Musselburgh
Flood Protection



PRESENTATION TO:
GOOSEGREEN CONSULTATION AREA
30th September 2021

Conor Price – Project Manager
Jim Baxter – Project Delivery Manager

East Lothian Council
Jacobs
CPE CONSULTANCY
Turner & Townsend

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Approach to Meeting:

1. PRESENTATION TO SET-UP EVENING / DISCUSSION

2. QUESTION & ANSWER SESSION

3. WORKING FORUM FOCUSED ON GOOSEGREEN AREA

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Approach to Presentation:

1. CP - Consultation on the Outline Design
2. CP - Flood Risk – to Musselburgh and Goosegreen Area
3. CP - What is a flood protection scheme?
4. CP – Where did the Scheme come from?
5. CP - Timescales for delivery
6. JB - The Stages of the Scheme
7. JB – The Preferred Scheme
8. JB – Multiple-Benefits
9. JB - Consultation
10. JB - Outline Design → At Goosegreen Area

END

11. ALL – Questions & Answers Session

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Consulting on the Outline Design (CP)

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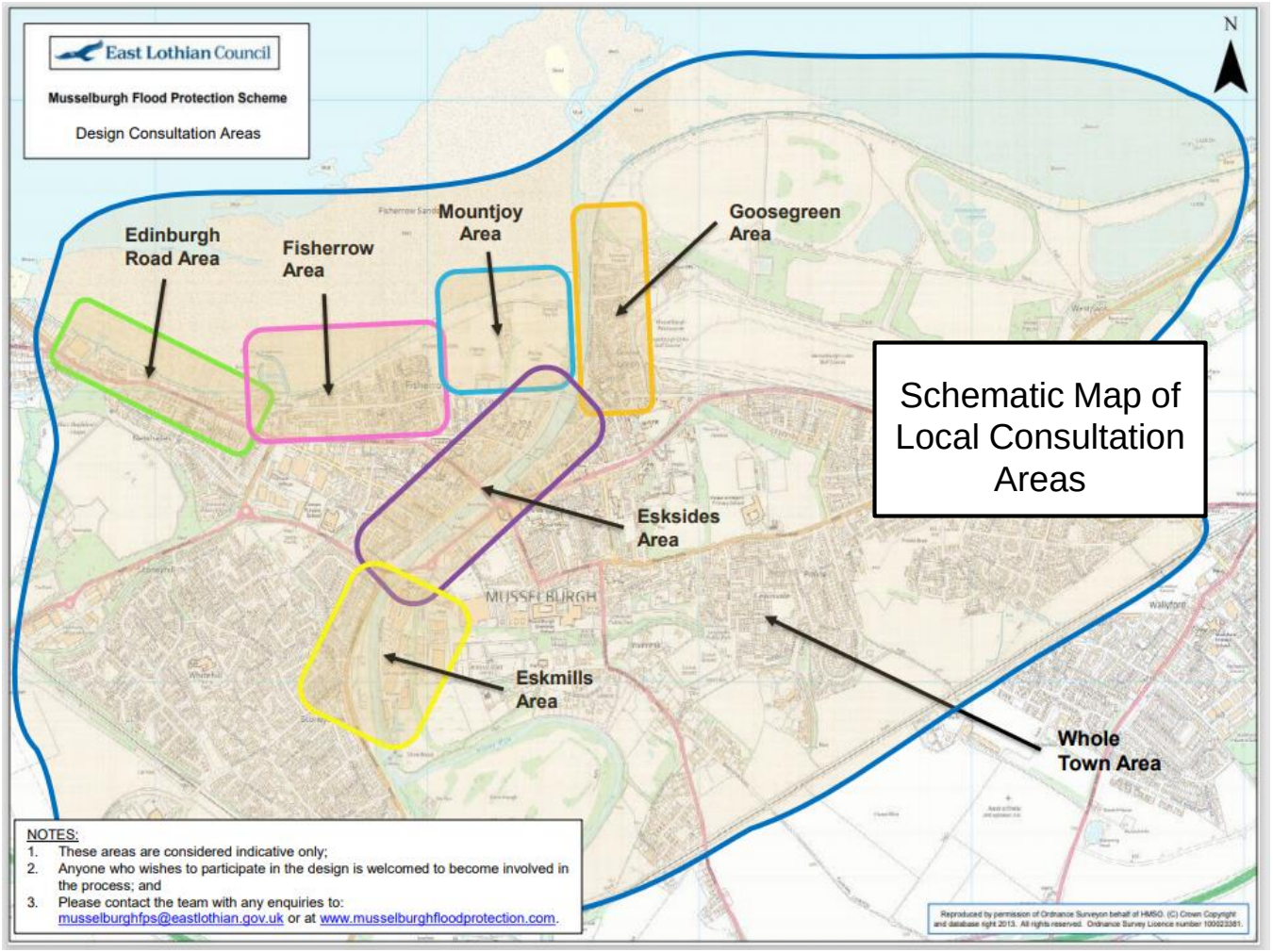
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Approach to Local Area Consultation:

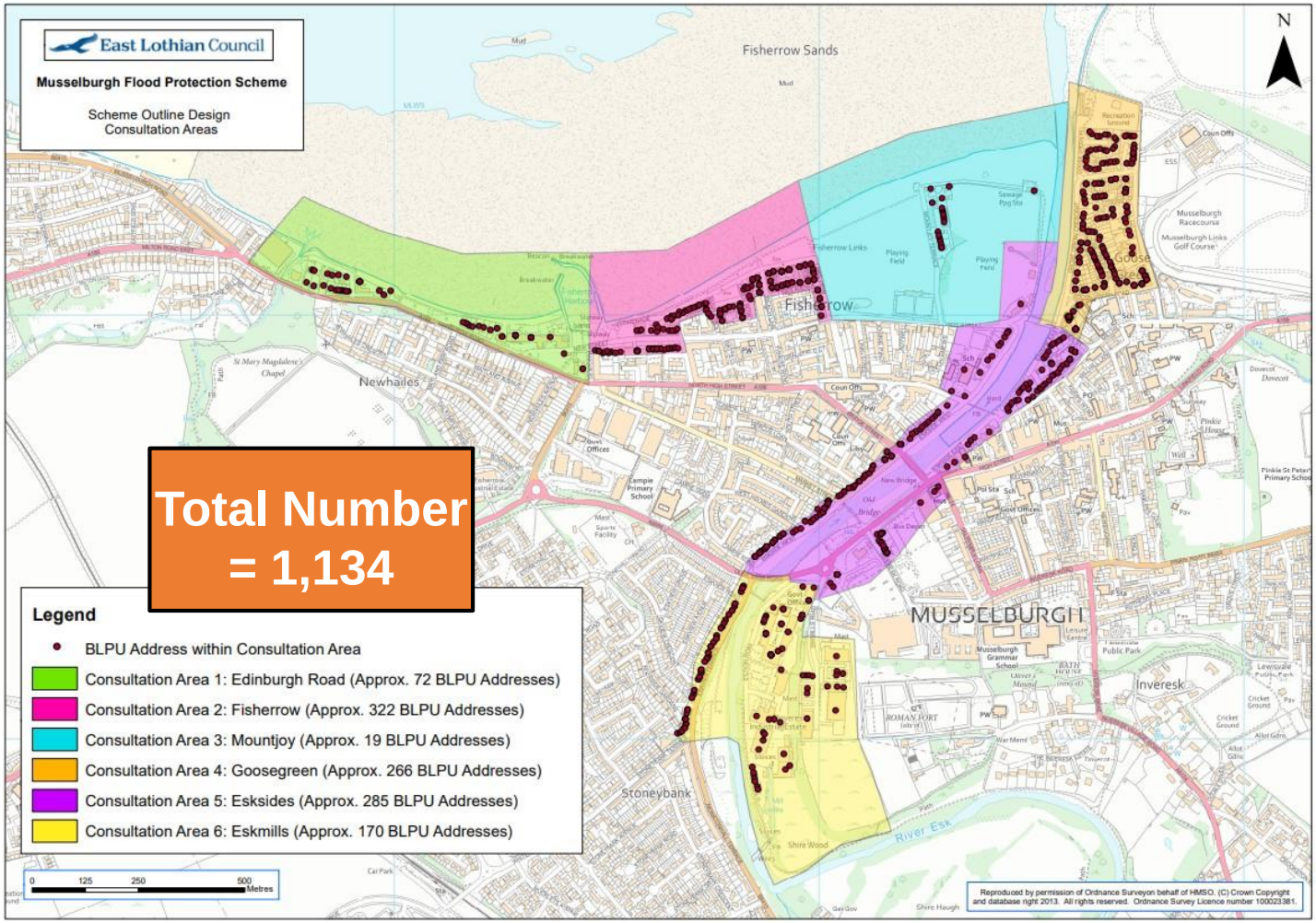


Tonight is all about Area 4 – Goosegreen

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Local Area Consultation Groups:



