EXECUTIVE **ITEM [insert Item No.]**

18 JANUARY 2011

REPORT BY CHIEF EXECUTIVE

AUTHORISATION TO TAKE FORWARD THE PREFERRED FLOOD PROTECTION SCHEME FOR SELKIRK

1 PURPOSE OF REPORT

1.1 To provide detail of the Preferred Scheme and obtain approval to take this forward through the Outline Design and Flood Order Stages.

2 BACKGROUND

2.1 Selkirk has suffered a number of significant floods in the recent past, notably the following:

- In 1926 a major flood on the River Ettrick caused a breach in the old Selkirk Cauld and significant flooding
- In October 1977 a major flood on the River Ettrick caused a collapse of Selkirk Bridge and inundation along Philiphaugh, Riverside and Lindean
- In May 2003 intense rainfall on the Long Philip Burn led to serious flooding in Bannerfield and Philiphaugh
- A similar but less serious flood occurred on the Long Philip Burn in August 2004
- In November 2009 flooding of the Ettrick and Yarrow Waters affected the Yarrow Valley and Lindean and came very close to damaging levels in Selkirk

2.2 On 4 September 2007 the Executive approved the Flood Protection Scheme Implementation Strategy which included preparation of the Selkirk Scheme in the short to medium term i.e. 2 to 5 years.

2.3 On 24 June 2010 the Council approved a revised strategy for the implementation of flood protection schemes. This revised strategy endorsed the Selkirk Flood Protection Scheme (FPS) and confirmed the desire to achieve a Flood Order. Thereafter, progress on the scheme would be subject to securing further funding.

2.4 On 15 October 2009 Halcrow Group Limited were awarded a contract to provide consultancy services to develop a flood protection scheme for Selkirk. This constituted the commencement of the design phase of this major scheme.

2.5 The principal objectives for the scheme are:

- To investigate and develop design solutions for a flood protection scheme that are technically sound and the most fit for purpose
- To ensure the solutions are environmentally acceptable and sustainable
- To ensure the solutions include appropriate natural flood management measures
- To ensure the solutions represent best value for money
- To consult with stakeholders and the general public within and without the flood protection scheme area to establish the issues of concern to the local population
- To allow for regeneration of Riverside Business Park Area within the current flood plain

3 INITIAL PROGRESS

3.1 In undertaking a full review of the historical records together with hydrological, economic and environmental assessment Halcrow concluded that promoting a Flood Protection Scheme for the Ettrick and Yarrow Waters, Long Philip Burn and Shaw Burn is a viable proposition with regard to significantly reducing flood risk to over 400 properties and up to 100 businesses in Selkirk and its surroundings.

3.2 The development of a new 1D to 2D linked Hydro-Dynamic Model of the Ettrick was undertaken. This sophisticated model enabled the flood risk to be determined and the potential options assessed. See ANNEX A and ANNEX B for 1 in 200 years (plus climate change) Flood Event Risk Maps from the Ettrick and the Long Philip Burn respectively.

3.3 Having assimilated sufficient data to inform the option development and selection process a tiered system of appraisal was implemented. In total, 59 flood protection components were considered; a component being a flood protection measure which requires to be combined with other flood protection measures to form an option for a particular Flood Cell.

3.4 The initial evaluation of each component was quickly followed by a process to eliminate those components which were unlikely to be implemented due to economic, environmental, technical or social constraints. Of the original 59 components, 15 were dismissed at an early stage.

3.5 The remaining 44 components were then combined to form 22 different flood protection options in eight cells from four watercourses for full economic assessment with up to four separate standards of protection being considered for each option.

3.6 This rigorous analysis required input from: a Ground Investigation Survey; a Topographic Survey; a Phase 1 Habitat Survey and over 15 individual Ecological Surveys; a Structural Investigation; Flood Modelling exercises; a Geomorphological Investigation; an Economic Analysis of the flood envelope; amongst others.

3.7 Extensive consultation was undertaken through two stakeholder workshops, a public exhibition and over 60 separate discussions with key landowners and stakeholders including the Scottish Government (SG), Scottish Environmental Protection Agency (SEPA) and Scottish Natural Heritage (SNH) to ensure that all those affected by the scheme had the opportunity to comment.

3.8 The review of these options was known as the Option Appraisal Process. The culmination of this process resulted in a proposal for a Preferred Scheme for Selkirk FPS which has been discussed and approved by the Project Board and the Flood Advisory Group.

4 PREFERRED SCHEME

4.1 The Selkirk FPS involves a series of measures that will reduce the flood risk to the town of Selkirk and its environs.

4.2 This FPS is being promoted under the new Flood Risk Management (Scotland) Act 2009 and has embraced its ethos of Sustainable Flood Management, Natural Flood Management, and a Catchment Based understanding of the flooding problem.

A map outlining the watercourses of Southern Scotland and a map outlining the Ettrick Catchment are contained in ANNEX C and ANNEX D respectively.

To ensure that the Scheme complies with the current Scottish Government guidelines for undertaking an Economic Appraisal for a Flood Protection Scheme, and in order to generate the Benefit Cost Ratio (BCR), it was necessary to split Selkirk into distinct *'Cells'.*

A Flood Cell is a specifically defined and isolated geographical area which is separately considered (as a block of land and property) for economic appraisal purposes. The economic benefits from one flood cell cannot be used to subsidise the economic benefits of another flood cell.

There is an overlapping of flood cells in certain areas. As an example, some areas of the Riverside Business Park are liable to flooding from flood events generated by the River Ettrick and the Shaw Burn. However, it is extremely unlikely that these flood events would occur simultaneously (due to different catchment hydrology). It is for this reason that both cells independently justify flood protection.

The inclusion of the St. Mary's Loch Option and Natural Flood Management allow the scheme to consider options at a catchment scale that deliver real benefits to Selkirk.

A schematic of the Ettrick Catchment, including its watercourses and the Project's Flood Cells, is contained in ANNEX E.

4.3 The Preferred Scheme is a combination of the best options, as determined by the Optional Appraisal Process. These options have been combined to form a Flood Protection Scheme for Selkirk.

These options are summarised in the table below. Further detail along with schematic illustrations of the options can be found in ANNEX F, ANNEX G, ANNEX H, ANNEX J, ANNEX K and ANNEX L.

A Summary of the Preferred Scheme broken down by cell			
Cell No.	**Cell Name**	**Level of Protection Proposed**	**Brief Description of Preferred Options**
1	**Philiphaugh** (from Ettrick)	**1 in 200** years (plus climate change)	• 2100m of new Flood Embankments • 110m of new Flood Walls • Defence line retreated from the line of existing defences at the river's edge
2	**Bannerfield** (from Ettrick)	None Already has approximately 1 in 60 years	• It is proposed the Council undertake local Flood Works to reduce flood risk at this location (**not** included in the formal Preferred Scheme)
3	**Riverside** (from Ettrick)	**1 in 200** years (plus climate change)	• 1600m of new Flood Walls all along the river's edge • Seepage collection behind the walls • Interaction with Pedestrian Bridges
4	**Lindean** (from Ettrick)	None	• It is proposed the Council undertake local Flood Works to reduce flood risk at this location (**not** included in the formal Preferred Scheme)
5	**Bannerfield & Philiphaugh** (from Long Philip Burn)	**1 in 100** years (plus climate change)	• Major conveyance improvements by widening and re-meandering the river adjacent Bannerfield • Works to Corbie Linn Bridge and Road • Remove A708 Bridge • Replace A707 Bridge
6	**Riverside** (from Shaw Burn)	**1 in 200** years (plus climate change)	• Major conveyance improvements by widening and replacing culverts in the Riverside Business Park
7	**St. Mary's Loch**	N/A	• To provide a control system that will allow the water levels in the loch be managed for the purpose of storing flood waters during an event
8	**Natural Flood Management**	N/A	• To undertake strategic measures across the whole catchment that will contribute to a reduction in flood risk to Selkirk, and provide a degree of '*insurance'* against the increased risk posed by climate change in the future

5 FINANCIAL IMPLICATIONS

5.1 The Total Estimated Cost of the Preferred Scheme is shown in the Table below. Costs have been shown against the proposed work in each flood cell and also broken down into 4 main elements, namely construction costs, maintenance costs, other costs and optimism bias.

Table - Detailing the build-up of the costs associated with each cell in the Preferred Scheme

Cell No.	Description of Best Options	Present Value Costs				
		Capital (i.e. Base Construction Costs)	Maintenance (Over 100 yr design life of the Scheme)	Other (e.g. Carbon)	Optimism Bias	TOTALS
1	No Storage + Mill Lade / Philiphaugh Defences + Mill Lade Flow Control + NFM	£2,171,000	£328,000	£12,000	£1,507,000	**£4,017,600**
3	No Storage + Riverside Defences + Erosion Protection + NFM	£6,207,000	£381,000	£83,000	£4,002,000	**£10,672,400**
5	No Storage + Conveyance Improvements + NFM	£1,290,000	£110,000	£0	£840,000	**£2,240,000**
6	No Storage + A7 / Oregon Defences + New Culverts + NFM	£937,000	£78,000	£11,100	£616,000	**£1,640,000**
7	St. Mary's Loch Option	£108,000	£22,000	£0	£78,000	**£208,000**
TOTALS		**£10,713,000**	**£919,000**	**£106,100**	**£7,043,000**	**£18,778,000**

The estimated figures in the above table includes for all monies spent to date and all future capital, design, land purchase, contractor's costs, service diversions, optimism bias, an allowance for NFM, an allowance for carbon cost and climate change @ 20% on peak flows.

