WRH Supporting Documentation for
CRT91 Cwm Crawnon

Documents included are:

- 4.2 CRT91_Cwm Crawnon Access Map
- Canal & River Trust Generic Map Key
- 7.1 CRT91_Cwm Crawnon Location Map
- 8.4 CRT91_Cwm Crawnon Abstraction Details
- 8.5 CRT91_Cwm Crawnon Evidence of Abstraction
- 13.1 CRT91_Cwm Crawnon - Other Abstractions

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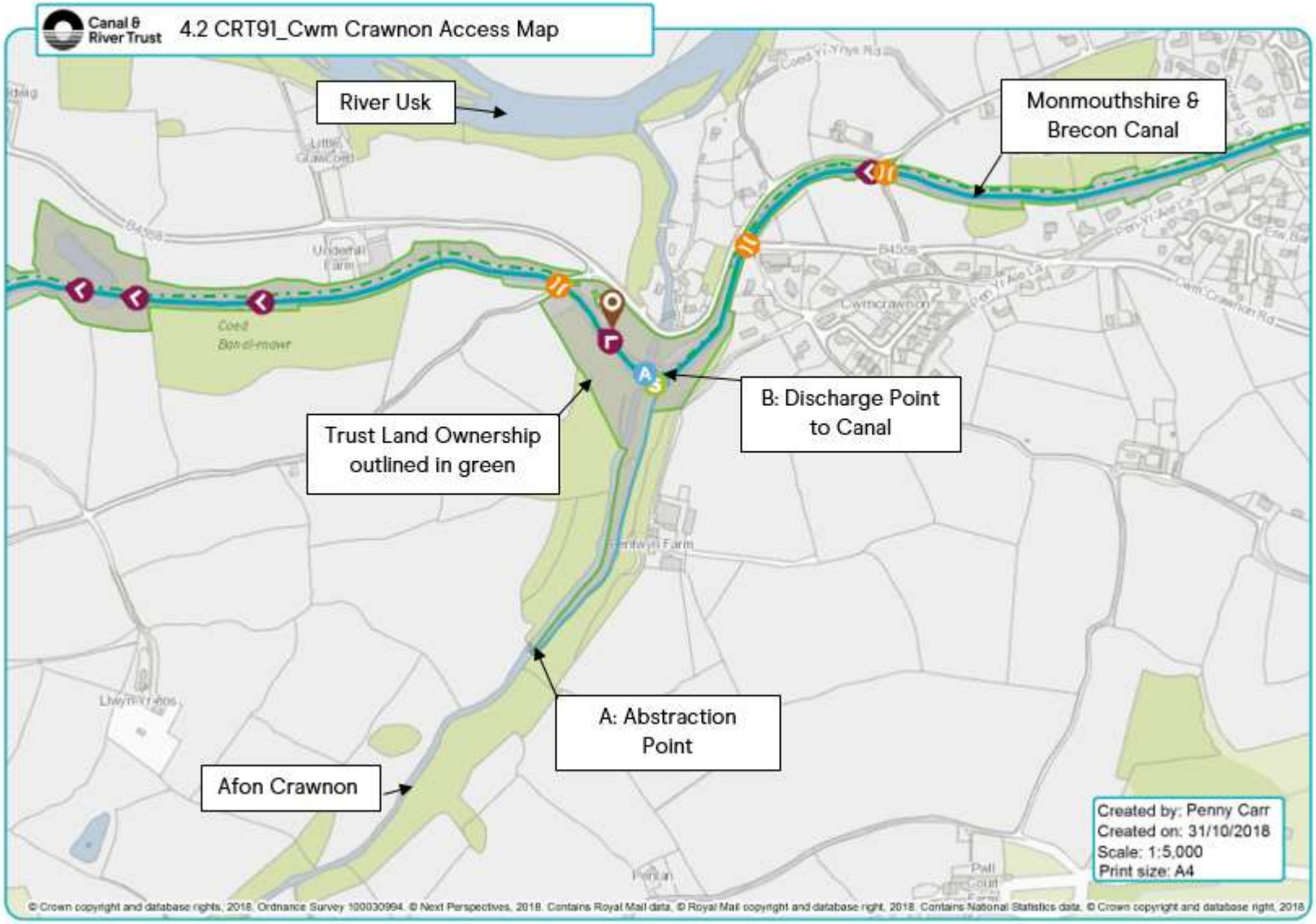
Canal & River Trust
