East Lothian Council

REPORT TO: Cabinet

MEETING DATE: 21 January 2020

BY: Depute Chief Executive (Partnership and Services for Communities)

SUBJECT: Musselburgh Flood Protection Scheme – Determination of Preferred Scheme

1 PURPOSE

1.1 To update Cabinet on the flood risk to Musselburgh as determined by the project's new Hydraulic Model, and which includes the significant implications deriving from the inclusion of UKCP18 (UK Climate Projections 2018) climate change increases in flood event levels until 2100.

1.2 To update Cabinet on the Preferred Musselburgh Flood Protection Scheme (the Preferred Scheme) which has been develop through an iterative design approach within a consultative framework in partnership with key stakeholders and the people of Musselburgh.

2 RECOMMENDATIONS

2.1 It is recommended that Cabinet:

(a) Notes the progress made in advancing the design of a flood protection scheme for Musselburgh since May 2016, and the increased flood risk that has driven the evolution of the flood protection scheme over that period;

(b) Approves the Preferred Musselburgh Flood Protection Scheme as set out in detail in the Preferred Scheme Report, such that the Outline Design of this Scheme can be undertaken, and Instructs the Project Executive to return to Council at the end of project Stage 4 (Outline Design) with an update on the development of the Scheme, and in advance of the commencement of the Scheme Approvals Process under the relevant legislation;

(c) Approves commencement of Stage 4 (Outline Design) of the Scheme Design in accordance with the project's PRINCE2 Project Management System; and

(d) Agrees that the Project Team should seek to achieve multiple-benefits in accordance with the 'One Council' approach, and seek to weave in potential additional external funding such that this major infrastructural project simultaneously maximises the assets delivered and minimises the overall cost to the Council.

3 BACKGROUND

3.1 The town of Musselburgh developed around the Old Roman Bridge that crosses the River Esk, and the harbour at Fisherrow. It therefore sits, in part, on the flood plains of the River Esk and the Firth of Forth. The town has experienced flooding on many occasions in the past and indeed many of the town's historic buildings and/or infrastructure sits on higher ground.

3.2 The River Esk itself has been substantially modified by engineered works along its length through the town. There are two weirs in the river, seven bridges over the river, and along almost its full 2km urban length it has been 'trained' to flow within edge walls. Its flow (and thereby power) was translated into the Musselburgh Mill Lade at the Eskmills Weir in the 19th century to power the town's mills. This mill lade is no longer used for its original purpose.

3.3 This relationship between the town and its river has never been reconciled to a 'sustainable system' and the town remains exposed to reasonably high probability Flood Events. A significant area of the town is inundated by the 0.5% Annual Exceedance Probability (AEP) Flood Event with an estimated 1,000 properties at risk. With the inclusion of an allowance for increased severity of flood events due to climate change this area increases to a much wider area that is estimated to inundate in the region of 2,600 properties.

3.4 The last major flood event experienced in Musselburgh was in August 1948. The project's new Hydraulic Model has been able to determine that this event was equivalent to a 0.5% AEP Flood Event today (a 0.5% Annual Event Probability Flood Event is also known as the 1 in 200 Years Flood Event). Previous to this event there were also major flood events in 1929 and 1891.

3.5 In early 2015 the Council commissioned Kaya Consulting Limited to undertake a Flood Study to support the Council's need to input into the National and Local Flood Risk Management Strategy being advanced under the Flood Risk Management (Scotland) Act 2009 (the FRM). It is considered that this Flood Study was a robust Feasibility Stage Flood Study for a major flood protection scheme.

3.6 A report to the May 2016 Cabinet meeting updated Cabinet on the Flood Risk Management process and sought approval of the Local Flood Risk Management Plan for the Forth Estuary Local Plan District which included a proposed flood protection scheme for Musselburgh which would be advanced under the FRM. This report confirmed that the Musselburgh Flood Protection Scheme (the Scheme) was a national propriety and that it was ranked 11 of 42 schemes on the national flood protection scheme

programme with 80% funding allocated. This report was based on the Feasibility Stage Flood Study.