These costs do not include for inflation.

The use of Optimism Bias is recommended by HM Treasury's 'Green Book'.

The application of 60% Optimism Bias is recommended by the DEFRA Flood and Coastal Erosion Risk Management Appraisal Guidance (FCERM-AG).

The Scottish Government has reviewed the Economic Appraisal for the scheme and is satisfied with the approach taken by the Halcrow and the use of Optimism Bias.

It is intended to undertake a full review of the level of Optimism Bias used during the next Stage of the Scheme Design (Outline Design). Halcrow have identified that the Scottish Government consider it acceptable to reduce the level of Optimism Bias applied to the Present Value Costs once Outline Design is undertaken.

5.2 From the table above it can be seen that the estimated Total Scheme Cost of the Preferred Scheme is £18,778,000.

5.3 The cost previously reported to Council for the Selkirk FPS was £15,204,442.

This cost was generated by the Selkirk Flood Study – Cost Benefit Analysis and dated May 2006 and did not allow for inflation.

An analysis of the migration of the 2006 cost-base due to inflation was undertaken. This identified that the £15,204,442 (2006 cost) equates to £19,234,897 (2010 cost).

5.4 Thus the cost of providing a flood protection scheme for Selkirk is within the cost previously reported to Council after accounting for inflation (i.e. £18,778,000 is less that £19,234,897).

The Preferred Scheme also includes the following additional aspects:

- The estimates are more specific and deliver a greater degree of cost surety
- It includes for climate change
- It includes for protection to Riverside from the Shaw Burn
- It includes for the St. Mary's Loch Option
- It includes for Natural Flood Management

5.5 There are many social benefits to reducing the flood risk to Selkirk. It is intended to fully quantify these during the next stage of the scheme design, however the Economic Appraisal has identified that over 400 properties will be protected.

These 400 properties constitute:

- Approximately 100 businesses employing around 1,100 people
- Approximately 600 residential addresses
- The Selkirk Rugby Club and Cricket Ground
- The Selkirk Sewage Treatment Works and an Electricity Sub-Station
- The Philiphaugh Community School
- Victoria Park including the Selkirk Leisure Centre

There are also many other social benefits which are difficult to quantify: the reduction in fear associated with living in an area that floods; the potential to unlock

development in designated business areas; a reduction in insurance premiums; the protection of essential infrastructure etc.

5.6 The cells that are promoted by the Preferred Scheme all achieve a positive BCR.

Benefit to Cost Ratio (BCR) is a ratio of the Total Avoided Damages divided by the Total Cost of providing Flood Protection Works within a specific location over the estimated life of the project. For this type of project this is set as 100 years.

The Economic Appraisal for Cell No. 2 and Cell No. 4 identified that it is not possible to undertake formal flood protection works at these locations and achieve a BCR greater than 1.0. Works within these Cells are therefore not included in the Preferred Scheme.

The table below details the value of damages avoided and the associated BCR by Flood Cell.

Table - A breakdown of the Preferred Scheme's Benefit Cost Ratio by Cell

Cell No.	Cell Name	Overall Cost of implementation	Total Damages Avoided	Benefit Cost Ratio
1	Philiphaugh (from Ettrick)	£4,017,600 (1 in 200 + C/C)	£6,271,100 (1 in 200 + C/C)	1.6
2	Bannerfield (from Ettrick)	-	-	Best available BCR = 0.2 which is < required 1.0
3	Riverside (from Ettrick)	£10,672,400 (1 in 200 + C/C)	£13,799,100 (1 in 200 + C/C)	1.3
4	Lindean (from Ettrick)	-	-	Best available BCR = 0.5 which is < required 1.0
5	Bannerfield & Philiphaugh (from Long Philip Burn)	£2,240,000 (1 in 100 + C/C)	£6,975,500 (1 in 100 plus C/C)	3.1
6	Riverside (from Shaw Burn)	£1,640,000 (1 in 200 + C/C)	£2,496,700 (1 in 200 + C/C)	1.5
7	St. Mary's Loch	£208,000	TBC	N/A
8	Natural Flood Management	This cost is contained within the other cells	N/A	N/A
	TOTALS	**£18,778,000**	**£29,542,400**	**1.6**

The damages avoided by the St. Mary's Loch Option have not yet been determined. Halcrow have identified that the value of Total Damages Avoided can reasonably be expected to increase once this exercise is completed during the next stage of the project.

5.7 The Total Avoided Damages (or Benefits) have been calculated in line with the current DEFRA FCERM-AG and following best practice using *"The Benefits of Flood and Coastal Risk Management: A Manual of Assessment Techniques"* (Flood Hazard Research Centre, 2005), often referred to as the Multi Coloured Manual or MCM.

The MCM method provides the user with mechanisms to estimate the likely damages caused by flooding. The manual includes methods to assess the following types of damages:

- Damage to residential properties and the expense of clearing up
- Damage to non-residential properties and the expense of clearing up
- Damage to agricultural land and the expense of clearing up
- Damage as a consequence of the closure of transport links
- Expense incurred by emergency services
- Damage caused by the loss of energy supply
- Intangible damage caused by flooding e.g. stress and poor health

The costs of these damages are not specific costs that would be incurred by SBC: they are the total costs that could be expected to be borne by all parties in the event of the flood being realised.

5.8 The total estimated value of damages avoided by the Preferred Scheme is £29,542,400 which gives an overall Benefit Cost Ratio (BCR) of 1.6. This provides a solid economic case for promoting a formal flood protection scheme.

Within individual cells of the Preferred Scheme differing levels of BCR are achieved: they are all positive and range from 1.3 (a solid economic case) to 3.1 (an excellent economic case).

The BCR's have been generated from the Total Estimated Costs which include Optimism Bias.

Once a Flood Protection Order has been obtained it is feasible that Construction Works could be phased. In the event that this was deemed appropriate the implementation programme would be determined by a prioritisation of the cells. This would be based on various aspects including the cost of works, the available funding, the potential for the works to adversely increase flood risk elsewhere, the BCR, social and environmental benefits, and technical issues.

5.9 The Council has set aside sufficient funding from its General Capital Allocation for Flood Protection to take Selkirk FPS through to the conclusion of Stage 5 (Submission of Flood Order). Thereafter further work to progress the defences in Selkirk will be taken forward within the funding available in accordance with the Flood Protection Strategy approved by Council on 24th June 2010.

The table below provides detail of the funding required to complete Stage 4 (Outline Design) and Stage 5 (Submission of Flood Order).

Table – Funding requirements to complete Stages 4 and 5 of the Preparatory Work for Selkirk FPS			
Budget Stream	**2010/2011**	**2011/2012**	**2012/2013**
Funding required	£398,367	£185,000	£0
Flood Protection – Current Capital Budget	£749,000	£700,000	£500,000

The current Selkirk FPS Project Programme projects that Stage 5 (Submission of Flood Order) will be completed by December 2011. This is based on the assumption that a Public Local Inquiry (PLI) will not be required. In the event that a PLI is required then there will be a requirement for money to complete Stage 5 during the 2012 / 2013 Financial Year.

It is recognised that under the current rules the cost of delivering this Major Project will be borne mainly by Scottish Borders Council and not the Scottish Government. Furthermore it is recognised that any project requiring such a large funding allocation must consider carefully how this can be achieved.

Once the FPS Order has been obtained the Project Team will return to Council with detailed proposals for Project Delivery post FPS Order. The outcome of this process will determine the spend profiles for Financial Years 2012 / 2013 onwards.

6 CONSULTATION

6.1 The Preferred Scheme was developed within an ongoing framework of consultation with key project stakeholders. As part of this process an Option Appraisal Workshop was held on 7 September 2010.

6.2 On 13 October 2010 the proposed preferred options were presented to the Project Board by Halcrow. During this working meeting the structure of the Preferred Scheme was agreed.

6.3 The Preferred Scheme was presented to and discussed with the member led Flood Advisory Group at their meeting on 20 October 2010. It received their formal approval.

6.4 The Chief Financial Officer, Head of Legal and Democratic Services, the Clerk to the Council and the Head of Audit & Risk have been consulted and their comments have been incorporated into the report.

7 EQUALITY

7.1 There are considered no significant equality or diversity implications within this Report, except that some other communities in the Borders may feel that Selkirk has been given priority over them with respect to flood protection.

8 ENVIRONMENT

8.1 There are considered no significant environmental implications of this Report.

The Selkirk FPS has been subjected to extensive environmental assessment during the preparation and execution of works.

8.2 It is the intention of the Selkirk FPS to undertake only works which have a neutral or positive impact on the environment.