4.2 CRT91_Cwm Crawnon Access Map
River Usk
Monmouthshire & Brecon Canal
Trust Land Ownership outlined in green
B: Discharge Point to Canal
A: Abstraction Point
Afon Crawnon
Created by: Penny Carr
Created on: 31/10/2018
Scale: 1:5,000
Print size: A4
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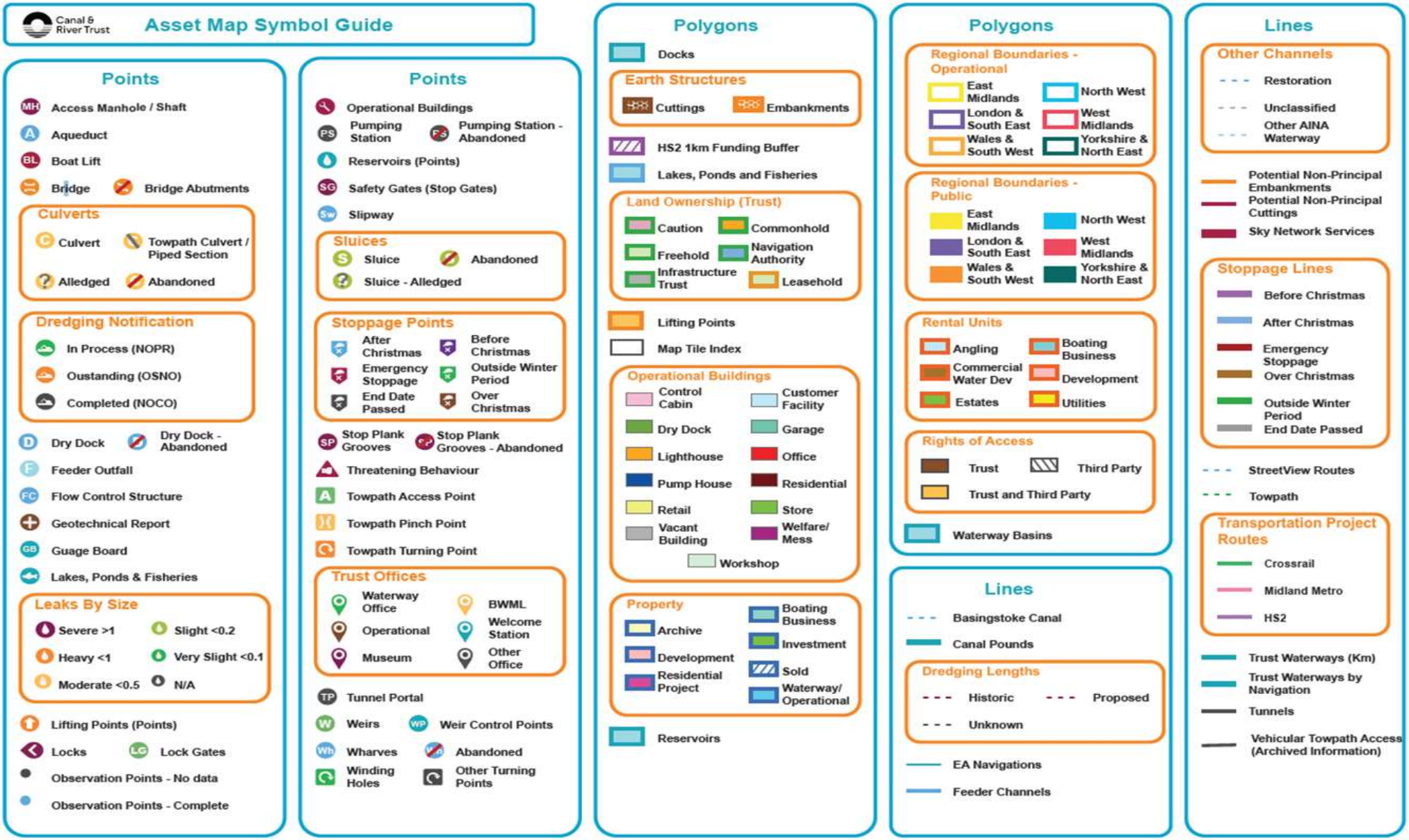
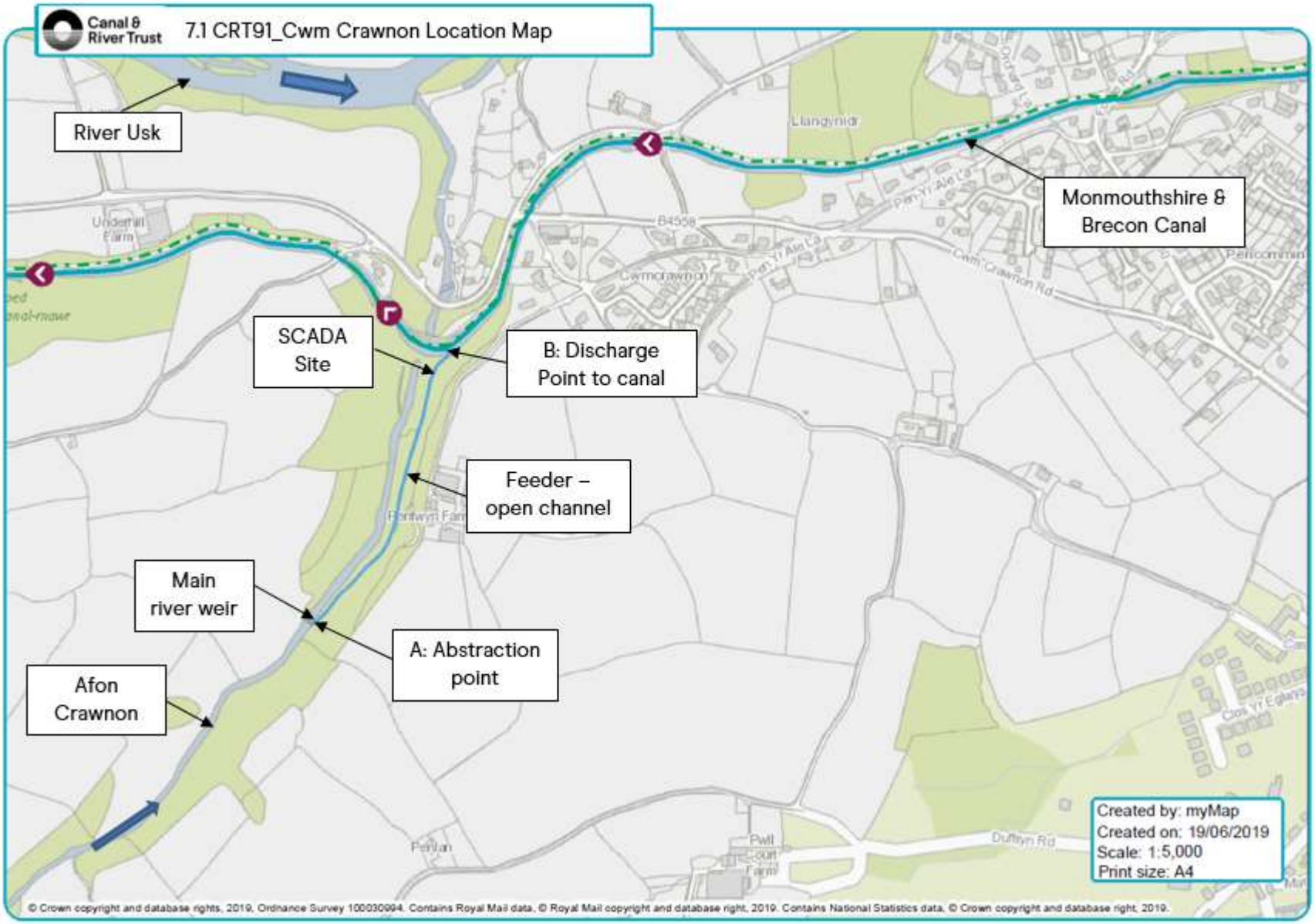
Canal & River Trust Generic Map Key:




