Atholl Associates

Flood Risk and Drainage

FLOOD RISK ASSESSMENT: PROPOSED VILLAGE HALL, ST FILLANS, PERTHSHIRE

Ref: AAFR/BC/196b

March 2022

Client: St Fillans Community Council
c/o Denholm Partnership Architects
11 Dunira Street
Comrie
Crieff
Perthshire
PH6 2LJ

Engineer Atholl Associates Ltd
Algo Business Centre
Glenearn Road
Perth
PH2 0NJ

t: 07904451873
e: brian@athollassociates.co.uk
w: www.athollassociates.co.uk

Report Prepared by:

.....
Dr Brian Coghlan
BSc (Hons) PhD CEng MCIWEM
Director

Terms and Conditions, Notes on Limitations & Basis for Contract

(These conditions supercede any previous conditions issued.) We will prepare a report solely for the use of the Client (the party invoiced) and its agent(s). No reliance should be placed on the contents of this report, in whole or in part by third parties. The report, its content and format and associated data are copyright, and the property of Atholl Associates. Photocopying of part or all of the contents, transfer or reproduction of any kind is forbidden without written permission. A charge may be levied against such approval.

All information acquired by the firm in the course of investigation is the property of the firm, and, only also becomes the joint property of the Client only on the complete settlement of all invoices relating to the project. The firm reserves the right to use the information in commercial tendering and marketing, unless the Client expressly wishes otherwise in writing.

Revision Schedule:

Rev	Date	Page	Details

CONTENTS Page

APPENDICES:

PLANS:

1.0 Introduction

Atholl Associates Ltd have been instructed by Denholm Partnership Architects, on behalf of St Fillans Community Council, to carry out a Flood Risk Assessment in relation to a proposed village hall at St Fillans, Perthshire. The proposed site is on the outskirts of the village, on land which lies to the south of the River Earn.

Perth and Kinross Council, as planning authority, have requested a Flood Risk Assessment for the proposed development. It is normal for a development of this type to be assessed for flood risk from a flood with a return period of 1 in 200 years (for floodplain extents and landraising), and to take into account the potential effects of climate change.

1.1 Scope and methodology

The scope of this Flood Risk Assessment is to assess and quantify flood risk to the proposed development. Flood risk to the development will be assessed for a 1-in-200-year flood event.

To assess flood risk to the development, a topographical survey has been undertaken, including surveyed cross sections through watercourses in the area near to the site and surrounding area as appropriate. This has been done to enable hydraulic modelling to be carried out. The survey was preceded by a site walkover to confirm the extent of survey required.

Using the FEH Statistical Method the Q200 flood flow in the vicinity of the site has been assessed and applied in the hydraulic model. The results provided by the hydraulic model have been utilised with the topographical survey to assess flood risk to the site.

Based on the assessed flood risk to the site, recommendations for the site from the perspective of flood risk have been made.

This assessment is prepared using our best engineering judgement but there are levels of uncertainty implicit in the historical data and methods of analysis. Details of the range of possible error in the methods of flood estimation are given in the Flood Estimation Handbook (FEH).

This Flood Risk Assessment is carried out in accordance with the requirements of the Scottish Planning Policy *(SPP) (Scottish Government, 2020)*, the Planning Advice Note 61 (PAN 61): Planning and Sustainable Urban Drainage Systems, PAN 69: Planning and Buildings Standards on Flooding and BS 8533-2011 Assessing and Managing Flood Risk in Development Code of Practice 4.

This assessment uses a set of procedures originally set out in the Flood Estimation Handbook *(Institute of Hydrology, 1999)* and embodied in the FEH and WINFAP software packages currently used.

2.0 General description of the site

The site of the proposed community facility is approximately 0.95 hectares in extent, and sits on an area of ground which is in the form of a low mound, roughly triangular in shape, which lies on the southern side (right bank) of the River Earn. The site is bounded to the north by the River Earn, to the west by the eastern shore of Loch Earn, and to the south by a single-track unclassified road.

To the west of the site, lies the eastern end of Loch Ear, which is a substantial body of water with an extensive catchment area. The levels in the loch (and the stretch of the River Earn which runs past the site) are artificially raised by a weir approximately 100m downstream of the eastern end of the site, which is part of the intake works for a large hydro scheme built in the late 1950's and run by SSE. The weir is a fixed concrete structure several meters high. Adjacent to the weir is the intake to a tunnel connecting to Dalchonzie Power Station. There is also a fish ladder on the south side of the weir. Although the intake is capable of taking a substantial flow, it is assumed that (as is normal operating practice for hydro schemes), the worst-case scenario of a "hands off" flow will normally be the setting during any substantial flood event.

On the north side of the river is the small village of St Fillans. The site can be accessed directly from the village by an existing footbridge over the river. This footbridge is a relatively substantial structure, in a single clear span constructed of concrete.

The footbridge connects with a path which runs down the western boundary of the site, parallel with the loch shore and across a small causeway to link with the unclassified road. There is a second path leading from the bridge along the northern boundary of the site, i.e. along the right bank of the River Earn, again leading to a junction with the unclassified road.

The site is in part wooded but with an area of open ground roughly in the centre of the site. This open ground is essentially the higher part of the site. Ground levels on site range from 97.4m to 101.0m AOD. Significantly, to the south the site dips lower than the adjacent road, along a strip of marshy ground which includes some ponded areas. The largest of the ponds is at the western end of this feature, where the pond appears to be up to around 0.5m deep (based on surveyed levels). The main pond is approximately 50m long by 20m wide. The other ponded areas are relatively small, and appear to be the route of outflow from the pond eastwards to the River Earn.

Drainage of the majority of the site seems, based on topography, to be towards the ponds on the southern boundary. It would appear that the natural outlet from the main pond would have been towards the loch shore to the west. However this is blocked by the causeway on which the footpath is situated, raising the level of the pond sufficiently that it overflows to the east and towards the river.

Figure 2.1 - Location Plan (Excerpt from Drawing 5342_-_Location Plan. See Plans section of this report)

It is proposed to build a community facility on the site consisting of a village hall, with car parking and outdoor activity space. The vehicular access to the site would be from the south, of the unclassified road. A proposed layout is shown in Figure 2.2 below:

Figure 2.2 - Proposed layout (excerpt from Drawing 5342_SK03_ Block Plan – see Plans section of this report)

Figure 2.3 - Photograph location plan

Photograph 1 - Left bank of the River Earn, just downstream of the footbridge, looking downstream. Car parking area on left, in the distance on the left can be seen the main road through St Fillans (A85) and some of the houses on the main street.

Photograph 2 - Looking upstream from hydro weir towards the stretch of the river downstream of the site. On the left is the intake grill for the tunnel to Dalchonzie power station.

Photograph 3 - River Earn flowing over hydro weir, with intake screen to tunnel and fish pass structure on opposite bank.

Photograph 4 - View from downstream at the SSE hydro intake and weir (on left of picture) and retaining wall on right (at street level of main road through St Fillans). On the left of the weir there is the outlet from the fish pass.

Photograph 5 - Looking upstream along the River Earn past the substantial footbridge near the upstream end of the river. A short distance upstream, Loch Earn is visible. On the opposite bank the landfall of the bridge is on the north west corner of the site.

Photograph 6 - From the same vantage point as Photograph 5, looking across to the northwest corner of the site.

Photograph 7 - View north across the footbridge towards the main road (A85) and houses in St Fillans

Photograph 8 - From the same vantage point as Photograph 7, looking east (downstream) along the River Earn. The boundary fence of the site is on the right of picture.

Photograph 9 - Looking south along the footpath next to the western boundary of the site. Loch Earn, which is at a moderate level, is on the right of picture. The unclassified single track road on the south of the site is in the distance.

Photograph 10 - Further along the same path as previous photograph, showing where the path meets the unclassified road, and the western end of the ponded arear on the left.

Photograph 11 - From the same vantage point as previous picture, with more of the pond in view.

Photograph 12 - From the same vantage point as previous picture, looking east towards the higher part of the site in a clearing, where drainage testing is underway.

Photograph 13 - Looking north on footpath, past the western end of the pond, and with Loch Earn shore on the left

Photograph 14 - Looking at footpath/pond from the road.

Photograph 15 - Looking east along line of "flood relief channel". The vehicle in the distance is sitting roughly on top of the culvert where the field entrance is situated. The culvert discharges onto the bank of the River Earn just beyond.

Photograph 16 - From the same vantage point as previous picture, looking west towards the main pond.

Photograph 17 - From the right bank to the River Earn, at the eastern corner of the site, looking towards the hydro weir which is approximately 100m downstream.

Photograph 18 - Feld access of unclassified road, at the eastern end of the site.

Photograph 19 - Looking east along the southern boundary of the site. The flood relief channel is in the middle distance, while further away the site testing is underway on the higher part of the site.

3.0 General Observations

The objectives of this flood risk assessment are to analyse flows in the watercourse, define appropriate flood levels and flood plain extents in the vicinity of the site, and also to establish whether there are safe means of access and egress from the site during flood events.

According to the indications in SEPA flood mapping, the site is almost completely within the 1 in 200 year (medium risk) floodplain. However, the mapping also indicates an area within the centre of the site which is at high risk. This is clearly not the case, as the area indicated is actually the highest part of the site. Hence, as is normally the case when considering flood risk at an individual site level, further investigation is required. This will be checked by carrying out an assessment of flood levels in the adjacent stretch of the River Earn (see section 5.0).

From a walkover of the site, it was apparent that the site is well above the normal loch level. Prior to the building of the downstream hydro scheme, most of the site would be above the 1 in 200 year flood level. However, the weir associate with the hydro scheme has high walls on either side which extend up to approximately street level when compared with the adjacent main road, so it is not surprising that there is a significant effect from the presence of the weir, and in effect (see discussion of results in Section 5.0) the weir is in effect a downstream control which dictates flood levels in the river and in the Loch Earn itself.

Also clear from the walkover is that the ground on the south side next to the unclassified road is effectively a secondary channel when flood levels in the river and the loch are very high. Because of this it is important to acknowledge that any vehicular access from the south will only be passable when there are not high levels of flooding in Loch Earn. Also, equally important, this secondary channel should not be blocked or restricted as a result of development. For this reason, it is recommended that any vehicular access is formed in such a way that it either conforms to existing ground levels (relatively inexpensive to achieve), or that the channel is spanned by a single clear span at road level, with a soffit height greater than the design flood level plus freeboard (very expensive, difficult to achieve, and very intrusive visually).

Flooding is also likely to restrict pedestrian access over the bridge during extreme flood events. However it should be noted that:

- Pedestrian access is not provided specifically for the proposed development so providing the community facilities are closed when high floods are predicted, no special arrangements regarding the bridge should be required.
- In order to ensure appropriate measures are in place to close the community centre when high flood levels are predicted, an appropriate emergency plan should be set out for the facility, for display in the building and distribution to management committee members.
- Because of the vast storage volume and surface area of Loch Earn, changes in loch and river levels upstream of the hydro weir will always be very gradual.

To gain a clearer understanding of the relative levels of the surrounding ground to the site, the flow capacity of the watercourse, and the levels along the main access route to the development site, a topographical survey, including cross sectional data along the main watercourse, was commissioned from Benchmark Surveys in 2021 of the River Earn, and added to with a survey of the subject site completed by Douglas Land Surveys in 2022. The relevant survey drawing is included in the Plans section of this report (Drawing 0722-01 Topographical 1-250 (A1)), and in the cross sectional data set out in Appendix A. The survey of the main site is included below as Figure 3.1

Figure 3.1 - Existing site layout (excerpt from Drawing 0722-01-War Memorial – see Plans section of this report)

4.0 Estimation of flood flows

In order to define the extent and water surface level of the 200 year (0,5% probability) floodplain, we have made an assessment of flood flows and flood levels in the River Earn using the FEH Statistical Method, which is appropriate for rivers with larger catchments, significant storage, and reasonable availability of gauged flows. The estimated flood flows have also been factored up by 35% to allow for the potential influence of climate change (following established practice and in line with guidance from the UK Climate Impacts Programme).

4.1 Flow estimation, River Earn

Based on catchment characteristics downloaded from the FEH Web Service (see Appendix A), flows in the River Earn at St Fillans were estimated using the FEH Statistical Method. This was chosen as:

- There is good data for the river from the downstream gauging station at Aberuchill for the River Earn
- The FARL value in the catchment is low (0.737). This is due to the very large volume of storage just upstream in Loch Earn. Hence, clearly catchment storage is a key influence on flowrates in the river. Upstream storage is not taken into account with the Rainfall Runoff or ReFH2 methods hence these would tend to overestimate the flow in the river.

Hence the FEH Statistical Method was used for flow estimation in the River Earn, which gave results as follows:

4.1.1 FEH Statistical Method

4.1.1.1 Estimation of Index Flood Qmed

In order to define the extent and water surface level of the 0.5% annual probability floodplain, we must first estimate the Index Flood, Q_{MED}, using the methods outlined in the Flood Estimation Handbook (FEH).

There are no observed records available to us for the River Earn at St Fillans. Hence, flows will be estimated using the Catchment Descriptor Method. This method uses catchment descriptors, and is adjusted using flow records from suitable donor sites. This method is described in Volume 3, Chapter 13, of the FEH.

The catchment descriptors define various physical and hydrological properties and characteristics of the land that forms the catchment upstream of the point of interest. The formula also includes variables that define the statistical rainfall pattern within the catchment. There is a further adjustment to the formula that accounts for the degree of urbanisation of the catchment.

The method produces the mean annual flood Q_{MED} – the index flood – which is the flood flow along the river or floodplain that is statistically “exceeded on average every other year”. It is roughly equivalent to the two-year flood. The exercise is done using the FEH and WINFAP software.

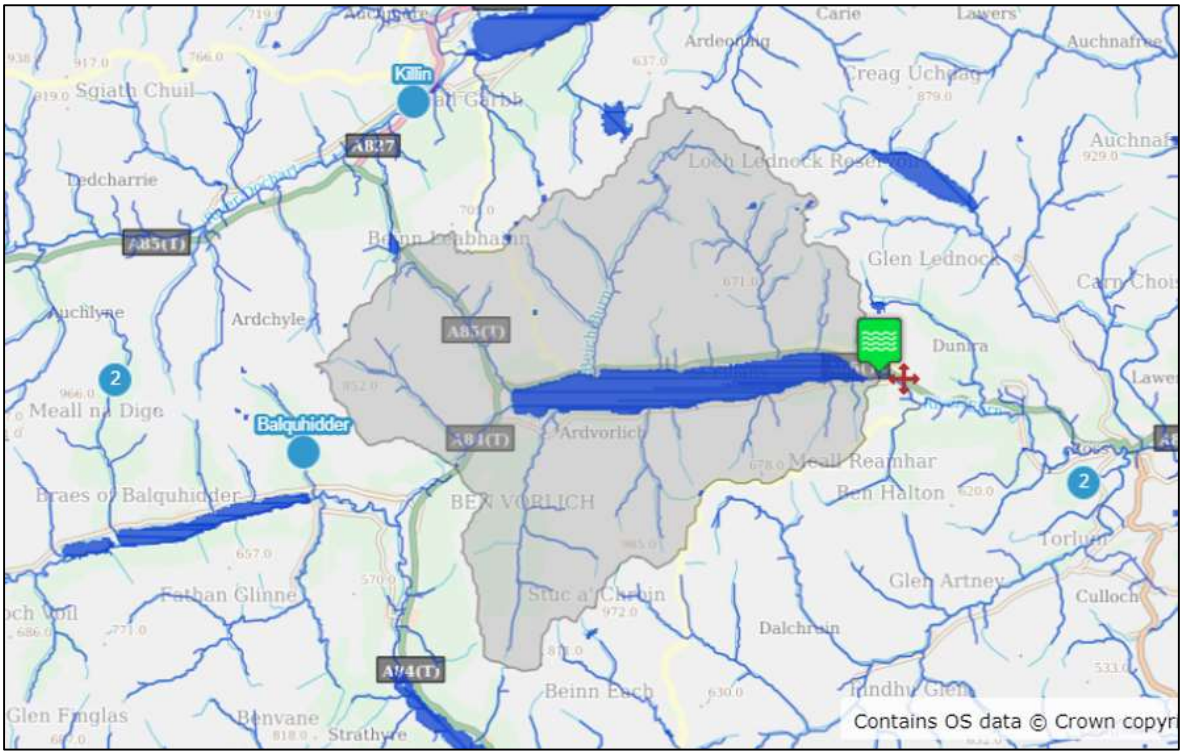


Figure 4.1 - River Earn catchment boundary from FEH web service, for catchment contributing to flow over the Hydro weir at St Fillans

The catchment descriptors used for the subject catchment are shown in Figure 4.2 below.

