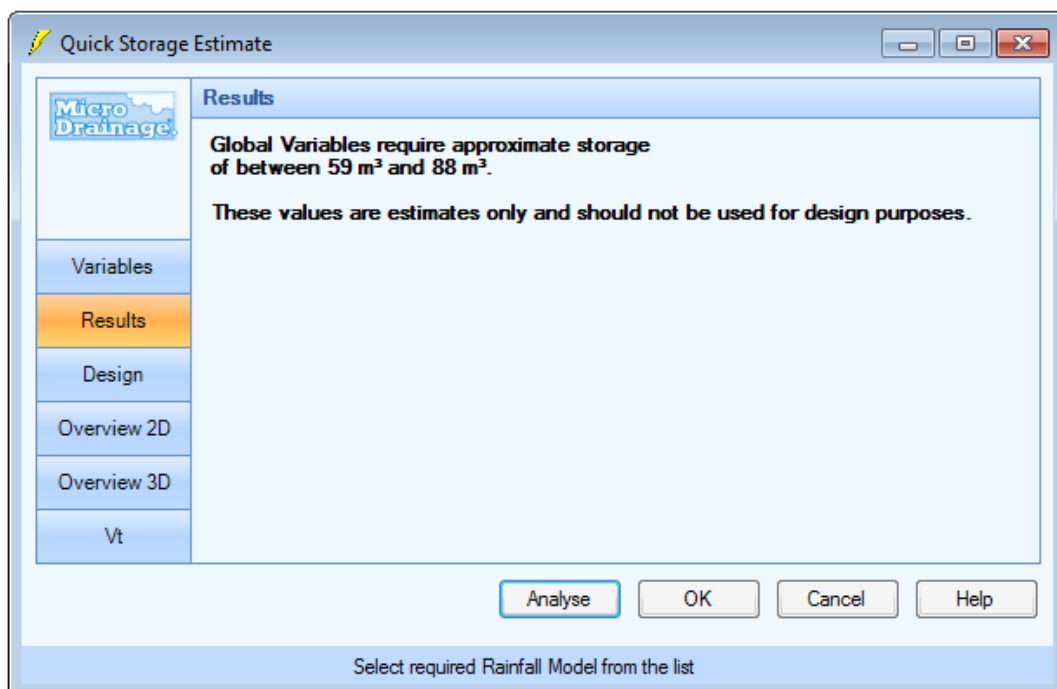
event plus 20% climate change in line with EA standing advice. Extracts from MicroDrainage can be seen below.



The screenshot shows the 'Variables' tab of the 'Quick Storage Estimate' window. The left sidebar contains buttons for 'Variables', 'Results', 'Design', 'Overview 2D', 'Overview 3D', and 'Vt'. The main area contains the following settings:

| Parameter                         | Value             |
|-----------------------------------|-------------------|
| Rainfall Model                    | FSR Rainfall      |
| Return Period (years)             | 100               |
| Region                            | England and Wales |
| Map                               | M5-60 (mm)        |
| Ratio R                           | 18.800            |
| Cv (Summer)                       | 0.750             |
| Cv (Winter)                       | 0.840             |
| Impervious Area (ha)              | 0.200             |
| Maximum Allowable Discharge (l/s) | 5.0               |
| Infiltration Coefficient (m/hr)   | 0.00000           |
| Safety Factor                     | 2.0               |
| Climate Change (%)                | 20                |

Buttons at the bottom: Analyse, OK, Cancel, Help. A footer note says 'Select required Rainfall Model from the list'.



The screenshot shows the 'Results' tab of the 'Quick Storage Estimate' window. The left sidebar contains buttons for 'Variables', 'Results', 'Design', 'Overview 2D', 'Overview 3D', and 'Vt'. The main area displays the following text:

**Global Variables require approximate storage of between 59 m<sup>3</sup> and 88 m<sup>3</sup>.**

**These values are estimates only and should not be used for design purposes.**

Buttons at the bottom: Analyse, OK, Cancel, Help. A footer note says 'Select required Rainfall Model from the list'.