9 RISK COMMENTARY

9.1 The main risk associated with this report is the effect of natural flood events on Selkirk and its environs.

Floods can happen at any time and a flood event could occur before protection works can be implemented. Flood events could even occur after protection works have been implemented but where the scale of the flood waters exceed the design return period and cause flooding.

These risks are mitigated by the following:

- Progressing with flood protection works as quickly and efficiently as the available budget will allow
- Communicating the scope of works and the level of defence that is provided
- Promoting flood awareness
- Providing assistance to help those at risk be prepared for a flood event

9.2 There is a risk that the St. Mary's Loch Working Group will not be able to reach an agreement with the many users of the loch and thus plans to utilise it for upstream flood attenuation will be lost.

This risk is being mitigated by involving all parties in the process.

10 SUMMARY

10.1 The town of Selkirk is at risk of flooding from the River Ettrick, the Shaw Burn and the Long Philip Burn.

10.2 The Council has developed a Preferred Scheme which will significantly reduce the risk of flooding to Selkirk at an estimated total scheme cost of £18,778,000. The preferred scheme has been sub-divided into flood cells and works could be undertaken in a phased programme to suit funding.

10.3 There is a strong economic case for delivering a flood protection scheme in Selkirk. The overall benefit cost ratio is 1.6 as the scheme protects against damages of £29,542,400.

10.4 As part of the preparatory work for a flood protection scheme a Flood Order needs to be published to give the Council power to take the Scheme forward. This Flood Order will be obtained under the new Flood Risk Management (Scotland) Act 2009.

10.5 The next stages for the scheme involve undertaking Outline Design and preparing the Flood Order.

10.6 It should be possible to undertake construction works within the Flood Cells independently thereby allowing for a phased construction programme of works.

11 RECOMMENDATIONS

11.1 I recommend that the Executive:

(a) Approves the Preferred Scheme and allows it to be progressed through Outline Design to Flood Orders. The Preferred Scheme consists of:

i. Provision of new flood defences to protect the Philiphaugh Area against a 1 in 200 years (plus climate change) flood event from the River Ettrick.

ii. Provision of new flood defences to protect the Riverside Business Park against a 1 in 200 years (plus climate change) flood event from the River Ettrick.

iii. Provision of conveyance improvements on the Long Philip Burn to protect the Bannerfield and Philiphaugh Areas from a 1 in 100 years (plus climate change) flood event.

iv. Provision of conveyance improvements on the Shaw Burn to protect the Riverside Business Park from a 1 in 200 years (plus climate change) flood event.

v. To continue work to establish a new management system at St. Mary's Loch which will deliver a level of flood risk reduction to Selkirk (including Lindean) and the Yarrow Valley.

vi. To undertake strategic Natural Flood Management measures across the whole catchment that will contribute to a reduction in flood risk to Selkirk (including Lindean).

(b) Agrees that the Chief Executive brings to Members the Flood Orders for the Scheme in advance of publication.

Approved by

Name	Designation	Signature
David Hume	**Chief Executive**	[insert signature)]

Author(s)

Name	Designation
Paul Frankland	**Engineering Design Manager**
David Green	**Flood Protection Programme Manager**
Conor Price	**Project Manager**

Background Papers: **4 September 2007 Executive – Flood Study Scheme Prioritisation Programme**

24 June 2010 Council – Strategy for Implementation of Flood Protection Schemes

Previous Minute Reference: **None identified**

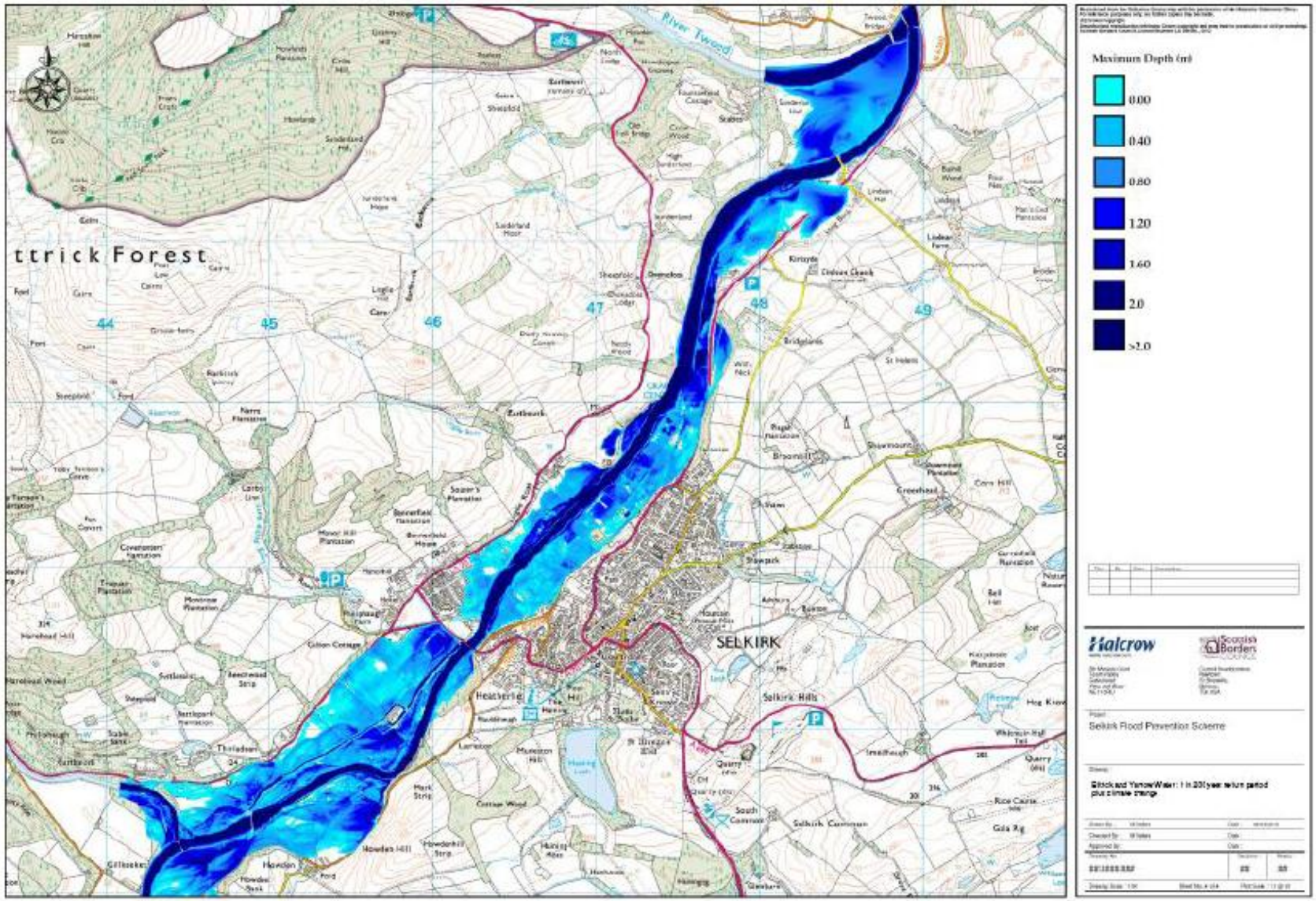
	REPORT CONSULTATIONS / TIMING		
Report Title:	**AUTHORISATION TO TAKE FORWARD THE PREFERRED FLOOD PROTECTION SCHEME FOR SELKIRK**		
Estimated Time Required for Presentation and Discussion:			***20 mins***
MANDATORY CONSULTATIONS			
Service	**Date Sent**	**Reviewed by**	**Date Replied**
HEAD OF LEGAL & DEMOCRATIC SERVICES	**1.11.2010**	**Ian Wilkie (incl. Resources mailbox)**	
CHIEF FINANCIAL OFFICER	**1.11.2010**	**Richard Webb**	
CLERK TO THE COUNCIL	**1.11.2010**	**Jenny Wilkinson**	**1.11.2010**
HEAD OF AUDIT & RISK	**1.11.2010**	**Jill Stacey**	**7.11.2010**
FINANCIAL ADMINISTRATION	**1.11.2010**	**Donald MacDonald**	
CHIEF EXECUTIVE		**David Hume**	
COMMUNICATIONS OFFICER	**1.11.2010**	**Janet Ross**	
OPTIONAL CONSULTATIONS (depending on report content)			
DIRECTOR OF PED		**Ian Lindley**	
HUMAN RESOURCES			
PROPERTY SERVICES			
DIRECTOR OF SOCIAL WORK			
DIRECTOR OF EDUCATION AND LIFELONG LEARNING			
TECHNICAL SERVICES MT			
PORTFOLIO HOLDERS		**Cllr. J Fullarton** **Cllr. L Wyse**	
MANAGEMENT TEAM:	**If YES, date when consulted**		