3.7 The Feasibility Stage Flood Study identified a possible flood protection scheme to protect against the 0.5% AEP Flood Event (without an allowance for climate change) that had a present value Total Scheme Cost from quarter one of 2016 (Q1-2016) of £8.9M. This cost is fully included for within the Council's current approved financial plans. This possible scheme had defences along both sides of the River Esk and involved the replacement of the Shorthope Street Footbridge which provided protection to c.1000 properties. It did not include for any defences along the coastal shore at Fisherrow Sands. This possible scheme is illustrated in a schematic provided within Appendix A to this report.

3.8 In September 2016 the Council awarded the role of Project Manager to Turner & Townsend after a competitive tendering exercise.

3.9 The project is being advanced under the PRINCE2 Project Management System. This system is led by a Project Executive, who is advised by a Project Board, with authority delegated to a Project Manager who undertakes the day-to-day management of the project. This system defines the project through nine distinct stages, which each stage being sequential to the previous and only commencing by the authority of the Project Executive / Project Board further to the approval of a Stage Plan for the next stage. It is considered that this system provides for appropriate systematic management of this major, complex civil engineering project whilst simultaneously minimising the financial exposure of the Council. A schematic of the current 'live' Scheme Programme against project's nine stages is provided within Appendix B to this report.

3.10 During Stage 1 of the project the Project Management Team set-up the Scheme's Project Board and the Scheme's processes. Throughout this stage the Project Team also developed the approach through which this Scheme would be evolved in consultation with the Council. The essence of the project's objectives can be summarised as follows: "*to develop a sustainable and environmentally acceptable flood protection scheme that considered natural and catchment flood risk reduction solutions alongside the use of traditional engineering protection"*. A copy of the Scheme's Project Objectives Report is provided in Appendix C to this report.

3.11 In December 2017 the Council awarded the role of Design Consultant to Jacobs after a competitive tendering exercise.

3.12 The Scheme is currently within project Stage 3 (The Option Appraisal Process). This stage has taken longer to undertake that originally estimated. This approximate six-month loss of time was primarily due to the complexities of determining the Scheme's Hydrology, and the incorporation of the UK Climate Projections 2018 (UKCP18) which were issued in December 2018.

3.13 With the determination of the Catchment Hydrology, the Design Consultant were able to define the flood risk to Musselburgh through a

new Hydraulic Model that they had developed. Both the Catchment Hydrology and the approach to Hydraulic Modelling were developed in partnership with SEPA (the Scottish Environment Protection Agency). Once this flood risk was understood it was possible to commence a consideration of the available options to reduce that flood risk.

3.14 The formal Option Appraisal Process (OAP) was a major activity within Stage 3. This process involved the determining all options through which the flood risk to Musselburgh could be reduced. Thereafter, the process involved an appropriate consideration of these c.100 options until such time as the best combination of the options was determined. This combination is named the Preferred Scheme. The Preferred Scheme is reported on within section five of this report.

3.15 The OAP was undertaken through an extensive consultative process with key stakeholders and the people of Musselburgh. An initial public consultation was held over two days at the Brunton Theatre in Musselburgh in February 2019. The OAP itself held seven workshops with key stakeholders during 2019, and amongst these meeting the Project Team held a formal three-day Public Exhibition at the Brunton in late July 2019. It is estimated that over 700 people have been consulted during 2019 along with scores of organisations.

3.16 At the conclusion of the OAP the Design Consultant determined the Preferred Scheme on behalf of the project based on the work undertaken and delivery of similar flood protection schemes. This Preferred Scheme has since been considered by the Project Team; the Project Executive and the Project Board; and all appropriate officers and sections of the Council. The cumulating of this process is the presentation of the Preferred Scheme, through this report, to Cabinet.

3.17 The next stage of the Scheme's design is to undertake project Stage 4 (Outline Design). The Project Executive will return to Cabinet at the end of project Stage 4 (Outline Design) with an update on the development of the Scheme, and in advance of the commencement of the Scheme Approvals Process under the relevant legislation.

3.18 Through the extensive consultation with other organisations and projects that the Project Team undertook as part of the OAP several possible multiple benefits have been identified. These are reported on within section seven of this report.