Canal & River Trust
7.1 CRT91_Cwm Crawnon Location Map
River Usk
Monmouthshire & Brecon Canal
SCADA Site
B: Discharge Point to canal
Feeder – open channel
Main river weir
A: Abstraction point
Afon Crawnon
Llangynidr
B4558
Cwm Crawnon Rd
Duffryn Rd
Created by: myMap
Created on: 19/06/2019
Scale: 1:5,000
Print size: A4
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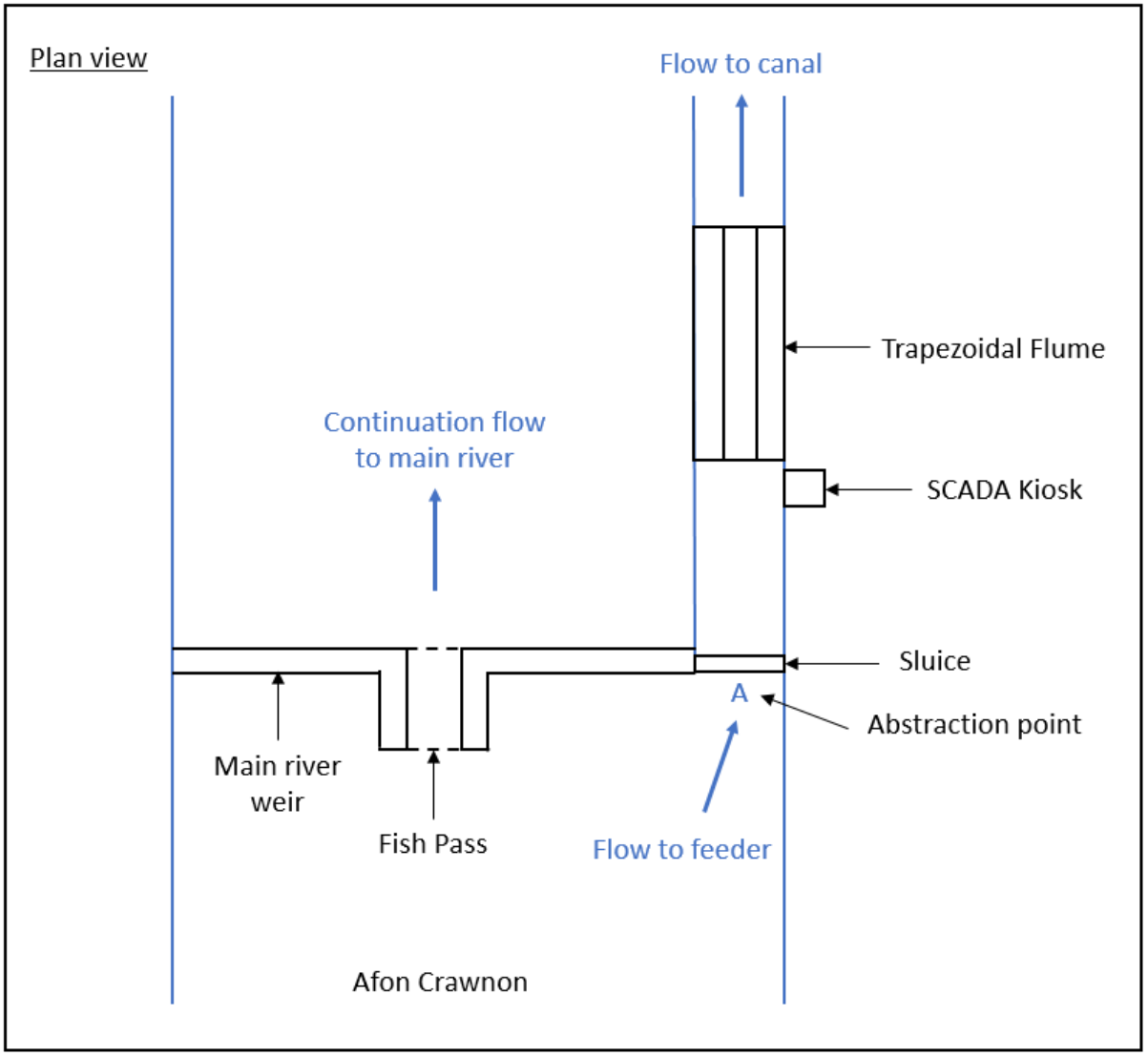
8.4 CRT91_Cwm Crawnon Abstraction Details

General Description:

Cwm Crawnon Feeder is a Scenario 2a feeder (as detailed in Navigation Scenario Workbook), with variable structures. The abstraction is from the main Afon Crawnon, near Cwmcrawnon, which is diverted into the feeder channel via a main river weir. Flow into the feeder is then controlled by a sluice which discharges into an open channel. Flow continues through a trapezoidal flume, which is used to monitor the abstraction, before discharging to the Monmouthshire & Brecon (M&B) Canal, 0.4km downstream of the abstraction. Please see schematic of abstraction arrangement.