GIS Map of Local Consultation Areas – property identification

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Update on Local Area Consultation:

Local Area:	No. of Properties:	Letters Delivered to Door:	Doorway Discussions:	Attendance at Meeting No. 1:	Attendance at Meeting No. 1 (as percentage):
Edinburgh Road	75	68	19	7	9.3%
Mountjoy Terrace	22	22	12	11	50%
Fisherrow	323	305	88	24	7%
Goosegreen	267	254	103	TBC	TBC
Esksides	286	TBC	TBC	TBC	TBC
Eskmills	171	TBC	TBC	TBC	TBC
TOTAL	**1,144**	**649**	**222**	**42**	**18.5%**

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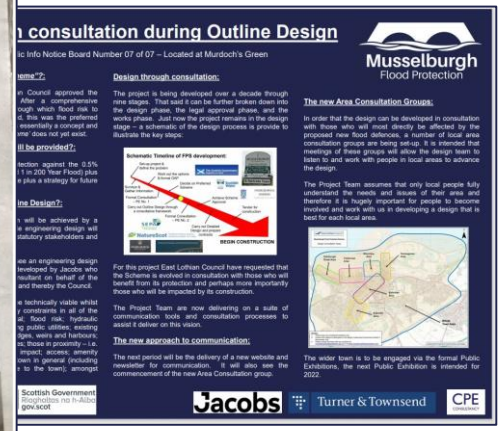
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Update on Communication Tools:

1. Public Information Boards
2. New Scheme Website
3. New Scheme Newsletters
4. Stakeholder Email List
5. Public Consultations
6. Presentations to Community Organisations
7. Door-to-Door Site Visits
8. Letters to properties
9. Formal Public Exhibitions
10. Press Releases - media

WE DID NOT PROCEED WITH THE DESIGN DURING LOCKDOWN → COULD NOT CONSULT


Musselburgh
COURIER
'A SCOURGE'
VANDALS SLAMMED AS PLAQUE TRASHED: P10
WHEEL DONE
TOP AEROBATIC STUNTS THRILL AT NEWHAILES
Residents urged to have their say on flood defences
OH MICKY, YOU'RE SO FINE!


consultation during Outline Design
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Design through consultation:
The new Area Consultation Groups:
The new approach to communication:
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Overview of flood risk (CP)

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How do we define a flood risk?:

- It is a statistical concept through which we state the probability of a flood of a certain magnitude at any given time
- **The key event from a planning perspective (i.e. Within SPP) is the 0.5% AEP (Annual Event Probability) Flood Event - known as the 1 in 200 Years Flood Event**
- This DOES NOT mean it will happen once every 200 years: it could happen today and again next week or not for 500 years

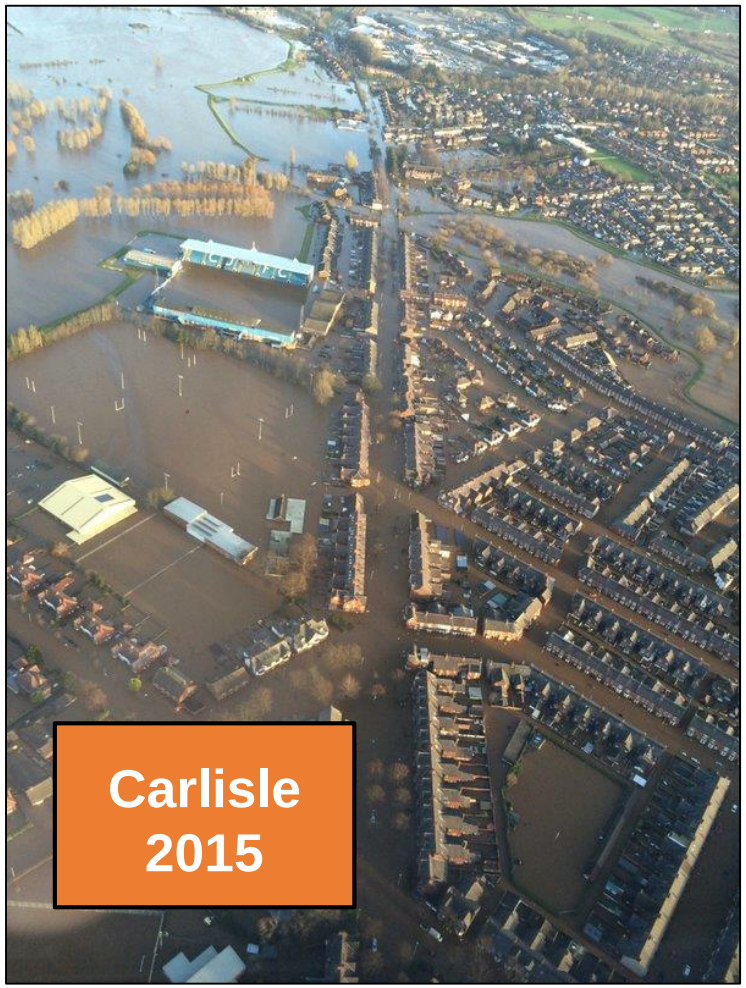
Musselburgh had a 0.5% AEP flood event in 1948

- Climate Change adds an allowance to river flows and sea level to account for changes happening due to predicted climate change

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Recent examples of major UK flooding:



Carlisle
2015



Cockermouth
2009

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A History of Flooding

Exhibition Board from Public Exhibition No. 1 in July 2019 at The Brunton









24th July 1888: pluvial flooding, several shops in the High Street flooded

12th Feb 1894: Beuccleugh House in Fisherrow flooded to 0.45m, rail track submerged

11th August 1901: pluvial flooding of shops in High Street, New Street and Millhill

17th August 1920: River Esk flooded fields; one tier of iron bridge knocked down by a tree

13th August 1948: Worst event on record. River Esk flooded Shorthope Street, Millhill, James Street, Eskside East & Eskside West. Many houses flooded to two feet

6th October 1990: Flooding from River Esk after debris retained water at structures

4th January 2014: Cycle path and Eskside West flooded

1888 — 2014

Sept 1891: River Esk flooded the Paper Mills and other factories, as well as nearby houses

July 1897: pluvial flooding, High Street and Shorthope Streets flooded

October 1907: pluvial flooding on High Street and Newbigging to 0.6m. Streets and railway flooded near Newhails Station

Sept 1927: River Esk flooded Shirehaugh and other areas upstream. Footbridge at Shirehaugh swept away.

14th August 1966: Major flooding of Eskside West, Eskside East, Shorthope Street & Millhill