Figure 5. MicroDrainage Quick Storage Analysis

Based on current architectural proposals and site restrictions, the main SuDS technique is a below ground attenuation tank located under the car, along Loverock Road.

An attenuation tank of 58m<sup>2</sup> and 1.5m depth will achieve a storage volume of 87m<sup>3</sup> – between the required storage volumes calculated previously. (Note that volume requirements are currently approximate and will be confirmed at detailed design stage).

Geocellular storage systems are modular plastic units with a high porosity (generally around 95%) that can be used to efficiently create a below-ground structure for the temporary storage of surface water before controlled release.

These systems can be designed for use under areas trafficked by HGV's and other heavy plant. Treatment to remove coarse sediment should be always be provided upstream of the tank.

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## 6.0 Site Restrictions/Additional Options

### 6.1 Green roof

Green roofs are areas of living vegetation, installed on top of buildings, for a range of reasons including visual benefit, ecological value, enhanced building performance and the reduction of surface water runoff.

They can absorb low intensity/volume rainfall without discharging surface water to the drainage system. During higher intensity rainfall, it also serves to delay the peak run-off which is advantageous during short duration, high intensity summer rainfall and will provide attenuation over longer duration events.

The inclusion of green roof will reduce the tank volume needed to achieve the attenuation storage requirements. This option should be reviewed by the design team.

### 6.2 Surrounding Sewers/Outfall Locations

Extents of existing drainage network is currently unknown, this design is based on information available at present.

Sewer records are to be obtained to confirm existing sewers. It is advised that CCTV survey will need to be undertaken to confirm proposed design intents and local connectivity.

---

## 7.0 Conclusion

This report is intended to provide further details on the design of the drainage systems for the proposed new residential building for Access Storage Ltd and to act as additional information in support of the sites planning application. The conclusions to be drawn from this report are as follows.

- Extents of existing drainage network is currently unknown, this design is based on information available at present. CCTV survey is recommended to confirm extent of existing network and condition before designs progress in order to validate design intents.
- Connection consents will be required for discharge of surface water networks from relevant authorities.
- Foul water will discharge by gravity to the existing foul water network. Above ground designs to suit.
- It is proposed to discharge surface water via gravity outfall to the north of the site into existing network.
- The surface water drainage system includes 87m<sup>3</sup> storage capacity unit to attenuate storm water, such that no flooding will be experienced from the drainage system for events up to return period of 100 years with 20% climate change allowance.