4 FLOOD RISK TO MUSSELBURGH

4.1 Musselburgh has a risk of flooding from several different flooding mechanisms and/or sources. These include:

1. Fluvial: i.e. from the River Esk and the Pinkie Burn;

2. Coastal: i.e. the Firth of Forth directly to Fisherrow Promenade; and the Firth of Forth backing up the River Esk corridor;
3. Pluvial: i.e. localised pluvial flooding as identified by the SEPA Flood Hazard Maps;
4. Secondary: i.e. the water and wastewater networks; the road drainage network; and the historic Musselburgh Mill Lade; and
5. Groundwater Seepage flooding: i.e. the high ground-water table in the low-lying sandy ground in proximity to the coast; and the possible impact of the groundwater associated with old mine workings.

4.2 Within the Scheme's Project Objectives is was confirmed that the Scheme would seek to reduce flood risk from all sources of flooding; and that it would aspire to deliver protection against the 0.5% AEP (plus an allowance for climate change) Flood Event.

4.3 As detailed in section 3.13 of this report, the Design Consultant developed a new Hydraulic Model for use by the project. This was deemed appropriate given the capability of the previous Hydraulic Model; the need for greater accuracy for formal scheme design versus earlier feasibility stage assessment; and the availability of very accurate new topographic survey ground levels achieved by the project's survey work in early 2019.

4.4 The new Hydraulic Model is a sophisticated model that provides a substantially more comprehensive tool for interrogating the flood risk to Musselburgh compared with earlier Council models and nationally available versions. This increases the accuracy of the Design Consultant's understanding of areas inundated, depths of flooding, and velocities of water moving through flooded areas. It also allows for interrogation of the impacts of all possible flood risk reduction options. It is noted that the Scheme's had developed two separate models which are linked, as appropriate, to deal with the overlapping of influence in the lower reach of the River Esk. The first is of the River Esk and this incorporates the hydrology projections of its catchment (i.e. the approx. 320 square kilometres of the River Esk catchment which stretches into the Pentland Hills). The second is the coastal catchment. The first is based on a quantification of river flow, whilst the second is based on the quantification of sea level.

4.5 Further to section 4.4 of this report, is it highlighted that under the FRM, and as reinforced through a Project Objective, it is not acceptable to increase flood risk to another due to the provision of flood risk reduction measures.

4.6 As detailed in section 3.12 of this report, the Design Consultant has reviewed the UKCP18 and thereby incorporated allowances to account for an appropriate estimate of future climate change. The projections used are: (i) an additional 40% onto defined river flows; and (ii) an additional 0.455m onto sea levels. These projections allow for increased risks until

2100 and have been determined as appropriate allowances based on the currently available SEPA guidelines and further to sensitivity testing of different scenarios through the new Hydraulic Model.

4.7 UKCP18 superseded UKCP09. Prior to the use of UKCP18 the Feasibility Stage Flood Study used the following projections for climate change: (i) an addition of 20% onto defined river flows; and (ii) and additional 0.25m onto sea levels. It is worth reviewing these figures relative to the new figures detailed in section 4.6 of this report. It is highlighted that whilst the inclusion of an additional 20% onto river flows does not substantially increase the flood risk from the River Esk; the inclusion of the additional 0.2m onto the sea level has a massive impact. The sea is now able to flow over the top of bank levels at Fisherrow promenade and thus inundate large areas with significant property concentration. This is a major change from the earlier Feasibility Stage Flood Study.

4.8 There is a flood risk to Musselburgh from a flood event deriving from the River Esk. This is termed the Fluvial Flood Event. It is highlighted that for this scenario it is improbable that the sea will be continuously low, therefore the design event used a certain level of sea must be assumed. For the design event the 'Fluvial Flood Event' is the combination of the 0.5% AEP (plus climate change) Flood Event in the river happening at the same time as a 50% AEP (plus climate change) Flood Event in the sea. The flood map for this Fluvial Flood Event is provided within Appendix D of this report. This flood map has also provided an identification of the Council's BLPU (i.e. Basic Land Property Units) such that a high-level overview of the land / property units impacted by the flood's area of inundation can be achieved. It is noted that the use of the BLPU is considered relatively crude, and that during the next stage of the project a significant activity will be undertaken to refine the Project Team's understanding of the actual land / property impacted by the flood map of the design flood associated with the approved Preferred Scheme. This flood maps affects 1,276 BLPU.