Schematic of Abstraction Arrangement:



Details of the Structures:

Flow is diverted to the canal via a concrete main river weir with timber crest and fish pass. Flow into the feeder is then controlled by a 0.66m x 0.66m wooden sluice which discharges into an open channel. Flow continues through a trapezoidal flume, which is used to monitor the abstraction, before discharging to the M&B Canal, 0.4km downstream of the abstraction. Please refer to photographic record in section 8.5 CRT91_Cwm Crawnon Evidence of Abstraction below for photographs of the abstraction arrangement.

Means of Measurement/Assessment of Abstraction Quantities Method:

The abstraction is monitored via the Trust's telemetry/SCADA (Supervisory Control and Data Acquisition) system approximately 0.4km downstream of the abstraction. A trapezoidal flume is installed at this location and head measurements are recorded. The flow is then calculated from the recorded head measurements using the following standard equation for trapezoidal flumes as follows:

$$Q = (2/3)^{3/2} \times \sqrt{g} \times C_V \times C_S \times C_D \times b \, (h^{3/2})$$

where Q is the flow in m^3/s, g is acceleration due to gravity in m/s^2, C_V is the coefficient of velocity, C_S is the coefficient of shape, C_D is the coefficient of discharge, b is the width of the flume throat (at bed) in m, Cd is the coefficient of discharge and h is the recorded head of water over the weir in m.

Please see section 8.5 CRT91_Cwm Crawnon Evidence of Abstraction below for further details.

General principles of maintaining a level on Canal & River Trust Navigations:

The purpose of water control at the Canal & River Trust (the Trust) is to keep the water level within a Normal Operating Zone (NOZ) to minimise business risks. The business risks associated with high water levels include overtopping, which could lead to canal infrastructure damage ranging from towpath surfacing to catastrophic embankment failure or breach. Low levels can lead to damage to canal lining and in cases of rapid drawdown collapse of canal bank, in addition to insufficient navigable depth which can lead to disruption and inconvenience to our customers, damage to reputation, loss of income and/or environmental/ ecological damage such as algal blooms, fish distress, kills etc. and/or impact on water sales (hands off flows, commercial agreements, intake structures exposed).

Generally, canals operate within the NOZ (Figure 8.41 below), which is a zone of tolerance around a Normal Water Level (NWL); NWL is usually determined by refining a given level based on unobstructed passage for navigation and efficient use of available resources (water and manpower).

Across the Trust's canal network, NWL may or may not be the same as 'level', 'pound datum' or 'zero' and slight variations between NWL and 'level' exist across the network i.e. in some areas NWL is equivalent to 'level', whereas in other areas 'level' maybe the bywash cill and NWL is 25 to 50mm above this to maintain a flow and level throughout the lower pounds in the canal.

The lower limit of the NOZ is generally governed by the minimal navigable depth of the section of canal in question, below NWL. Assuming pound datum and NWL are the same, then typical values of the lower limit of NOZ are in the region of - 200mm from pound datum. Depending on location, this can vary between -450mm and -100mm.

The upper limit of the NOZ is generally governed by the available freeboard of the section of canal and then subtracting a 'margin' from this. The freeboard enables the canal to have a degree of passive control, by the waste and bywash weirs (and in some areas the top beam of the lock gates), before requiring active intervention/flood control activities to avoid overtopping of the canal. In some locations on the network, the upper limits of NOZ is governed by the air draft under a bridge, i.e. the point below NWL beyond which navigational issues occur due to restricted head room.