7th July 2012: Fields along River Esk flooded to depth of 2-3m









All historic images provided courtesy of John Gray Centre, Haddington

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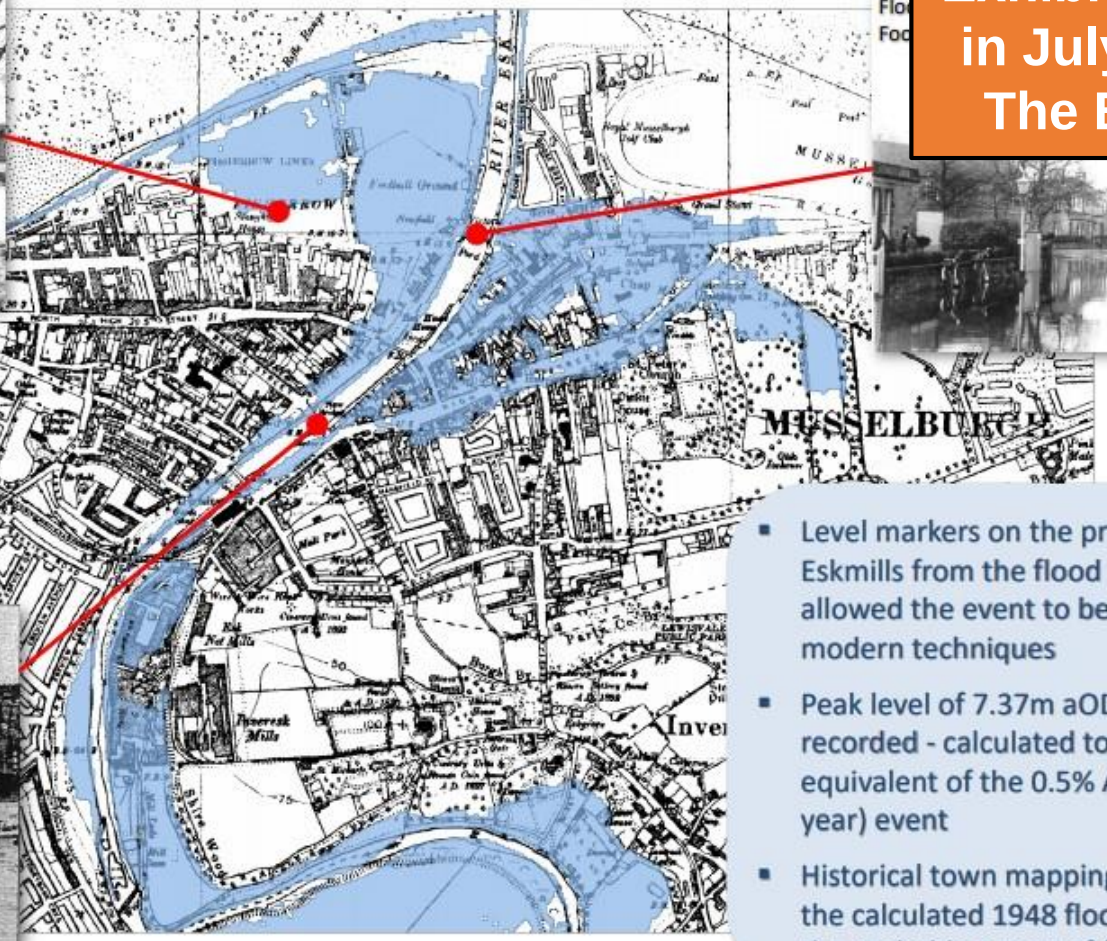
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August 1948 Flood Event

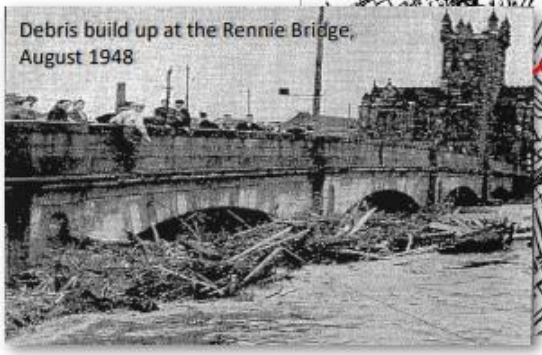
Exhibition Board from Public Exhibition No. 1 in July 2019 at The Brunton



New Street looking towards Fisherrow, August 1948





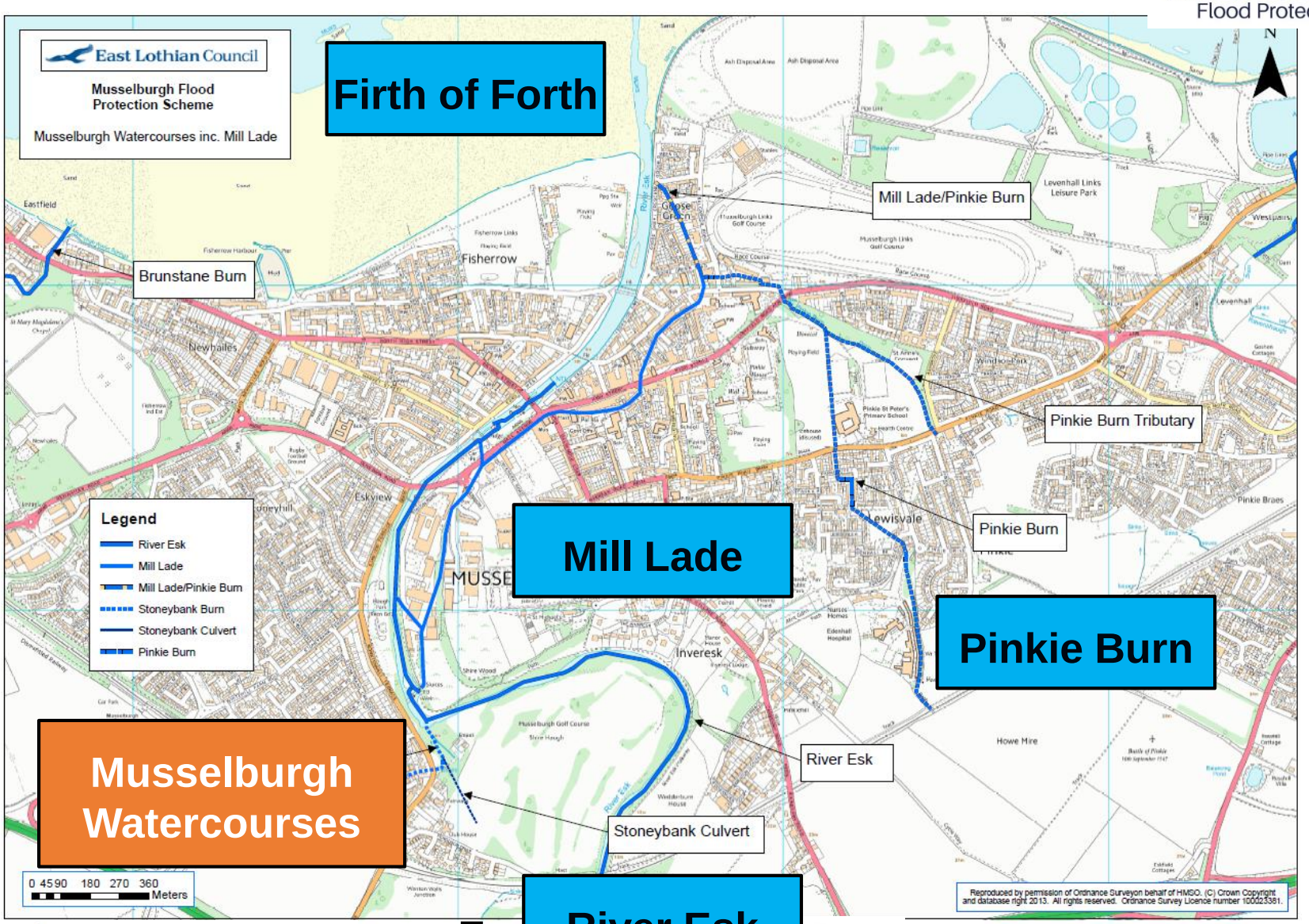


Debris build up at the Rennie Bridge, August 1948

- Level markers on the properties at Eskmills from the flood event have allowed the event to be analysed using modern techniques
- Peak level of 7.37m aOD at Eskmills was recorded - calculated to be the equivalent of the 0.5% AEP (1 in 200 year) event
- Historical town mapping overlain with the calculated 1948 flood event shows the probable extent of flooding

Rennie Bridge image provided as extract from local history publication, author unknown, all other historic images provided courtesy of John Gray Centre, Haddington

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Overview of Flood Risk Modelling:

1. The Scheme has developed two separate hydraulic models – one of the sea and one of the river;
2. These models use actual river flow and sea level data issued to us by SEPA from their network of gauging stations;
3. The model is calibrated against historic events (where possible) to verify the accuracy of its outputs;
4. Climate change is accounted for as a percentage increase in river flow, and as a change in sea level;
5. Climate change data / projections were last updated by UKCP18 in December 2018;
6. The whole process of determining the Scheme's Hydrology and thereafter the approach to Hydraulic Modelling was advanced in partnership with SEPA's Flood Modelling Team in Perth;

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Overview of Flood Risk Modelling:

7. The project team has undertaken significant and detailed land surveying (topographic survey) so that we have a Digital Terrain Model (DTM) of the ground – this now sits within the Hydraulic Model;
8. When the model is run to simulate any flood event the output can be provided as a Flood Map that shows the areas of inundation / flooding on that map.
9. During the Option Appraisal Process – we termed the Hydraulic Model as ‘Model A’;
10. We are now using a refined ‘Model B’ – this is not yet formally approved as SEPA suffered a cyber attack in December 2020 and have not been able to assist us in its final review;
11. Model B has fully absorbed to ‘new’ UKCP18 data and advice / guidelines on its usage.