4.9 There is a flood risk to Musselburgh from a flood event deriving from the Firth of Forth (the coast). This is termed the Coastal Flood Event. It is highlighted that for this scenario it is improbable that the river will be continuously low, therefore for the design event used, a certain level of river flow must be assumed. For the design event the 'Coastal Flood Event' is the combination of the 0.5% AEP (plus climate change) Flood Event in the sea happening at the same time as a 50% AEP (plus climate change) Flood Event in the river. The flood map for this Coastal Flood Event is provided within Appendix E of this report. This flood maps affects 2,091 BLPU.

4.10 The Scheme is however tasked with protecting Musselburgh against the 0.5% AEP (plus climate change) Flood Event from all sources of flooding. Such that the Fluvial and Coastal Flood Events detailed in sections 4.8 and 4.9 respectively can be brought together the Project Team has created what is termed the 'Blended Flood Event'. This is not a 0.5% AEP (plus climate change) Flood Event from the river and the sea happening

simultaneously: that would be an event of a much lesser probability and thereby outside the scope of this project. Instead this can be considered the combined overlapping of the flood envelopes of both events. The flood map for this Blended Flood Event is provided within Appendix F of this report. This flood maps affects 2,514 BLPU.

4.11 Further to section 4.10 of this report, it is confirmed that the Blended Flood Map is the area of flood inundation for the design event for the Preferred Scheme and that it is this area of flood inundation that will not occur after the Preferred Scheme's new defences are constructed and operational. These 2,514 properties will be protected against all flood events up to and including the 0.5% AEP (plus climate change) Flood Event. For the purpose of impact consideration, a drawing identifying some of the key infrastructure impacted within the area of inundation is provided within Appendix G to this report.

4.12 There is also a flood risk from the Pinkie Burn, the Musselburgh Mill Lade, secondary flooding, and the groundwater table within the town. These risks are however relatively minor within the context of the risks identified from the River Esk and the Firth of Forth. They are reported on within the Preferred Scheme Report, and various specific flood risk reduction measures are provided to reduce their risks.

4.13 It is highlighted that there will always be a possibility that a flood event larger that the Preferred Scheme's design event may occur. In such a scenario it is likely that the Scheme's defences would not fail but would be overtopped, thereby resulting in a flooding of the town. The Project Team are ongoing in understanding such residual flood risks and in considering the potential to develop flood defences that they could potentially be raised in the future. It is intended that a full update on this potential for future flexibility within the Scheme will be reported on at the end of the next stage of the Scheme design.

5 THE PREFERRED SCHEME

5.1 As detailed in section 3.16 of this report, the Preferred Scheme is the determined best combination of flood protection options through which the town of Musselburgh can be protected against a major flood event. The Preferred Scheme was determined by the Council's Design Consultant, Jacobs, after a formal and comprehensive OAP that included a three-day public exhibition at the Brunton in Musselburgh. The Executive Summary of the Preferred Scheme Report is provided in Appendix H to this report. The full Preferred Scheme Report which is a large document with many very large Appendices is separately provided to the Members Library.

5.2 Through the OAP's workshops, the extensive stakeholder engagement, and the public exhibition several key constraints / determinations became evident. These were:

1. That the Scheme should aspire to avoid any direct impact on the Grade A listed Old Roman Bridge;

2. Further to point one, but to a lesser extent, that the Scheme should aspire to minimise any direct impact on the Grade B listed New Rennie Bridge;

3. That the Scheme should aspire to avoid siting the new coastal defences on the area of the Firth of Forth Special Protection Area (SPA) – i.e. from the beach into the Fisherrow Sands;

4. That minimising the height of the defences along the length of the River Esk and Fisherrow Promenade was important to the people of the town;

5. That many of the existing bridges along the length of the River Esk through the town significantly increased the flood risk to the town during the design flood event;

6. That there was a significant risk posed by timber debris (e.g. trees) being carried downstream by the River Esk. This risk was elevated in combination with the aspiration to not modify and / or remove the Roman and Rennie Bridges; and

7. That key stakeholders and the people of Musselburgh wanted to ensure that appropriate catchment and natural flood risk management solutions were incorporated into the Scheme.