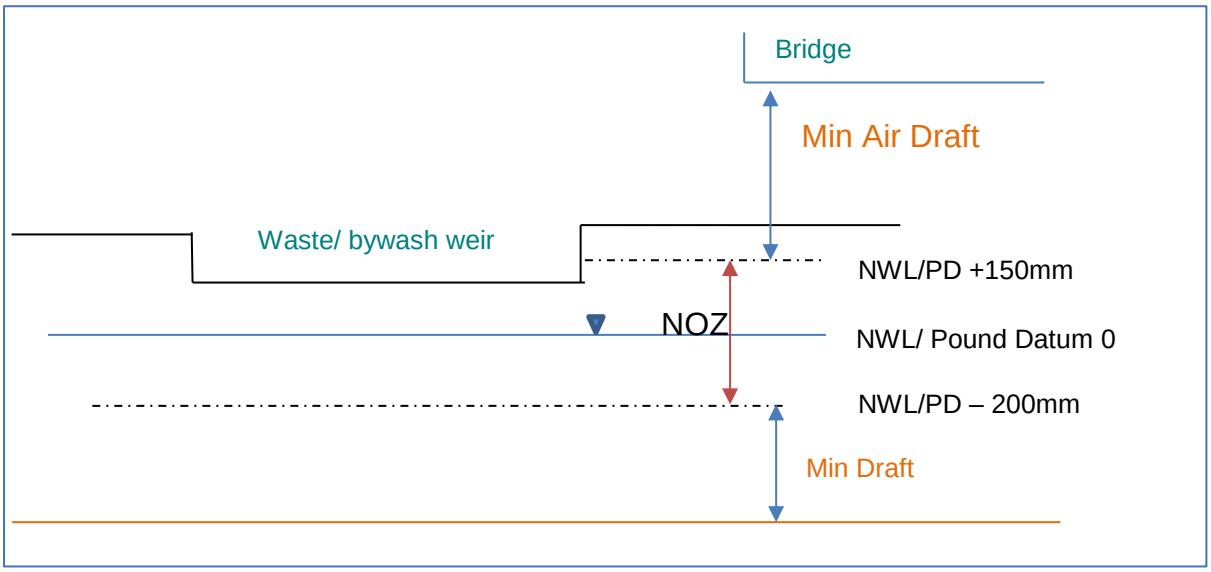


Figure 8.41: Example of Normal Operating Level on Canal & River Trust Navigations

8.5 CRT91_Cwm Crawnon Evidence of Abstraction

Telemetry/SCADA data:

The abstraction is measured and recorded via the Trust's telemetry/SCADA system. Figure 8.51 below shows the daily mean abstraction quantities for the period 2011-2017 inclusive.

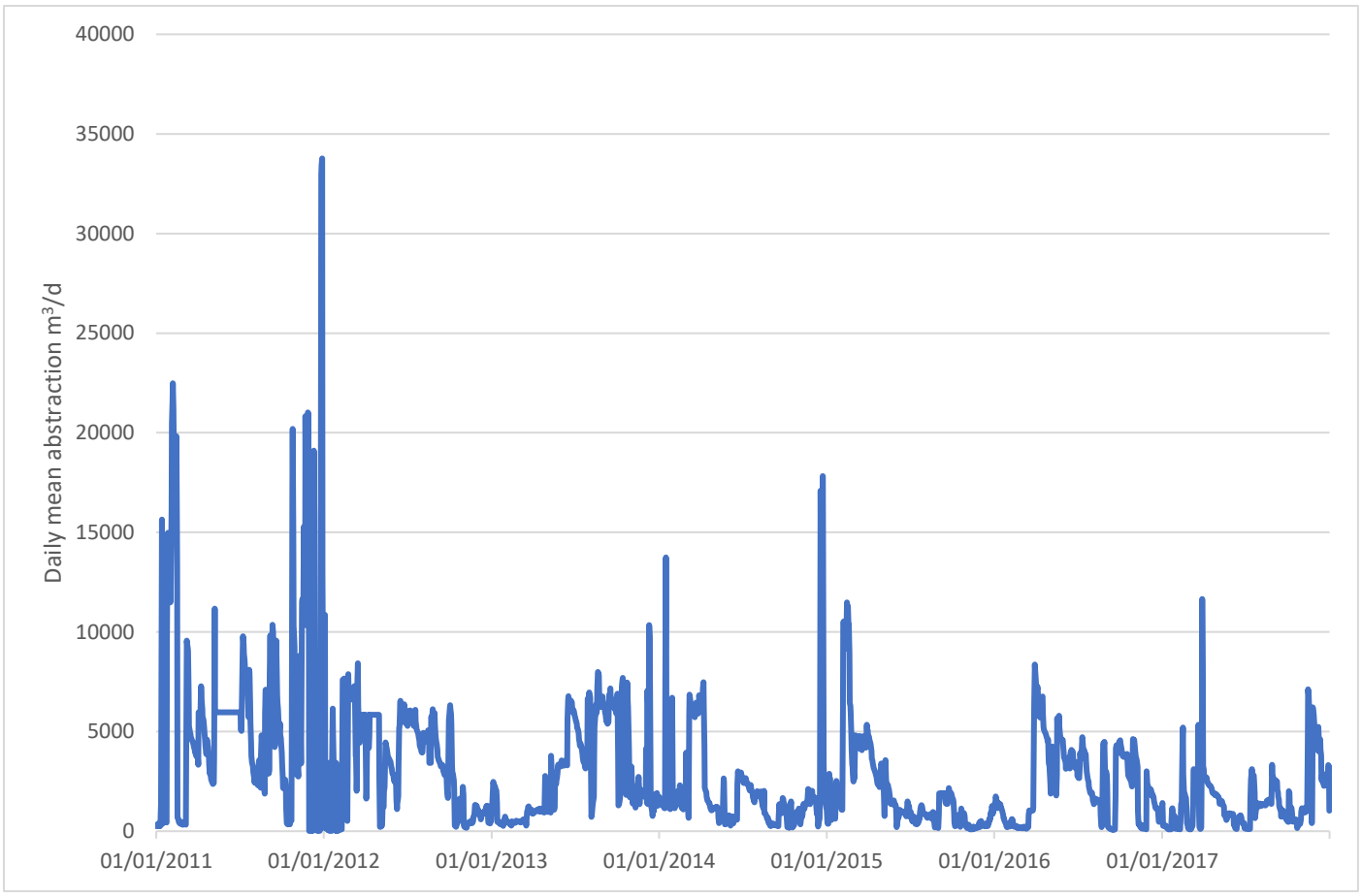
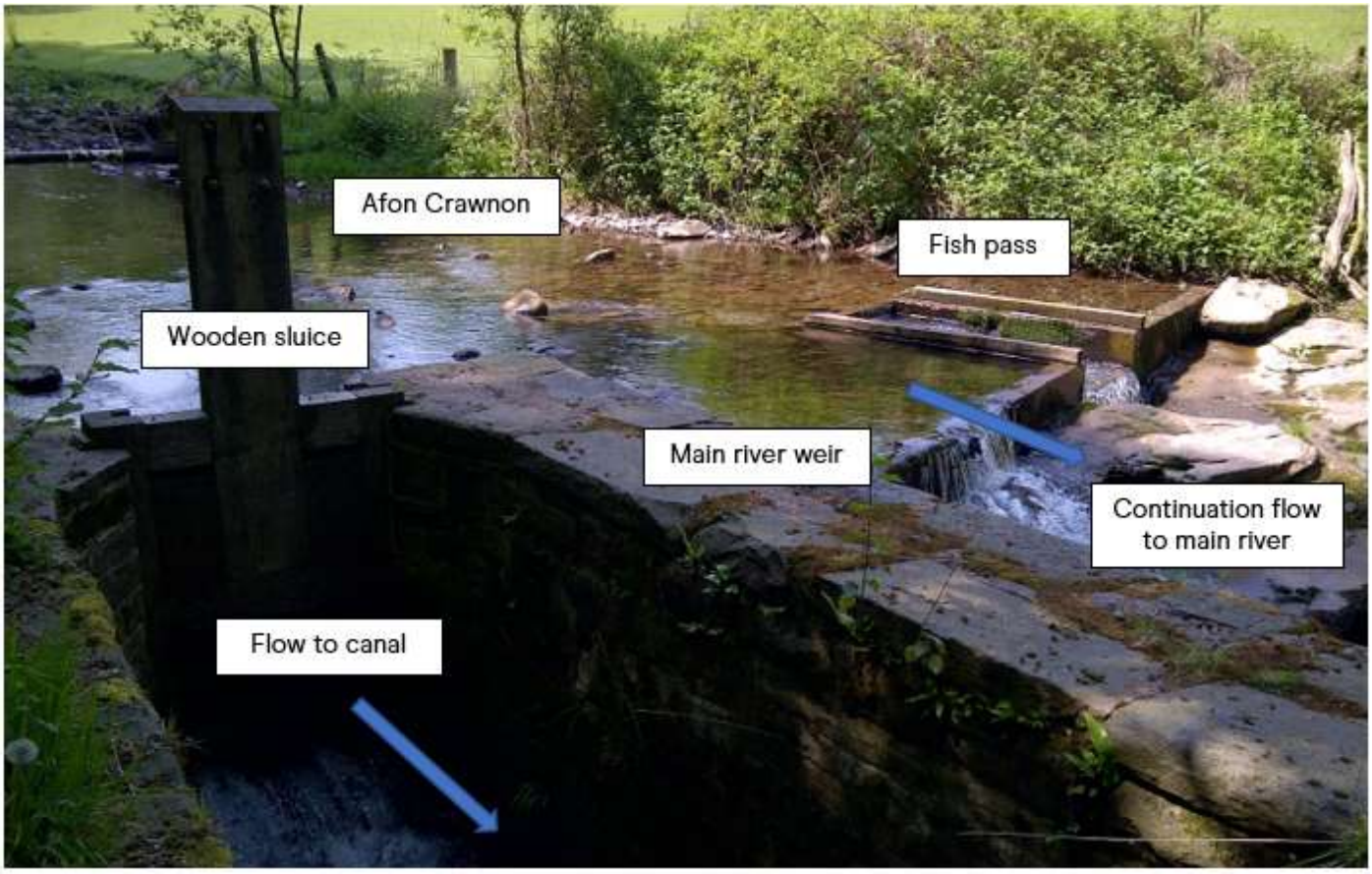