VERSION	"FEH CD-ROM"	Version	4.0.0	exported at	11:03:10 GMT
CATCHMENT	GB	269950	724100	NN 69950 24100	
CENTROID	GB	262244	724339	NN 62244 24339	
AREA	139.67				
ALTBAR	400				
ASPBAR	94				
ASPVAR	0.06				
BFIHOST	0.435				
BFIHOST19	0.471				
DPLBAR	11.32				
DPSBAR	231.7				
FARL	0.737				
FPEXT	0.0161				
FPDBAR	0.199				
FPLOC	0.977				
LDP	20.86				
PROPWET	0.67				
RMED-1H	10.3				
RMED-1D	47.9				
RMED-2D	67.8				
SAAR	1794				
SAAR4170	1805				
SPRHOST	43.46				
URBCONC1990	-999999				
URBEXT1990	0.0003				
URBLOC1990	-999999				
URBCONC2000	-999999				
URBEXT2000	0.0004				
URBLOC2000	-999999				
C	-0.01652				
D1	0.4762				
D2	0.41948				
D3	0.4098				
E	0.24378				
F	2.46315				
C(1 km)	-0.017				
D1(1 km)	0.558				
D2(1 km)	0.459				
D3(1 km)	0.409				
E(1 km)	0.247				
F(1 km)	2.403				

Figure 4.2 - Catchment Descriptors for the River Earn based on catchment shown in Figure 4.1

The WINFAP-FEH estimation of QMED from catchment descriptors is 38.172m^3/s.

4.1.1.2 Adjustment to Qmed based on selected donor sites

In order to make the estimation of Q_{MED} more accurate, it is necessary to use flow data from donor sites with similar hydrological characteristics, where gauged information does exist for an adequate number of years. An appropriate local adjustment to the estimate of Q_{MED} at the subject site is then made. The procedure uses several donor sites to estimate an adjusted Q_{MED} value which is then applied to the subject site.

As discussed, in this case, there is a very good donor site in the downstream Aberuchil gauging site on the River Earn. For the Aberuchil site, Q med = 38.172m^3/s

Using WINFAP software, the adjusted Q_{MED} value becomes 44.358m^3/s.

4.1.1.3 Flood Growth Curves

In order to estimate the magnitude of the range of possible statistical flood events which will occur in this catchment, for example the flood that will statistically occur once in 200 years (the flood flow which has a 0.5% chance of occurring in any one year), it is necessary to determine a flood growth curve and a flood frequency curve. This is done by forming a "Pooling Group", i.e. by selecting a group of other catchments across the UK which have very similar characteristics to the subject site and which have existing gauged flow records covering a statistically adequate number of years, and subjecting this group to statistical analysis.

The catchment descriptors from the FEH Web Service are entered as a data file to the WINFAP software, which collates a pooling group of similar catchments, subjects these to a statistical analysis, and calculates a range of flows representing floods of different probabilities at the subject site.

The results can vary slightly, depending upon the chosen weighting of the statistical analysis, but adopting the recommended "Generalised Logistic" (GL) technique, the watercourse flow results are as follows:

Return Period	Flow (m^3/s)
Q200	138.3

Table 4.1 Flow calculation results using FEH Statistical Method

The data and results for the WINFAP growth curve derivations are shown in Appendix A.

4.2 Applicable Flowrates

As previously discussed, only the FEH Statistical method was used for the River Earn, so the outcome is straightforward.

For the Struie Burn, both the Rainfall Runoff and the ReFH2 methods were used, so it is necessary to decide which is more appropriate. In this context it can be said that the ReFH2 method should be more reliable, being a method developed with the intention of replacing the RR method. However, as the result from the RR method is a higher flowrate, and in the interests of using the "precautionary principle" we will carry out flood estimation for the Struie Burn using the RefH2 method flows, but check the effects of applying the RR Method figure also. This is a very conservative estimate, being almost exactly double the flow predicted by ReFH2.

Return Period	Flow (m^3/s)
Q200	**138.3**
Q200 + CC	**186.7**

Table 4.4 Applicable flowrates

5.0 Predicted Flood Levels

Having estimated flood flows in the River Earn, flood modelling is required to analyse the watercourse channels to see what level the floodwater would reach in each during the critical 0.5% annual probability flood event.

5.1 River Earn flood modelling

5.1.1 Initial model

The watercourse between the sections is analysed using the HEC-RAS river analysis software, which is generally recognised by the relevant authorities as producing verifiable results. The watercourse has been surveyed on site over the length adjacent to the site and for some distance upstream and downstream (see Drawing AA-FR-196b-002 - cross section location plan).

Manning's n coefficients were selected for the site based on inspection of existing conditions, and comparison with tabulated descriptors in tables of Manning's values. Hence the following were selected:

- Main channel: clean, straight, no rifts or deep pools, (medium value of n = 0.030 applied)
- Floodplains: scattered brush, heavy weeds (normal value of n = 0.050), and medium to dense brush and trees in summer (normal value of n = 0.100), and tarmac (normal value 0.015)

Once appropriate Manning's values had been selected, boundary conditions at the downstream and upstream ends of the modelled length were modelled based on normal depth commensurate with average channel gradients at each end.

Modelling included 3 in-line structures. These were

- a footbridge near the upstream end of the river (at Section 5.9) where it emerges from Loch Earn
- a major dam and intake structure at Section 4.4 associated with the SSE hydro scheme in this area
- a masonry arch road bridge near the downstream end of the modelled stretch of the river (at Section 2.1)

It should be noted that for health and safety reasons, the surveyed cross sections include depths to the bed close to the bank at either side, with no measurement of deeper parts in the middle of the river, apart from the loch at the entrance to the river, where a remote-controlled boat with a sensor was used. When checks were taken of typical water depths by dipping from the two bridges, in both cases the actual depth of water was approximately 1 meter deeper than is shown on the surveyed cross sections. Hence the modelling results quoted below are conservative, and predicted flood levels downstream of the hydro weir could be nearly 1m lower if it had been possible to survey the complete river cross section.

Cross sections on the left bank generally extend as far as the main road, but do not include the ground around and behind the private properties on the opposite side of the road. To avoid glass walls on the model upstream of the hydro weir, the surveyed cross sections were extended using interpolated data from OS mapping. This was also done from cross sections on the south side of the unclassified road for the same reasons.

Results of the analysis are contained in Appendix D.

The analysis shows the level of the 0.5% (Q200) flood level using the flood flows derived above:

Section Number	Q200 Flood Level (m AOD)	Q200 + 35% Flood Level (m AOD)
6.1	99.81	100.44
6	99.76	100.40
5.8	99.77	100.41
5	99.77	100.41
4.5	99.71	100.32
4.3	98.35	98.75
4	98.32	98.73
3	98.28	98.69
2.2	98.25	98.65
2	96.15	96.44
1	95.57	95.85

Table 4.1 – Predicted flood levels

The results show that for a 1-in-200-year event, flow in the River Earn would exceed channel capacity and flood out in places over both banks in the stretch of the river which passes through the village of St Fillans. There will also be flow along the secondary channel at the south side of the site, with depths of up to 2.3m indicated at the cross sections modelled.

At the dam itself, the river is predicted to stay in-bank even for the Q200 plus climate change scenario, and downstream of the hydro dam, flood flows are generally in-bank (there are some glass walls on the modelling results for the right bank further downstream, which are a reflection of the lack of survey data on the right bank rather than any particular indication of flooding).

As might t be expected, given that the river reach that passes the site is controlled by the downstream weir structure, velocities of flow are relatively low. For the 1 in 200 year flow, velocities in the stretch adjacent to the site range from 0.44m/s to 1./11m/s. Hence, the danger of e.g. erosion of bridge abutments at the pedestrian footbridge is limited.

Appendix D contains details of the HECRAS analysis, including plots of the watercourse cross-sections and the water surface levels appropriate to the values above.

The predicted flood extents for the Q200 and Q200+CC flows are indicated in Figure 4.1 below, and show that the site would in theory be accessible from the pedestrian bridge up to the 1 in 200 year event, but that there would be effectively an island in the middle of the site on which the proposed building would stand. For future flooding taking into account climate change, the building would remain flood free but on a relatively small island with limited freeboard.

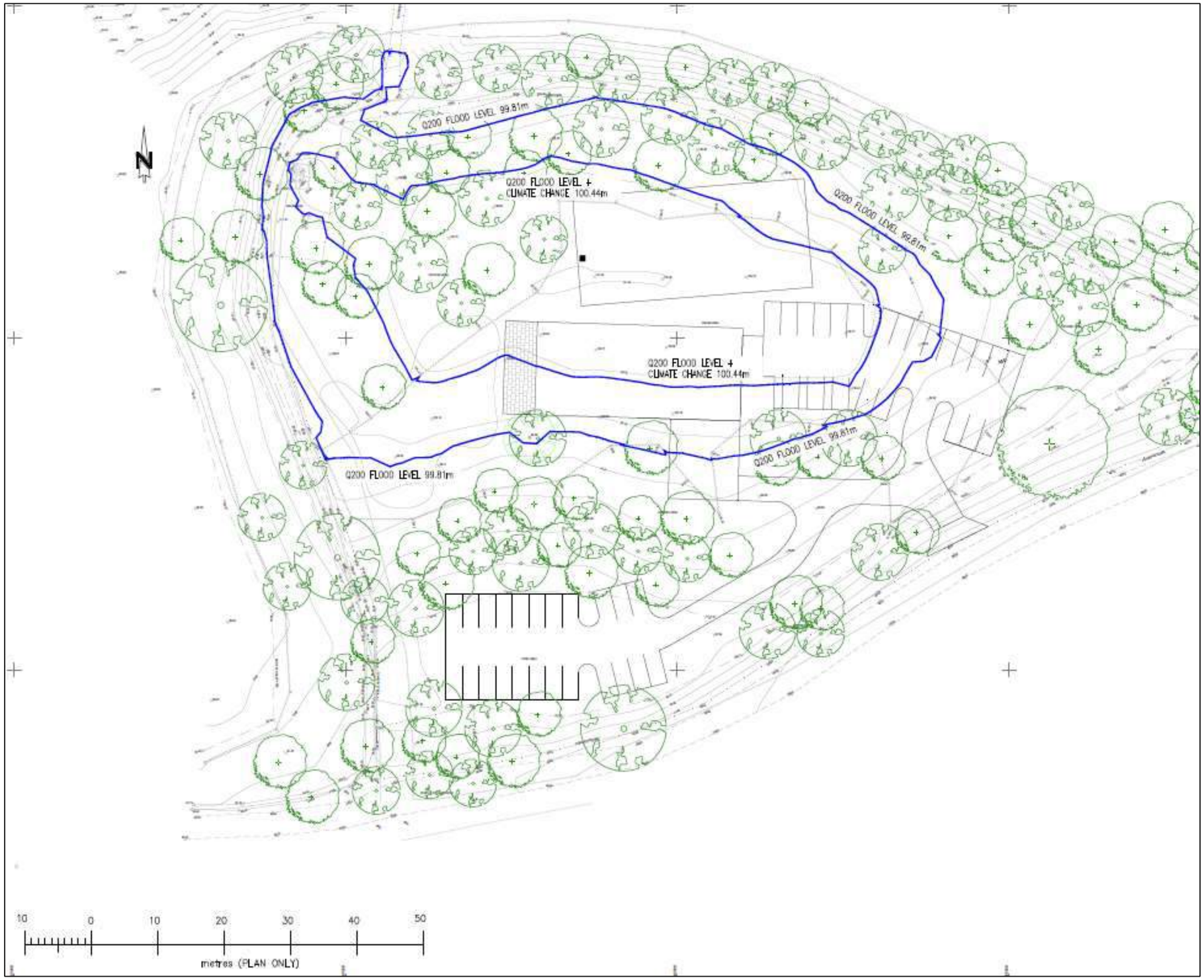


Figure 4.1 - Estimated flood extents

5.1.2 Sensitivity Analysis

Sensitivity analyses were carried out to check the effect of a variation in flow rate, of variation in Manning's 'n' values, and of variation in downstream boundary conditions. Only levels upstream of the hydro intake/weir are critical to the analysis for the subject site, and hence only Cross Sections from 5.0 to 6.1 are listed below and in the following sections regarding sensitivity analysis.

The following table compares predicted flood levels for the Q200 and Q200 + 35% (Q200 plus climate change) flood events.

Section Number	Flood Level (m AOD)		Variation in level(m)
	Q200	+35%	
5	99.81	100.44	0.65
5.8	99.76	100.40	0.64
6	99.77	100.41	0.64
6.1	99.77	100.41	0.64

Table 5.2a – Sensitivity analysis – variation in flowrate

The above results show that an increase in flood flow of 35% would have a moderate effect on flow depths. This would cause out of bank flow on the left banks, resulting in depths of up to 300mm on the main A85 road through St Fillans. On the south side of the site, predicted flood depths on the unclassified road would increase from up to 0.75m up to nearly double at 1.4m (at Section 5.8) but in either case the southern approach would be impassable.

As there are good records of flow in the River Earn catchment, it is not anticipated that flow estimates are likely to be particularly inaccurate.

Sensitivity of the model to changes in Manning's *n* were tested, by increasing the initial (normal) values for watercourse sections by 0.01:

Section Number	Flood Level (m AOD)		Variation in level (m)
	Q200	Manning's n increased by 0.01	
5	99.81	99.78	0.03
5.8	99.76	99.79	0.03
6	99.77	99.79	0.02
6.1	99.77	99.83	0.06

Table 5.2b – Sensitivity analysis – variation in Manning's n

The above results show that the increase in roughness values does not result in significant variation in predicted flood levels.

Sensitivity of the model to changes in the downstream boundary conditions were tested, by increasing the initial gradient determining normal depth by 10%.

Section Number	Flood Level (m AOD)		Variation in level (m)
	Q200	Downstream Gradient increased by 10%	
5	99.81	99.77	0.04
5.8	99.76	99.77	0.01
6	99.77	99.76	0.01
6.1	99.77	99.81	0.01

Table 5.2c – Sensitivity analysis – variation in downstream gradient

As can be seen in the results above, the increase in downstream gradient does not significantly affect predicted flood levels near the site.

5.1.3 Flood levels including bridge blockage scenario

The flows in the reach adjacent to the subject site are clearly controlled by the downstream hydro weir, and hence by inspection, a bridge blockage at the masonry arch bridge at the downstream modelled length of the river (at Section 2.1) would have no effect on flood levels at the subject site.

The hydro weir is an open-topped and relatively wide structure, with a smooth ogee type profile. Hence, it is not likely that a significant blockage due to debris could occur at the weir. Therefore, no bridge blockage scenario is relevant to this flood risk assessment.

6.0 Proposed mitigation and management of flood risk

The results of the flow estimation and flood modelling exercise for the 1 in 200 year flood scenarios indicate that there is a significant flood risk to the site, which would affect significant parts of the site, and would frequently make vehicular access from the south impassable. However, the site has well designed and safe pedestrian access from the north for all flows up to and including the 1 in 200 year flood.