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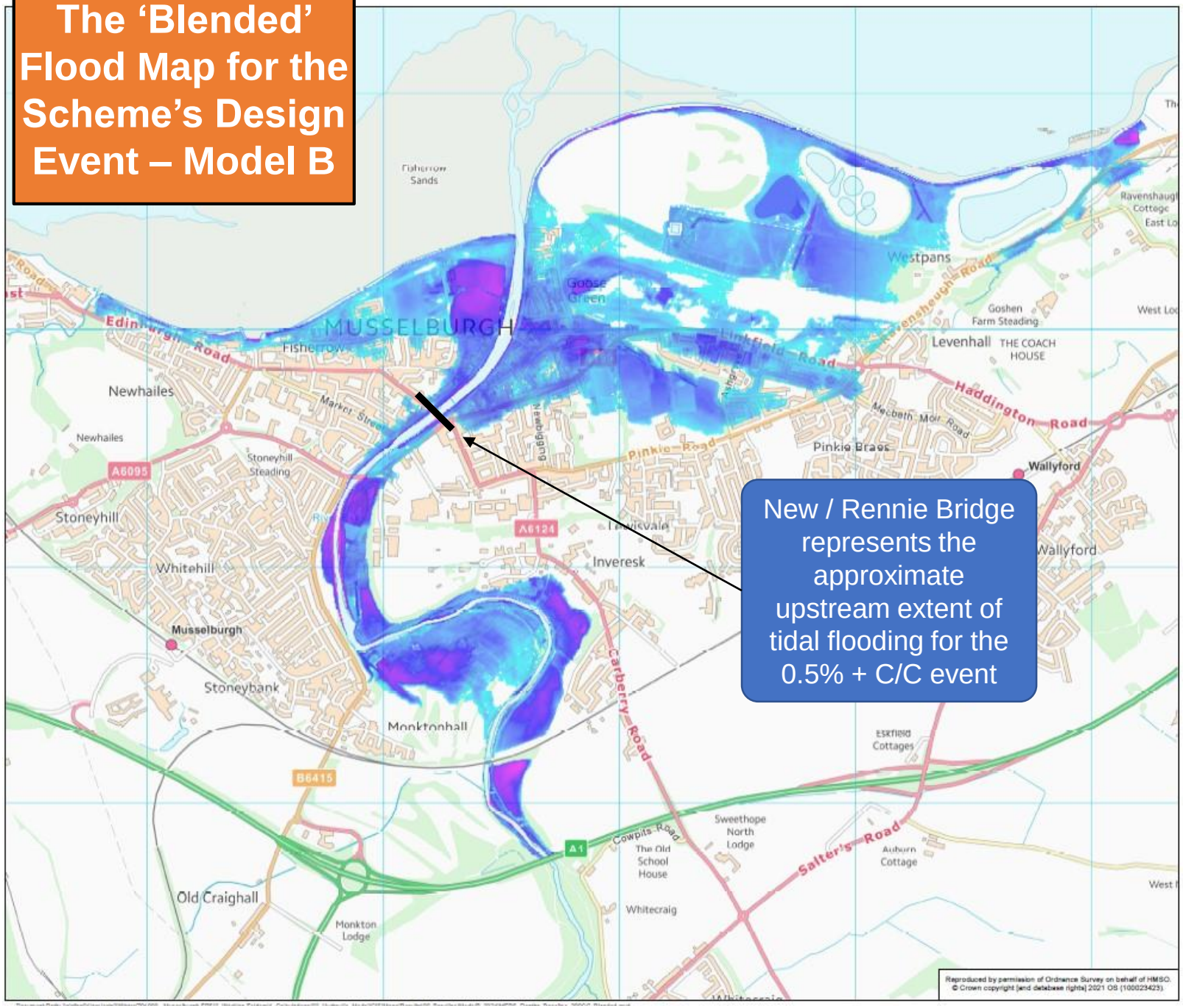
Overview of Flood Risk Modelling:

Scheme Hydraulic Model 'A' - 2019 → **Standard of Protection = against 0.5% AEP Flood Event plus Climate Change**

Scheme Hydraulic Model 'B' – since 2020 → **Standard of Protection = against 0.5% AEP Flood Event plus an allowance for Climate Change plus a Strategy for Future Flexibility**

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The ‘Blended’ Flood Map for the Scheme’s Design Event – Model B





KEY

Water Depth (m)

Value

High : 3

Low : 0

Client: East Lothian Council

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Project: Musselburgh Flood Protection Scheme

Drawing: Baseline Scenario - Blended Flood Maps Fluvial 0.5% AEP+CC; Tidal 0.5%

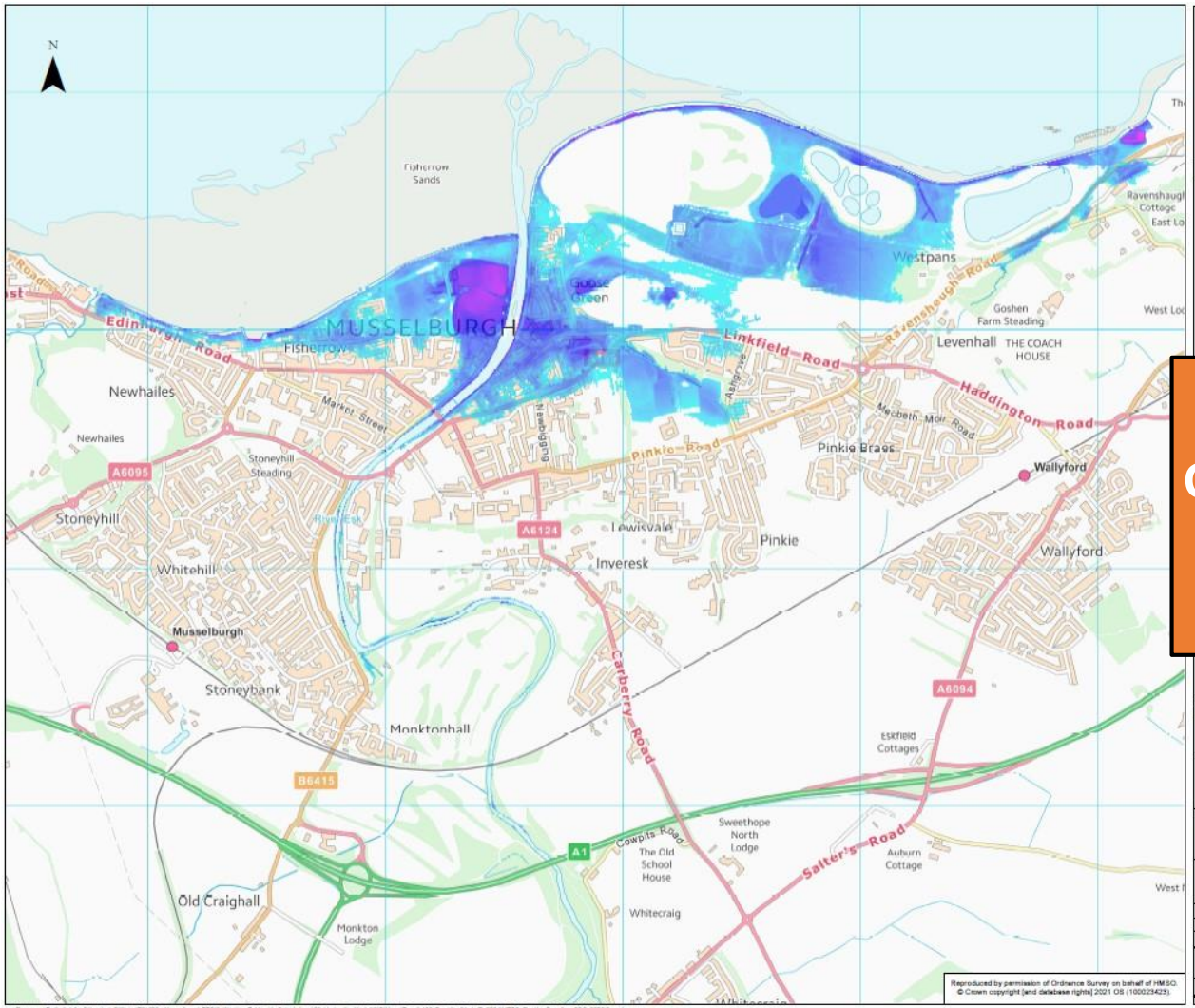
Drawn By : EM	Date: 23/09/2021
Checked By : GL	Date: 23/09/2021
Approved By : JB	Date: 23/09/2021
Drawing No. :	Revision 1