5.3 It is considered that the determined Preferred Scheme has taken all of these constraints into consideration, along with all technical, economic, social, environmental, hydraulic considerations etc. of the formal OAP to achieve a sustainable and environmentally acceptable flood protection scheme that includes suitable catchment and natural flood risk management measures. Two schematic illustrations of the Preferred Scheme are provided within Appendix J to this report.

5.4 Within the OAP due to the complexity of the flood risk to the town of Musselburgh and the number of possible options it became necessary to incorporate an additional layer of analysis within the determination process. This is detailed fully within the Preferred Scheme Report, but for reference there were various ‘Scenarios’, or combinations of options, that were considered. The Preferred Scheme is identified within the Report as ‘Scenario D’.

5.5 As detailed in section 4.10 of this report, this Preferred Scheme is currently estimated to provide protection against the Blended 0.5% AEP (plus climate change) Flood Event to 2,514 BLPU’s.

5.6 The Preferred Scheme consists of a combination of direct defences, pumping stations and bridge removal in Musselburgh town centre, combined with an upper catchment debris trap and the adaption of two Scottish Water reservoirs to store greater volumes of water during a flood event.

5.7 The Total Scheme Cost for the Preferred Scheme is currently estimated as a Total Scheme Cost from quarter three of 2019 (Q3-2019) of £42.1M, which is in excess of the Council's current approved financial plans.

5.8 This cost has a Present Value Benefit to Cost Ratio (BCR) of 1.1. The BCR is the ratio of cost (i.e. cost of delivery) versus the benefit (i.e. value of flood damages avoided). At 1.1 the Preferred Scheme's BCR is greater than the Project Objective's minimum of 1.0, and it is understood that the value of damages avoided will go up during the next stage of the project when a full assessment of land / property is undertaken. It is considered that the current cost estimate is robust and not likely to increase if the scope of the project does not change.

5.9 It is highlighted that the Total Scheme Cost of £42.1M is not directly comparable with the value of £8.9M previously reported to Cabinet and detailed in section 3.7 of this report. The new Total Scheme Cost includes an estimate for the risk of inflation between now and completion of the project. As such this is not a Present Value Cost but a delivery cost. It is also highlighted that due to the implications of climate change that the scale of the defences required by Musselburgh leads to it being effectively impossible to equate the Feasibility Stage Flood Study's possible scheme with this Preferred Scheme.

5.10 Through the inclusion of natural and catchment flood risk reduction measures in the catchment via the proposed modification of two existing Scottish Water (SW) reservoirs on the South Esk and the proposed in-stream debris catcher between the meeting of the waters (i.e. the north and south Esk rivers) and the town the Scheme is able to provide the following benefits: (note that further detailed hydraulic and structural assessment of the reservoirs is required during the next stage of the project to fully quantify the benefits)

1. Achievement of the Project Objective of including natural, sustainable and catchment flood risk management options;

2. A response to the stakeholder and public desire that flood risk reduction also dealt with a reduction of risk out with the town;

3. The delivery of a multiple benefit in reducing flood risk along the length of the rivers between the measure and the sea (i.e. the modification of the SW reservoir at Rosebery on the South Esk will reduce flood risk all along the South Esk between that reservoir and Musselburgh. It is assumed that, in particular, this will benefit Newbattle, Dalkeith however this assessment requires to be undertaken during the next stage of the project;

4. The ability to reduce flood risk at Inveresk and Shirehaugh (i.e. Musselburgh Golf Course);

5. A substantial reduction in risk to the Roman and Rennie Bridges, and the probable removal of a need to directly impact these bridges through physical modifications of the structures; and

6. A reduction in the height of the new flood defences along the length of the River Esk through the town.

5.11 Through the inclusion of the natural flood risk reduction measures in the coastal zone via the proposal to leave the Musselburgh and Fisherrow Sands alone to continue developing naturally the Scheme is able to provide the following benefits:

1. Achievement of the Project Objective of including natural, sustainable and catchment flood risk management options;

2. The potential for future enhancement of the Firth of Forth SPA; and

3. The potential for the future development of the coastal environment to deliver increased flood risk reduction through natural breakwater and dune systems. It is assumed in the longer-term that this could act to offset any more onerous impacts of greater than projected climate change.