The building should be sited on the highest part of the site in order to make it as safe as possible. This will ensure that it will be safe from present day floods in excess of the 1 in 200 year event, and that it will also sit above the future flood of 1 in 200 year including the effects of climate change.

An example of how the proposed mitigation strategy could be enacted is set out in AA-FR-196b-003 - Mitigation Strategy Plan, an extract of which is set out in Figure 5.1 below, along with AA-FR-196b-004 Key Features Plan, an extract of which is set out as Figure 5.2:

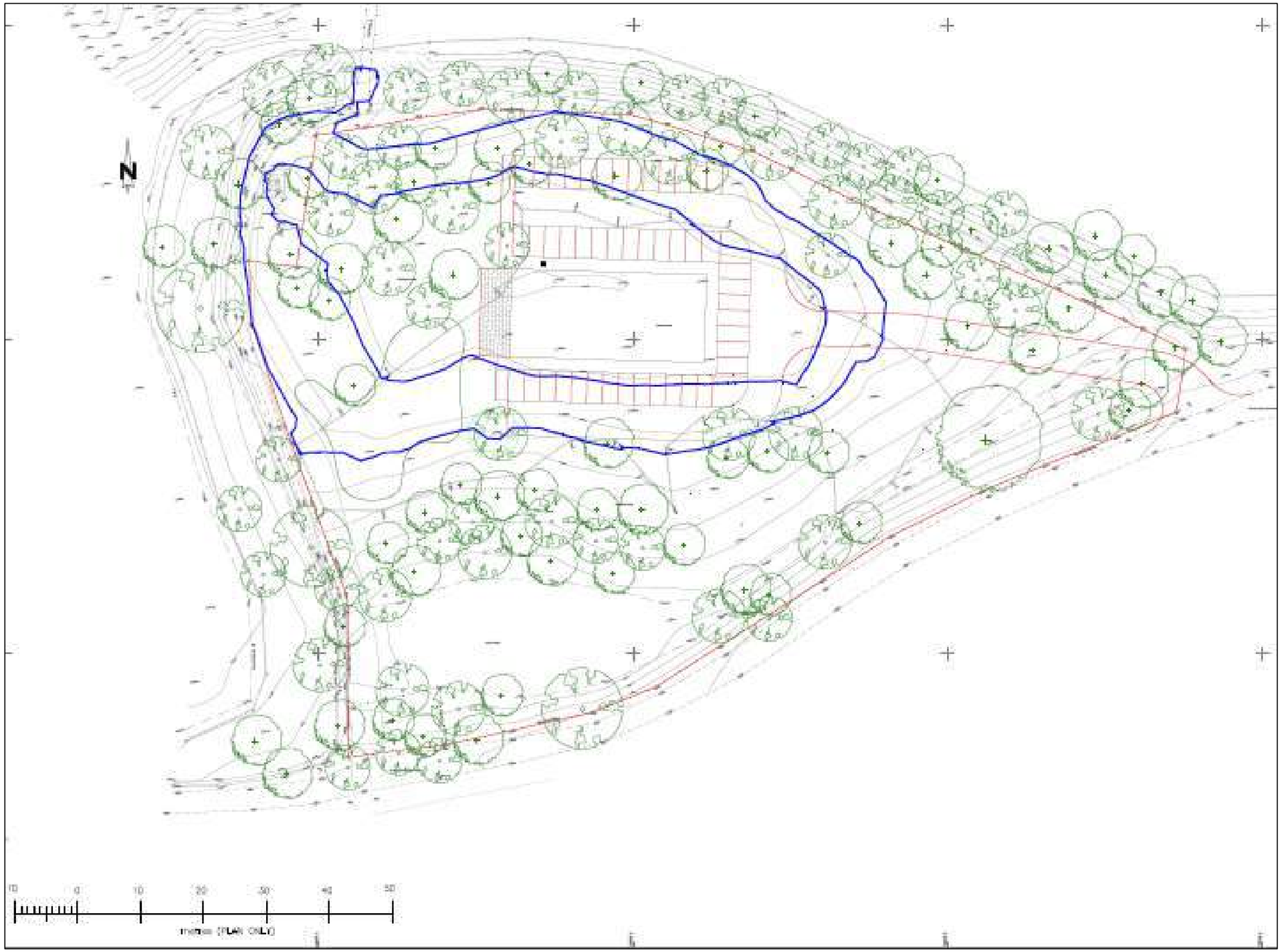


Figure 5.1 - Extract from AA-FR-196b-003 Mitigation Strategy

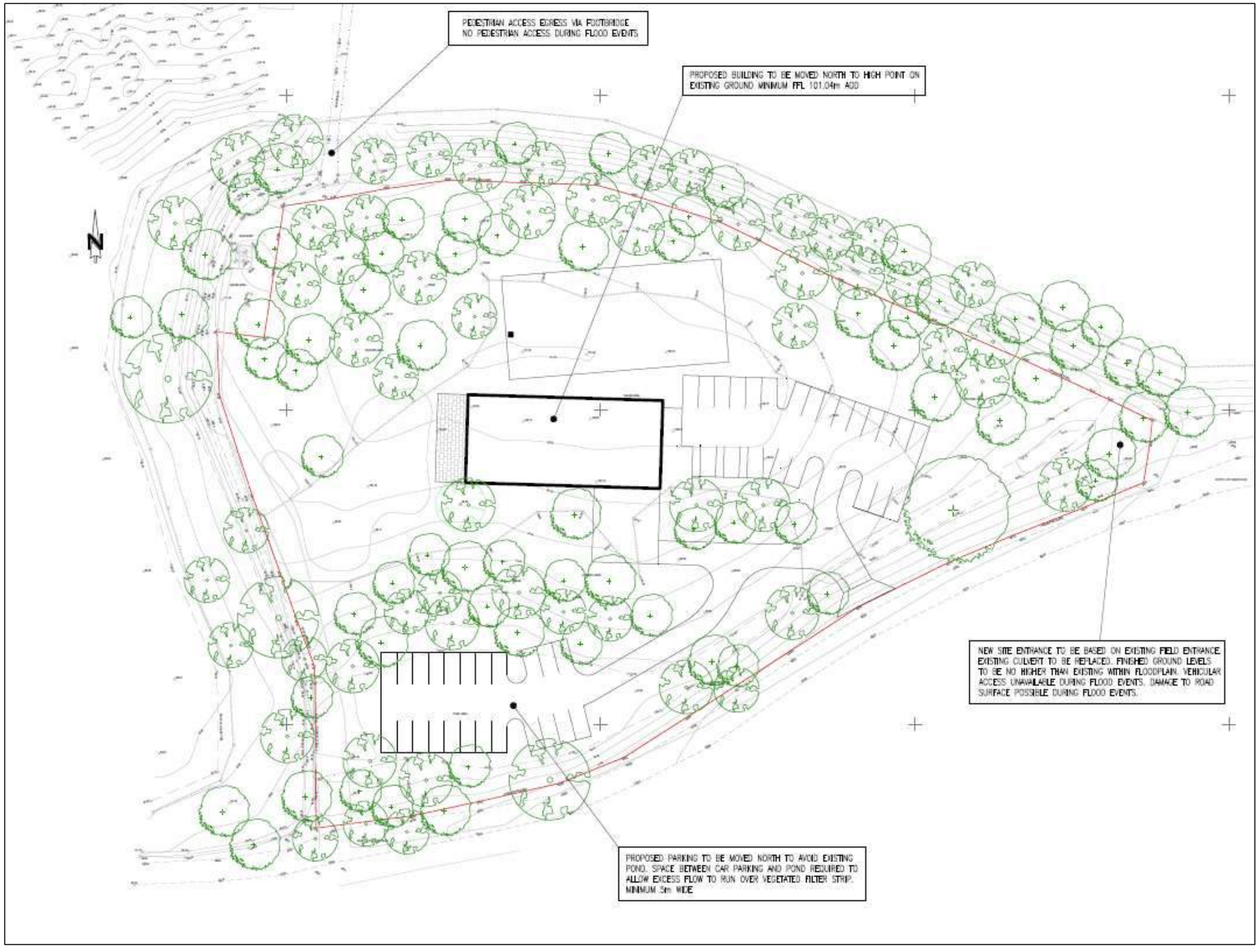


Figure 5.2 - Extract from AA-FR-196b-004 Key Features Plan

Fortunately, the predicted flood flows are not associated with high velocities or with sudden changes in level. Extreme floods of the magnitude considered in this report would come on gradually with sufficient warning to allow the site to be closed in advance. This is very important as the greatest risk would be of anyone accessing the site in the dark and becoming disoriented while the facility is surrounded by floodwater. For this reason, a site-specific Flood Emergency Plan should be developed, and the resulting plan issued to all relevant stakeholders involved with managing the proposed facility.

There should be a minimum freeboard above predicted flood levels of at least 600mm, relative to the Q200+CC level. Hence, the minimum flood level recommended for the completed building is 101.04m AOD.

It should be noted that the proposed vehicular access should not be raised higher than existing ground levels along the southern flood channel, as previously discussed. Hence in Drawing AA-FR-196b-003 - Mitigation Strategy Plan, the proposed access route is indicated to follow the line of the existing field access. The field access passes over a culvert which may be in a poor condition and unlikely to be a suitable basis for a regular vehicular access. Hence it is recommended that as part of the preparatory works, a new pipe culvert of a similar diameter is installed. It should be noted that the proposed access will be subject to occasional flooding and should therefore have a reasonably resilient construction. It is possible however that it will be subject to damage from time to time as a result of flood event.

Although there is no indication that the proposed building would be at direct risk of flooding, it would be prudent to ensure that the floor level of the proposed building has a suitable upstand above surrounding finished ground levels of at least 300mm, and (as a further precaution) that buildings should be constructed using water resilient methods and materials.

In order to avoid any increase in flood risk to third party property, surface water runoff generated by the site should be dealt with following the principals of Sustainable Urban Drainage Systems.

Based on our findings and the above recommendations, it is possible to say that the development of the proposed site will not cause an increase in flood risk to third party property, and that there will be no resultant loss of flood storage.

7.0 Conclusions

- The site will in parts be prone to flooding on occasion. Hence, the proposed building should be sited on the highest part of the site in order to make it as safe as possible.
- There should be a minimum freeboard above predicted flood levels of at least 600mm, relative to the Q200+CC level. Hence, the minimum flood level recommended for the completed building is 101.04m AOD
- The floor level of the buildings should have a suitable upstand above surrounding finished ground levels of at least 300mm, commensurate with good building practice.
- A site-specific Flood Emergency Plan should be developed, and the resulting plan issued to all relevant stakeholders involved with managing the proposed facility.
- As a precaution, buildings should be constructed using water resilient methods and materials.
- The proposed vehicular access should not be raised higher than existing ground levels along the southern flood channel. Also, a new pipe culvert of a similar diameter to the existing one is installed at the access.
- It should be noted that the proposed access will be subject to occasional flooding and should therefore have a reasonably resilient construction.
- In order to avoid any increase in flood risk, surface water runoff generated by the site should be dealt with following the principals of Sustainable Urban Drainage Systems.
- The development of the proposed site will not cause an increase in flood risk to third party property, and that there will be no resultant loss of flood storage.

We have used our best engineering judgement in this Assessment, and our calculations have been carried out using the Flood Estimation Handbook, WINFAP, HECRAS and other standard hydrological methods. We note that as with all such Flood Risk Assessments the accuracy of the results is only as good as the data and statistical techniques used.

8.0 References

i. Flood Estimation Handbook, Duncan Reed, CEH Institute of Hydrology, Wallingford, 1999.

ii. WINFAP-FEH, Version 4.1, Wallingford Hydrosolutions, 2020

iii. HEC-RAS, Version 5.0.7, March 2019, US Army Corps of Engineers Hydrologic Engineering Center.

iv. Revitalised Flood Hydrograph (ReFH2) design package for both catchment and plot scale applications. Version.2.3, Wallingford Hydrosolutions, 2019

v. Flood Modeller Version 4.5, Jacobs 2019

vi. Climate change allowances for flood risk assessment in land use planning, SEPA, April 2019

vii. Scottish Planning Policy, Scottish Government, Crown Copyright, December 2020

viii. The Scottish Government (2000), Planning Advice Note PAN 61: Planning and Sustainable Urban Drainage Systems

ix. The Scottish Government (2004, Planning Advice Note PAN 69: Planning and Building Standards Advice on Flooding

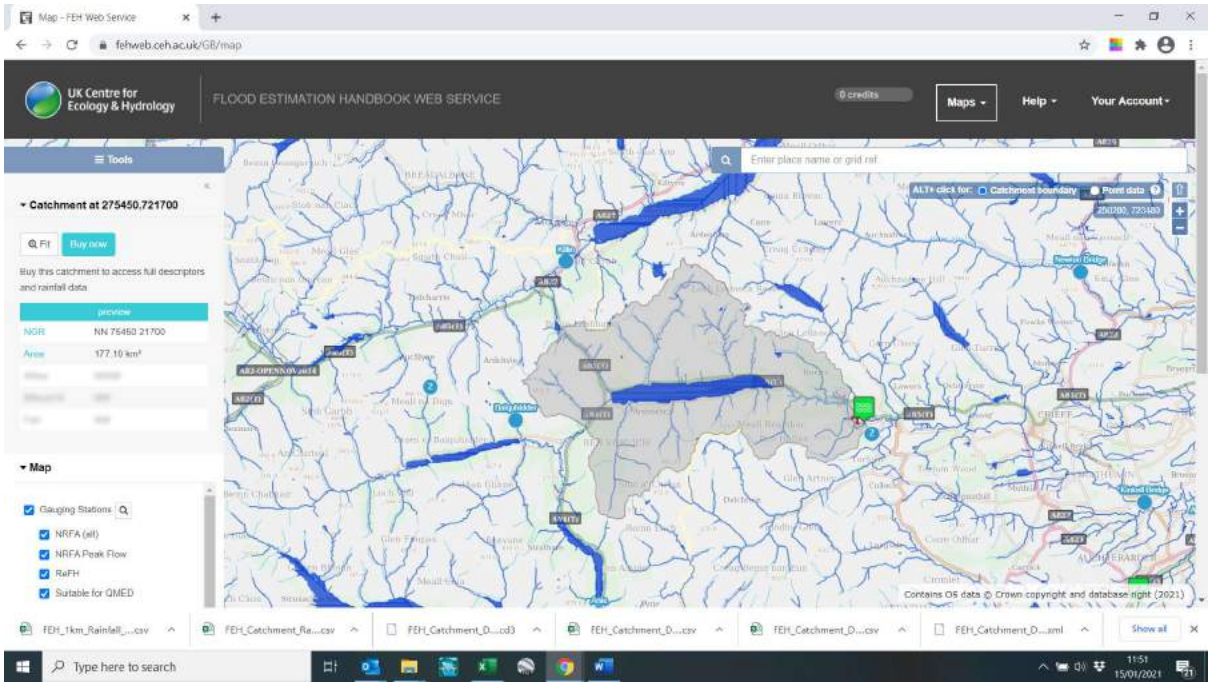
x. BS 8533-2011 Assessing and Managing Flood Risk in Development Code of Practice4, BSi October 2011