## Appendix A – Plans

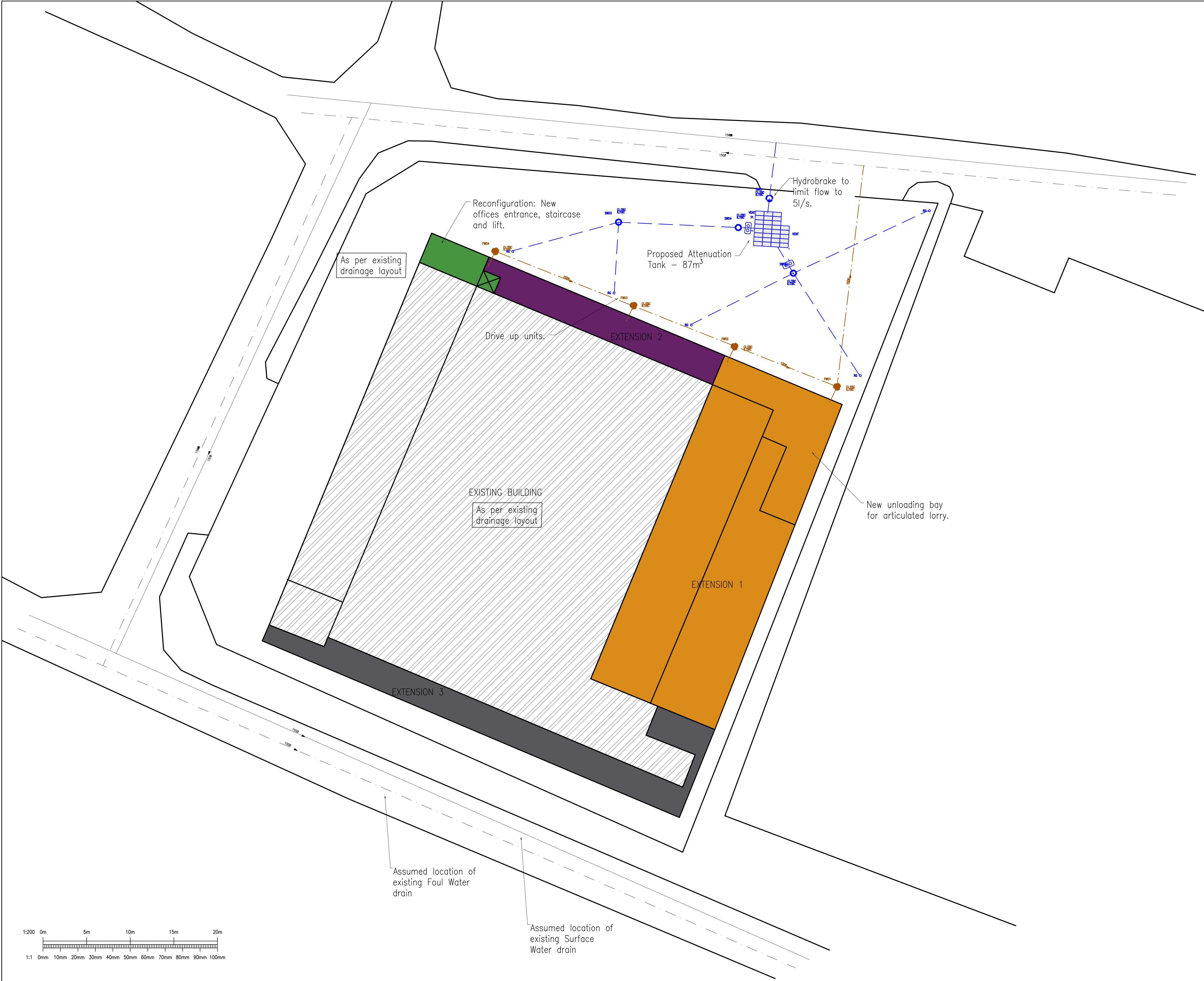
B060652 – Proposed drainage layout

## Appendix B – Referenced Documents

Flood zone map

Historic flood map

## Appendix A – Plans



**KEY:**

**PRIVATE DRAINAGE**

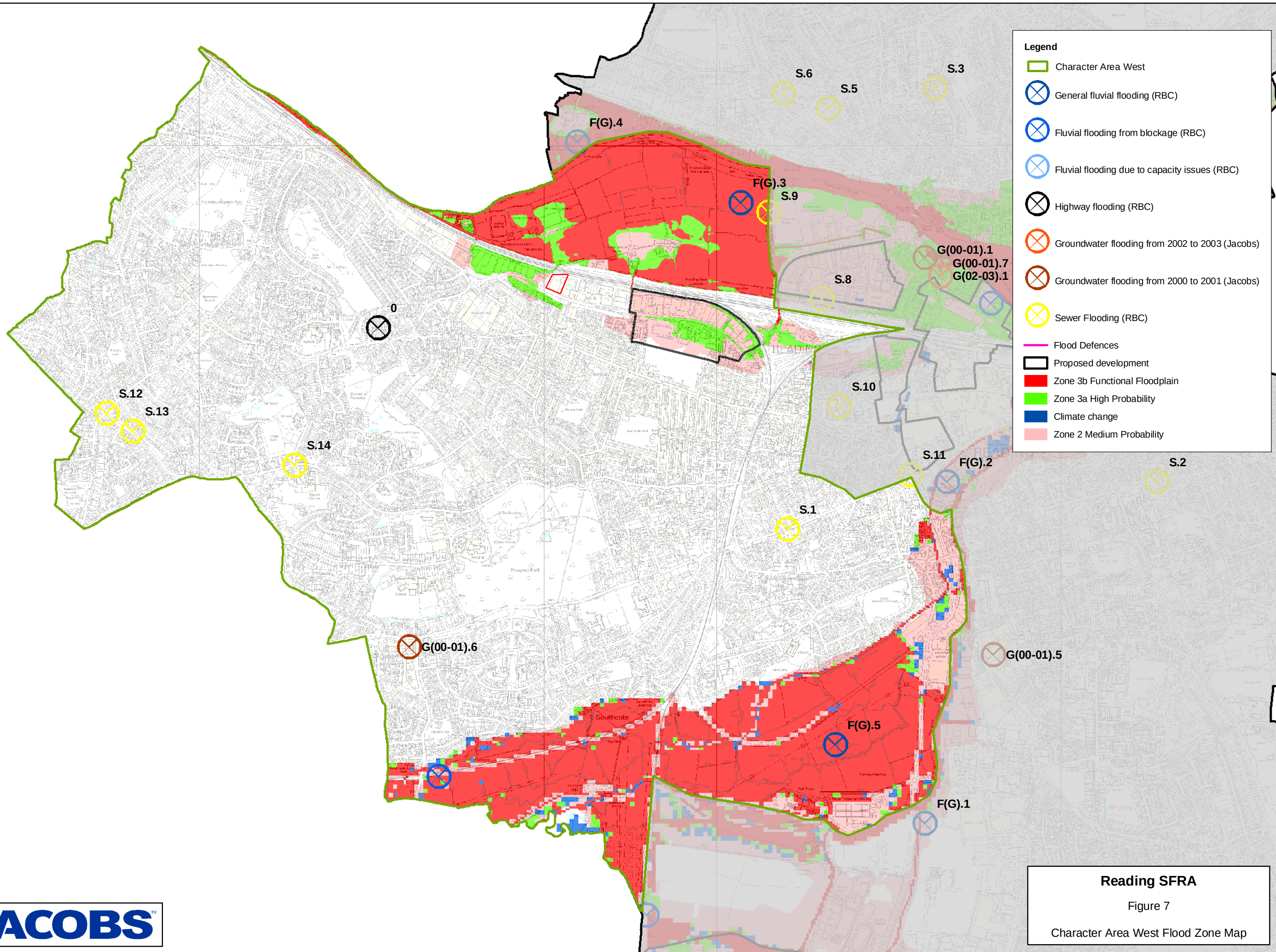
- SURFACE WATER DRAIN.
- SURFACE WATER CHAMBER.
- RAIN WATER DOWN PIPE.
- ROAD GULLY, 150Ø OUTLET.
- BYPASS PETROL INTERCEPTOR.
- BELOW GROUND SURFACE WATER ATTENUATION STORAGE SYSTEM.
- FOUL WATER DRAIN.
- FOUL WATER CHAMBER.
- TRAPPED FOUL GULLY, 100Ø OUTLET.

**EXISTING DRAINAGE**

- SURFACE WATER DRAIN TO REMAIN.
- FOUL WATER DRAIN TO REMAIN.