EQUALITIES APPROVED IMPACT ASSESSMENT REPORT COMPLETED **N/A**

FOR NEW OR REVISED STRATEGIES AND POLICIES – RURAL PROOFING CHECKLIST MUST BE COMPLETED **N/A**

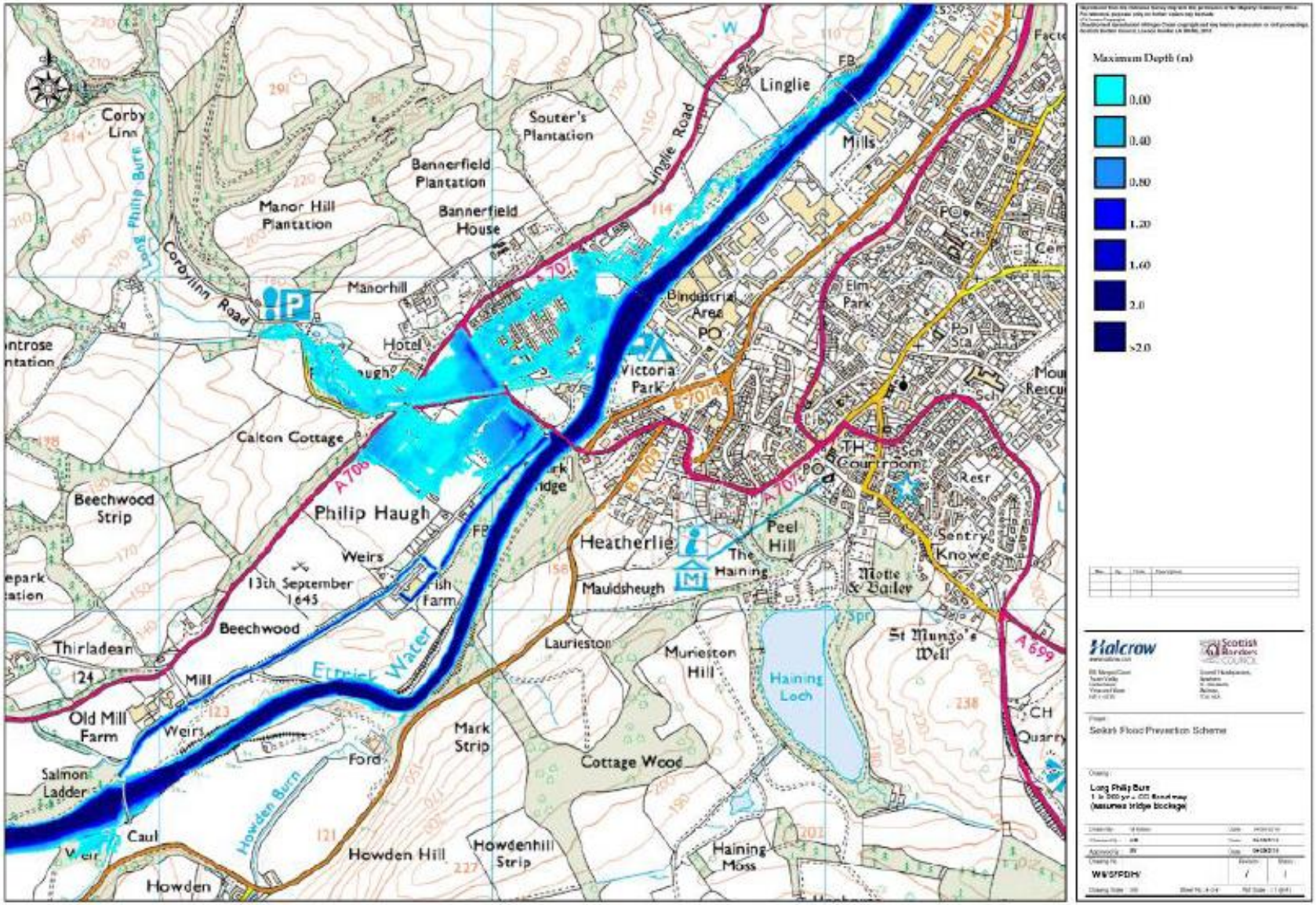
ANNEX A:

A MAP OF THE 1 IN 200 YEARS (PLUS CLIMATE CHANGE) FLOOD EVENT FROM THE RIVER ETTRICK



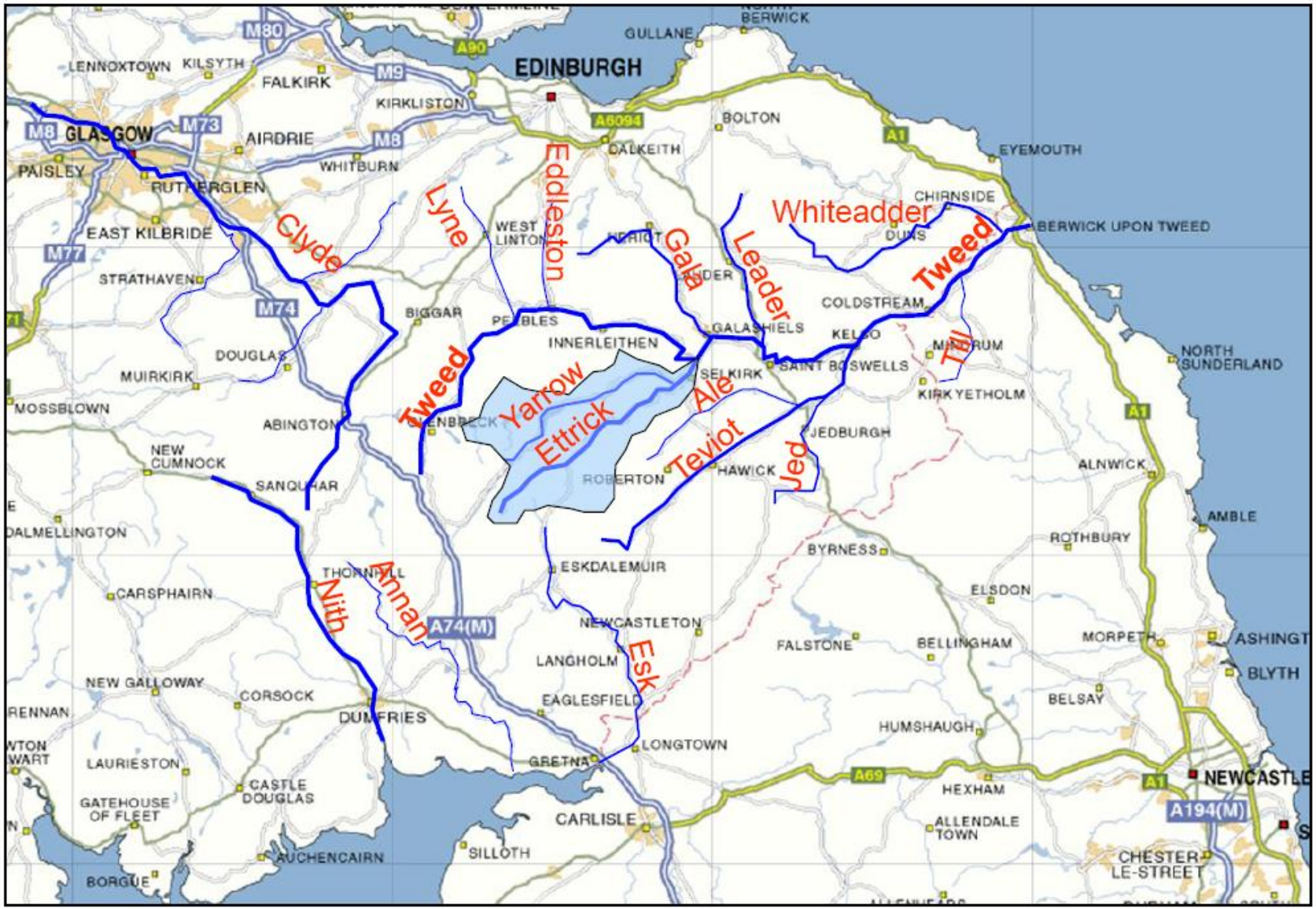
ANNEX B:

A MAP OF THE 1 IN 200 YEARS (PLUS CLIMATE CHANGE) FLOOD EVENT FROM THE LONG PHILIP BURN



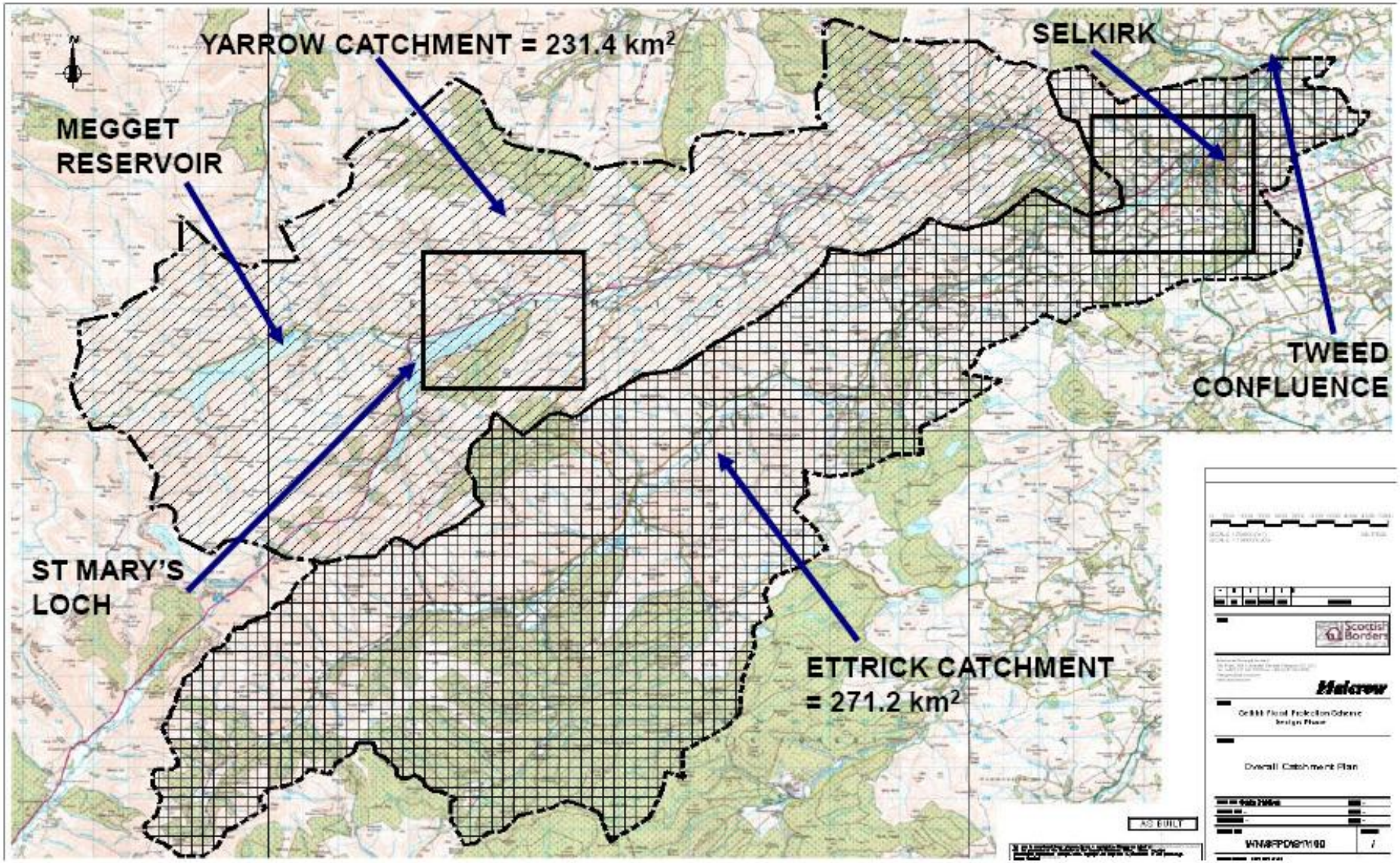
ANNEX C:

THE RIVER SYSTEMS IN SOUTHERN SCOTLAND
(WITH THE ETTRICK CATCHMENT IDENTIFIED)



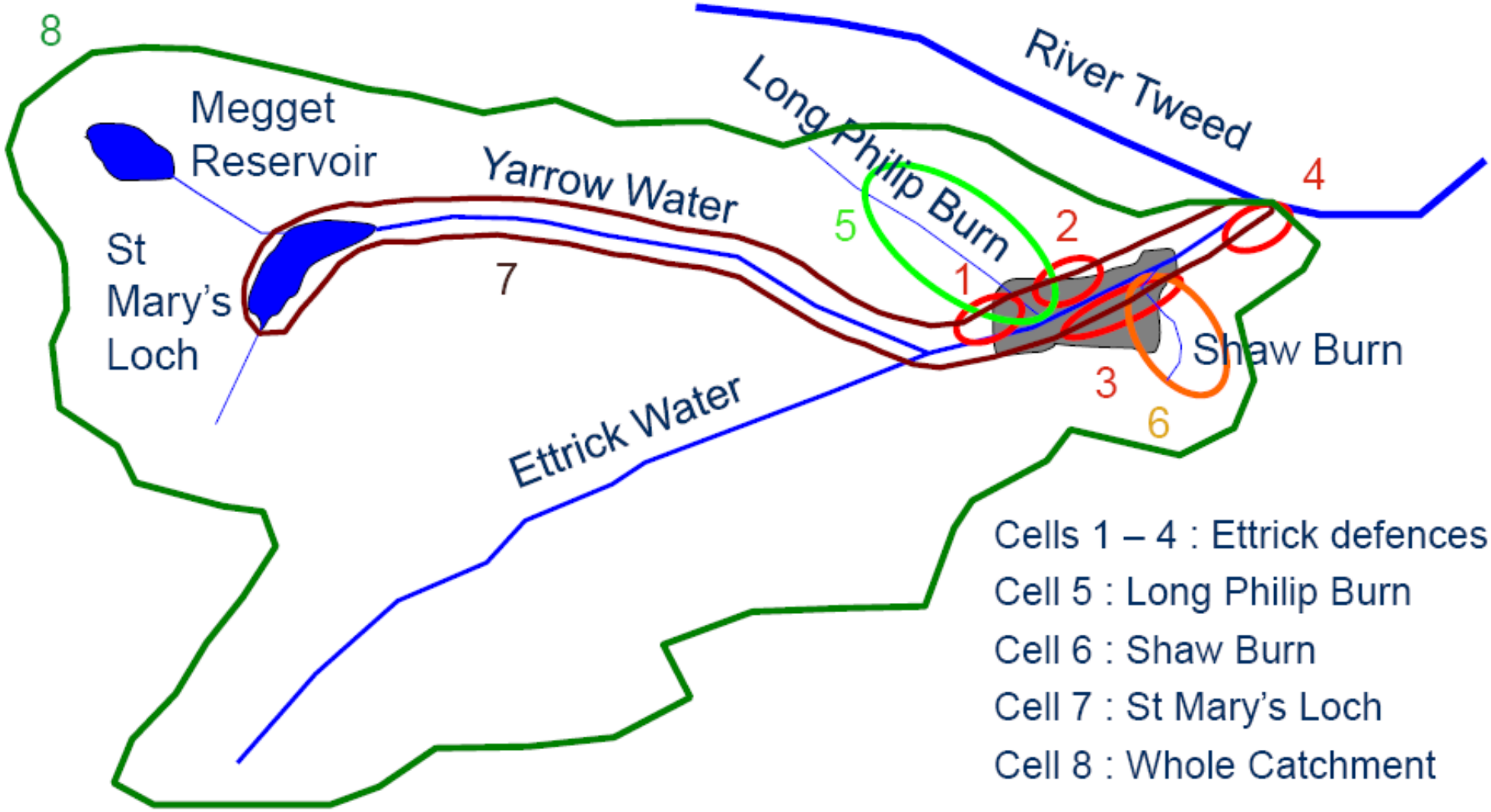
ANNEX D:

THE RIVER ETTRICK CATCHMENT
(INCLUDING THE RIVER YARROW SUB-CATCHMENT)



ANNEX E:

A SCHEMATIC REPRESENTATION OF THE RIVER ETTRICK CATCHMENT (INCLUDING THE DISCRETE CELLS IDENTIFIED BY THE PROJECT TEAM)



ANNEX F:

CELL NO. 1 – PHILIPHAUGH – FROM THE RIVER ETTRICK
THE PROPOSED WORKS

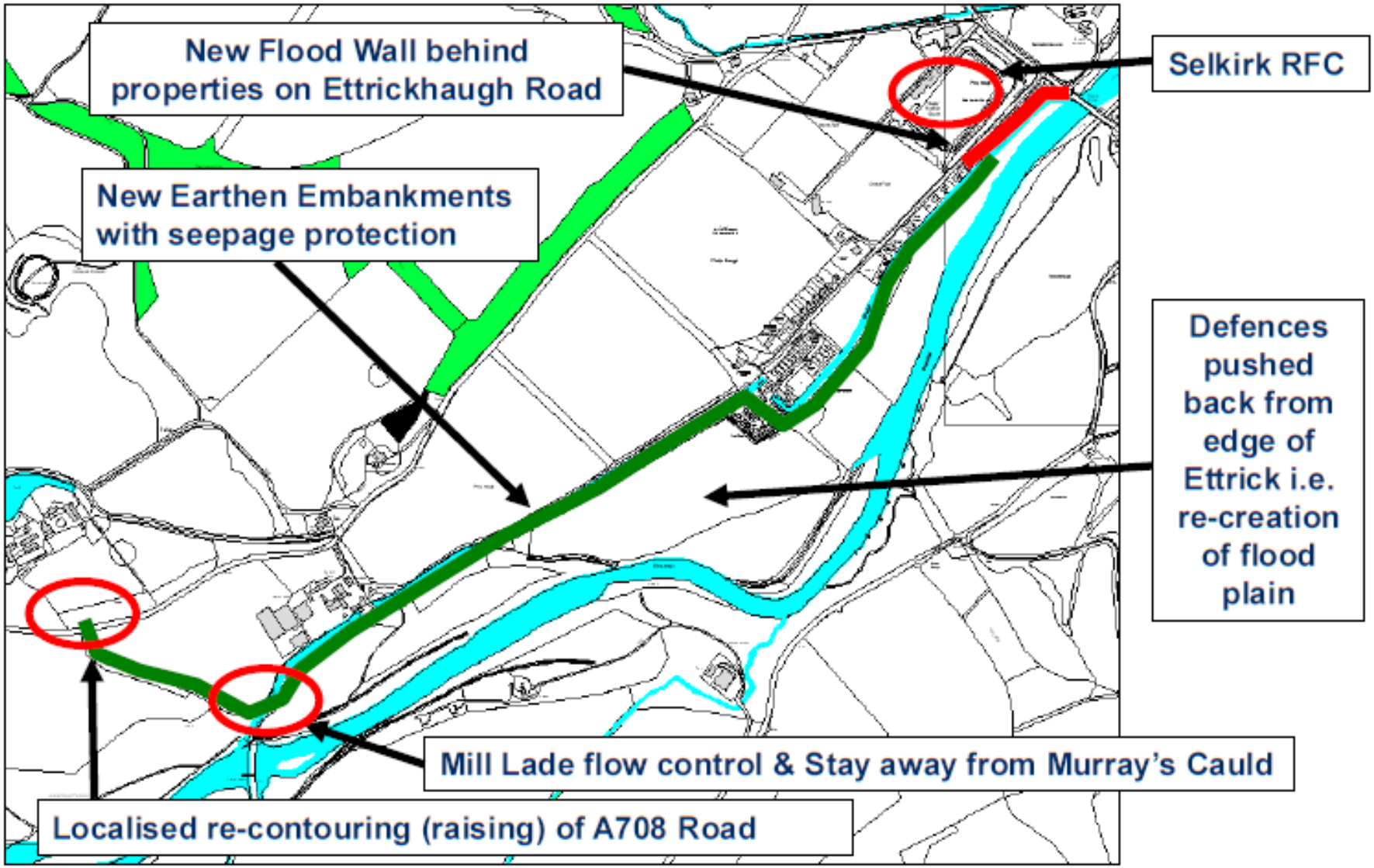
A map with a schematic illustration of the various works proposed within the Philiphaugh Area is provided on the following page.