APPENDICES

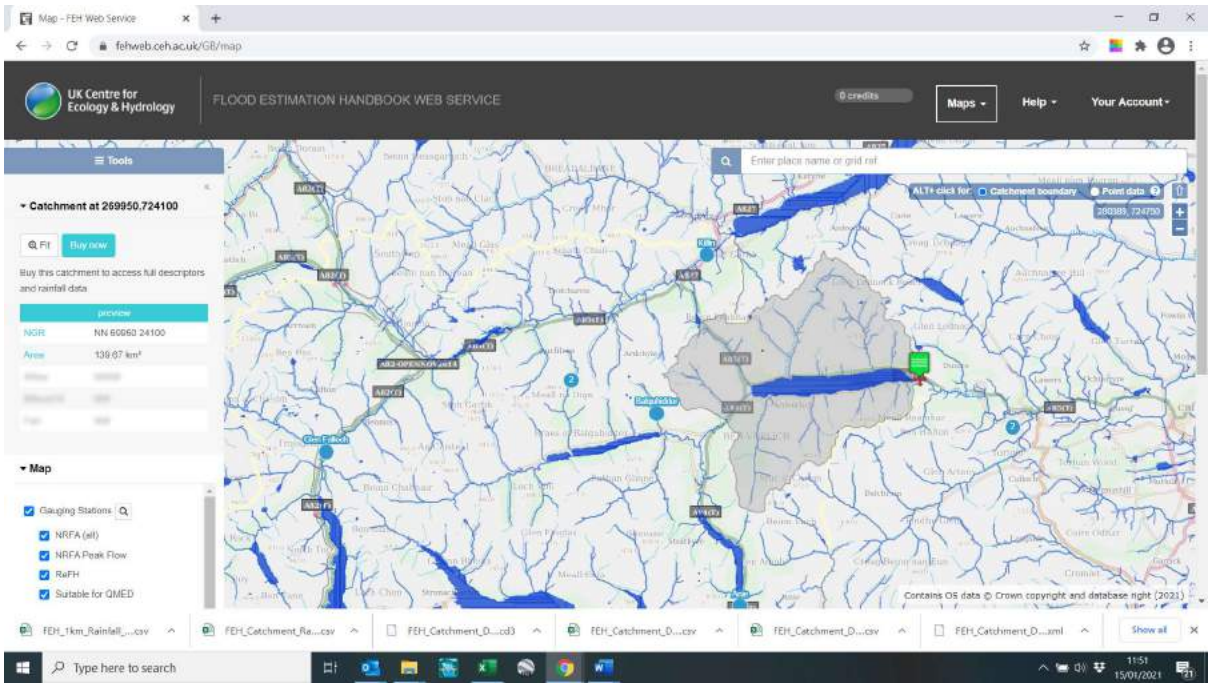
Appendix A

River Earn:
Catchment characteristics from the FEH Web Service and Results of WINFAP flow estimation (FEH Statistical Method)

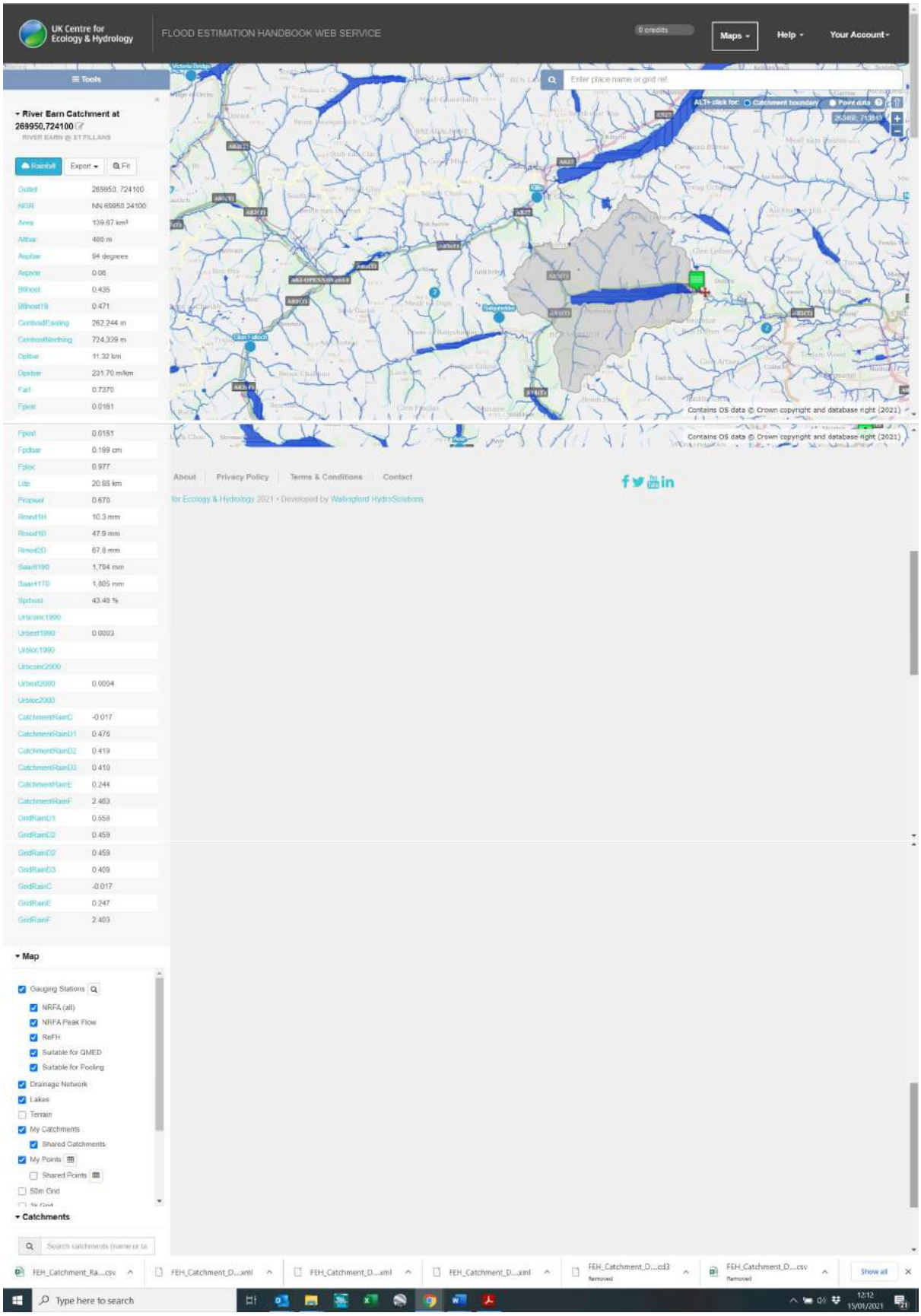
Comparison, River Earn catchments:



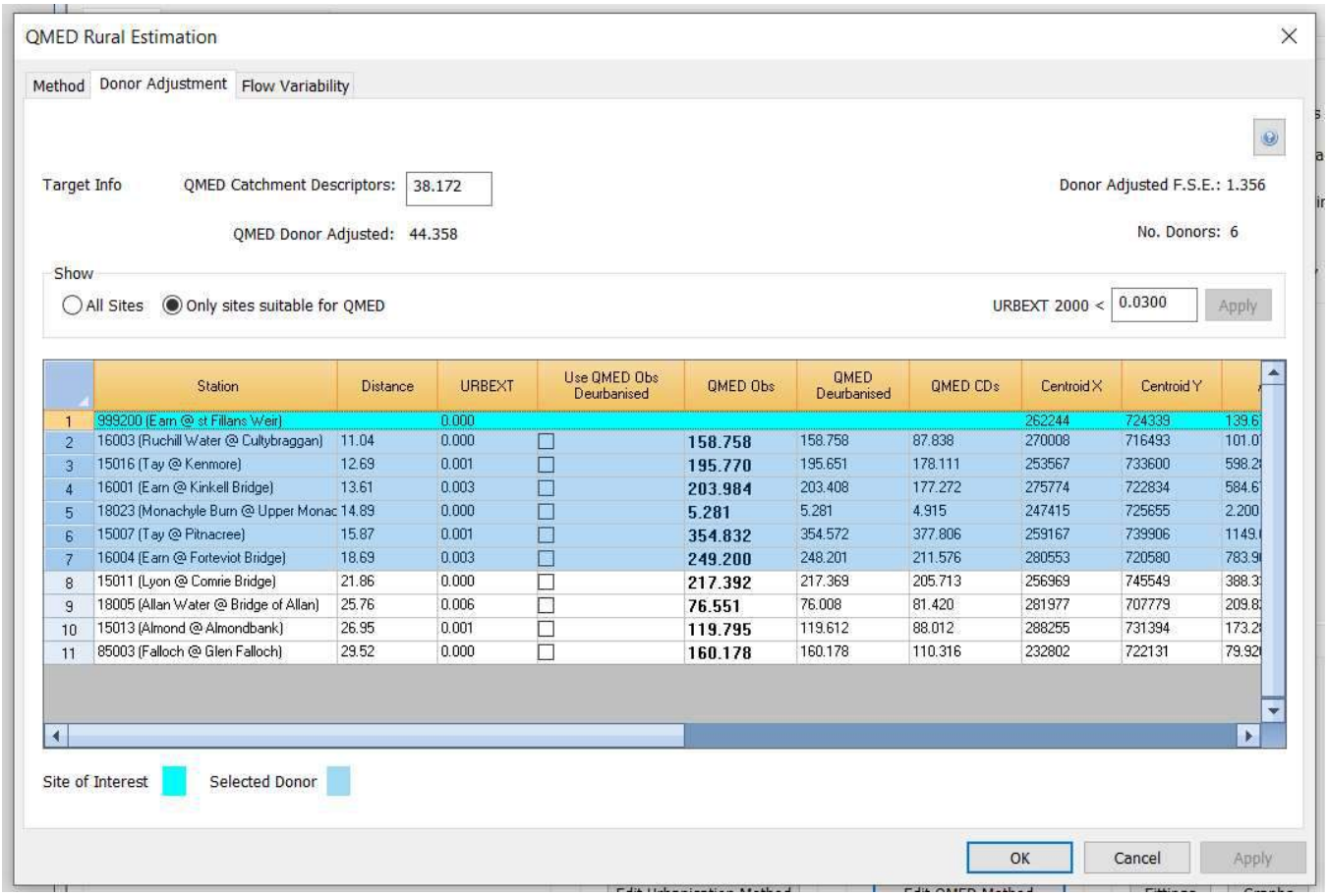
River Earn at Aberuchill gauging station