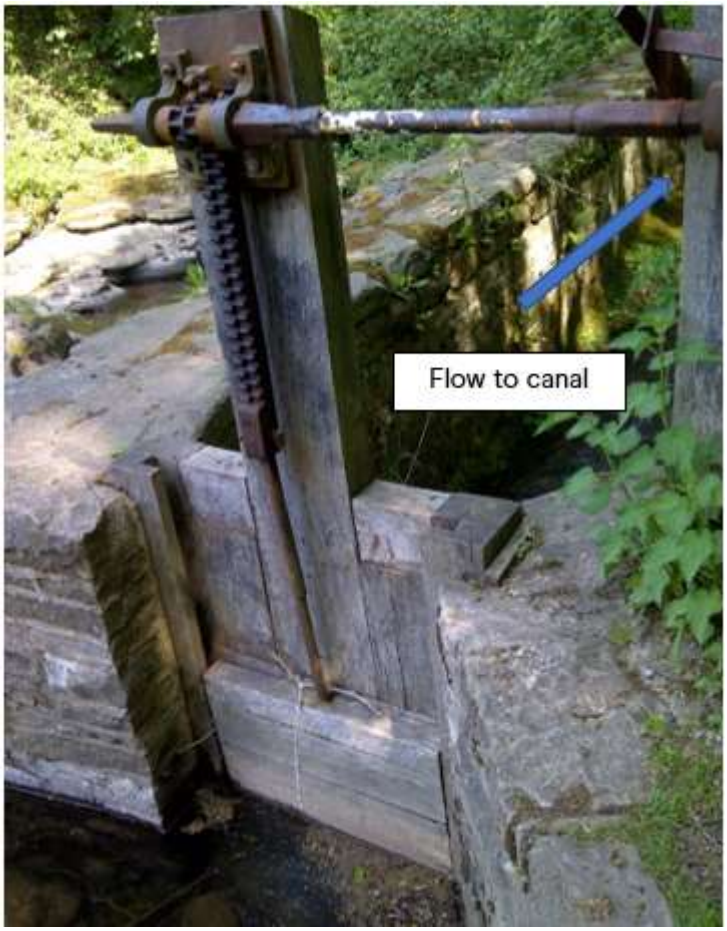
Figure 8.51 Daily mean abstraction 2011-2017