5.12 This project is aware of the presence of the Scottish Power Seawall which was constructed in the 1960's by Scottish Power to facilitate the Ash Lagoons developed behind it for Cockenzie Power Station. The Project Team have analysed the Seawall within the Scheme's Hydraulic Model. This analysis indicated that notwithstanding the scale of this Seawall that the Coastal Flood Event is capable of throwing relatively large volumes of water over the top of the wall due to it being a vertical wall and not being designed with a wave return curve. It is this overtopping that generates the areas of flood inundation behind the Seawall on the flood maps.

It is the Scheme's consideration that the Seawall and Ash Lagoons are part of the existing coastal boundary and landmass and that they are now essential to the flood protection of the town of Musselburgh. This is separate from its primary function of encasing the Ash Lagoons. It is understood by the Scheme's analysis that if the Seawall were to fail, or no longer be in place, that the Coastal Flood Event would then outflank the new Scheme's defences and thus a new pathway of coastal flood risk would exist to Musselburgh.

This structure is however a private structure and the Scheme is not aware of any intention for Scottish Power to either remove the Seawall or to allow it to fall into a state of disrepair. As such this Scheme assumes that this private structure will continue to exist due to its obligation to encase the Ash Lagoons and as such that it will continue to perform is current function of providing a barrier between the sea and Musselburgh.

Due to the circumstances surrounding the seawall mentioned above, the seawall hasn't been included in the preferred scheme.

6 STAGE 4 (OUTLINE DESIGN)

6.1 In accordance with the PRINCE2 Project Management System the determination of the Preferred Scheme will bring Stage 3 (Option Appraisal Process) to an end and commence Stage 4 (Outline Design).

6.2 The Outline Design will be of the Preferred Scheme, and notwithstanding this Stage Gateway it can be considered a natural continuation of the design process and thus the evolution of the Scheme through its consultative design process.

6.3 The Project Team will continue to develop the Scheme through its working groups in partnership with key stakeholders, and it is intended that a second formal Public Exhibition will be held during the summer of 2020 to engage the people of Musselburgh on the Outline Design.

6.4 Stage 4 is currently estimated to take 10 months with a start in late January and thereby completion in October 2020.

6.5 Stage 4 currently has an estimated cost of £960k, which will be paid for from within the Council's current approved capital budget. Within this cost estimate £500k is allocated to the undertaking of surveys to collect additional information to facilitate the development of the design. In particular, a major Ground Investigation Survey No. 2 will be required.

6.6 A comprehensive Stage 4 Plan will be developed by the Project Manager and presented to the Project Executive and the Project Board prior to their instruction to commence the stage.

6.7 Over the duration of Stage 4 significant additional detail will be added to the design concepts identified within the Preferred Scheme. This will allow the Scheme to be fully defined to facilitate its approval under the FRM which includes for Deemed Planning Permission.

6.8 At the end of Stage 4 the Project Executive will present an update report to Council in advance of Stage 5 (the Approvals Process) commencing. At that point the estimated Total Scheme Cost will require to be reflected within future Council financial plans.

7 POSSIBLE MULTIPLE-BENEFITS

7.1 As highlighted in section 3.18 of this report, the Project Team have encountered several significant project / organisational overlaps during Stage 3 of the project which it is felt could deliver multiple benefits to the Council. The following are considered the main potential overlaps:

1. Scottish Power and the winding-down of their obligations as defined within the Musselburgh Agreement;

2. The Musselburgh Sustainable Travel Plan;

3. Traffic Management Planning in Musselburgh; and

4. Engagement with the Fisherrow Harbour and Seafront Association.

7.2 Scottish Power are in negotiations with the Council under the Musselburgh Agreement in relation to their remaining assets in Musselburgh – i.e. the Ash Lagoons, the Seawall, and the Electric Bridge. The Preferred Scheme will interface directly with all three of these assets to a greater or lesser extent. It is assumed that there is a potential for a multiple benefit to both organisations by engaging in a discussion to determine how both organisations can best achieve their individual objectives considering this evolving overlap.