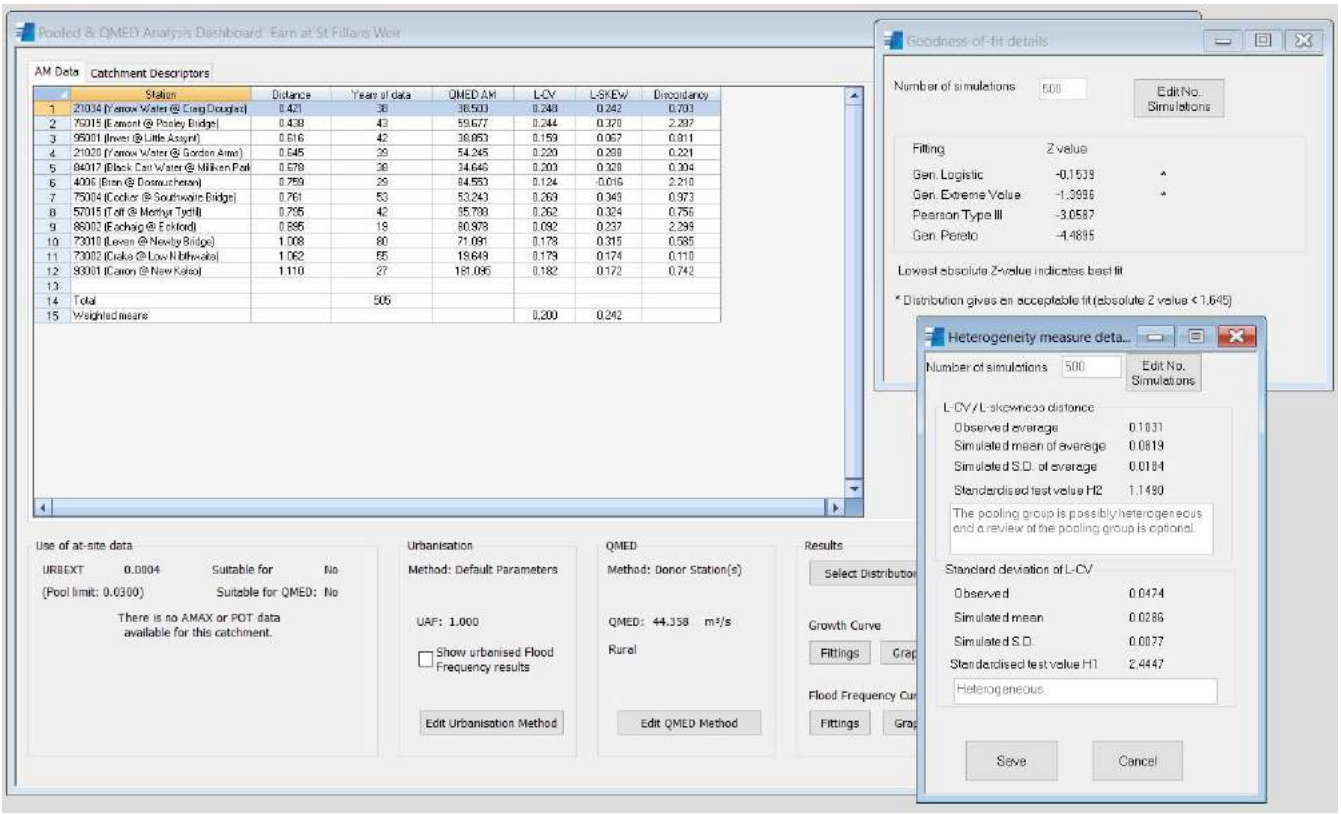


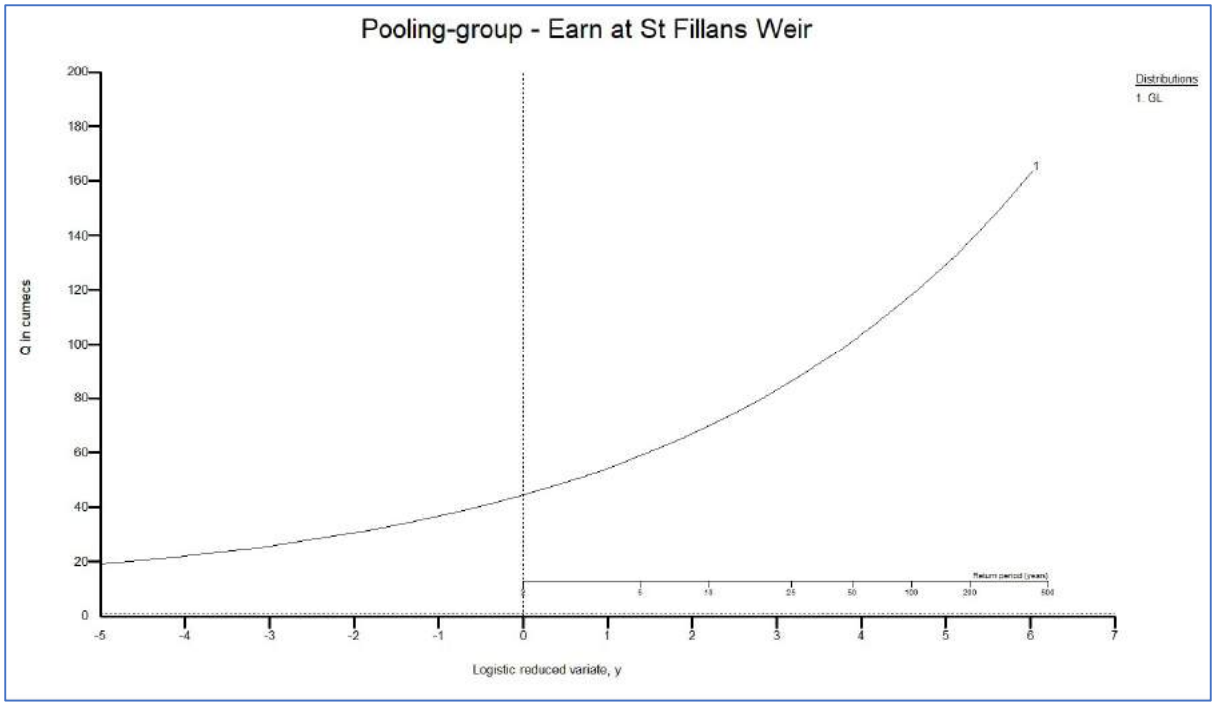
River Earn at St Fillans Hydro Weir

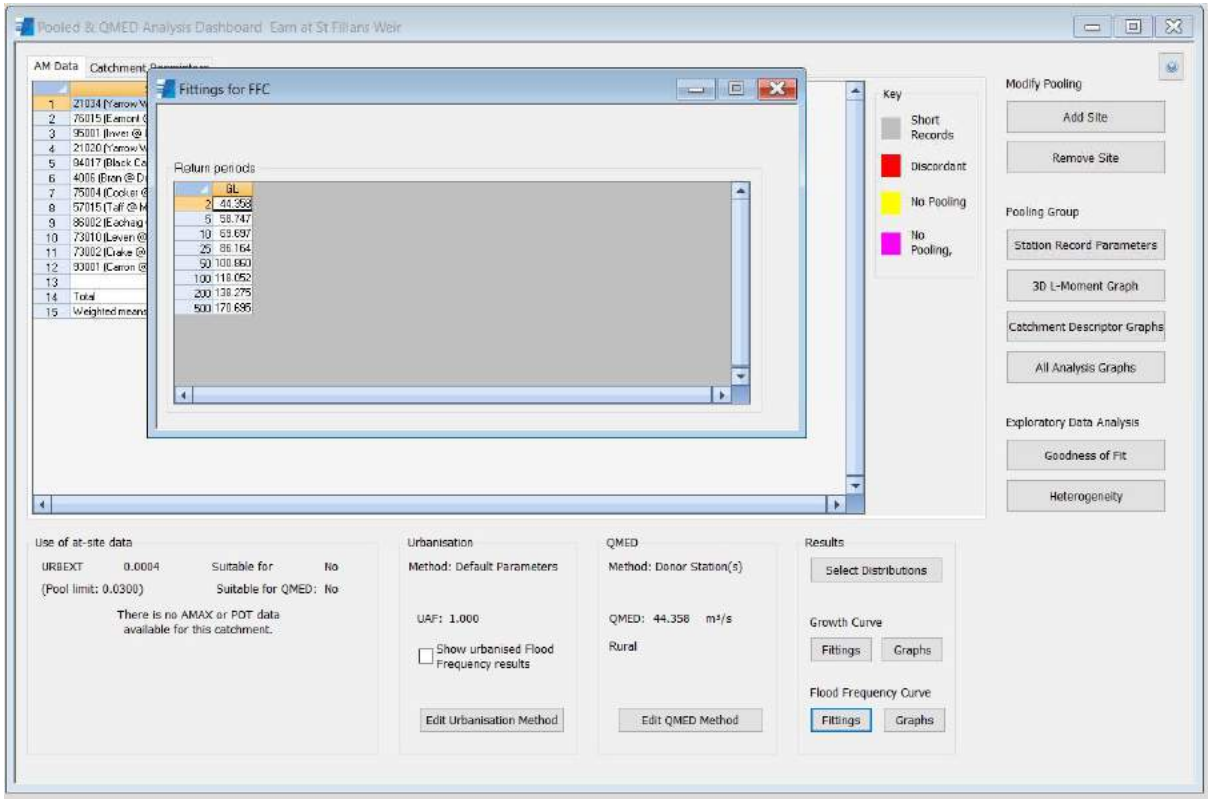


Catchment descriptors for the River Earn at St Fillans


QMED Rural Estimation
Method
Donor Adjustment
Flow Variability
Target Info
QMED Catchment Descriptors: 38.172
Donor Adjusted F.S.E.: 1.356
QMED Donor Adjusted: 44.358
No. Donors: 6
Show
All Sites
Only sites suitable for QMED
URBEXT 2000 < 0.0300
Apply
Station
Distance
URBEXT
Use QMED Obs Deurbanised
QMED Obs
QMED Deurbanised
QMED CDs
Centroid X
Centroid Y
1 999200 (Earn @ st Fillans Weir) 0.000 262244 724339
2 16003 (Ruchill Water @ Cultybraggan) 11.04 0.000 158.758 158.758 87.838 270008 716493
3 15016 (Tay @ Kenmore) 12.69 0.001 195.770 195.651 178.111 253567 733600
4 16001 (Earn @ Kinkell Bridge) 13.61 0.003 203.984 203.408 177.272 275774 722834
5 18023 (Monachyle Burn @ Upper Monac 14.89 0.000 5.281 5.281 4.915 247415 725655
6 15007 (Tay @ Pitnacree) 15.87 0.001 354.832 354.572 377.806 259167 739906
7 16004 (Earn @ Forteviot Bridge) 18.69 0.003 249.200 248.201 211.576 280553 720580
8 15011 (Lyon @ Comrie Bridge) 21.86 0.000 217.392 217.369 205.713 256969 745549
9 18005 (Allan Water @ Bridge of Allan) 25.76 0.006 76.551 76.008 81.420 281977 707779
10 15013 (Almond @ Almondbank) 26.95 0.001 119.795 119.612 88.012 288255 731394
11 85003 (Falloch @ Glen Falloch) 29.52 0.000 160.178 160.178 110.316 232802 722131
Site of Interest
Selected Donor
OK
Cancel
Apply


Pooled & QMED Analysis Dashboard - Earn at St Fillans Weir
AM Data
Catchment Descriptors
Station
Distance
Years of data
QMED AM
L-CV
L-SKEw
Discordancy
1 21034 (Yarrow Water @ Craig Douglas) 0.421 38 38.503 0.248 0.242 0.703
2 79015 (Earwont @ Pooley Bridge) 0.438 43 59.677 0.244 0.320 2.397
3 95001 (Inver @ Little Assynt) 0.616 42 39.953 0.159 0.067 0.911
4 21020 (Yarrow Water @ Gordon Arms) 0.645 39 54.245 0.220 0.298 0.221
5 84017 (Black Cart Water @ Milliken Park 0.679 39 34.646 0.200 0.328 0.304
6 4006 (Brin @ Dosmuchearn) 0.759 29 84.553 0.124 0.016 2.210
7 75004 (Cocker @ Southwaite Bridge) 0.761 53 53.243 0.269 0.348 0.973
8 57015 (Tolt @ Merthyr Tydfil) 0.795 42 95.709 0.262 0.324 0.756
9 86002 (Eachaig @ Eckford) 0.895 18 80.978 0.092 0.237 2.299
10 73010 (Leven @ Newby Bridge) 1.008 80 71.091 0.178 0.315 0.585
11 73002 (Duddon @ Low Nibthwaite) 1.062 55 19.649 0.179 0.174 0.110
12 93001 (Carron @ New Kelso) 1.110 27 161.086 0.182 0.172 0.742
13
14 Total 505
15 Weighted means 0.200 0.242
Use of at-site data
URBEXT 0.0004 Suitable for No
(Pool limit: 0.0300) Suitable for QMED: No
There is no AMAX or POT data available for this catchment.
Urbanisation
Method: Default Parameters
UAF: 1.000
Show urbanised Flood Frequency results
Edit Urbanisation Method
QMED
Method: Donor Station(s)
QMED: 44.358 m³/s
Rural
Edit QMED Method
Results
Select Distribution
Growth Curve
Fittings
Flood Frequency Cur
Fittings
Goodness-of-fit details
Number of simulations 500
Edit No. Simulations
Fitting
Z value
Gen. Logistic -0.1539 *
Gen. Extreme Value -1.3996 *
Pearson Type III -3.0587
Gen. Pareto -4.4695
Lowest absolute Z-value indicates best fit
* Distribution gives an acceptable fit (absolute Z value < 1.645)
Heterogeneity measure deta...
Number of simulations 500
Edit No. Simulations
L-CV / L-skewness distance
Observed average 0.1031
Simulated mean of average 0.0819
Simulated S.D. of average 0.0184
Standardised test value H2 1.1490
The pooling group is possibly heterogeneous and a review of the pooling group is optional.
Standard deviation of L-CV
Observed 0.0474
Simulated mean 0.0286
Simulated S.D. 0.0077
Standardised test value H1 2.4447
Heterogeneous
Save
Cancel

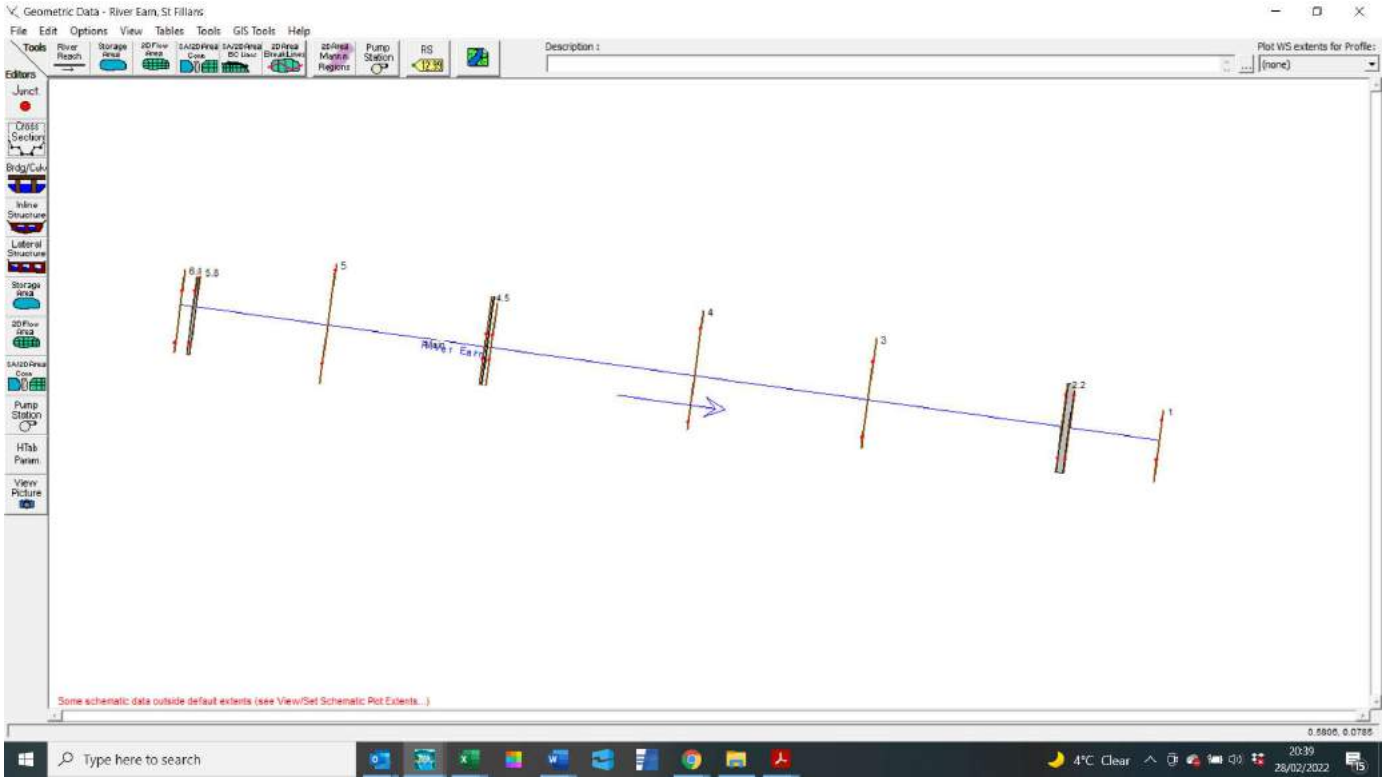


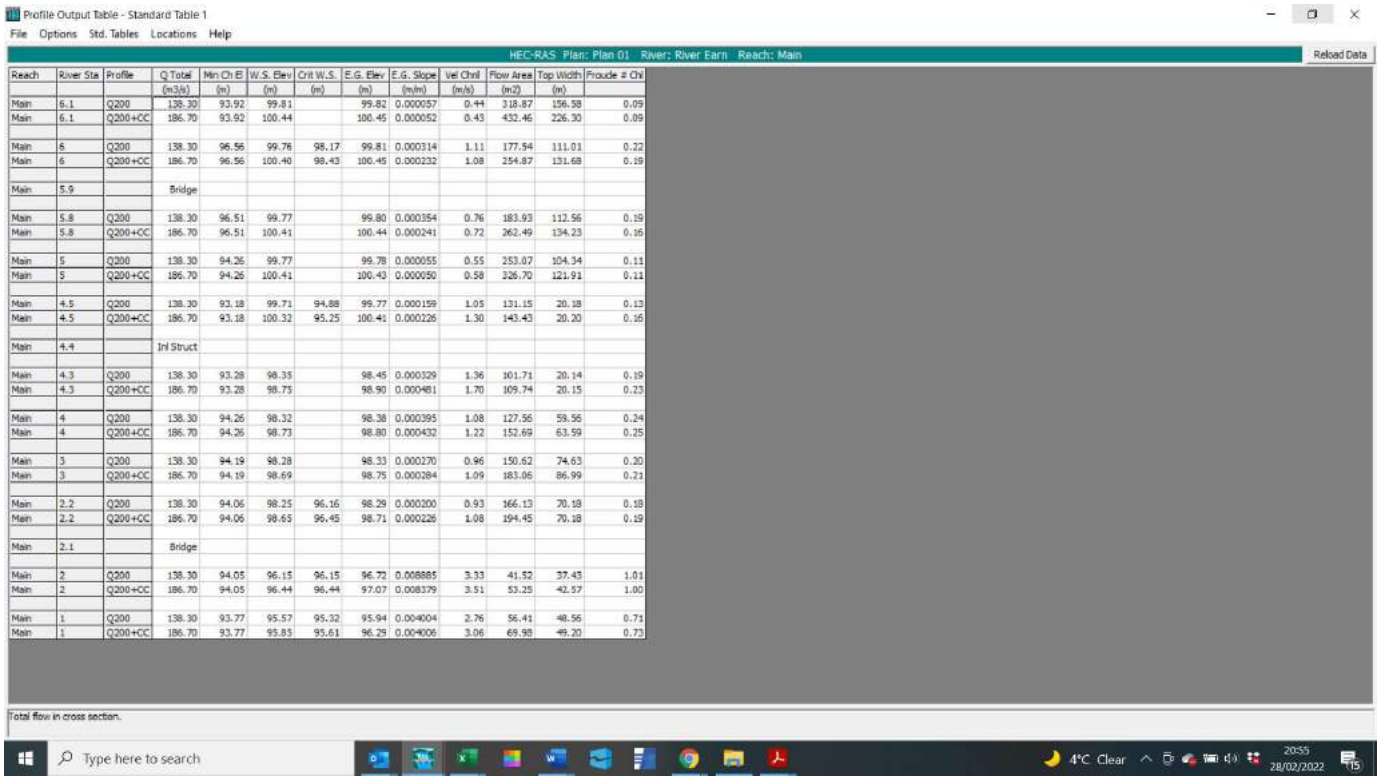


(Fittings with WINFAP-defined donors)