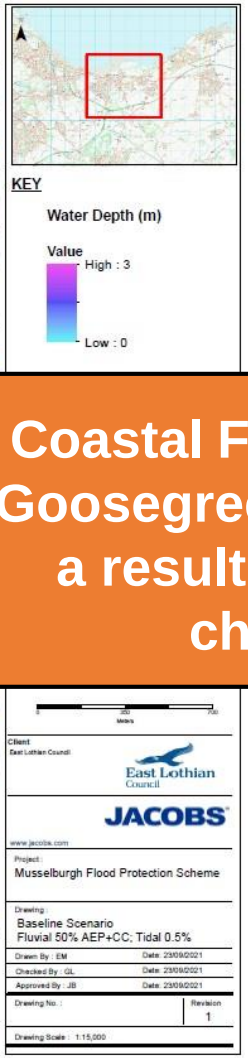
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Coastal flood risk – At Goosegreen Area:



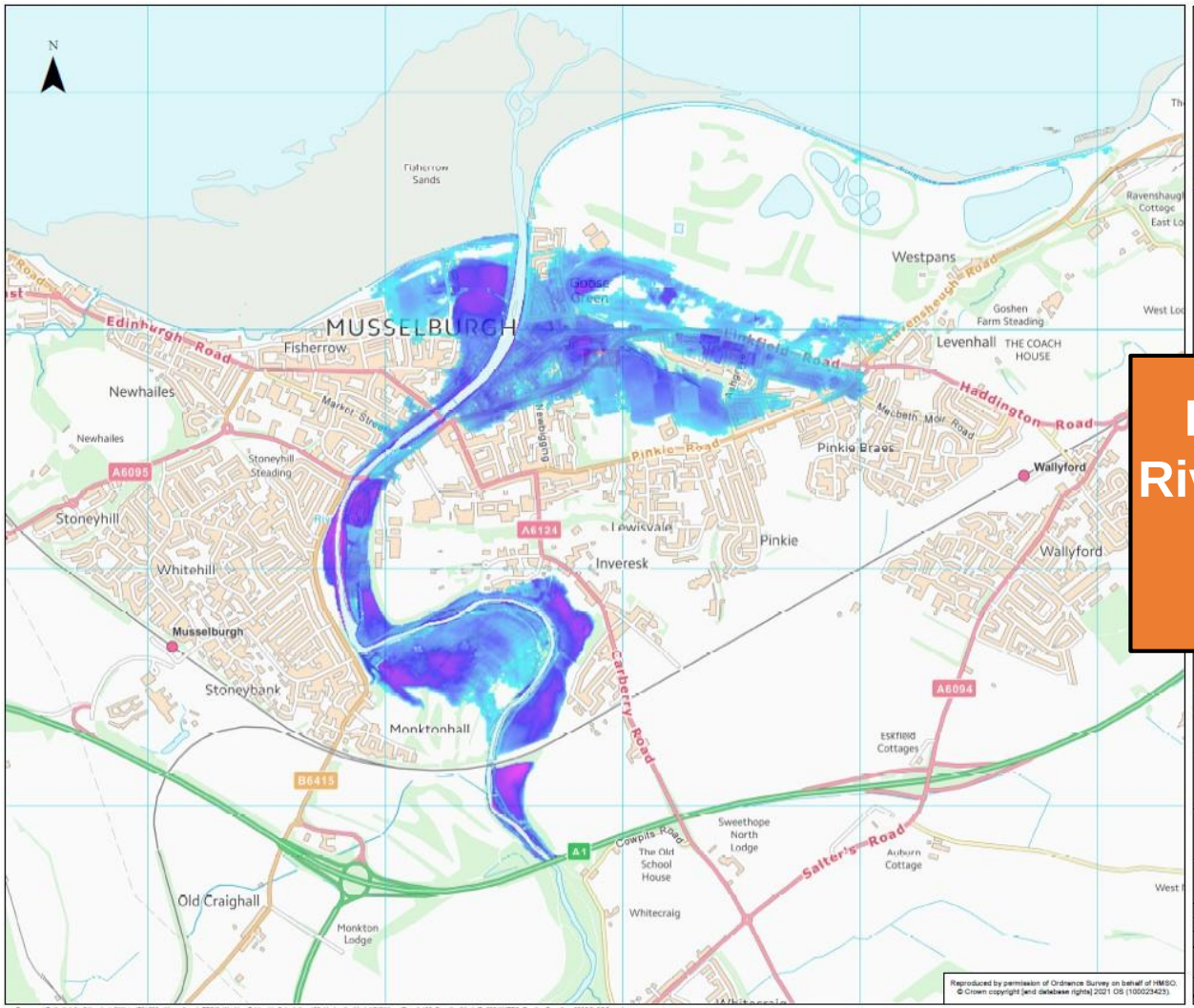


Coastal Flood Risk to Goosegreen Area is as a result of climate change

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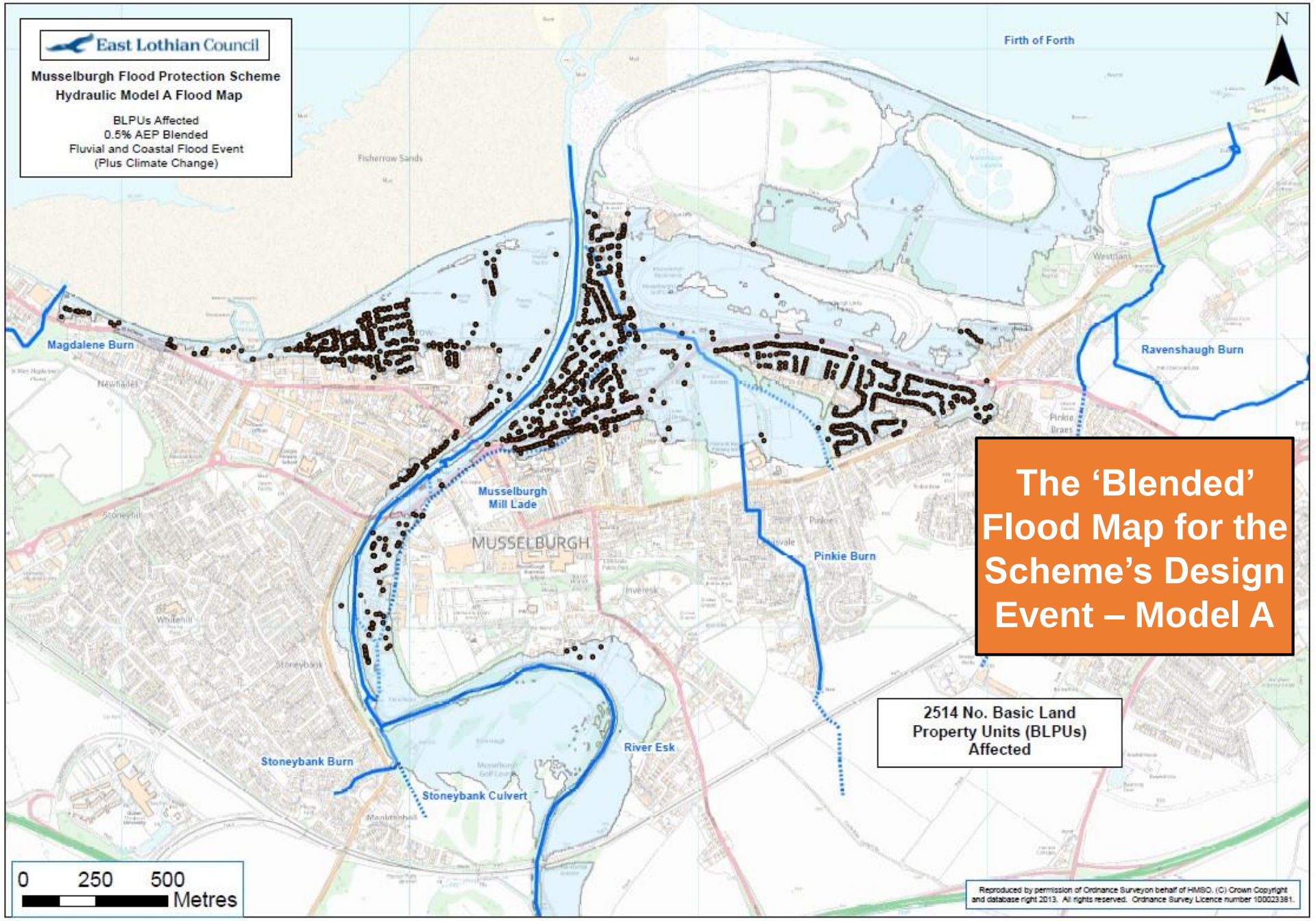
Fluvial flood risk – At Goosegreen Area:





Flood Risk from the River Esk gets as far as the Levenhall roundabout

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Musselburgh Flood Protection Scheme
Hydraulic Model A Flood Map
BLPUs Affected
0.5% AEP Blended
Fluvial and Coastal Flood Event
(Plus Climate Change)
N
Firth of Forth
Fisherrow Sands
Magdalene Burn
Ravenshaugh Burn
Musselburgh
Mill Lade
MUSSELBURGH
Pinkie Burn
River Esk
Stoneybank Burn
Stoneybank Culvert
The 'Blended' Flood Map for the Scheme's Design Event – Model A
2514 No. Basic Land Property Units (BLPUs) Affected
0 250 500
Metres
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Advancing a flood scheme (CP)

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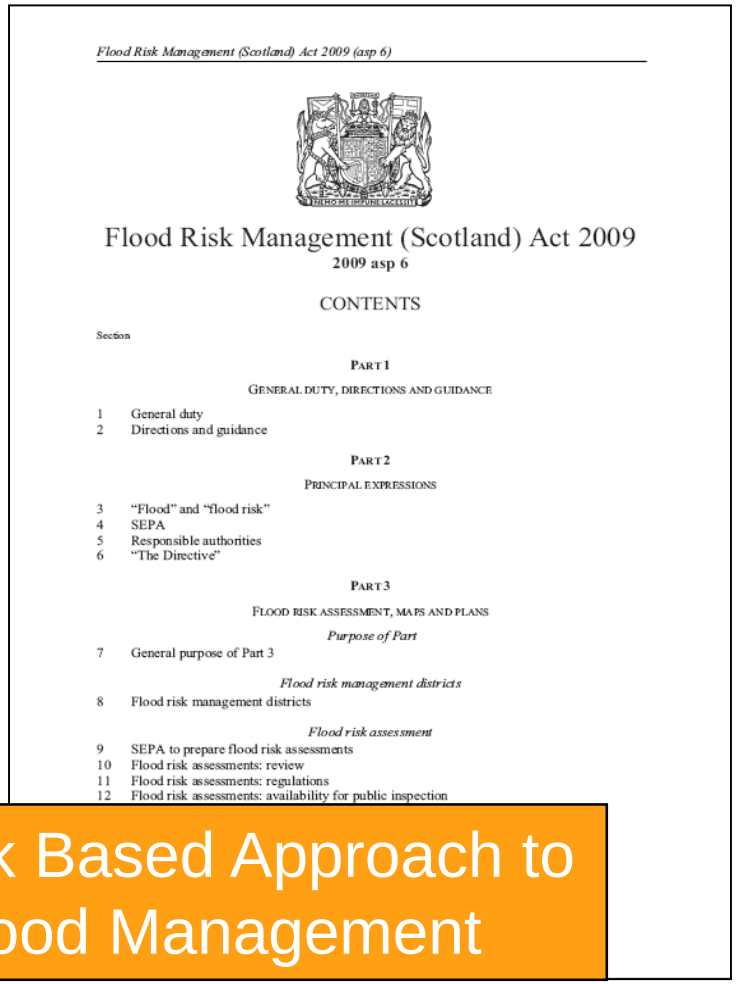
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The Legislation and a FPS:

- This (new) Act superseded the (old) Flood Prevention (Scotland) Act 1961
- Maps out how flood risk will be managed in Scotland and who will be responsible for managing that risk
- New approach – i.e. professionally manage: not just bigger walls
- Major projects to reduce flood risk are delivered through a 'flood protection scheme'
- Formal approval under FRM with DPP



Flood Risk Management (Scotland) Act 2009 (asp 6)

Flood Risk Management (Scotland) Act 2009
2009 asp 6

CONTENTS

Section

PART 1
GENERAL DUTY, DIRECTIONS AND GUIDANCE
1 General duty
2 Directions and guidance

PART 2
PRINCIPAL EXPRESSIONS
3 "Flood" and "flood risk"
4 SEPA
5 Responsible authorities
6 "The Directive"

PART 3
FLOOD RISK ASSESSMENT, MAPS AND PLANS
Purpose of Part
7 General purpose of Part 3
Flood risk management districts
8 Flood risk management districts
Flood risk assessment
9 SEPA to prepare flood risk assessments
10 Flood risk assessments: review
11 Flood risk assessments: regulations
12 Flood risk assessments: availability for public inspection

Ethos of Act: Catchment & Risk Based Approach to Sustainable & Natural Flood Management

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Schematic Timeline of FPS development:

Set-up project & define the problem

Work out the options & formal OAP

Surveys & Gather information

Decide on Preferred Scheme

Formal Consultation – PE No. 1

Achieve Scheme Approval

Carry out Outline Design through a consultative framework

Tender for construction

Formal Consultation – PE No. 2

Carry out Detailed Design and prepare contracts

BEGIN CONSTRUCTION

The Scottish Government
Riaghaltas na h-Alba

Scottish Water



MUSSELBURGH & INVERESK COMMUNITY COUNCIL

SEPA
Scottish Environment Protection Agency

NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

MUSSELBURGH RACECOURSE
SINCE 1816



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Background to the Scheme (CP)

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Where has this Scheme come from:

1. There is a history of flooding to Musselburgh;
2. The Council are already managing that risk from the sea via Demountable Barriers at the lower reach of the River Esk;



Forth High Tide Surge Event – December 2013

Flood water from the River Esk, or the sea backed-up the River Esk can flow down New Street when not controlled at the edge of the River Esk

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Where has this Scheme come from:

3. Climate change projections make the situation much worse;
4. The new Flood Risk Management (Scotland) Act 2009 put in place a national approach to managing flood risk;
5. From this the Local Flood Risk Management Plans were developed and approved;
6. The Forth LFRMP records a specific action of a flood protection scheme for Musselburgh;
7. The SEPA and the Scottish Government then confirmed the Scheme as a priority via its Cycle 1 Flood Protection Scheme Programme – 42 No. FPS's across Scotland;
8. The Council → Project Team have been advancing it since 2016;
9. A Preferred Scheme was confirmed by Council in January 2020.

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Timescales for delivery (CP)

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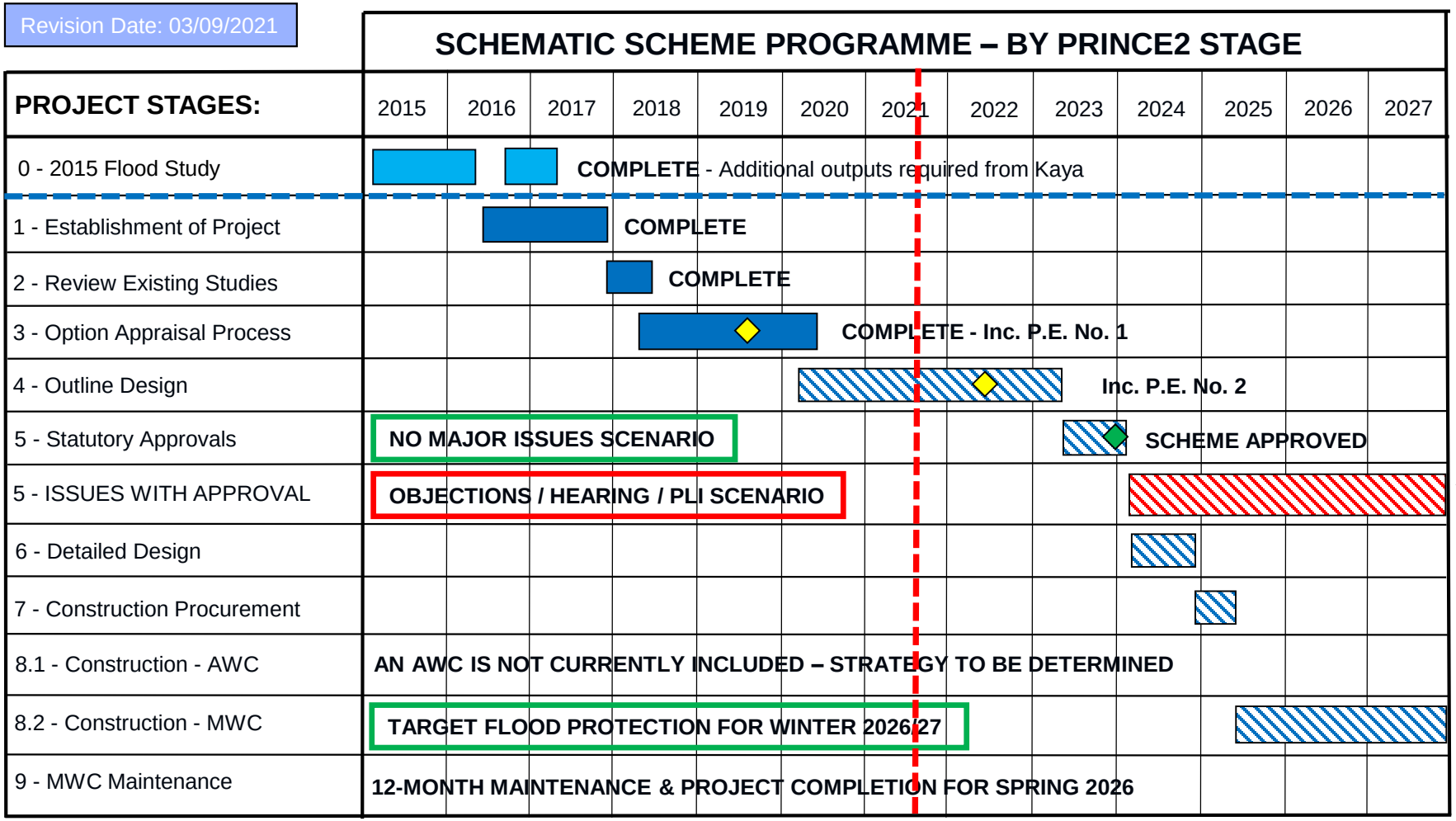
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What is the likely delivery timetable:

Revision Date: 03/09/2021



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What are the next steps:

Assume by spring 2022

1. Local Area Consultation Meetings;
2. Make the new Scheme Website live;
3. Develop first edition of new Scheme Newsletter;
4. Meetings with Key Stakeholders;
5. Continue work of Working Groups with Regulatory Officers;
6. Finalise the Hydrology and Hydraulic Model with SEPA;
7. Produce formal outputs from the approved Hydraulic Model;
8. Advance Outline Design;
9. Continue cycle of design → consultations → design etc.;
10. Present the draft Outline Design to a formal Public Exhibition for review and comment by anyone who wishes to view / participate.

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The Stages of the Scheme (JB)

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Project Stages

- Stage 1 – Establishment of the scheme
- Stage 2 – Review of existing studies
- Stage 3 – Option appraisal
- Stage 4 – Outline design
- Stage 5 – Statutory approvals
- Stage 6 – Detailed design
- Stage 7 – Procurement
- Stage 8 - Construction

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The Outline Design (JB)

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Stage 4 – Outline Design

- Collect further information
- Consult stakeholders on the preferred scheme
- Develop an outline design
- Assess the impact of the outline design on the environment
- Refine the outline design to form a ‘Proposed Scheme’

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Data Collection During the Pandemic

- Updated hydraulic modelling to reflect climate change projections
- Ground Investigation no.2
- Topographic survey no.2
- Tree condition survey
- Ecology surveys (birds, bats etc.)
- Giant hogweed treatment south of Eskmills Business Park
- Mill Lade clearance at Eskmills Business Park
- Pinkie Burn and Mill Lade condition survey
- Eskmills weir and Goosegreen weir condition survey

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The Preferred Scheme (JB)

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The Preferred Scheme

- The terminology comes from: “Flood Risk Management (Scotland) Act 2009 – Flood Protection Schemes – Guidance for Local Authorities”.
- The preferred scheme is a preferred combination of options from the option appraisal process.
- The preferred scheme is not a design – it is a collection of concepts which, subject to further development, could collectively reduce the risk of flooding to Musselburgh from coastal, fluvial, pluvial and groundwater sources.
- We need engagement with the community and other stakeholders to develop the preferred scheme into a design which best meets the needs of the people of Musselburgh

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The Preferred Scheme Components

1. **Attenuation** – Sustainable flood management, using Rosebery and Edgelaw reservoirs to store floodwater at the height of the storm and reduce the peak flow of water entering Musselburgh
2. **Debris management** – Sustainable flood management to intercept large woody debris to reduce the risk of blockage beneath bridges
3. **Conveyance improvement** – replace bridges at a higher level, above the flood to reduce restrictions to the flow of water
4. **Containment** – direct defences to contain the river and keep out the sea
5. **Urban drainage** – pumping stations to collect rainwater caught behind defences and return it to the river

None are effective on their own – their combined effect is required

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Multiple-Benefits (JB)

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Multiple Benefits

- One of the Scheme's objectives is to, *"where possible… strive to achieve multiple benefits"*.
- Multiple benefits are opportunities to add further value to the town besides reducing flood risk. Some of the potential multiple benefits already identified are:
  - Working with FH&SA
  - Working with Musselburgh Active 'Toun' project
  - Working with Musselburgh Traffic Management Plan
  - Working with Scottish Power Assets
- This is where stakeholders have the greatest opportunity to influence the legacy of the Scheme

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Consultation (JB)

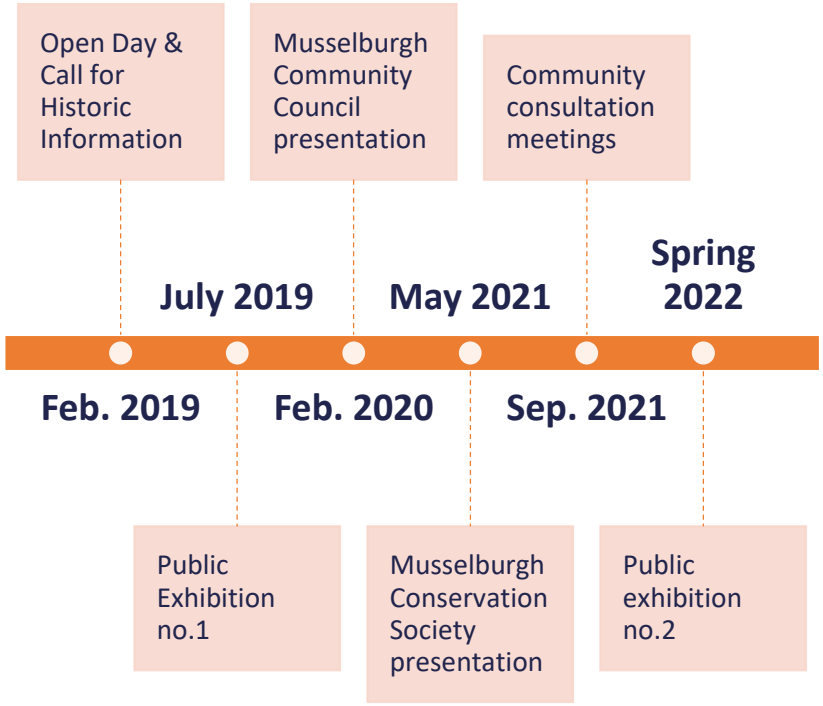
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Public Consultation Programme





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The Outline Design – At Goosegreen Area (JB)

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Outline Design

- **It will…**establish the general position, size and appearance of the works, similar to a planning application.
- **It will not…** include detailed construction drawings and product specifications (this happens later, during detailed design).
- The outline design requires a balance between sufficient detail for stakeholders to consider its merits, and sufficient flexibility for the designer to develop the design.
- Once complete, the outline design will be formally published in the form of scheme drawings and a written description of scheme operations. If confirmed through the statutory process, the Scheme will then proceed to detailed design and construction.