The proposals to protect against the River Ettrick are to:

- Provide 2060m of landscaped earthen embankments with appropriate seepage protection to the dry-side. These will be approximately 1m higher than existing ground levels
- Provide 110m of flood walls along the rear of the properties on Ettrickhaugh Road stretching from Selkirk Bridge and up the existing Philiphaugh Mill Lade
- Undertake a contoured rising of the A708 by up to 300m in height where the new earthen embankments meets the A708 in the vicinity of the entrance to Philiphaugh Estate
- Provide a new crossing over the existing Philiphaugh Mill Lade and an automatic flow control system
- Retreat from the line of the existing Flood Defences (built in 1978 to protect against a flood event of approximately 1 in 50 after the flood event of 1977) along the water's edge thereby returning areas of haugh-land to the river's flood plain.
- The line of defences will be set-back from the location of the existing Murray's Cauld and thus this Scheme does not affect the ongoing existence of this structure

In combination these works will provide a standard of protection of 1 in 200 years plus climate change from a flood event. This will provide a significant increase in the level of protection accorded to the residents of Ettrickhaugh Road; Philiphaugh and Bannerfield; the potential development site at the old Fish Farm; and the recreational infrastructure including Selkirk Rugby Club and Selkirk Cricket Grounds.

ANNEX F – Cell 1 – Philiphaugh – The Proposed Works



ANNEX G:

CELL NO. 3 – RIVERSIDE – FROM THE RIVER ETTRICK THE PROPOSED WORKS

A map with a schematic illustration of the various works proposed within the Riverside Business Park is provided on the following page.

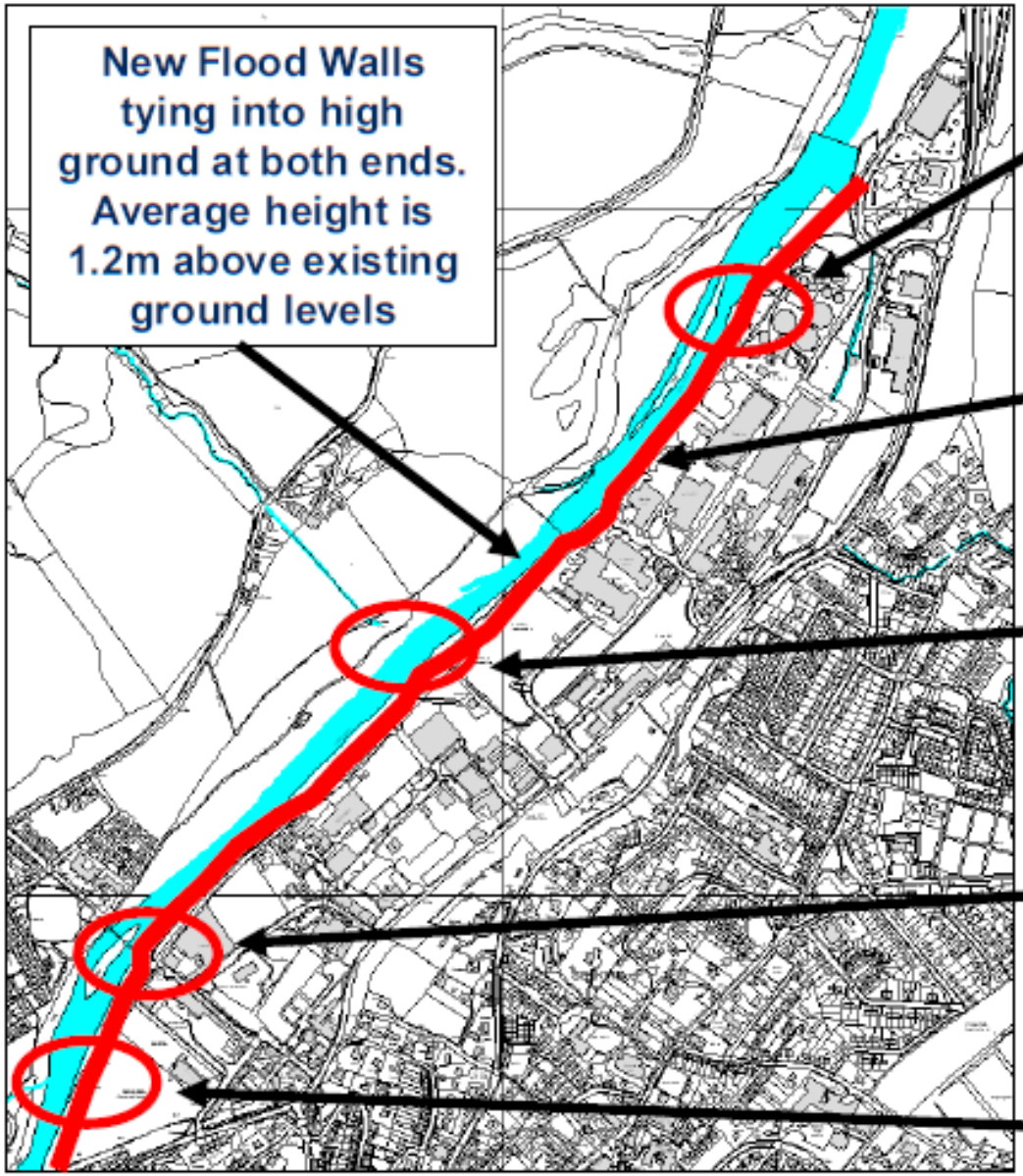
The proposals to protect against the River Ettrick are to:

- Provide 1600m of flood walls along the length of the river's edge, tying into higher ground at both ends. This wall will be an average of 1.2m higher that existing ground levels. The line of the flood wall will be set back from the immediate water's edge but will be held outside existing infrastructure such as Riverside Road
- Provision of erosion protection to the new flood wall where required: for example the riverbanks at Victoria Park and at the Selkirk Community Recycling Centre
- Provide a system to deal with Secondary Flooding (Groundwater Collection) behind the new flood walls including a Pumping Station
- Provide Access Infrastructure to allow for use of the existing Bannerfield and St. Mary's Mill Pedestrian Footbridges
- Provide a Flood Gate in the flood wall to allow for the Selkirk Common Riding to maintain their historic access route from Selkirk into River Ettrick

In combination these works will provide a standard of protection of 1 in 200 years plus climate change from a flood event. This will provide a significant increase in the level of protection accorded to the residents of Riverside; the Business and Industrial Community of Riverside; the potential development sites within the Riverside; the recreational infrastructure including Victoria Park and the Leisure Centre; and the road network especially Riverside Road.

The Appraisal of the Riverside Cell is not yet complete. Increasing the wall height to protect against a 1 in 500 years plus climate change event yields additional economic benefits thus providing an improved BCR with a marginal increase in cost and wall height. At this point in time the Project Team is ongoing in evaluating the optimum level of protection for the Riverside Cell from a holistic perspective (i.e. the sum of all economic, environmental, social, technical, and reputation criteria). This exercise will be completed in the next stage of the scheme design.

ANNEX G – Cell 3 – Riverside – The Proposed Works



ANNEX H:

CELL NO. 5 – BANNERFIELD & PHILIPHAUGH – FROM THE LONG PHILIP BURN – THE PROPOSED WORKS

An aerial photo with a schematic illustration of the various works proposed within the Philiphaugh and Bannerfield Areas is provided on the following page.