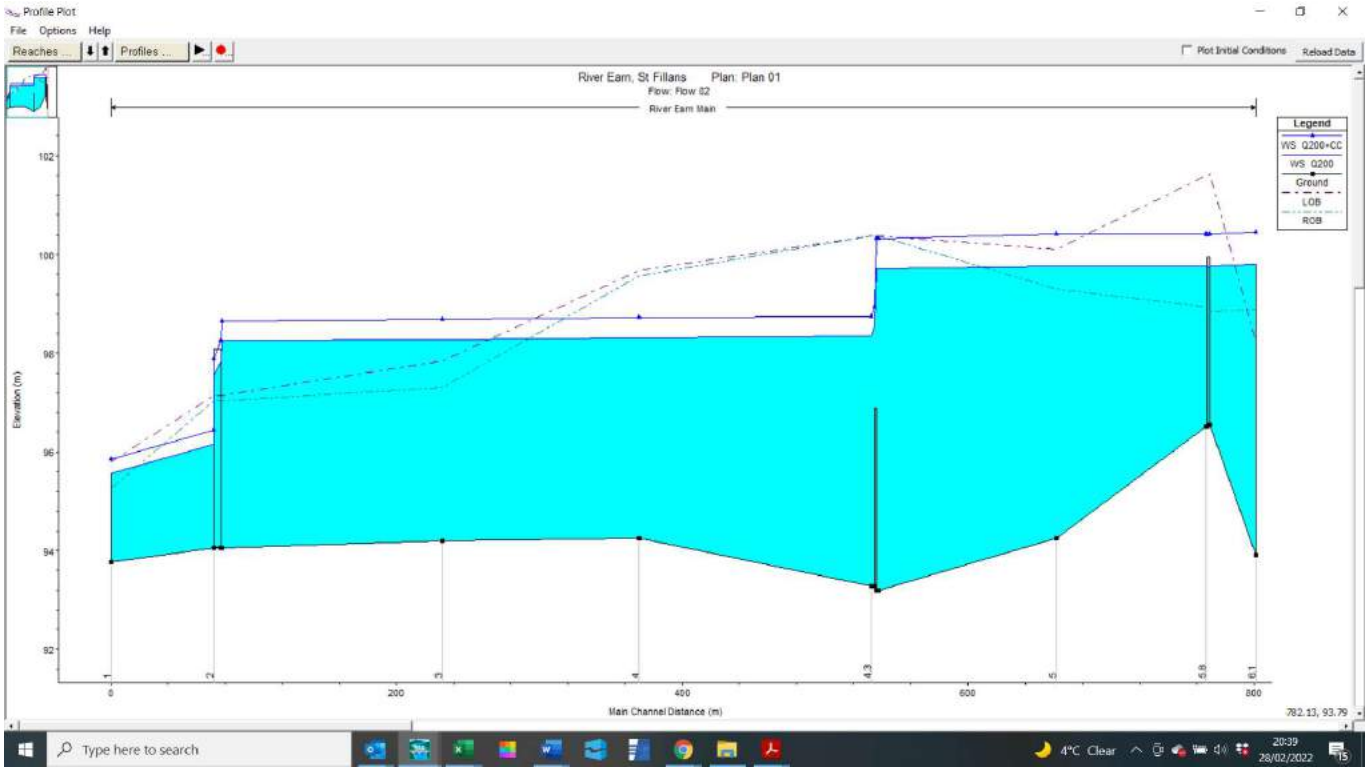
Appendix B

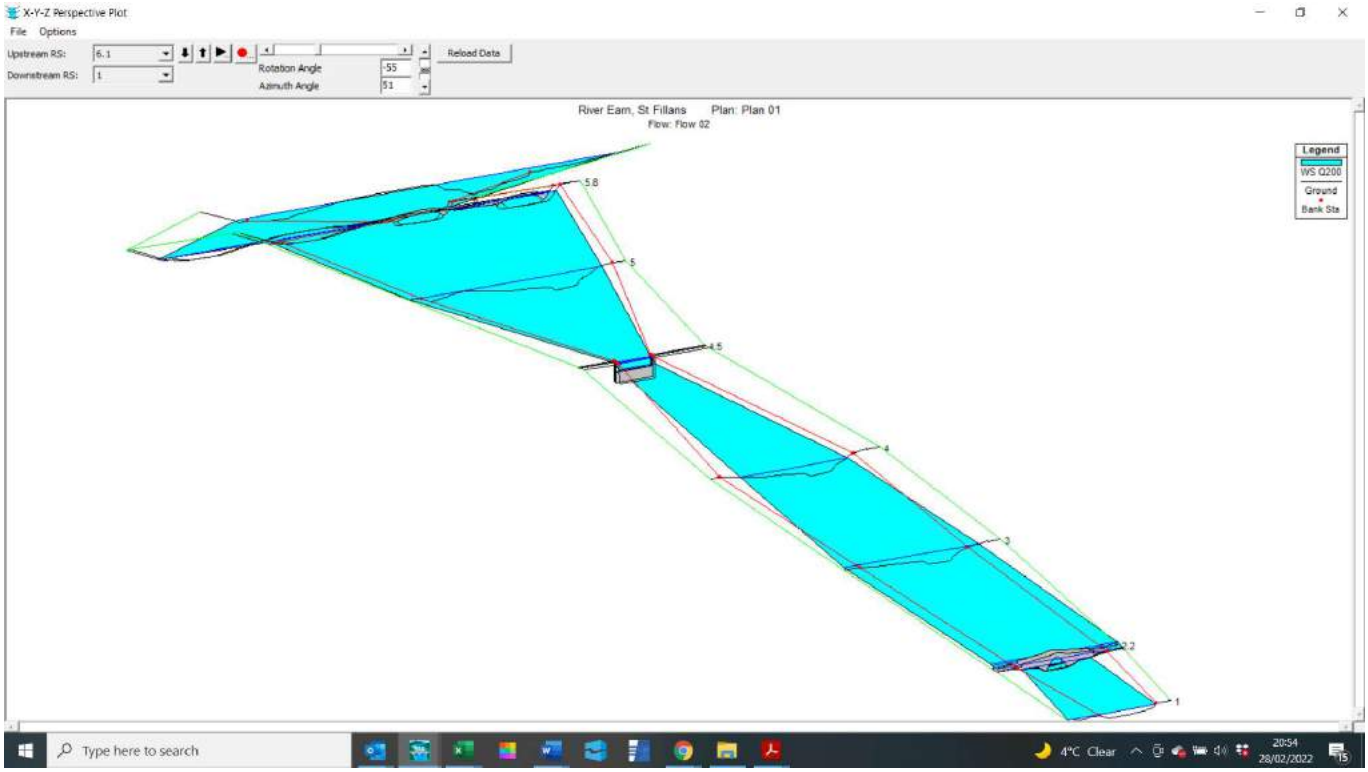
Output from HECRAS model

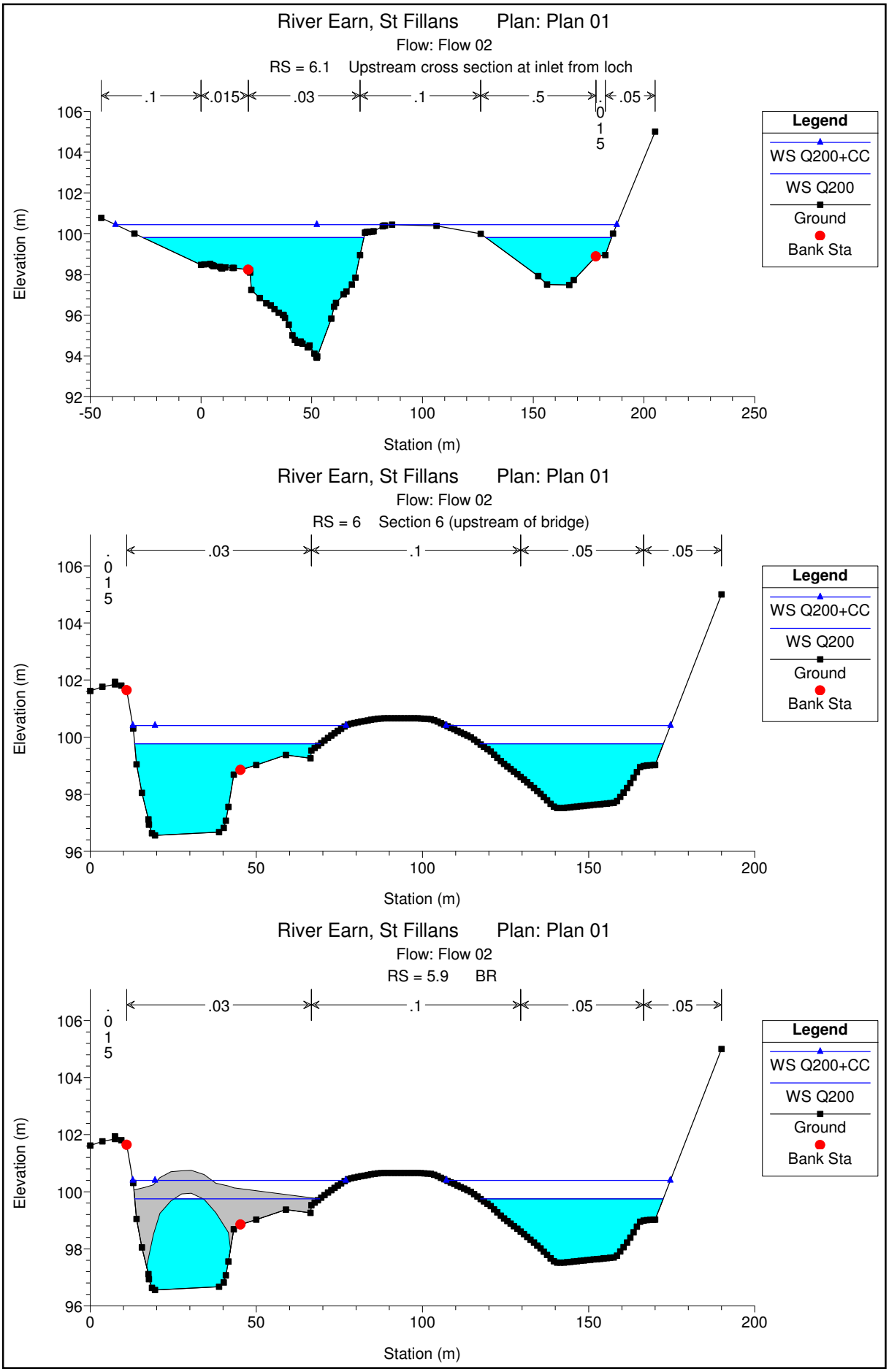


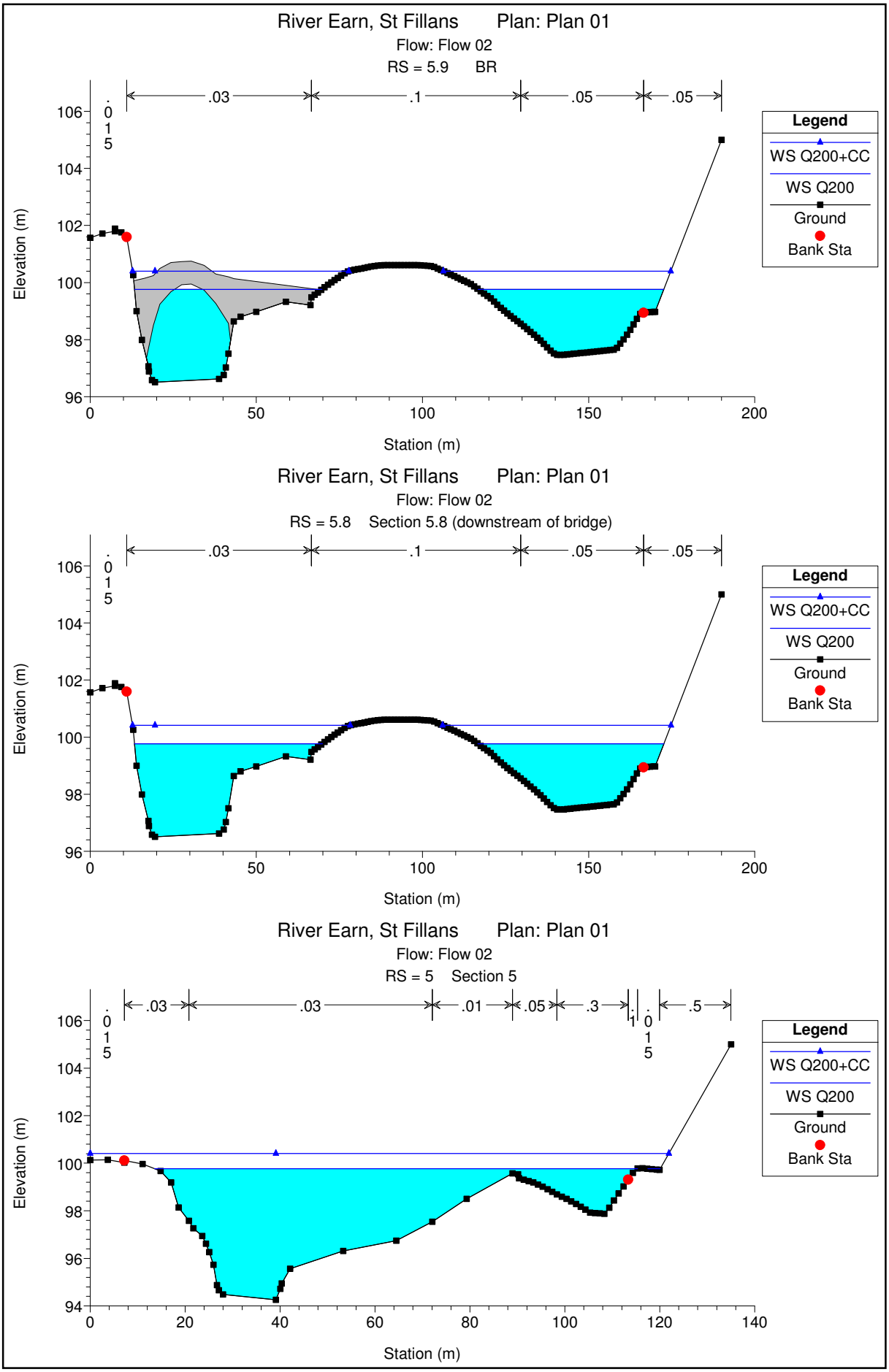


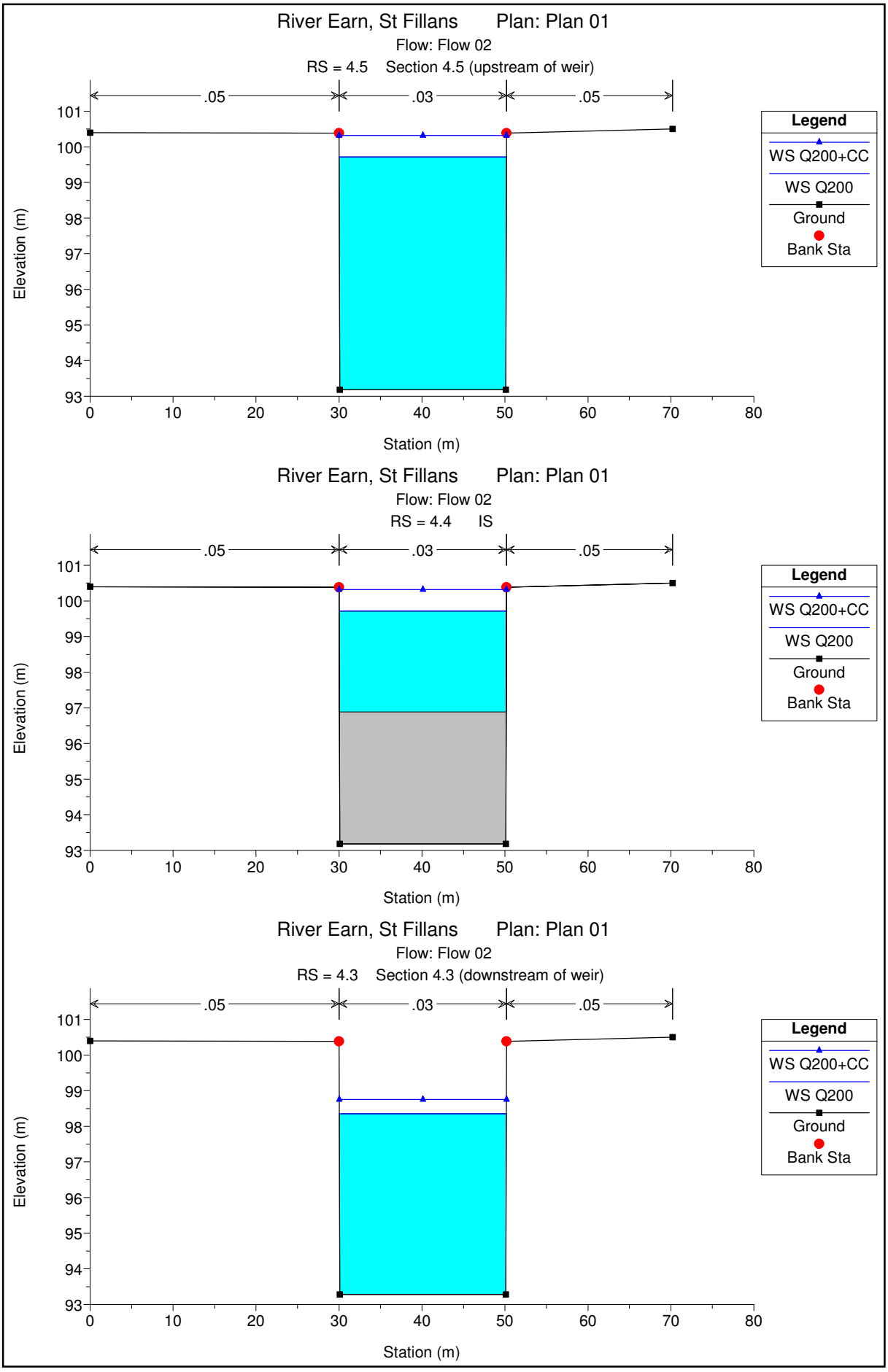
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
Main	6.1	Q200	138.30	93.92	99.81		99.82	0.000057	0.44	318.87	156.58	0.09
Main	6.1	Q200+CC	186.70	93.92	100.44		100.45	0.000052	0.43	432.46	226.30	0.09
Main	6	Q200	138.30	96.56	99.76	98.17	99.81	0.000314	1.11	177.54	111.01	0.22
Main	6	Q200+CC	186.70	96.56	100.40	98.43	100.45	0.000232	1.08	254.87	131.68	0.19
Main	5.9		Bridge									
Main	5.8	Q200	138.30	96.51	99.77		99.80	0.000354	0.76	183.93	112.56	0.19
Main	5.8	Q200+CC	186.70	96.51	100.41		100.44	0.000241	0.72	262.49	134.23	0.16
Main	5	Q200	138.30	94.26	99.77		99.78	0.000055	0.55	253.07	104.34	0.11
Main	5	Q200+CC	186.70	94.26	100.41		100.43	0.000050	0.58	326.70	121.91	0.11
Main	4.5	Q200	138.30	93.18	99.71	94.88	99.77	0.000159	1.05	131.15	20.18	0.13
Main	4.5	Q200+CC	186.70	93.18	100.32	95.25	100.41	0.000226	1.30	143.43	20.20	0.16
Main	4.4		Inl Struct									
Main	4.3	Q200	138.30	93.28	98.35		98.45	0.000329	1.36	101.71	20.14	0.19
Main	4.3	Q200+CC	186.70	93.28	98.75		98.90	0.000481	1.70	109.74	20.15	0.23
Main	4	Q200	138.30	94.26	98.32		98.38	0.000395	1.08	127.56	59.56	0.24
Main	4	Q200+CC	186.70	94.26	98.73		98.80	0.000432	1.22	152.69	63.59	0.25
Main	3	Q200	138.30	94.19	98.28		98.33	0.000270	0.96	150.62	74.63	0.20
Main	3	Q200+CC	186.70	94.19	98.69		98.75	0.000284	1.09	183.06	86.99	0.21
Main	2.2	Q200	138.30	94.06	98.25	96.16	98.29	0.000200	0.93	166.13	70.18	0.18