Photographic Record:

Photograph 1: Abstraction structures looking upstream - sluice and main river weir 25.05.12

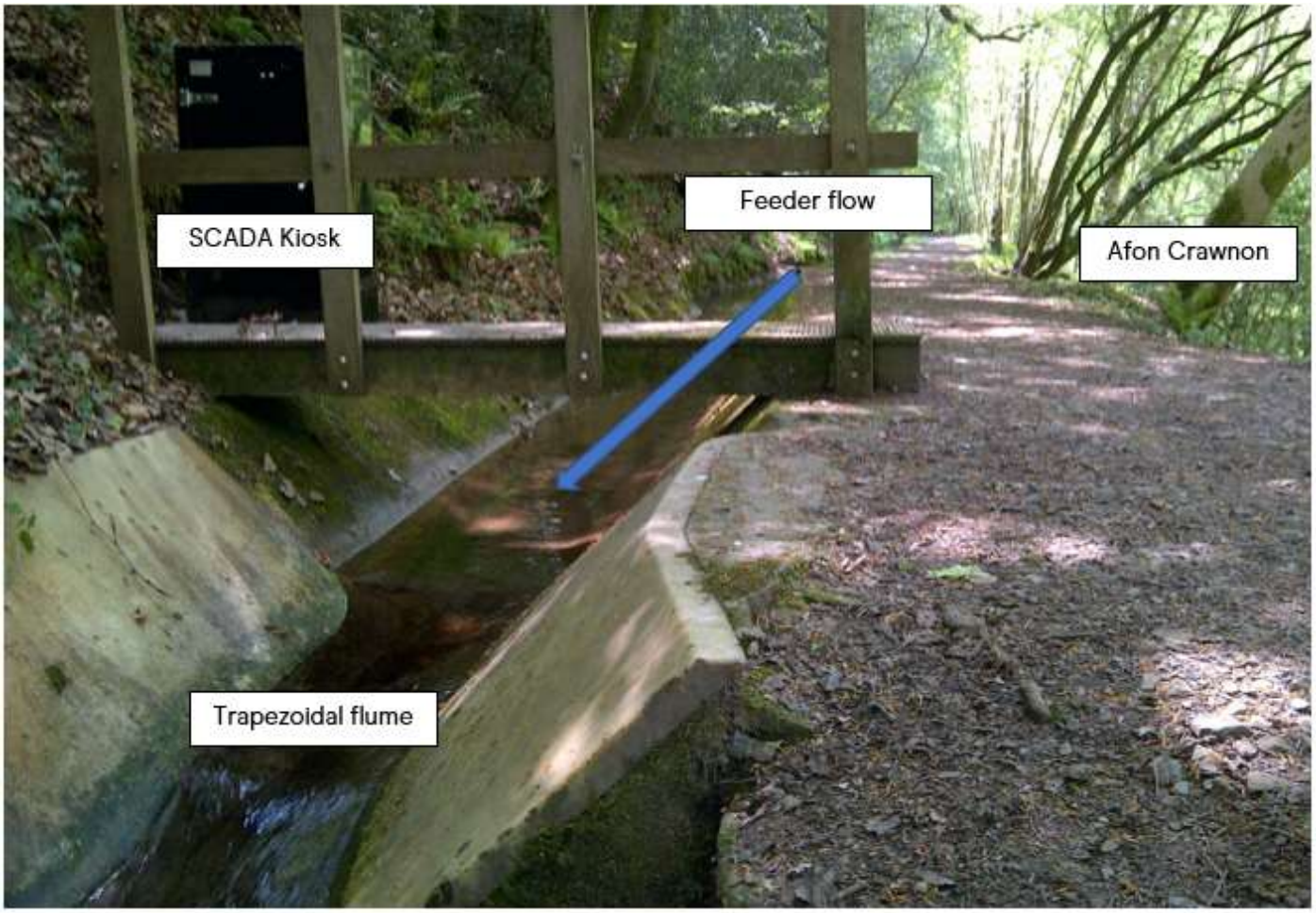


Photograph 2: Wooden sluice 25.05.12

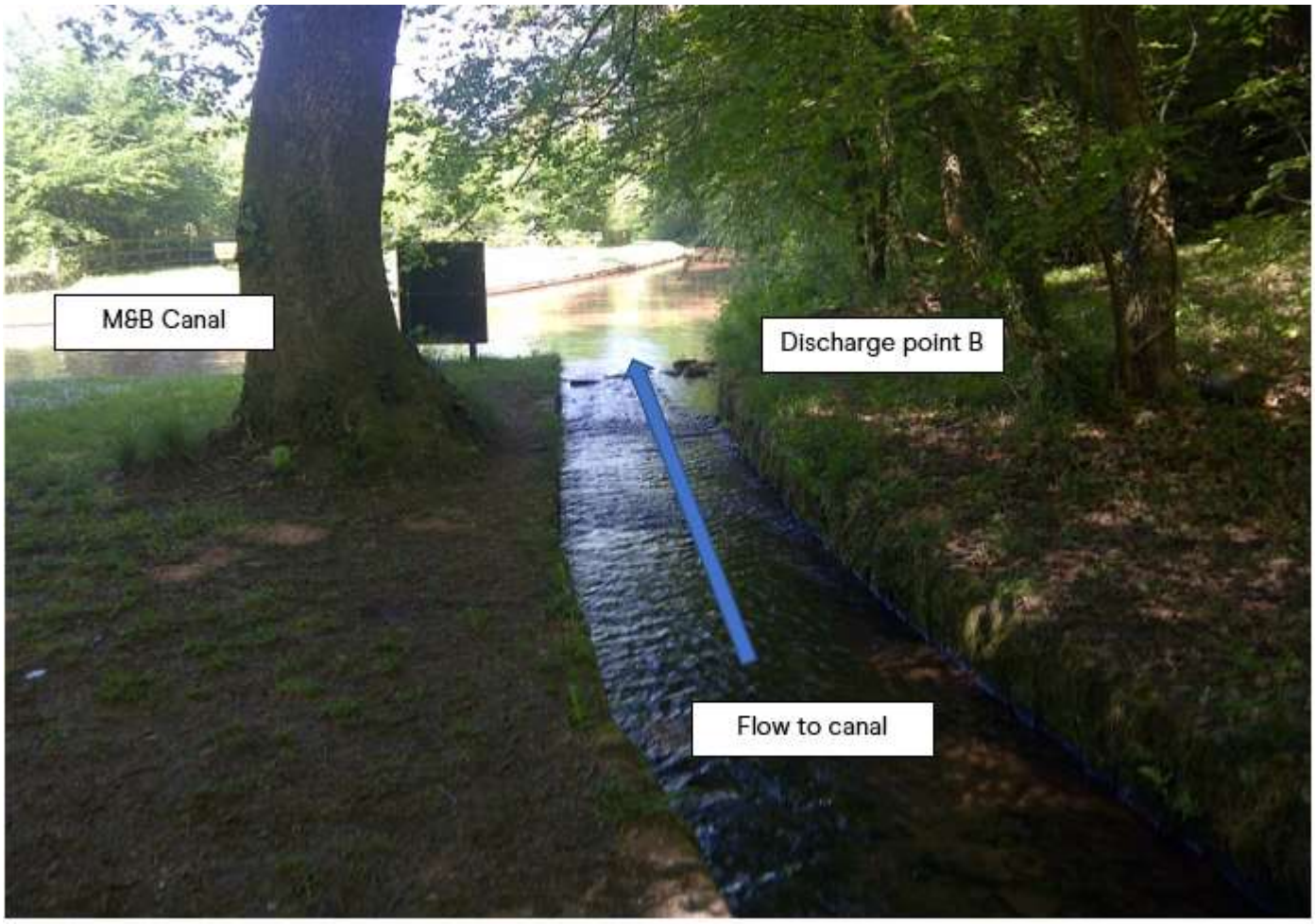


Photograph 3: Abstraction structures looking upstream – sluice and main river weir 25.05.12

Photograph 4: Trapezoidal Flume and SCADA Kiosk 25.05.12



Photograph 5: Discharge point to canal 25.05.12



13.1 CRT91_Cwm Crawnon - Other Abstractions

Table 13.1 – Details of any other abstraction(s) (licensed or exempt) that are associated with this application					
National Grid Reference (12 digit) of where you abstract water	Source name and type	Purpose of abstraction	Where do you use the water?	When do you abstract the water	Is this a pending application, or already licensed? Please provide the application or licence number as appropriate
SO 29207 11704	Tributary of River Usk – Single point	Transfer from one source of supply to another	Monmouthshire & Brecon Canal	All year	Pending application – CRT61_Castle Turn
SO 20844 16956	Nant Onnau-fach – Single point	Transfer from one source of supply to another	Monmouthshire & Brecon Canal	All year	Pending application CRT234_Llangattock
SO 30500 07288	Nant Rhyd-y-Meirch – Single point	Transfer from one source of supply to another	Monmouthshire & Brecon Canal	All year	Pending application CRT263_Mill Turn Feeder
SO 29704 09116	Tributary of Ochram Brook – Single point	Transfer from one source of supply to another	Monmouthshire & Brecon Canal	All year	Pending application CRT276_Ochran Turn