The proposals to protect against the Long Philip Burn are to:

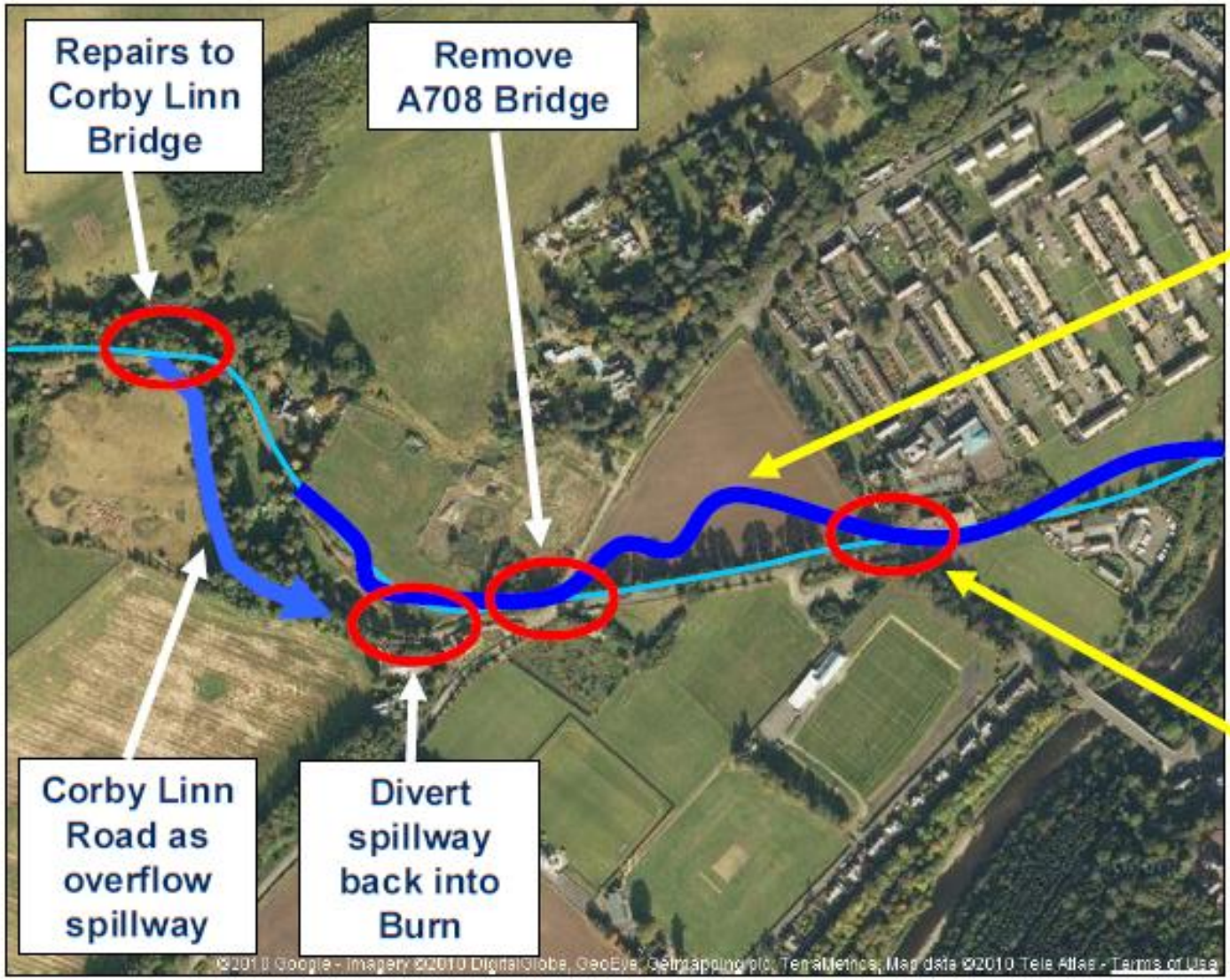
- Not provide Flood Attenuation in the Upper Long Philip Burn Catchment due to a combination of economic, technical and environmental difficulties. Instead the reduction in flood risk is through conveyance improvements in the Lower Long Philip Burn Catchment

Specifically this involves:

- Works to the Corbie Linn Bridge. This will re-engineer the bridge such that it is designed to allow only specified flows through its arch. Additional waters will be diverted over an adjacent spillway structure and then onto Corbie Linn Road. At the bottom end of the Corbie Linn Road a spillway catch grating will be constructed to capture the flood waters and divert them back into the Long Philip Burn. This will involve modification to and rising of the Corbie Linn Road
- Remove the A708 Bridge. This results in a length of road in front of the Philipburn Country House Hotel becoming a cul-de-sac and traffic being re-routed via the A707 Bridge
- Replace the A707 Bridge and associated A707 / A708 Junction. This will involve provision of a new bridge with a greater flow capacity and an upgrade of the road junction
- Increase the capacity of the Long Philip Burn over a 1km stretch from Ravensheugh to the Ettrick. This will involve removing the burn from its existing undersized channel adjacent the A707 and in providing a re-meander of the burn through the Angles field
- In renewing the Long Philip Burn the project has the potential to deliver multiple benefits, namely flood protection, river restoration, watercourse ecological enhancements (to a SAC Watercourse), habitat creation, habitat connection, creation of new park and amenity land, creation of new access pathways, connection of existing SBC Core Path Networks, release of development land opportunities and road network improvements

In combination these works will provide a standard of protection of 1 in 100 years plus climate change from a flood event. This will provide a significant increase in the level of protection accorded to this area.

ANNEX H – Cell 5 – Long Philip Burn – The Proposed Works



ANNEX J:

CELL NO. 6 – RIVERSIDE – FROM THE SHAW BURN
THE PROPOSED WORKS

An aerial photo with a schematic illustration of the various works proposed within the Riverside Business Park is provided on the following page.

The proposals to protect against the Shaw Burn are to:

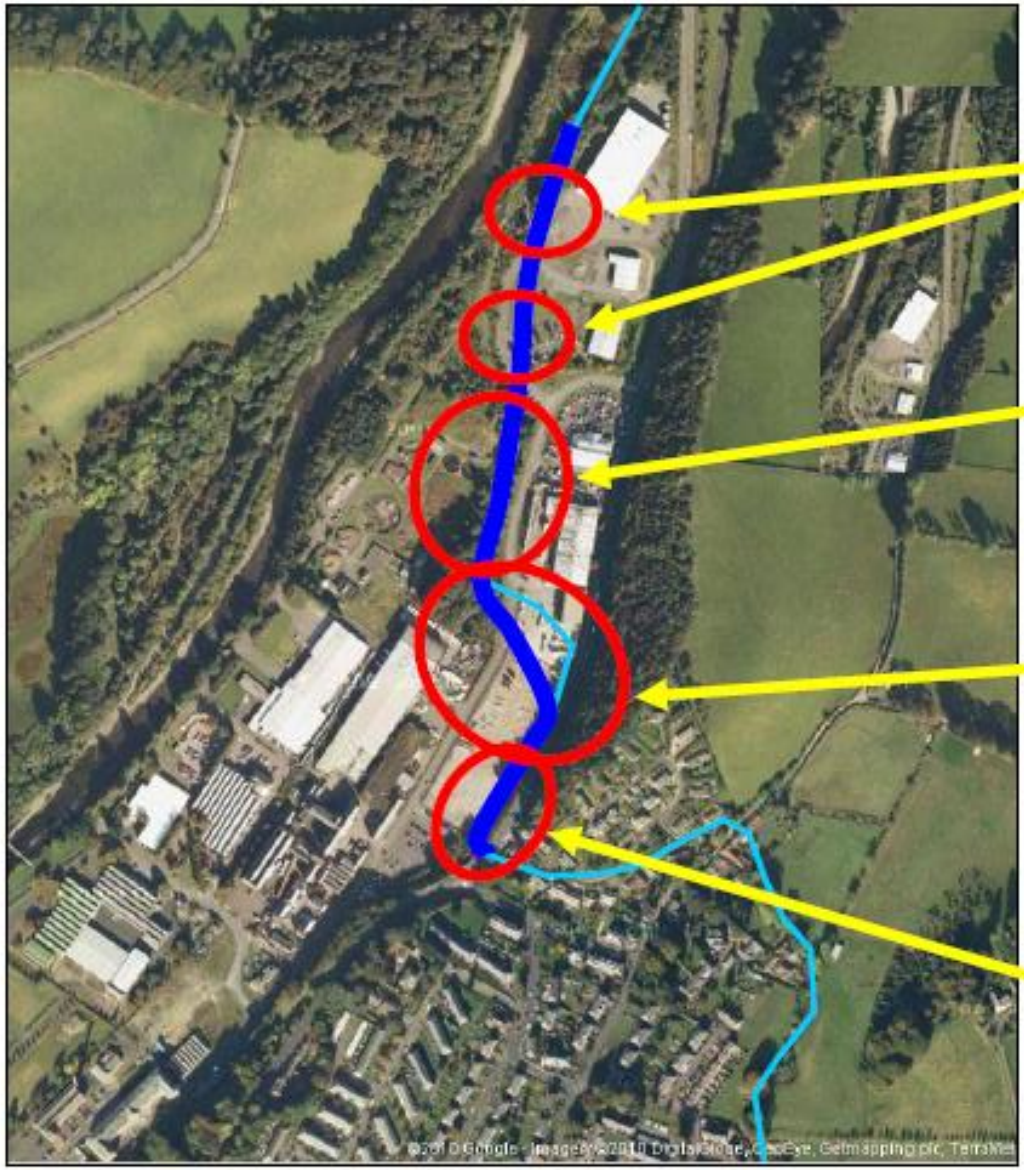
- Not provide Flood Attenuation in the Upper Shaw Burn Catchment due to a combination of economic, technical and environmental difficulties
- Deliver the reduction in flood risk through conveyance improvements in the Lower Shaw Burn Catchment