Main	2.2	Q200+CC	186.70	94.06	98.65	96.45	98.71	0.000226	1.08	194.45	70.18	0.19
Main	2.1		Bridge									
Main	2	Q200	138.30	94.05	96.15	96.15	96.72	0.008885	3.33	41.52	37.43	1.01
Main	2	Q200+CC	186.70	94.05	96.44	96.44	97.07	0.008379	3.51	53.25	42.57	1.00
Main	1	Q200	138.30	93.77	95.57	95.32	95.94	0.004004	2.76	56.41	48.56	0.71
Main	1	Q200+CC	186.70	93.77	95.85	95.61	96.29	0.004006	3.06	69.98	49.20	0.73

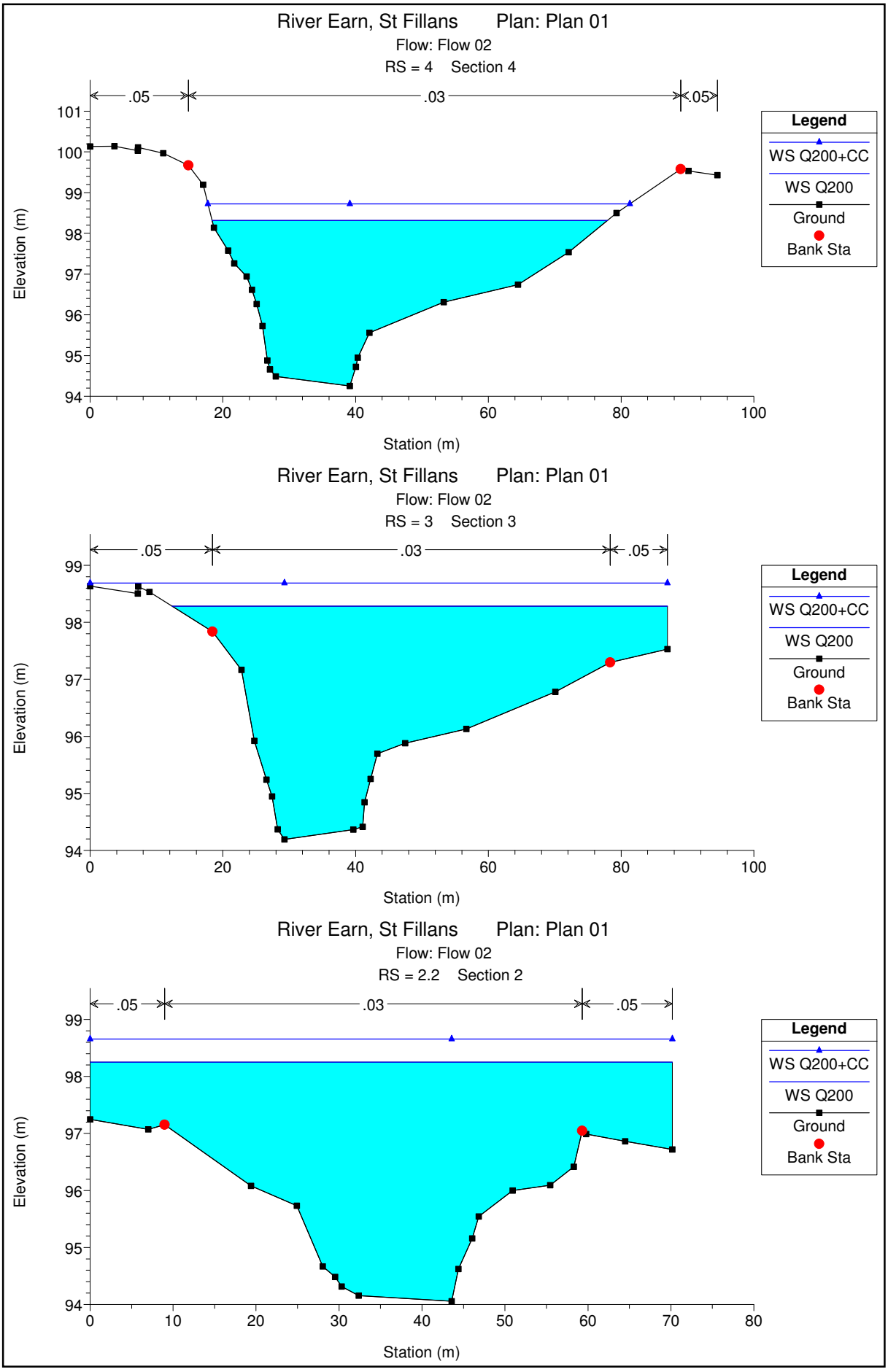

Profile Plot
File Options Help
Reaches ...
Profiles ...
Plot Initial Conditions
Reload Data
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
River Earn Main
Legend
WS Q200+CC
WS Q200
Ground
LOB
ROB
Elevation (m)
Main Channel Distance (m)
782.13, 93.79
Type here to search
4°C Clear
20:39
28/02/2022

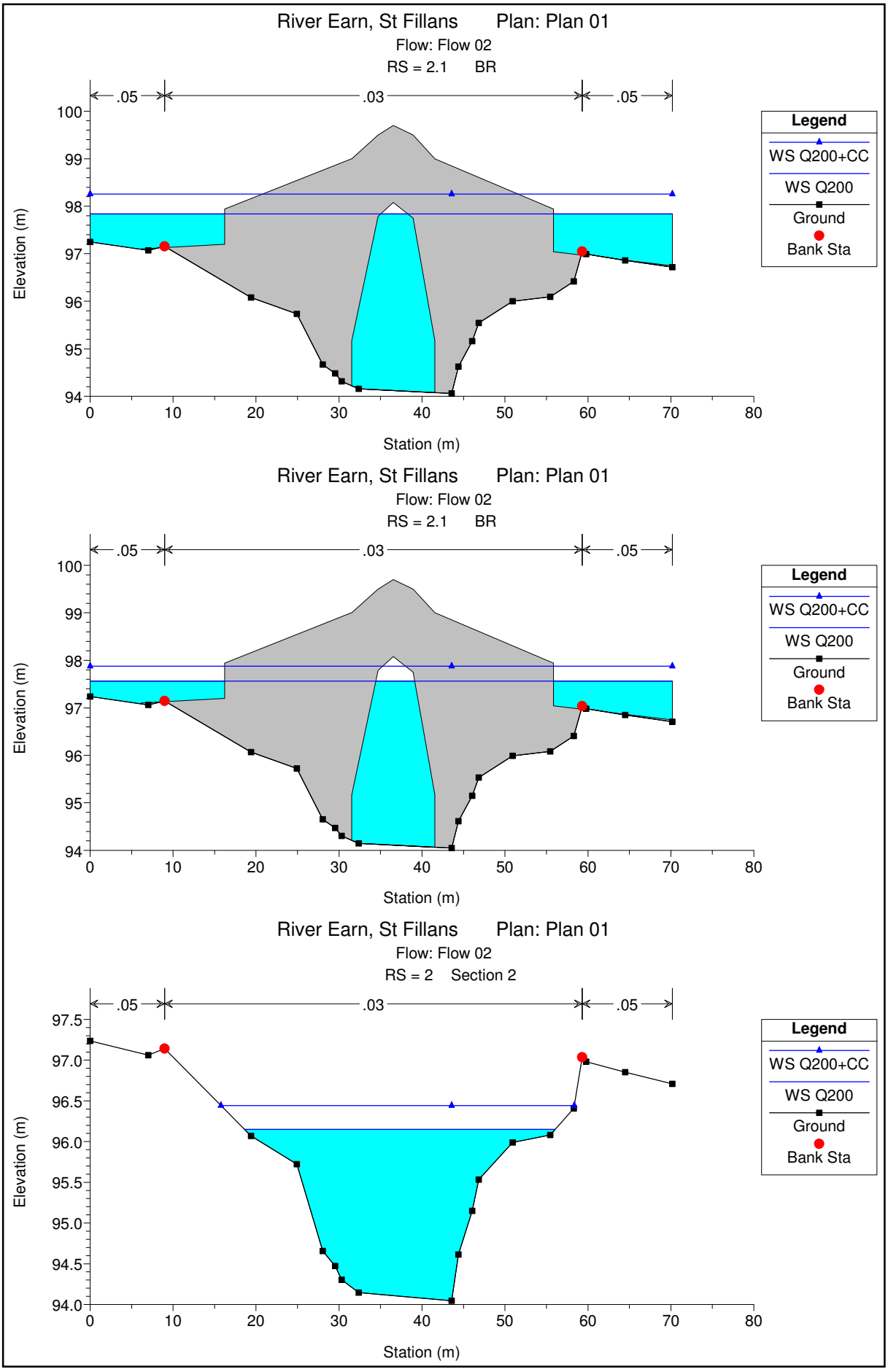

X-Y-Z Perspective Plot
File Options
Upstream RS:
Downstream RS:
Rotation Angle
Azimuth Angle
Reload Data
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
Legend
WS Q200
Ground
Bank Sta
Type here to search
4°C Clear
20:54
28/02/2022

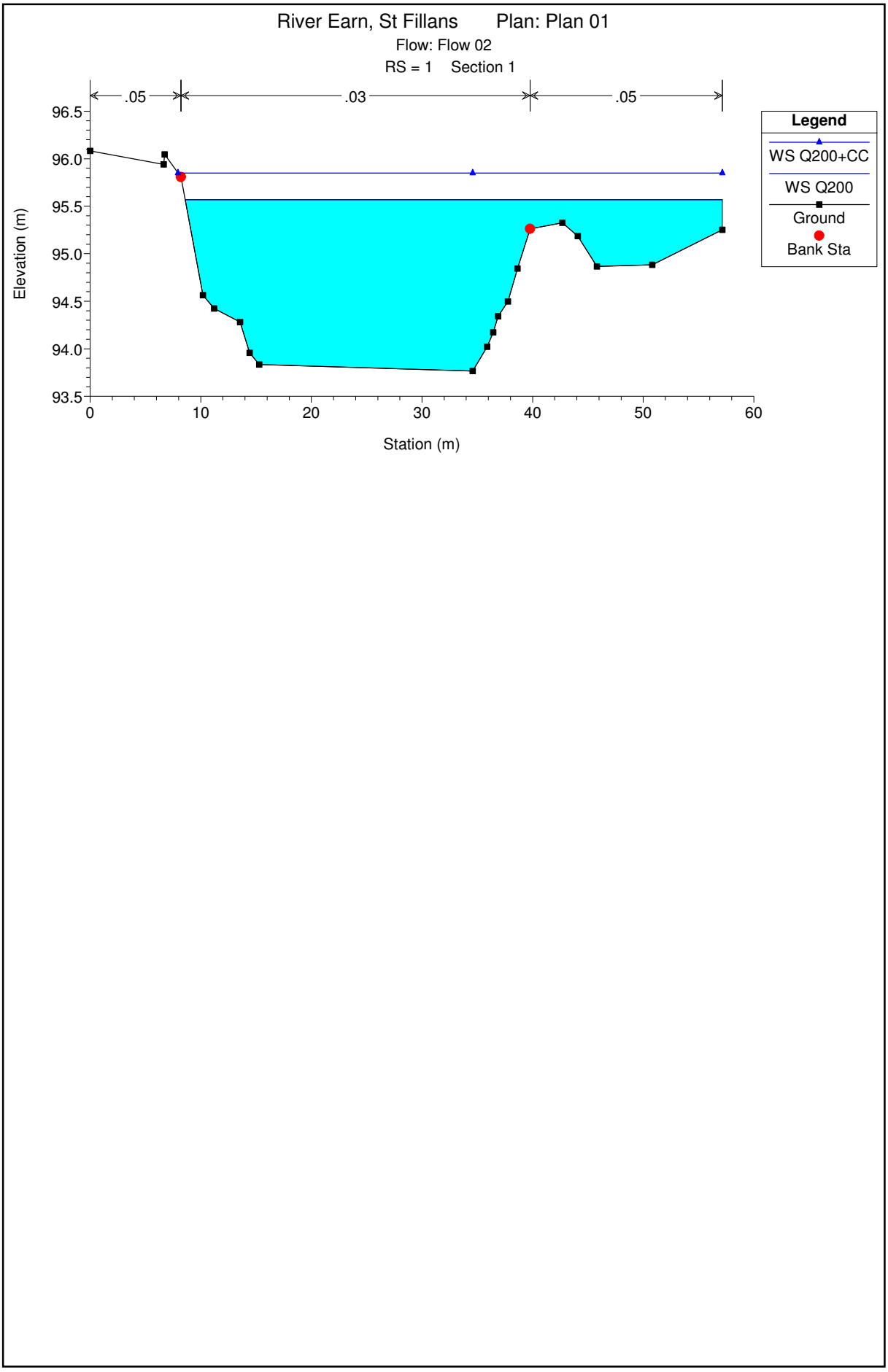

River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 6.1 Upstream cross section at inlet from loch
.1
.015
.03
.1
.5
.05
.0
1
5
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
Elevation (m)
Station (m)
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 6 Section 6 (upstream of bridge)
.03
.1
.05
.05
.0
1
5
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
Elevation (m)
Station (m)
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 5.9 BR
.03
.1
.05
.05
.0
1
5
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
Elevation (m)
Station (m)