SO 03975 28882	River Usk – Single point	Transfer from one source of supply to another	Monmouthshire & Brecon Canal	All year	Pending application CRT327_River Usk at Brecon
SO 28609 00570	Trosnant Brook – Single point	Transfer from one source of supply to another	Monmouthshire & Brecon Canal	All year	Pending application CRT438_Trosnant Spring

Cwm Crawnon is one of the main feeders to the M&B Canal. There are six additional feeders that support navigation on the canal. These are shown in Table 13.1 above and separate applications have been submitted for each.

The River Usk and its tributaries are designated a Special Area of Conservation (SAC) under the Habitats Directive. To comply with this directive, Natural Resources Wales (NRW) have indicated that for each of these feeders, conditions will need to be applied to licences. This will most likely result in a reduction in supply to the canal, once these licences are determined and lead to the canal being closed for significant periods every year.

The Trust has therefore been working with Natural Resources Wales, together with Dwr Cymru Welsh Water and the Wye & Usk Foundation as part of the UWAG (Usk & Wye Abstraction Group), to come up with an agreed solution to secure the long-term resources to the canal. In addition to improvements to existing feeders, this solution may also include abandoning some and establishing new, alternative sources of supply.

Please note however, that this work is still ongoing and an agreed and funded solution has not yet been reached. Separate applications have therefore been submitted for each existing feeder to the M&B Canal.