7.3 The Council has developed a Sustainable Travel Plan for Musselburgh and the Project Team understand that a key element of this involves the delivery of km's of new or upgraded Active Travel Corridors in partnership with SUSTRANS. It is recognised that the proposed line of the Preferred Scheme along the River Esk corridor and along Fisherrow Promenade aligns with that of the proposed Active Travel Corridors. There is similar overlap between the projects in relation to the Shorthope Street and Goosegreen Footbridges. It is assumed that there is a potential for a multiple benefit to both projects within the Council by engaging in a discussion to determine how both projects can best achieve their individual objectives considering this evolving overlap.

7.4 The Council is ongoing in developing Traffic Management Plans in Musselburgh due to the increasing congestion being experienced in the town's road network and in particular at its two road bridges. The assumed overlap is considered by the Scheme's Project Team to be more relevant to the Scheme's Construction Stage Planning due to the scale of the existing congestion and the desire of the Project Team to minimise impacts to the town during the Construction Work when space will be required for the construction site and the contractor will require large civil engineering plant and equipment to be present to undertake the work. It is assumed that there is a potential for a multiple benefit to both projects within the Council by engaging in a discussion to determine how both projects can best achieve their individual objectives considering this evolving overlap.

7.5 The Fisherrow Harbour and Seafront Association are an umbrella group for all organisations involved in Fisherrow Harbour and Fisherrow Promenade. They have engaged with the Project Team via the two public consultations held to date, and the Project Manager delivered a presentation to their AGM in November 2019. They have requested that they would like to become involved as a key stakeholder in relation to the evolution of the Scheme design in this area. The Project Team consider this beneficial to the potential to develop a bespoke Scheme design that will be acceptable to be large number of residents of this area and users of these coastal facilities. It is assumed that there is a potential for a multiple benefit to both projects within the Council by engaging in a discussion to determine how both projects can best achieve their individual objectives considering this evolving overlap.

7.6 This report recommends that the Project Team explore these main potential multiple benefit overlaps through the Outline Design Process, and simultaneously continues to remain vigilant for the possibility of others in accordance to the definer Project Objective relating to multiple benefits.

8 POLICY IMPLICATIONS

8.1 The Flood Risk Management (Scotland) Act 2009 (the FRM) places a statutory responsibility on the Local Authority to exercise their flood risk related functions with a view to reducing overall flood risk and complying with the EC Floods Directive. A key responsibility is the implementation of the flood risk management measures in the Local Flood Risk Management Plan.

8.2 The scheme will contribute towards The East Lothian Plan – 2017-27 focusing on health and wellbeing, safety, transport connectivity, sustainability and protecting our environment.

8.3 The scheme will support the Councils Climate Change Strategy.

9 INTEGRATED IMPACT ASSESSMENT

5.1 The Scheme will undergo Integrated Impact Assessments during its development.

5.2 A Preliminary Environmental Appraisal Report (PEA) has been undertaken and is included in the Preferred Scheme Report.

10 RESOURCE IMPLICATIONS

10.1 **Financial** –

(a) Table 10.1(a) provides the Preferred Scheme's estimated Total Scheme Cost:

Cost Category	Cost (GBP - £)
1 – Scheme Preparation	1,074,350
2 – Construction Preparation	1,303,454
3 – Construction Works	30,975,000
4 – Public Utilities	3,100,000
5 – Survey & Site Investigations	750,000
6 – Site Supervision	2,065,732
7 – Land & Compensation	900,000

8 – Client Risk	2,000,000
9 – Miscellaneous	215,000
TOTAL SCHEME COST	**42,100,000**

Table 10.1(a) – Summary of Preferred Scheme estimated Total Scheme Cost

(b) The following key points are notes in relation to the estimates provided in Table 10.1(a):