River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 5.9 BR
.03
.1
.05
.05
.015
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 5.8 Section 5.8 (downstream of bridge)
.03
.1
.05
.05
.015
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 5 Section 5
.03
.03
.01
.05
.3
.1
.5
.015
.015
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta


River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 4.5 Section 4.5 (upstream of weir)
.05
.03
.05
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
Elevation (m)
Station (m)
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 4.4 IS
.05
.03
.05
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
Elevation (m)
Station (m)
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 4.3 Section 4.3 (downstream of weir)
.05
.03
.05
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
Elevation (m)
Station (m)


River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 4 Section 4
.05
.03
.05
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 3 Section 3
.05
.03
.05
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 2.2 Section 2
.05
.03
.05
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta


River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 2.1 BR
.05
.03
.05
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 2.1 BR
.05
.03
.05
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta
River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 2 Section 2
.05
.03
.05
Elevation (m)
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta


River Earn, St Fillans Plan: Plan 01
Flow: Flow 02
RS = 1 Section 1
.05
.03
.05
96.5
96.0
95.5
95.0
94.5
94.0
93.5
Elevation (m)
0
10
20
30
40
50
60
Station (m)
Legend
WS Q200+CC
WS Q200
Ground
Bank Sta

PLANS

NOTES

ALL SIZES TO BE SITE VERIFIED
IF IN DOUBT, PLEASE ASK
THIS DRAWING IS COPYRIGHT
DO NOT SCALE FOR CONSTRUCTION PURPOSES

HEALTH AND SAFETY NOTES

SIGNIFICANT RESIDUAL HAZARDS	PRESENT	DESCRIPTION
Asbestos	☐	
Health Hazards	☐	
Structural Instability	☐	
Ground Conditions	☐	
Contamination	☐	
Buried and Overhead Services	☐	
Underground Structures	☐	
Adjacent Activities	☐	
Site Restrictions	☐	
Other (specify)	☐	

ACTIONS / NOTES:

REVISIONS

REV	DATE	BY	DETAILS

CLIENT
St Fillans Community Council

PROJECT
Proposed New Village Hall
St Fillans

DRAWING TITLE
Location Plan
SITE A
As Proposed

PURPOSE	DRAWN BY	DATE	JOB NO.	DWG. NO.	REVISION	SCALE	PAPER SIZE
Pre App	RP	01.11.21	5342	Loc 1		1:2500	A3

DENHOLM PARTNERSHIP ARCHITECTS
www.denholmpartnership.co.uk T: (01764) 670899

NOTES

ALL SIZES TO BE SITE VERIFIED
IF IN DOUBT, PLEASE ASK

DO NOT SCALE FOR CONSTRUCTION PURPOSES

HEALTH AND SAFETY NOTES

SIGNIFICANT RESIDUAL HAZARDS	PRESENT	DESCRIPTION
Asbestos	☐	
Health Hazards	☐	
Structural Instability	☐	
Ground Conditions	☐	
Contamination	☐	
Buried and Overhead Services	☐	
Underground Structures	☐	
Adjacent Activities	☐	
Site Restrictions	☐	
Other (specify)	☐	

ACTIONS / NOTES:

REVISIONS

REV	DATE	BY	DETAILS

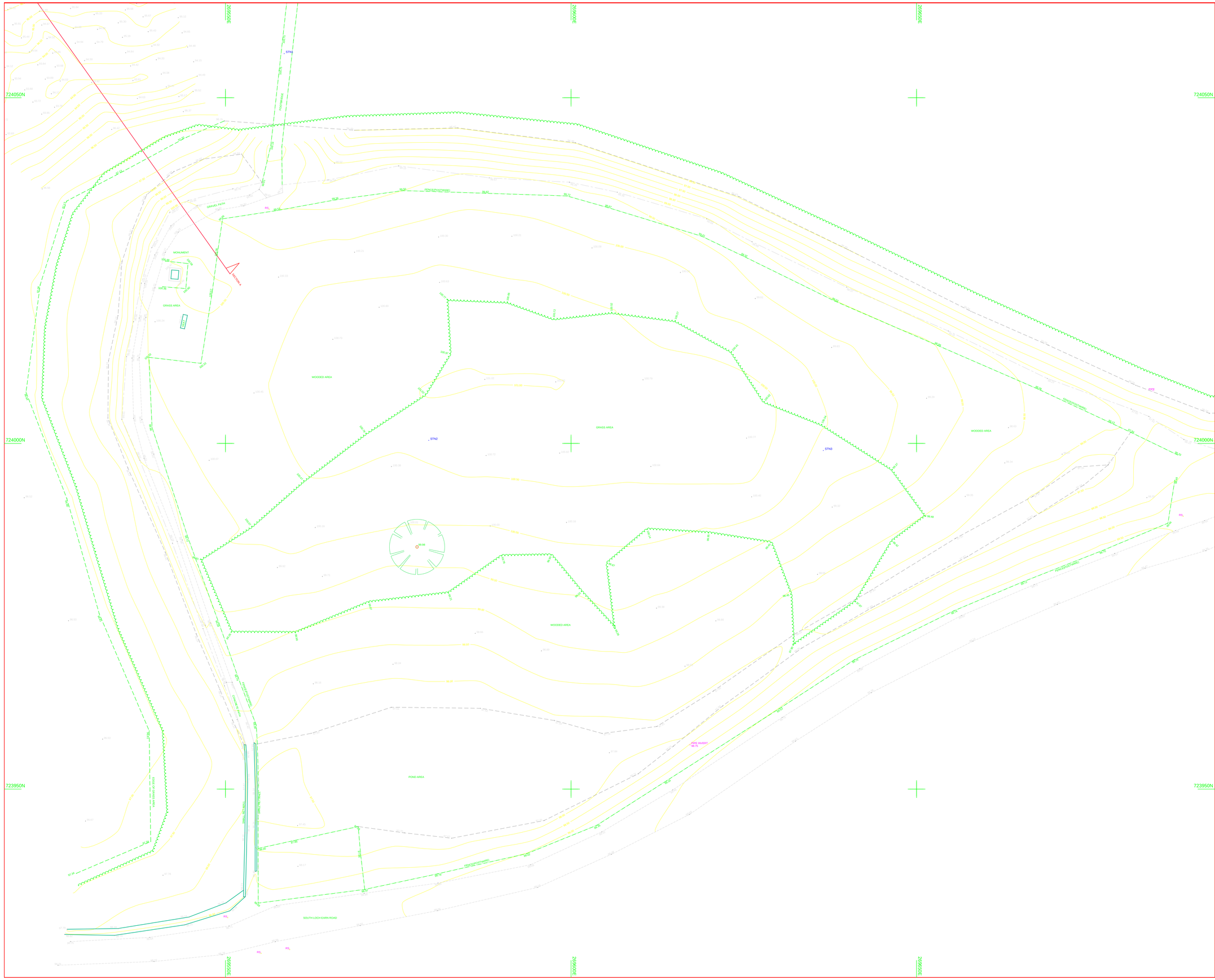
CLIENT
St Fillans Community Council

PROJECT
Proposed New Village Hall
St Fillans

DRAWING TITLE
Block Plan
SITE A
As Proposed

PURPOSE	DRAWN BY	DATE	SCALE	JOB NO.	DWG. NO.	PAPER SIZE	REVISION
Pre App	RP	01.11.21	1:500	5342	SK03	A3	

DENHOLM PARTNERSHIP ARCHITECTS
www.denholmpartnership.co.uk T: (01764) 670899



LEGEND

SYMBOLS

- BOREHOLE
- CONTROL STATION
- GATE
- SERVICE COVER
- STUMP
- TRIAL PIT
- TREE

LINE STYLES

- BOTTOM OF BANK
- BUILDING FOOTPRINT
- BUSH CANOPY
- CHANGE OF SURFACE
- CHANNEL LINE
- FENCE
- HEDGE
- OVERHEAD WIRES
  - ELECTRIC (E)
  - TELECOM (BT)
- PATH EDGE
- ROAD CENTRE LINE
- STRIP GULLY (G)
- TOP OF BANK
- TOP OF KERB
- TREE CANOPY
- WALL

ABBREVIATIONS

AV	=	AIR VALVE	LP	=	LAMPOST
BH	=	BOREHOLE	MH	=	MANHOLE
BOL	=	BOLLARD	MKR	=	MARKER
BOX	=	ELEC / BT BOX	PIT	=	TRIAL PIT
BT	=	BRITISH TELECOM	PEG	=	MARKER PEG
EA	=	EAVES LEVEL	RD	=	RIDGE LEVEL
EC	=	ELECTRICITY COVER	RS	=	ROAD SIGN
EP	=	ELECTRICITY POLE	SB	=	SIGN BOARD
FFL	=	FINISHED FLOOR LEVEL	SC	=	STOP COCK
FP	=	FLAG POLE	SV	=	STOP VALVE
G	=	GULLY	TCB	=	TELEPHONE CALL BOX
GAS	=	BRITISH GAS	TL	=	TRAFFIC LIGHT
HY	=	FIRE HYDRANT	TOW	=	TOP OF WALL
IC	=	INSPECTION COVER	TP	=	TELEGRAPH POLE
IL	=	INVERT LEVEL	TV	=	TELEVISION
SG	=	STRIP GULLY	WM	=	WATER METER

NOTES

1. GRID IS RELATED TO O.S. GRID
2. ALL LEVELS RELATE TO O.S.B.M. ASCERTAINED BY LOGGING G.P.S. DATA
3. CONTOURS ARE AT 0.50 (m) INTERVALS
4. CONTOURS AT VERTICAL FEATURES ARE INDICATIVE
5. LEVELS FOR ROAD ARE TAKEN ALONG CHANNEL LINE
6. WHILE EVERY EFFORT HAS BEEN MADE TO LOCATE THE POSITION OF ALL SERVICE COVERS (eg. manholes) IT SHOULD BE NOTED THAT THIS MAY NOT HAVE BEEN POSSIBLE AT THE TIME OF SURVEY DUE TO GROUND COVER OR LOCAL OBSTRUCTIONS.
7. ISOLATED MATURE TREES ARE DENOTED BY TRUNK AND ESTIMATED AVERAGE OUTER CANOPY.
8. ALL CONTROL STATION COORDINATES SHOULD BE CHECKED AND VERIFIED ON SITE PRIOR TO USE. DOUGLAS LAND SURVEYS SHOULD BE INFORMED OF ANY DISCREPANCIES FOUND.
9. OWNERSHIP OF SURVEY DATA REMAINS WITH DOUGLAS LAND SURVEYS, UNTIL INVOICE RELATING TO SUCH DATA HAS BEEN PAID IN FULL.

CONTROL STATIONS

SURVEY STATIONS

Name	Easting	Northing	Height	Remark
STN1	269558.490	724056.380	100.774	HILTI
STN2	269579.402	724000.439	100.928	W.PEG
STN3	269636.501	723998.968	100.168	W.PEG

19/01/2022

Douglas LAND SURVEYS Ltd.

AGRA HOUSE,
15 KING STREET,
NEWPORT-ON-TAY,
FIFE. DD6 8BN.
SCOTLAND

T. 01382 - 541333
F. 01382 - 541999

W. www.douglas-land-surveys.co.uk

- LAND SURVEYS
- HYDROGRAPHIC SURVEYS
- PHOTOGRAMETRIC SURVEYS
- AS BUILT SURVEYS
- BOUNDARY RESOLUTION

Douglas Land Surveys Ltd. Registered in Scotland No. 379 369.
Registered Office: Agra House, 15 King Street, Newport-on-Tay, Fife, DD6 8BN.

A1

Title:

WAR MEMPRIAL, ST. FILLANS.

Drawn By:	Scale:	Date:
S.WILSON	1/250	10/02/2022

Drawing Number:	Revision:
0722	01

REV	DESCRIPTION	DATE

Atholl Associates
Flood Risk and Drainage

Algo Business Centre
Glenearn Road, Perth PH2 0NJ

T 07904451873 E brian@athollassociates.co.uk

Project: ST FILLANS VILLAGE HALL			
Title: FLOOD EXTENTS PLAN			
Drawn By: DK	Scale: (A2) 1:500	Date: FEB 21	
Drawing Number: AA/FR/196b/001		Revision:	

REV	DESCRIPTION	DATE

Atholl Associates
Flood Risk and Drainage

Algo Business Centre
Glenearn Road, Perth PH2 0NJ
T 07904451873 E brian@atholassociates.co.uk

Project: ST FILLANS VILLAGE HALL

Title: SURVEY CROSS SECTION LOCATION PLAN

Drawn By: DK

Scale: (A0) 1:1000

Date: FEB 22

Drawing Number: AA/FR/196b-002

Revision: –

REV	DESCRIPTION	DATE

Atholl Associates
Flood Risk and Drainage

Algo Business Centre
Glenearn Road, Perth PH2 0NJ

T 07904451873 E brian@athollassociates.co.uk

Project: ST FILLANS VILLAGE HALL			
Title: MITIGATION STRATEGY PLAN			
Drawn By: DK	Scale: (A2) 1:500	Date: FEB 22	
Drawing Number: AA/FR/196b/003		Revision:	

PEDESTRIAN ACCESS EGRESS VIA FOOTBRIDGE
NO PEDESTRIAN ACCESS DURING FLOOD EVENTS

PROPOSED BUILDING TO BE MOVED NORTH TO HIGH POINT ON EXISTING GROUND MINIMUM FFL 101.04m AOD

NEW SITE ENTRANCE TO BE BASED ON EXISTING FIELD ENTRANCE. EXISTING CULVERT TO BE REPLACED. FINISHED GROUND LEVELS TO BE NO HIGHER THAN EXISTING WITHIN FLOODPLAIN. VEHICULAR ACCESS UNAVAILABLE DURING FLOOD EVENTS. DAMAGE TO ROAD SURFACE POSSIBLE DURING FLOOD EVENTS.

PROPOSED PARKING TO BE MOVED NORTH TO AVOID EXISTING POND. SPACE BETWEEN CAR PARKING AND POND REQUIRED TO ALLOW EXCESS FLOW TO RUN OVER VEGETATED FILTER STRIP. MINIMUM 5m WIDE

10 0 10 20 30 40 50
metres (PLAN ONLY)

REV	DESCRIPTION	DATE

Atholl Associates
Flood Risk and Drainage

Algo Business Centre
Glenearn Road, Perth PH2 0NJ

T 07904451873 E brian@athollassociates.co.uk

Project: ST FILLANS VILLAGE HALL			
Title: KEY FEATURES PLAN			
Drawn By: DK	Scale: (A2) 1:500	Date: FEB 22	
Drawing Number: AA/FR/196b/004		Revision:	

Atholl Associates
Algo Business Centre
Glenearn Road
Perth
PH2 0NJ

t: 07904451873
e: enquiries@athollassociates.co.uk
w: www.athollassociates.co.uk