

TECHNICAL MEMORANDUM

CH2MHILL®

## South Bristol Link Road

### Response to Issues Raised by Long Ashton PC

PREPARED FOR: North Somerset Council  
PREPARED BY: Philip Paterson  
DATE: 15<sup>th</sup> July 2014  
PROJECT NUMBER: 467470.AM.01.20

#### 1.0 Introduction

1.1 This note has been prepared in response to matters raised by Long Ashton Parish Council in an email from Rod Sterland to the Inquiry Programme Officer of 14 July 2014 (8.28pm).

1.2 The questions relate to footpaths and flooding.

#### 2.0 Flooding

2.1 The issue of flooding has been addressed in the attached note from Dr. Lucy Willis.

#### 3.0 Footpaths

##### Longmoor Brook Bridge

3.1 At Longmoor Brook it can be confirmed that on the southern side of the brook the footpath and cattle pass will be segregated and that the footpath is not for equestrian use as shown on Drawing No. CTRAEB-730-STR-710 (NSC/2/2 Appendix 18). Cattle will be prevented from accessing the footpath by appropriate pedestrian access gates on either side of the bridge.

3.2 On the north side of the brook, Planning Condition No. 18 of the North Somerset planning permission dated 18 March 2013 (CD2/1) states that 'a suitable footpath surface is installed on the north side of the Longmoor Brook under bridge to carry diverted public footpath LA12/12C and pedestrian access gates are erected either side of the bridge embankment to control farm livestock'.

3.3 It can be confirmed that these measures will be implemented and the path will be 2.5 metres in width. For clarity, cattle will not be able to pass under the bridge on the north side of the brook. They will cross the brook by way of the existing farm bridge to the east, the cattle pass to be installed as described above to the south and then back to the north by way of a new accommodation bridge to the west (described in NSC/9/1. Para 9.6.9 in response to OBJ/17, now withdrawn).

##### Colliter's Brook Bridge

There is no need for cattle to cross beneath the Scheme at this location.

# Technical note

<b>Project:</b>	South Bristol Link	<b>To:</b>	Burges Salmon
<b>Subject:</b>	Flood Risk	<b>From:</b>	Atkins
<b>Date:</b>	15 Jul 2014	<b>cc:</b>	

## 1. Introduction

This Technical Note considers the following issues raised by objections:

- 12/5/100 - Use of the Colliter's Brook underbridge is acceptable only if the route offers safe passage during flooding events.
- 12/12c/20 – Concern is expressed as potential flooding at the sunken footpath and livestock crossing beneath Longmoor Brook under bridge.

The Environment Agency, Bristol City Council and North Somerset Council have been consulted throughout the development of the Scheme. The Environment Agency has not objected to the proposed Scheme subject to the discharge of a number of conditions.

## 2. Response

### 2.1. Background

A FRA was produced to comply with relevant planning requirements. This means we have considered more extreme return period events such as a 20-year, 100-year and 100 year (plus climate change) events. Flood risk has been considered across the design life of the proposed scheme taking into account the impacts of climate change.

### 2.2. Flooding and Return Periods

Flooding is a natural process that can present a range of different risks depending on its form. Flood practitioners and professionals define the risks presented by flooding according to an Annual Exceedance Probability (AEP), or as having a 'return period.'

Flood risk includes the statistical probability of an event occurring and the scale of the potential consequences. Flood risk is estimated from historical data and expressed in terms of the expected frequency of a flood of a given magnitude. The 10-Year, 50-Year and the 100-Year floods have a 10%, 2% and 1% chance of occurring in any given year, respectively. However, over a longer period the probability of flooding is considerably greater.

For example, for the 100-Year return period flood:

1. There is a 1% chance of the 100-year flood occurring or being exceeded in any single year;
2. There is a 26% chance if the 100-year flood occurring or being exceeded in a 30-year period; and
3. There is a 51% chance of the 100-year flood occurring or being exceeded at least once in a 70-year period.

#### 2.2.1. Historical Flooding

A flood event on 11 July 1968 affected significant areas of the south west and resulted in major damage and loss of life. The 1968 event peak flood flows in the affected watercourses have been estimated to be up to 0.2% probability (1 in 500 year).