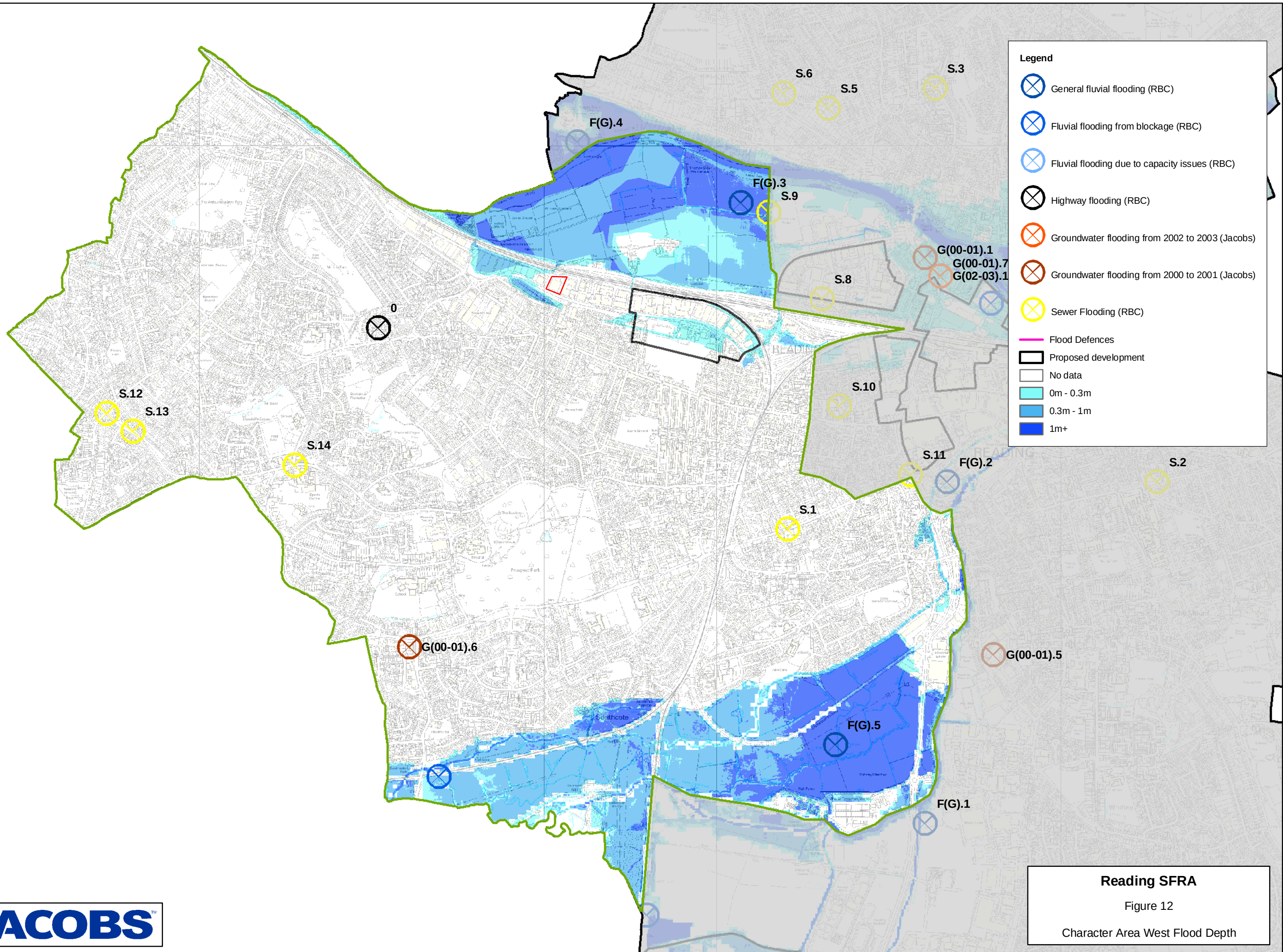
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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------|----------------|
| Rev:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Description: | Date:        | By:    | Chkd:          |
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| Status: <b>PRELIMINARY</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |              |        |                |
| Project: <b>ACCESS STORAGE READING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |              |        |                |
| Drg Title: <b>PROPOSED DRAINAGE LAYOUT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                           |              |              |        |                |
| Scale:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Size:        | First Issue: | Drawn: | Checked:       |
| AS SHOWN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | A1           | 08/04/2016   | SC     | TL             |
| Drg No: <b>B060652/DR01</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |              |        | Rev: <b>P1</b> |

## Appendix B – Referenced Documents



**Legend**

- Character Area West
- General fluvial flooding (RBC)
- Fluvial flooding from blockage (RBC)
- Fluvial flooding due to capacity issues (RBC)
- Highway flooding (RBC)
- Groundwater flooding from 2002 to 2003 (Jacobs)
- Groundwater flooding from 2000 to 2001 (Jacobs)
- Sewer Flooding (RBC)
- Flood Defences
- Proposed development
- Zone 3b Functional Floodplain
- Zone 3a High Probability
- Climate change
- Zone 2 Medium Probability



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