Specifically this involves:

- Provide 130m of flood wall adjacent the Oregon Timber Property downstream of the A7 Bridge. This will connect to the A7 bridge's existing abutments
- Replace the culvert running under the Oregon Timber Property and Dunsdale Road with a new larger sized culvert
- Increase the capacity of the Shaw Burn adjacent to Dunsdale Road and the Sewage Treatment Works
- Replace the two sections of culverts within the Baxter's / Co-Op Properties with new larger sized culverts
- Increase the capacity of the Shaw Burn adjacent to the Co-Op Property as it makes its way to the Ettrick

In combination these works will provide a standard of protection of 1 in 200 years plus climate change from a flood event. This will provide a significant increase in the level of protection accorded to the Business and Industrial Community of Riverside and specifically Oregon Timber, the Sewage Treatment Works and the Baxter's / Co-Op Site.

ANNEX J – Cell 6 – Shaw Burn – The Proposed Works



Replace Culverts with new larger Culverts (within Baxter's / Co-Op Site)

Works to River Channel to increase capacity

Replace Culverts with new larger Culverts (within Oregon Timber Site and under Dunsdale Road)

Provision of a new Flood Wall adjacent the A7 and Oregon Timber from the A7 Bridge over the Shaw Burn

ANNEX K:

CELL NO. 7 – THE ST. MARY'S LOCH OPTION
THE PROPOSED WORKS

The St. Mary's Loch Option involves:

- Utilizing the existing infrastructure at the bottom of St. Mary's Loch to manage the water levels in the loch such that they can deliver flood protection to those areas that lie downstream of the loch
- This cell cannot be analysed independently as the benefits that it generates are spread across multiple cells. For the purpose of the FPS the costs and benefits associated with this cell will be spread across the other cells
- In essence, this is a sustainable flood protection solution that can deliver multiple benefits to Selkirk, the Yarrow Valley and Lindean for a small capital cost covered by the Selkirk FPS

A formal Working Group (SMLWG) has been established through which the proposals will be generated, reviewed, and formally agreed before the detail is included in the Flood Protection Scheme. The main works of the SMLWG will take place during the next stage of the scheme design therefore the inclusion in the Preferred Scheme is the concept only.

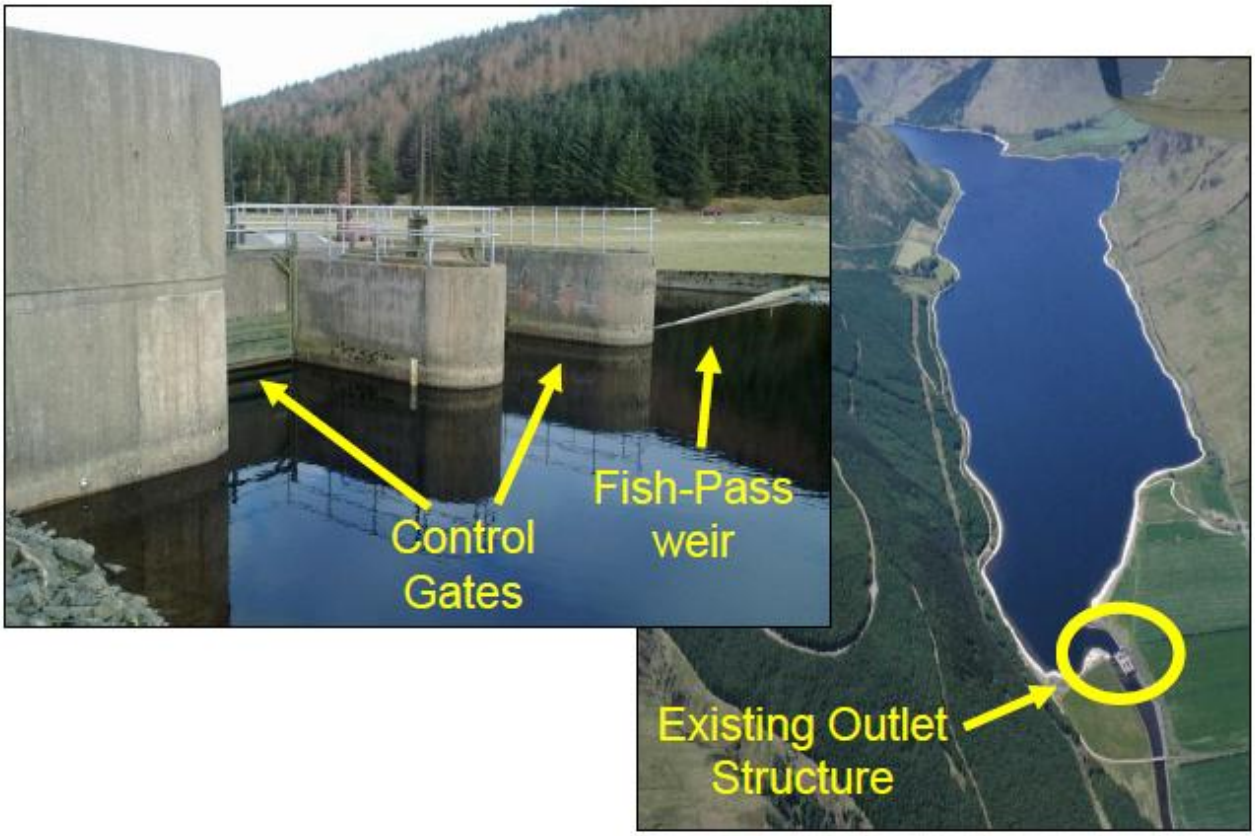
It is worth noting the following about the St. Mary's Loch Option:

- The SMLWG will be constituted by representatives of all relevant stakeholders however the Working Group is a part of the Selkirk FPS. Scottish Water is the major stakeholder as they hold the existing SEPA CAR (Controlled Activities Regulations) Licence for St. Mary's Loch
- The SMLWG will seek ways in which the current management of SML can be amended such that the loch can deliver flood attenuation during a flood event
- The SMLWG recognises there are already many users of the loch and that these users have multiple and different requirements. In delivering flood protection the requirements of these users must not be diminished. This, coupled with a requirement to achieve consensus between all stakeholders, poses a major risk to the Scheme
- It is lightly the final proposal will involve a lowering of the normal loch level such that the existing outlet gates can be closed for the duration of a storm event: this would allow the

loch to hold a large volume f flood waters out of the Yarrow. As an example: if the level was dropped by 500mm this could make available approximately 1.3M cubic metres of water storage

- The Control System required to manage a new operating system would be based on sophisticated computer algorithms controlled through a telemetry type system. It is possible that this management system could be tailored to the seasons in recognition of local weather patterns

The Selkirk FPS was not establish to provide protection to the Yarrow Valley however this Option delivers real protection to those at risk of flooding along the length of the Yarrow Valley and all the way along the Ettrick from the meeting of the waters (with the Yarrow) to the confluence with the Tweed including the Lindean Area



These photos identify the existing Outlet Structure at the downstream end of St. Mary's Loch. This is owned and operated by Scottish Water.

ANNEX L:

CELL NO. 8 – NATURAL FLOOD MANAGEMENT
THE PROPOSED WORKS

Natural Flood Management (NFM) involves:

- Utilising natural processes to deliver flood protection to those areas that lie downstream of that point in the catchment
- This work cannot be analysed independently as the benefits that it generates are spread across multiple cells. For the purpose of the FPS the costs and benefits associated with this cell are spread across the other cells

During the next stage of the scheme design undertake a further analysis of the catchment will be undertaken before specific proposals can be identified and formally included in the Flood Protection Scheme. The inclusion of NFM in the Preferred Scheme is therefore the concept only.

It is worth noting the following about the NFM Option:

- NFM can deliver flood risk reduction benefits over a prolonged timescale and often many of the benefits will not begin to fully arise for many years. In this respect NFM provides an ideal protection against the increase in flood risk caused by climate change
- The NFM Plan will be developed and implemented in partnership with landowners and other organisations across the catchment

In general NFM cannot deliver protection to Selkirk at the higher flood event return periods due to the sheer size of such a flood event. It does however have a significant role to play at the lower flood event return period events, and at a local level.