# Technical note

The Ashton Vale Scheme, including the new Ashton Vale Tunnel, was completed in 1977, diverted virtually all Colliters Brook flows to the artificial New Colliters Brook channel, away from the urban area.

## 2.3. 12/5/100

The following provides a summary for the Colliter's Brook underbridge:

- The existing situation 100-year (plus climate change) peak water levels at the existing culvert are 23.47m AOD, reducing to 21.99m AOD with the scheme. This is due to the removal of twin 1m diameter culverts and replacement with a clear span bridge;
- The with scheme 100-year peak water levels at the bridge are 21.91m AOD;
- Existing left bank levels are between 21.76m AOD and 23.22m AOD, these are reduced to 21.3m AOD with the scheme, giving a flood depth on the PROW of approximately 0.7m at the 100-year (plus climate change) event. However, the outline design drawings (CTRAEB-730-STR-720) indicate a small amount of ground raising for the PROW (approximately 100-200mm) which would reduce this flood depth;
- The existing situation 20-year flood event peak water levels are 22.5m AOD upstream of the twin culvert, the with scheme water level is 21.4m AOD;
- In summary, the scheme reduces peak water levels but the lowering of the bank levels at the location of the PROW results in flood depths of approximately 0.7m depth at 100-year (plus climate change) event.

## 2.4. 12/12c/20

The following provides a summary for the Ashton / Longmoor Brook underbridge:

- The cross section used for the new bridge had to be interpolated between the two surveyed cross sections upstream (2133AB) and downstream (2021AB) by lowering of ground levels by 0.4m;
- The existing ground levels on the right bank of Ashton / Longmoor Brook are 9.13-8.93m AOD and on the left bank 9.4m AOD. These are lowered to 8m AOD with scheme;
- The 100-year (plus climate change) with scheme and mitigation peak water level is 8.38m AOD and is out of bank. Under existing conditions the 100-year (plus climate change) event upstream cross section peak water level is 8.67m AOD (at 2133AB), and at the downstream section peak water levels are 8.27m AOD (at 2021AB). At both these sections under existing conditions flow remains in bank;
- Comparing the with scheme and mitigation model with the existing situation at the identical cross sections (i.e. upstream and downstream of the bridge) for the 100-year (plus climate change) event gives peak water levels of 8.65m AOD at cross section 2133AB, and 8.21m AOD at cross section 2021AB. Therefore, at both cross sections water levels are slightly lower with scheme, this is to be expected as bank levels have been reduced so water can spill onto the floodplain, thus lowering in channel water levels;
- The existing situation 20-year peak water level is 8.38m AOD at cross section 2133AB and 7.99m AOD at cross section 2021AB and is in bank at both sections. The with scheme model predicts a flood level at the new bridge of 8.1m AOD for the 20-year event, giving 0.1m flood depth along the bank top level of 8m AOD at the underbridge. For the 100-year event this increases to 8.3m AOD. Whilst we haven't modelled flood events smaller than the 20-year, given that at this event there is only 0.1m depth of water it is unlikely that under more frequent events that the underbridge bank tops would be flooded;
- In summary, there are limited changes in flood levels but the lowering of the banks is such to cause approximately 0.4m depth of flooding across the proposed PROW at the 100-year (plus climate change) event.

# Technical note

## 2.5. Wider Flood Risk to the PROW Network

During high flow events other areas of the PROW network in this area are also predicted to flood, for example adjacent the New Colliter's Brook along the Park and Ride bus only link. During periods of high rainfall or flooding standard advice is that walking close to a river should be avoided.

## 3. Summary

As described above peak water levels have not increased as a result of the proposed scheme.

Ground levels below the bridges are proposed to be reduced as part of the scheme, resulting in the footpath for the length of the bridges being predicted to flood during high flow events.

In conclusion:

- The Environment Agency have been consulted throughout the development of the Scheme. The Environment Agency has not objected to the proposed Scheme subject to the discharge of a number of conditions;
- Peak water levels have not increased as a result of the proposed scheme;
- Ground levels below the bridges are proposed to be reduced as part of the scheme, resulting in the footpath for the length of the bridges being predicted to flood during high flow events;
- During severe rainfall events walking close to a river should be avoided. Other parts of the PROW network in the area will be affected;
- Flood durations will be short;
- The footpath will therefore be accessible except under extreme flood conditions.

Dr Lucy Willis CEng MCIWEM