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Scheme Overview



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Goosegreen area



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Goosegreen area



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Goosegreen Flood Defence Levels

- Able to incorporate the full climate change allowance without excessively high flood defences
- Standard of Protection: 0.5% AEP (plus climate change) event
- Flood defence level downstream of Electric bridge is determined by sea level rather than fluvial flood event

Location	Level above ordnance datum
Flood Defence Level	+5.11mOD
Goosegreen ground level	+3.80 – 4.00mOD
Approximate defence height relative to existing ground level	1.1m – 1.3m high

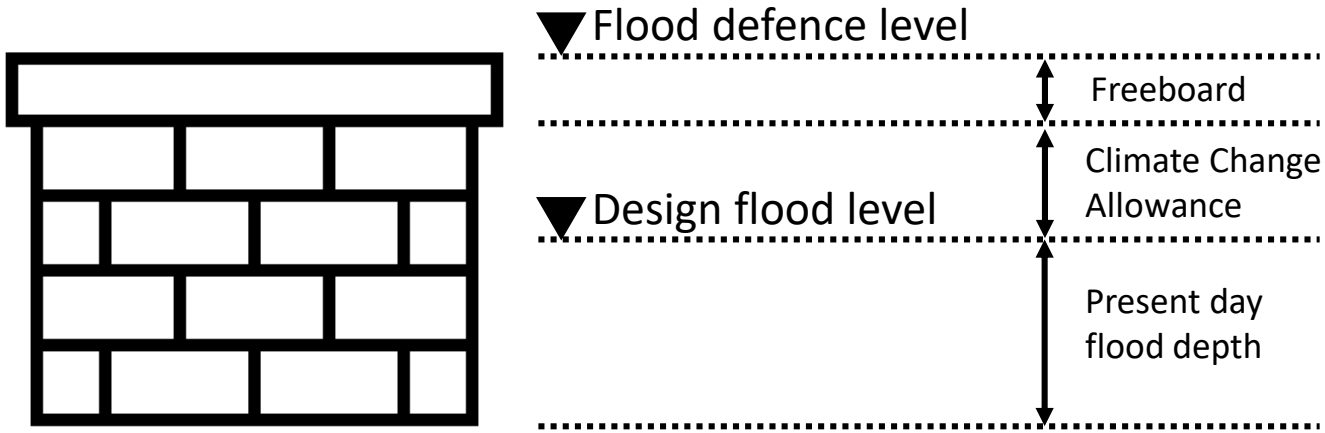
NB. All defence levels are subject to change, pending completion of outline design

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Goosegreen Flood Defence Levels

The height of a flood defence is based on several components:

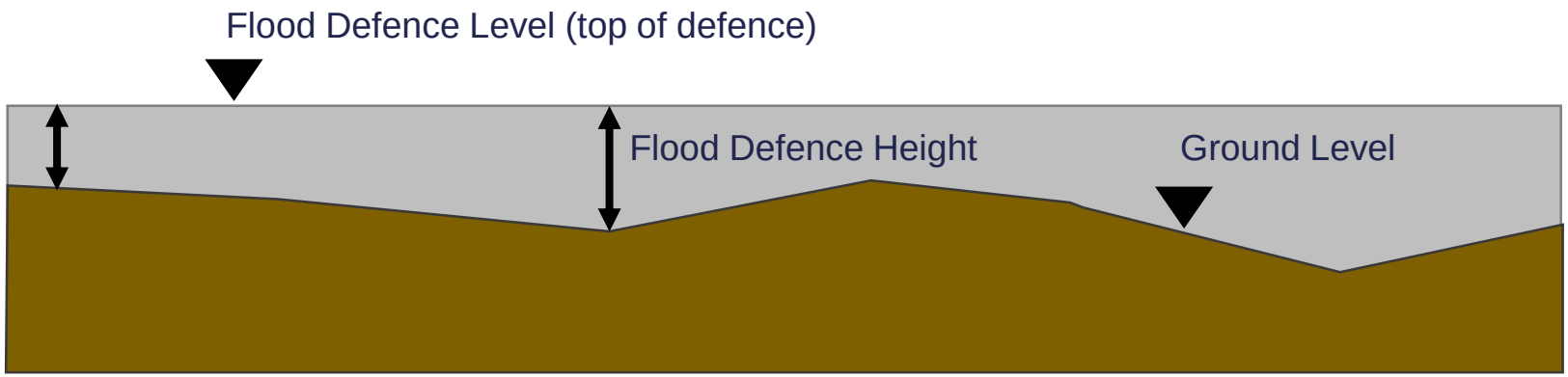
- The level the flood is expected to reach at present day
- An allowance for climate change, making the level higher in the future
- Freeboard (an allowance for uncertainty. Also known as a factor of safety).



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Flood Defence Heights

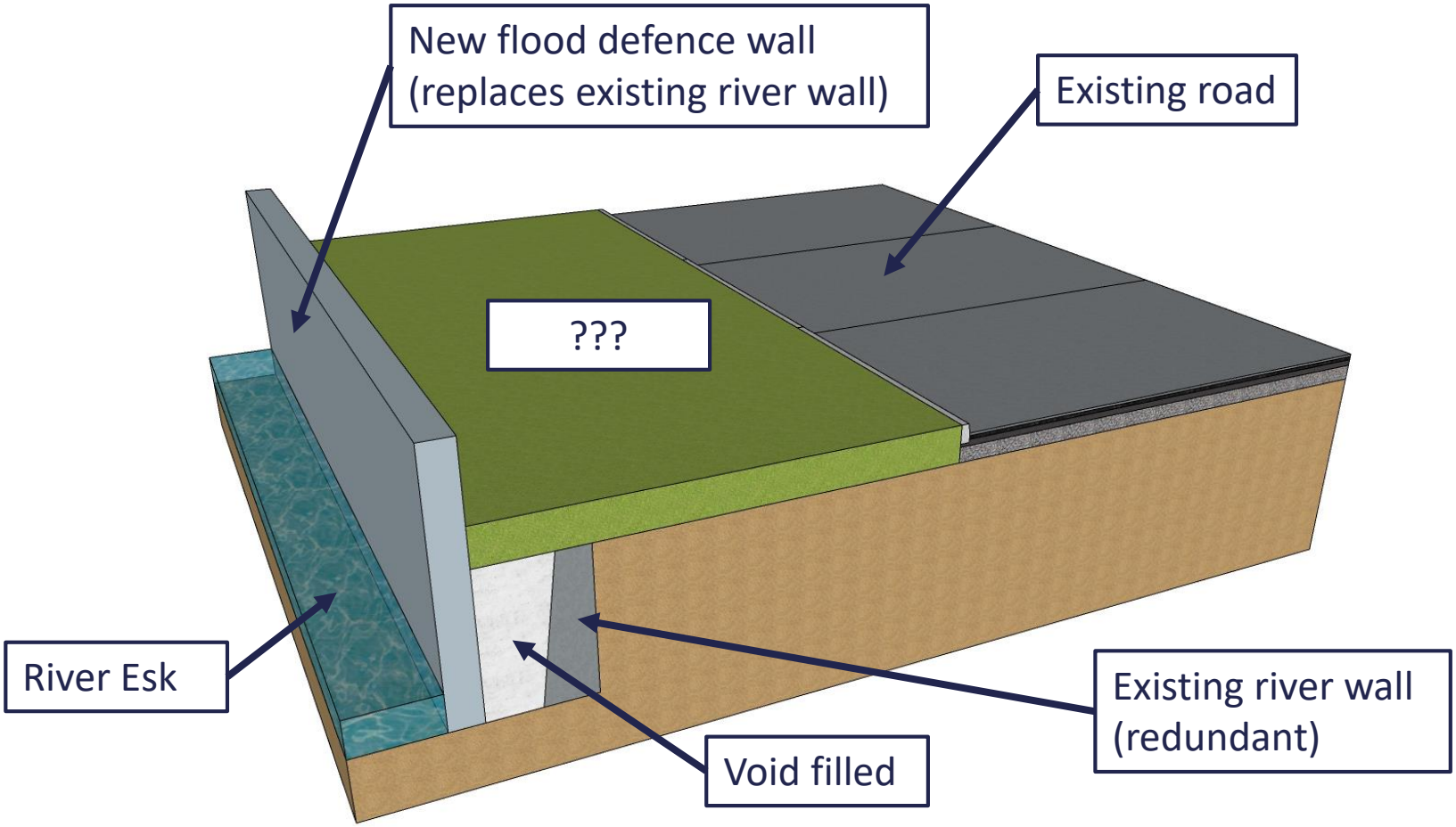


NB. All defence levels are subject to change, pending completion of outline design

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Goosegreen Design Considerations



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Goosegreen Design Considerations

- Existing river wall in poor condition. Road and public utilities need to be supported.
- Flood risk is 1.1m to 1.3m above level of verge
- Space available means only a wall is feasible. Can replace retaining function of existing river wall.
- Verge will become wider, which presents opportunities for planting, parking, footpath etc.
- Appearance of flood defence wall open to discussion

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Thank you for listening to our presentation

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FOLLOWED BY QUESTIONS & ANSWERS SESSION

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FOLLOWED BY OPEN DISCUSSION / BRAINSTORMING SESSION

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