(1) The total scheme cost categories applied are the cost categories that the Scottish Government has always applied against flood protection schemes;
(2) The total scheme costs were estimated by the project team in quarter 2 of 2019;
(3) The design consultant construction cost of £36.5M estimate detailed in the preferred scheme report was estimated in quarter 2 of 2019 (Q2-2019) this has been interrogated by the project team and as appropriate absorbed into the Total Scheme Cost;
(4) The estimated costs includes for all monies spent to date and all future capital, design, land purchase, contractor's costs, service diversions, and optimism bias;
(5) These costs include for the risk of inflation until mid-point in the Construction Works in relation to the current approved Scheme Programme;
(6) The use of Optimism Bias is recommended by HM Treasury's 'Green Book';
(7) The application Optimism Bias is recommended by the DEFRA Flood and Coastal Erosion Risk Management Appraisal Guidance (FCERM-AG) and the Optimism Bias applied at specific locations has been determined through a calculator; and
(8) 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).

(c) 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: (i) damage to residential properties and the expense of clearing; (ii) damage to non-residential properties and the expense of clearing; (iii) damage to agricultural land and the expense of clearing; (iv) damage as a consequence of the closure of transport links; (v) expense incurred by emergency services; (vi) damage caused by the loss of energy supply; and (vii) 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 the Council: they are the total costs that could be expected to be borne by all parties in the event of the flood being realised.

(d) The Scottish Government will contribute 80% of the cost of the Scheme. In accordance with the Scottish Government's criteria the Total Scheme Cost will be confirmed when the Construction Works Contract is signed. Within the PRINCE2 Project Management System being applied by this project this is at the end of project Stage 7 (Construction Procurement).

(e) As the Scheme is already authorised under the Scottish Government's flood protection scheme programme the Council are ongoing in receiving the 80% contribution on an annual basis. The Project Team and thereby the Council update the Scottish Government every autumn on the updated estimate for the Total Scheme Cost and its Spend Profile.

(f) Further to the last point it is highlighted that within the last update to the Scottish Government in November 2019, that the project's original Q1-2016 £8.9M estimated Total Scheme Cost was updated to a Q2-2019 estimated Total Scheme Cost of £10.6M to account for inflation over that interval. The allocation of the 80% funding for financial year 2020/21 will be awarded based on this update and therefore the Council budget will continue to reflect the funding contribution and expenditure budget based on the November 2019 update. These will be revised and updated for future years as part of the 2021/22 capital budget process.

(g) The financial provision for the Scheme will be allocated from past, current and future year Flooding and Coastal Protection budgets.

(h) Provision for the Council's contribution towards the Scheme (current estimate £7.3m) will be allocated in future capital budget estimates for Coastal Protection / Flooding.

(i) It is recognised that if the £42.1M Preferred Scheme is approved that the Council's contribution towards the Scheme will require to be updated within a future capital budget. Similarly, the Scottish Government will be required to be updated of this revised Total Scheme Cost and revised Spend Profile: it has been agreed with the Scottish Government that this can be done immediately and thereby out with the annual autumn update.

(j) Table 10.1(j) provides the estimated costs for project Stage 4, which are fully reflected in the capital budget:

Cost Category	Cost (GBP - £)
1 – Scheme Preparation	340,000

2 – Construction Preparation	0
3 – Construction Works	10,000
4 – Public Utilities	0
5 – Survey & Site Investigations	500,000
6 – Site Supervision	0
7 – Land & Compensation	14,000
8 – Client Risk	80,000
9 – Miscellaneous	13,000
TOTAL SCHEME COST	**957,000**

Table 10.1(j) – Summary of Preferred Scheme estimated Total Scheme Cost

(k) It is highlighted that as in accordance with the Scheme's PRINCE2 Project Management System that at any point in the delivery of the project the Council is only liable for the costs authorised within the stage that is open.

(l) As of the end of November 2019 a total of £1.1M has been spent on the development of the Scheme to date: this equates to £0.22M and £0.88M for the Council and the Scottish Government respectively.

10.2 **Personnel** - None

10.3 **Other** - None

11 BACKGROUND PAPERS

11.1 The Musselburgh Flood Protection Scheme Preferred Scheme Report; which is a large document with many very large Appendices and is separately provided to the Members Library.

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